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Alice Mining Co., Mont.
Amie Consolidated Mining Co., Colo.
Atlantic Mining Co., Mich.
Argenta Mining Co., Nev.
Barbee & Walker Mining Co., Utah.
Bassick Mining Co., Colo.
Belcher Mining Co., Nev.
Belle Isle Mining Co., Nev.
Birdseye Mining Co., Cal.
Black Bear Mining Co., Cal.
Bodie Consolidated Mining Co., Cal.
Bonanza Development Mining Co., Mont.
Boston & Montana Mining Co., Mont.
Breece Mining Co., Colo.
Bulwer Mining Co., Cal.
California Mining Co., Nev.
Calumet & Hecla Mining Co., Mich.
Carbonate Hill Mining Co., Colo.
Caribou Consolidated Mining Co., Colo.
Carolina Queen Mining Co., N. C.
Castle Creek Mining Co., Idaho.
Catalpa Mining Co., Colo.
Central Mining Co., Mich.
Christy Mining Co., Utah.
Chrysolite Mining Co., Colo.
Climax Mining Co., Colo.
Consolidated Gold Mining Co., Ga.
Consolidated Virginia Mining Co., Nev.
Contention Mining Co., Ariz.
Copper Queen Mining Co., Ariz.
Crown Point Mining Co., Nev.
Deadwood-Terra Mining Co., Dak.
Dunkin Mining Co., Colo.
Eureka Consolidated Mining Co., Nev.
Evening Star Mining Co., Colo.
Excelsior Mining Co., Cal.
Father de Smet Mining Co., Dak.
Findley Mining Co., Ga.
Franklin Mining Co., Mich.
Freeland Mining Co., Colo.
Fresno Enterprise Mining Co., Cal.
Gem Mining Co., Colo.
Glass-Pendery Mining Co., Colo.
Glen Mining Co., Colo.
Gold Stripe Mining Co., Cal.
Gould & Curry Mining Co., Nev.
Grand Central Mining Co., Ariz.
Grand Prize Mining Co., Nev.
Granite Mining Co., Colo.
Great Eastern Mining Co., Dak.
Great Western Mining Co., Cal.
Green Mountain Mining Co., Cal.
Hale & Norcross Mining Co., Nev.
Hall-Anderson Mining Co., N. S.
Hecla Consolidated Mining Co., Mont.
Henriett Mining Co., Colo.
Hibernia Mining Co., Colo.
Holyoke Mining Co., Idaho.
Homestake Mining Co., Dak.
Hope Mining Co., Mont.
Horn-Silver Mining Co., Utah.
Hukill Mining Co., Colo.
Idaho Mining Co., Cal.
Independence Mining Co., Nev.
Indian Queen Mining Co., Nev.
Inyo Mining Co., Cal.
Iron Silver Mining Co., Colo.
Jocuistita Mining Co., Mex.
Kentuck Mining Co., Nev.
La Plata Mining Co., Colo.
Leadville Mining Co., Colo.
Leeds Mining Co., Utah.
Little Chief Mining Co., Colo.
Little Pittsburg Mining Co., Colo.
Marguerite Mining Co., Cal.
Martin White Mining Co., Nev.
Minas Nuevas Mining Co., Mex.
Moose Mining Co., Colo.
Morning Star Mining Co., Colo.
Napa Mining Co., Cal.
Navajo Mining Co., Nev.
New York Hill Mining Co., Cal.
New York & Colorado Mining Co., Colo.
North Belle Isle Mining Co., Nev.
Northern Belle Mining Co., Nev.
Ontario Mining Co., Utah.
Ophir Mining Co., Nev.
Osceola Mining Co., Mich.
Oxford Mining Co., N. S.
Pleasant Valley Mining Co., Cal
Plumas Mining Co., Cal.
Polonia Mining Co., Colo.
Prussian Mining Co., Colo.
Quicksilver Mining Co., Cal.
Quincy Mining Co., Mich.
Renfrew Mining Co., N. S.
Richmond Mining Co., Nev.
Rising Sun Mining Co., Dak.
Robinson Bar Mining Co., Idaho.
Robinson Consolidated Mining Co., Colo.
Robert E. Lee Mining Co., Colo.
San Francisco Mining Co., Cal.
Savage Mining Co., Nev.
Shoshone Mining Co., Idaho.
Sierra Buttes Mining Co., Cal.
Sierra Grande Mining Co., N. M.
Sierra Nevada Mining Co., Nev.
Sierra Plumas Eureka Mining Co., Cal.
Silver King Mining Co., Ariz.
Silver King Mining Co., Colo.
Smuggler Mining Co., Colo.
Socorro Mining Co., N. M.
Spring Valley Mining Co., Cal
Standard Mining Co., Cal.
Starr Grove Mining Co., Nev.
Stormont Mining Co., Utah
St. Joseph Mining Co., Mo.
Tip Top Mining Co., Ariz.
Tombstone Mining Co., Ariz.
True Fissure Mining Co., Utah.
United Gregory Mining Co., Colo.
United Gold Mining Co., Colo.
Vizina Mining Co., Ariz.
Yellow Jacket Mining Co., Nev.
Yuba Mining Co., Cal.

NON-DIVIDEND-PAYING MINES—DEALT IN AT THE NEW YORK MINING STOCK EXCHANGE.

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Advance Mining and Milling Co.
Albion Mining Co., Nev.
Allouez Mining Co., Mich.
Alpha Consolidated Mining Co., Nev.
Alta Mining Co., Nev.
Alta-Montana Mining Co., Mont.
American Flag Mining Co., Colo.
Barcelona Mining Co., Nev.
Battle Creek Mining Co.
Bear Creek Mining Co., Cal.
Beauce Mining Co.
Bechtel Consolidated Mining Co., Cal.
Best & Belcher Mining Co., Nev.
Big Pittsburg Mining Co., Colo.
Black Jack Mining Co., Cal.
Bonanza Chief Mining Co., Mont
Bonanza King Mining Co., Cal.
Bondholder Mining Co., Colo.
Boston Consolidated Mining Co., Cal.
Boulder Consolidated Mining Co Colo.
Bradshaw Mining Co., Ariz.
Buckeye Mining Co., Colo.
Bull-Domingo Mining Co., Colo.
Bullion Mining Co., Nev.
Bye and Bye Mining Co., Ariz.
Calaveras Mining Co., Cal.
Calaveras Water and Mining Co., Cal.
Caledonia Mining Co., Dak.
Catskill Mining Co., Nev.
Central Arizona Mining Co., Ariz
Chapparal Mining Co., Cal.
Cherokee Mining Co., Cal.
Chollar Mining Co., Nev.
Climax Mining Co., Colo.
Colorado Central Mining Co., Colo.
Columbia Consolidated Mining Co., Nev.
Consolidated Imperial Mining Co., Nev.
Consolidated Pacific Mining Co., Cal.
Crescent Mining Co., Colo.
Crowell Mining Co., N. C.
Dahlonega Mining Co., Ga.
Dardanelles Mining Co., Cal.
Decatur Mining Co.
Dunderberg Mining Co., Colo.
Durango Mining Co., Colo.
Eastern Oregon Mining Co.
Elko Consolidated Mining Co., Nev.
Empire Mining Co., Utah.
Enterprise Mining Co., Colo.
Exchequer Mining Co., Nev.
Fannie Barret Mining Co., Colo.
Globe Copper Mining Co., Ariz.
Gold Placer Mining Co., Colo.

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Goodshaw Mining Co., Cal.
Granville Mining Co., N. C.
Harlem Mining and Milling Co., Cal.
Harshaw Mining Co., Ariz.
Head Center Mining Co., Ariz.
Hortense Mining Co., Colo.
Julia Mining Co., Nev.
Kossuth Mining Co., Nev.
Lacrosse Mining Co., Colo.
Leviathan Mining Co., Nev.
Lucerne Mining Co., Colo.
Mariposa Mining Co., Cal.
May Belle Mining Co., Cal.
Mayflower Mining Co., Colo.
Mexican Mining Co., Nev.
Michoacan Syndicate Mining Co., Mexico.
Miner Boy Mining Co., Colo.
Miller Mining Co., Nev.
Mono Mining Co., Cal.
Moose Silver Mining Co., Colo.
Moulton Mining Co., Mont.
Nevada Syndicate Mining Co.
North Standard Mining Co., Cal.
North Horn-Silver Mining Co., Utah.
Noonday Mining Co., Cal.
Old Dominion Mining Co., Ariz.
Oriental Mining Co., Nev.
Oriental & Miller Mining Co., Nev.
Overman Mining Co., Nev.
Parnell Mining Co.
Potosi Mining Co., Nev.
Quartz Creek Mining Co.
Rappahannock Mining Co., Va.
Red Elephant Mining Co., Colo.
Retort Mining and Milling Co., Colo.
San Pedro Mining Co., New Mex.
Silver Cliff Mining Co., Colo.
Silver Islet Mining Co., Can.
Sonora Consolidated Mining Co., Mexico.
South Bodie Mining Co., Cal.
South Bulwer Mining Co., Cal.
South Hite Mining Co., Cal.
South Pacific Mining Co., Cal.
State Line Mining Co., Nev.
Sullivan Mining Co., Me.
Sutro Tunnel Co., Nev.
Taylor-Plumas Mining Co., Cal.
Tioga Mining Co., Cal.
Tuscarora Mining Co., Nev.
Unadilla Mining Co., Colo.
Union Consolidated Mining Co., Nev.
Utah Mining Co., Nev.
Vandewater Mining Co., Nev.
Washington Mining Co., Ariz.
Whalen Copper Mining Co., Nev.
Wide West Mining Co.
Willshire Mining Co., Cal

BOSTON STOCKS.

Allouez Mining Co.
Amie Mining Co.
Atlantic Mining Co.
Aztec Mining Co.
Bodie Consolidated Mining Co.
Bonanza Development Mining Co.
Bowman Silver Mining Co.
Brunswick Antimony Mining Co.
Bulwer Mining Co.
California Mining Co.
Calumet & Hecla Mining Co.
Catalpa Mining Co.
Central Arizona Mining Co.
Climax Mining Co.
Consolidated Virginia Mining Co.
Copper Falls Mining Co.
Copperopolis Mining Co.
Crescent Mining Co.
"Cusi" Mining Co.
Decatur Mining Co.
Deer Isle Mining Co.
Denver City Mining Co.
Douglas Mining Co.
Duncan Mining Co.
Dunkin Mining Co.
Empire Mining Co.
Eureka Consolidated Mining Co.
Franklin Mining Co.
Hancock Gold Mining Co.
Harshaw Mining Co.
Huron Mining Co.
Independence Mining Co.
Indian Queen Mining Co.
Little Pittsburg Mining Co.
Mammoth Mining Co.
Massachusetts & New Mexico Mining Co.
Milton Mining Co.
Napa Mining Co.
National Mining Co.
Northern Belle Mining Co.
Ontario Mining Co.
Osceola Mining Co.
Penn-Breckenridge Mining Co.
Pewabic Mining Co.
Pine Tree Mining Co.
Plymouth Mining Co.
Quincy Mining Co.
Ridge Mining Co.
Robinson Mining Co.
San Pedro Mining Co.
Sierra Nevada Mining Co.
Sierra Grande Mining Co.
Silver Islet Mining Co.
Silver King Mining Co.
Simpson Gold Mining Co.
South Pacific Mining Co.
Standard Mining Co.
Sullivan Mining Co.
Sutro Tunnel Co.
Sycamore Mining Co.
Twin Lead Mining Co.
Vizina Mining Co.

PHILADELPHIA STOCKS.

American Consolidated Mining Co.
Argent Mining Co.
Aztec Mining Co.
Battle Mountain Mining Co.
Buena Mining Co.
California Mining Co.
Calista Mining Co.
Chrysolite Mining Co.
Cincinnati Mining Co.
Compromise Mining Co.
Contention Mining Co.
Consolidated Virginia Mining Co.
Dauntless Mining Co.
Del Monte Mining Co.
Denver City Mining Co.
Eureka Mining Co.
Girard Mining Co.
Governor Mining Co.
Grand Union Mining Co.
Green Mountain Mining Co.
Gunnison Mining Co.
Homestake Mining Co.
Horn-Silver Mining Co.
Iowa Gulch Mining Co.
Iron Silver Mining Co.
King Bullion Mining Co.
Ledger Consolidated Mining Co.
Little Diamond Mining Co.
Little Maud Mining Co.
Little Pittsburg Mining Co.
Long & Derry Hill Mining Co.
Montana Mining Co.
Mount Sheridan Mining Co.
National Mining Co.
Northern Belle Mining Co.
Orion Mining Co.
Orion Preferred Mining Co.
Palmetto Extension Mining Co.
Pembina Mining Co.
Penn-Breckenridge Mining Co.
Permanent Mining Co.
Pizarro Mining Co.
Pizarro Extension Mining Co.
Potosi Mining Co.
Rara Avis Mining Co.
Rara Avis Extension Mining Co.
Record Mining Co.
Rico Pioneer Mining Co.
Sierra Apache Mining Co.
Sierra Bella Mining Co.
Sierra Grande Mining Co.
Sierra Nevada Mining Co.
Silver Cord Mining Co.
Silver King Mining Co.
Silver Plume Mining Co.
Sonora Consolidated Mining Co
Standard Mining Co.
Sultana Mining Co.
Sutro Tunnel Co.
Tombstone Mining Co.
Victor Mining Co.
Yale Mountain Mining Co.

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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DR. THOMAS M. DROWN, Secretary of the American Institute of Mining Engineers, announces that the annual meeting of the Institute will be held in Boston, beginning Tuesday, February 20th, 1883.

THE Finance Committee of the Senate has now completed its little tariff bill, which places an expectant country in the embarrassing position of having three sets of schedules to choose from. There are very few articles, so far as we have been able to see, in examining the metal schedule, in which the members of the Tariff Commission, of the House Ways and Means Committee, and the Finance Committee of the Senate agree. The Tariff Commission on the whole recommended a modest reduction; the Ways and Means Committee tinkered with the schedule so devised, to the extent of increasing a few figures, often in a very injudicious manner; the Senate Committee, on the other hand, has, in a general way, proposed a further reduction. They compare as follows:

	Present.	Ways and Means.	Senate Finance C.
Iron ore	20 per cent.	50c. per ton.	50c. per ton.
Iron pyrites	20 per cent.	50c. + 2½c. for copper.	50c. + 2½c. for copper.
Oxide manganese	20 per cent.	50c. per ton.	.....
Pig-iron	$7 per ton.	0·3c. per lb.	$6 per ton.
Cast scrap	$6 per ton.	0·3c. per lb.	$6 per ton.
Wrought scrap or scrap steel	$8 per ton.	0·3c. per lb.	$6 per ton.
Bar iron, according to dimensions	1@1·5c. per lb.	0·9@1·2c. per lb.	0·9@1·2c. per lb.
Iron railroad bars	0·7c. per lb.	0·7c. per lb.	0·7c. per lb.
Cut nails and spikes	1·5c. per lb.	1·25c. per lb.	1·25c. per lb.
Iron and steel forgings	2c. per lb.	2½c. per lb.	.....
Anvils and cable chains	2½c. per lb.	2c. per lb.	2c. per lb.
Boiler tubes	3½c. per lb.	3c. per lb.	4c. per lb.
Other wrought-iron or steel tubes	3½c. per lb.	2¼c. per lb.	2¼c. per lb.
Boiler and sheet-iron, according to gauge	1¼@1½c. per lb.	1·3@1·9c. per lb	1·25@1·8c. per lb.
Tin plates	1·1c. per lb.	2c. per lb.	1·1c. per lb.
Hoop, band and scroll	1¼@1¾c. per lb.	1·2@1·6c. per lb.	1·2@1·6c. per lb.
Steel ingots, blooms	45 per cent, and on smaller sizes valued at 7c., or less, 2¼c.; above 7, 3c.; above 11, 3¼c. per lb.	Valued at 2½c., or less, 2c. per lb.; above 2½c., 2¾c. per lb.; above 9, 3c. per lb.	Valued at 5c., or less, 1½c. per lb.; above 5c., 2c. per lb.; above 9c., 2¾c. per lb. (all crucible). All steel ingots, blooms, etc., not crucible steel, 0.6c. per lb.
Steel railroad bars	1¼c. per lb.	0.8c. per lb.	0.8c. per lb.
Iron wire	¼ in. diam. to No. 16, 2c. + 15 per cent.; No. 16 to No. 25, 3·5c. + 15 per cent; above No. 25, 4c. + 15 per cent per lb.	To No. 10, 2¼c.; No. 10 to No. 18, 2¾c.; No. 18 to No. 26, 3¼c.; above, 4c. per lb.	No. 5 to 10, 1½c.; No. 10 to 16, 2c.; No. 16 to 26, 2½c.; smaller than No. 26, 3c.
Steel wire	¼ in. diam. to No. 16, 2½c. + 20 per cent; finer, 3c. + 20 per cent.	Same as iron wire.	Same as iron wire.
Wire cloth	Not provided for.	Same as wire of same gauge + 3c. per lb.	Same as wire of same gauge + 2c. per lb.
Wire rope	Not provided for.	Same.	Same as wire of same gauge + ¼c. per lb.
Lead ore and dross	1½c. per lb.	1½c. per lb.	1½c. per lb.
Pig-lead	2c. per lb.	2c. per lb.	2c. per lb.
Manufactured lead	2¾c. per lb.	2c. per lb.	45 per cent.
Nickel	37c. per lb.	15c. per lb.	20c. per lb.
Copper ore	3c. per lb.	2½c. per lb.	2½c. per lb.
Regulus	3c. per lb.	3½c. per lb.	3½c. per lb.
Ingot	5c. per lb.	4c. per lb.	4c. per lb.
Manufactured copper	45 per cent.	35 per cent.	35 per cent.
Yellow metal	.....	3c. per lb.	.....
Antimony	.....	10 per cent.	.....
Spelter	1½c. per lb.	1½c. per lb.	1½c. per lb.
Sheet-zinc	2¼c. per lb.	2¼c. per lb.	2¼c. per lb.

The most striking changes in iron are the reduction in pig—already announced—a slight reduction in plate and sheet, a retention of the present duty on tin plates, and quite a sweeping lowering on steel. The Finance Committee singles out crucible steel, with the rates specified, and then places all other steel in crude form at 0·6 cents, with steel rails unchanged at $17.92 per ton. It attempts, too, a solution of the vexed question, "What is steel?" which in years past troubled the experts in the American Institute of Mining Engineers so much. The definition is as follows:

"Steel in any form not specially enumerated or provided for in this act, per pound, three cents. Provided that all metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation, or converted, cast, or made from iron, or its ores, by the crucible, Bessemer, pneumatic, Thomas-Gilchrist, basic, Siemens-Martin, or open-hearth process, or by the equivalent of either, or by the combination of two or more of the processes, or their equivalent, or by any fusion or other process which produces from iron or its ores a metal either granular or fibrous in structure, which is cast and malleable, excepting what is known as malleable iron castings, shall be classed and denominated as steel."

The committee sweeps away the increase on larger sizes of iron and steel wire recommended by the Ways and Means Committee, and makes a strong reduction all around. It discriminates especially against wire rope.

The metal schedule proper remains in much the same position as before.

Among the recent recommendations of the House Ways and Means Committee, we notice 30 cents per ton on coal slack, 75 cents on bituminous coal, 20 per cent on coke, 30 per cent on gunpowder and explosives generally, india-rubber goods 25 per cent, and salt in bulk 6 cents per 100 pounds. The Finance Committee, however, goes back to the old figures.

THE GENESIS OF ORE-DEPOSITS.

We publish elsewhere an article on this subject by Mr. RUDOLF KECK of Denver, which deserves attention, as a suggestive attempt to generalize from known data, and also a contribution to the data themselves. Under the latter head, we should feel obliged to Mr. KECK if he would give us more in detail the experiments of Professor SANDBERGER, to which he alludes. We have not yet read the book, and know it only through the medium of the Austrian *Zeitschrift*, in which, by the way, Professor SANDBERGER'S conclusions are vigorously attacked.

We publish Mr. KECK'S paper because we like it, not because we agree with it. We are glad to have the subject of ore-deposits discussed from the stand-point of chemical geology, and we welcome intelligent contributions to such discussion, whether they represent our views or not. Moreover, the importance of closer study and description of individual mines and mining districts is very great; and we are glad to have it emphasized. As Professor POSEPNY has forcibly urged, a good deal of this sort of work must be done, before safe generalizations will be possible. The English mathematician, DE MORGAN, cited the vast amount and meager results of meteorological observations as an instance of the failure of the inductive method. But the rapid progress in meteorological science which has followed the activity of our Signal Service Bureau proves that the former difficulty was not in the inductive method, but in the loose and heterogeneous character of the observations. The data heretofore accumulated as to ore-deposits are open to similar criticism. Thousands of descriptions of mines and mining districts have added lit-

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tle to our theoretical knowledge. As Mr. KECK says, the work should be more carefully done, and the chemist and microscopist should be called to assist.

Discussion is doubtless what Mr. KECK, like all other thoughtful inquirers, most desires; and we shall pay him the compliment of indicating some points in which we consider his views defective. Their one comprehensive defect is that which affects all generalizations at the present stage of our knowledge. They are premature. Mr. KECK is quite right in attributing much to the agency of water, organic matter, etc. But we think the details of his theory, as a general theory, are not sufficiently supported by facts.

Briefly stated, the theory is, that the sulphide ores were present in the original eruptive rocks as silicates of the metals, and that they were changed into sulphides by the action of alkaline sulphides, which themselves derived their sulphur from organic matter of animal origin. The first difficulty in this hypothesis arises from the probability that all known eruptive rocks are themselves the product of the fusion of sedimentary rocks. It is therefore not safe to consider as the "primitive constituents" of an eruptive rock substances which may have entered it after fusion and before (or even after) solidification.

Again, if we are to go back to primitive rock-constituents, we can not ascribe to organic origin the vast quantities of sulphur required for the production of metallic sulphides. The organic sulphur must itself have been obtained from the inorganic world. In short, there must have been sulphur before there were sulphates and sulphides, in the mass of the earth itself. The hypothesis that the ocean itself at one period was sulphatic has much in its favor, as Professor WURTZ and others have forcibly shown, though they have not shown the compatibility of such an ocean with animal or vegetable life, and must therefore, we suppose, relegate it to a period anterior to the appearance of such life. The whole subject is still obscure; but in the present state of our knowledge, it is more reasonable to assume the formation of sulphates without the intervention of organic matter, than to suppose the metals to have been, in original combination, silicates. Moreover, the specific gravity of the earth's interior is higher than that of such silicates as we find in its crust.

The agency of organic processes in the formation of ore-deposits has been lucidly explained by Prof. STERRY HUNT, with whose chemical and geological essays Mr. KECK does not seem to be familiar. It is eminently a work of redistribution and aggregation. But we do not think it can be made the agent of sulphatization.

Nor do we agree with Mr. KECK in attempting to classify the ages of vein-formation according to their mineralogical contents. The data are not sufficient as a basis for any such law. To take his own example, we do not always or nearly always find that veins of banded structure show first quartz, then metallic sulphides, and then spars, filling the fissure. It would be easy to cite innumberable instances in which bands of spar inclose a later filling of quartz, and in which the metallic ores are contemporaneous, to all appearance, with the quartz. In fact, this is one of the very points which should not be confused by generalization, but carefully studied, free from all such predisposition, in each individual instance.

We differ again with Mr. KECK as to the invariable character of the process of ore-deposition. Perhaps we do not quite understand what he means when he says that the circumstances were manifold, but the process in itself was always the same. Perhaps he is thinking more particularly of certain kinds of ore-deposits. At all events, the statement, if it means any thing, is scarcely applicable to such various deposits as are actually known to the miner.

Some light is perhaps thrown on it by Mr. KECK'S proposed classification of ore-deposits. He objects to distinguishing them according to their form or their contents, and proposes instead a classification based on a single feature in their history. Three classes, he says, cover all that he can conceive—fissure-veins, veins of replacement, and secondary deposits. This shows how much easier it is to criticise than to construct. The systems which Mr. KECK condemns are at least good for something. It is convenient, if not scientific, to talk about gold, silver, copper, or lead deposits; it is convenient to speak of veins, beds, and masses; and we undertake to say that Mr. KECK never does and never could describe an ore-deposit without including these features. But the system he proposes as a substitute is scarcely good for any thing. Nearly all veins of replacement are enlargements of original fissure-veins; the majority of fissure-veins have been enlarged by processes of replacement; and the term secondary deposits, though a handy one for loose, popular description, can scarcely receive a scientific definition which would not include fissure-veins and veins of replacement. Yet, indefinite as these classes are, it would be difficult to bring under either of them such deposits as the Ducktown copper mines, the iron mines of New Jersey, Lake Champlain, or Lake Superior, the Mansfield copper-schists, and many others. Mr. KECK'S own illustrations condemn his system. He puts the Leadville mines under "veins of replacement," but the lead ore-deposits of the Upper Mississippi and of Raibl in the Austrian Alps under "secondary deposits," to which class also he refers the quicksilver mines of California!

We heartily agree with him in condemning "the absurd worship of fissure-veins." But it is useless to deny that fissure-veins afford, in their greater regularity of form, a certain guaranty of permanence which is wanting in some other kinds of deposits.

Mr. KECK apparently subscribes to the belief that the contents of fissures are derived from the country-rock inclosing them. This is true enough, in a sense; but it need not be true that the metalliferous contents of a fissure came from the wall-rock at precisely the horizon where they are now found. The general term "from below" includes also the deeper-lying country-rock through which a fissure may pass. We are not ready yet to admit that the lead, silver, and iron ores of Leadville came from the limestone which underlies them or the porphyry that overlies them. And the proof offered of minute traces of these metals found by analyses in the rock is not sufficient to cover the case. *

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Volhard Silver Assay.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The Volhard silver assay process having been recommended to me by a gentleman of acknowledged ability in metallurgical matters, as an exceedingly accurate method, and one now coming into use among assayers in Europe, I have had a series of tests made by one of my most careful assistants in the "silver room," under my personal observation, with the results set forth in the following report, which I send you as being of general interest.

If any of your readers have used the process with satisfactory results, and can furnish any suggestions regarding manipulation, etc., which would increase its efficiency, such suggestions will be cordially received.

Yours truly, HERBERT G. TORREY,
U. S. Assayer.

UNITED STATES ASSAY OFFICE,
NEW YORK, Jan. 3, 1883.

MR. HERBERT G. TORREY, U. S. ASSAYER:

DEAR SIR: In accordance with your request, careful tests have been made of the "rhodan-ammonia" process for assay of silver bullion, and I submit herewith a brief report of the results of the experiments, with remarks as to its applicability to the operations of this office.

The process depends upon the strong affinity between thiocyanic acid and silver, and the intense color formed by its combination with iron. Sulphocyanate of ammonia is added to the silver solution in presence of a ferric salt, and when all the silver present is satisfied, the thiocyanic acid combines with the iron, producing a color which varies from light brown to deep red, according to the quantity of sulphocyanate added.

In the first tests, the solution of rhodan-ammonia was made of such a strength that 100 c.c. precipitated a little less than 1000 milligrams of silver. From a solution of one tenth strength, small amounts were added until a permanent color appeared. In this way, several sets of ten or twelve assays each were worked, and the results compared with those obtained by our usual salt method.

To secure more rapid and satisfactory returns, the solution was changed so that 100 c.c. completely precipitated 1000 milligrams of silver, and left a slight excess of the precipitant, producing a red color of intensity varying in proportion to the excess of the sulphocyanate, and the assay was then worked to the point of neutralization by the addition of a decimal solution of silver, until the color disappeared. On comparing with chloride assays, this was found to give somewhat better returns than the first method, in some instances agreeing closely with the correct fineness, but in others differing too largely to be at all satisfactory.

Comparison with the chloride method was then abandoned, and sets of proof silver were weighed with scrupulous exactness, and special attention paid to the boiling of the assays, to expel all the lower oxides of nitrogen formed during the solution of the silver. To determine both the delicacy and accuracy of the process, these were worked after the first charge, with a solution diluted so that 10 c.c. contained one milligram of silver, and a correspondingly dilute solution of rhodan-ammonia. This was continued until the repeated discrepancies between the results showed that the process, as applied in these experiments, was not reliable closer than one half thousandth.

Assays of proof silver made by the salt method will indicate differences of one quarter thousandth with great distinctness and reliability, and in our regular work we frequently note differences of less than one quarter thousandth, which we call tenths, so that even on fine metal, the process failed to show any superiority over the salt.

When ten per cent or more of copper is present in the bullion, the color of the solution interferes with the noting of the appearance or disappearance of the iron reaction, while in the salt method copper is not an impediment.

Other points observed during the experiments may be briefly mentioned as follows:

It requires less agitation than the chloride process; but I think that it would nevertheless take fully as much time to work a set, as with salt, and there is the additional operation of adding the ferric indicator.

It requires prolonged boiling, the experiments tending to show that the presence of the fumes of nitric peroxide render the assay worthless, although the investigation was not followed up in this direction.

In conclusion, I would respectfully submit that the experiments here reported upon conclusively show that the rhodan-ammonia process, so far as known and applied by us, is decidedly inferior to our present chloride method. Yours respectfully, GEORGE R. COMINGS.

UNITED STATES ASSAY OFFICE, Jan. 3, 1883.

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THE GENESIS OF ORE-DEPOSITS.

Written for the Engineering and Mining Journal by Rudolf Keck, Denver, Colo.

The aim of the study of ore-deposits is to acquire a clear understanding of their genesis, which will enable the miner to conduct both prospecting and mining in a rational manner. But in no branch of geology are we so far from a clear understanding as in this. The reason is that, as a positive science, it requires the working together of the chemist, the mineralogist with his microscope, and the mining engineer. But the latter professes to have no time for reading geological periodicals, or for giving careful descriptions of the particular phenomena of his mine or mining district, with correct maps, or an abstract of the more important practical conclusions at which he has arrived; while we can not always expect that the chemist and mineralogist have acquired practical experience in regard to the different conditions of ore-deposits as they appear before our eyes. Hence, we should not wonder that we find the literature in this branch so limited in amount, and still more in scope.

In the three books written on ore-deposits, and published during the last thirty years, by Cotta, Grimm, and Groddeck, we fail to find what we are looking for—characteristic distinctions among the ore-deposits, instead of differences determined by their mere shape, or by the kind of metals they bear. The ghost of the formerly almighty plutonic school is still hovering between the lines of these books; fissures are opened, closed, and reopened like the stops on a clarionet; dikes of the same rock content themselves by catching cold; at another locality, but under the same circumstances, they do not, just as may be required for a plausible explanation; parts of the vein-matter emigrate into the wall-rock, and suggestions of ore sublimation or igneous injection are gravely made. If we find such crude doctrines in these books, otherwise very good, what can we expect from periodicals, and the ordinary little text-books on geology? Look at their pictures, representing veins like mathematically correct parallelopipeds! Nothing is said about the fact that they are mostly small and irregular in length and composition, while the wood-cut hints that they go down to the center of the earth. The innocent student can not help but see our earth's crust full of bonanzas, and impatiently waits for the time when he can go prospecting.

Thirty years ago, chemists (especially G. Bischof, of Bonn) made revelations previously unanticipated in geology; and more recently, the microscope has led to a complete revolution in petrography. Thirty years ago, Bischof had proved that the materials of the gangue in veins originated in their wall-rocks. But a few years ago, Prof. F. Sandberger, at the University at Würzburg, Bavaria, himself a practical mining engineer, arrived at the conclusion, and followed it out, that substances which occur together in such close connection as vein-material and ores must logically have a similar origin. He separated the constituent silicates of rock (for instance, mica), and analyzed them in much larger quantities than those generally used for analysis. The results were and still are quite astonishing. With the exception of tellurium, gold, and mercury, for which he could not get proper material for analysis, all the chemical elements occurring in ore-veins have been detected *in those silicates*, undoubtedly demonstrating that not only the ingredients of the gangue, but also those of the ores, are contained in the eruptive rocks which often are the wall-rocks of veins, or occur in their vicinity. A further result of his laborious researches is the proof that these metallic contents are found in the silicates of crystalline rocks of *all* geological periods.

We find ourselves forced to believe in a causal connection between eruptive rocks and ore-deposits, when, in the light of Professor Sandberger's researches, we study the aspect of volcanic rocks and the transmutations they undergo subsequently to their first consolidation, by weathering, by exhalations of sulphureted hydrogen, muriatic acid, and other gaseous emanations, by which they are converted from a hard to a soft clayey state, or are bleached and become porous, fissile, or honeycombed, until at length they crumble into a siliceous powder; when we observe the massive segregations of ores in eruptive rocks; when we take into consideration that those mountainous regions in which eruptive rocks are wanting contain the least ore-deposits, and that the ore-deposits occur more frequently in older than in the recent rocks, and are more common at the junction of various kinds of rocks than in the midst of large districts of a uniform rock; and that they usually occur in the latter case, only in case the rock is metamorphosed.

The entire material of all sedimentary rocks has been derived from the destruction and decomposition of former ores; thus it can be traced back to that region in our earth's crust from which the eruptive rocks were and are still arising.

The Archæan rocks are, among those of all sedimentary periods, the richest in ores, not only because they show the mightiest development, but also because they have been longest exposed to volcanic and chemical activity. "They are the *only universal* formation, they extend over the whole globe, and were the floor of the ocean and the material of all emerged land, when life first began to exist." In these rocks we have to acknowledge the visible origin of certain ores which we find, nowadays, *as secondary products in higher geological horizons.*

The fact that all minerals occurring in ore-deposits could have originated in aqueous solutions; the drusy or combed texture of some ore-deposits; the occurrence of minerals together with fragments of the wall-rocks in veins, a part of which appears to have been disintegrated by the action of water and friction; the omnipresence of water above and in our earth, especially during former geological periods; the absence of all indications of former *intense* heat within the ore-deposits; the pseudomorphoses and other mineralogical phenomena; all these circumstances indicate that water was and still is the main agent in the mineralizing process.

All subterranean movements that produce joints and fractures in rocks, and the chemical action of the water circulating in our earth's crust, have given origin and peculiarities to ore-deposits. In many cases, it is evident that the origin of an ore-deposit commenced with a more or less empty fissure caused by subterranean movements; but in many other cases, this can not be shown. The occurrence in granite of numerous crystals of tourmaline more than six inches long, but fractured and cemented together again in their finest fractures by granitic matrix; the occurrence of fractured crystals of orthoclase in granite; limestone containing manifold minerals at its contact with granite; all this demonstrates that an afflux of silicates in solution has taken place after the crystallization of other silicates within the granitic mass. Remember also that the microscope has proved that within eruptive rocks transmutations and new compositions of minerals have taken place, by means of which the primitive state of those rocks is essentially changed. We see such changes taking place. We see mountains of formerly eruptive rocks altered to serpentine, chloritic and talcose shists, diabase and other rocks, as secondary products by mere chemical action. We find dolomites decreasing in their quantity of lime, by which procedure they decrease in their volume. We observe that anhydrite, by the mere admission of one fourth of its weight of water, has been transformed to gypsum, while the increase of its volume has been so great and powerful that mighty sediments have been upheaved, distorted, bent, or folded. Should we not, then, be induced by such facts to believe that the origin of veins has not been in every case in the opening of fissures by rough volcanic power or other subterranean movements, but that the veins have attained their present dimensions by the gradual solution, removal, and replacement of the rocks? In many cases, we may even suppose that the faults in a rock or the fractures within veins were caused by the preceding chemical and physical internal changes.

Change of the Silicates of Metals Contained in the Eruptive Rocks into Sulphides.—The meteoric water on the surface of our earth carries free oxygen, nitrogen, and carbonic acid. Penetrating the upper parts of the earth, which are rich in decaying organic matter, the free oxygen produces carbonic acid, which is absorbed by the water; but this on its way downward takes up still more carbonic acid, which rises from the interior, and carries down also some organic substances which reduce the sulphates of metals to sulphides. In this way, the water effects the decomposition of a great many minerals by solution and precipitation. The results are carbonates, sulphates, sulphides, and silicic acid (becoming quartz afterward), while the less soluble part mostly remains as silicates of alumina (clay) and magnesia (talc).

The microscope has revealed the existence in abundance of minute cavities in eruptive rocks, in which water and salt, compressed carbonic acid, and sulphates are inclosed so hermetically that the water does not escape even when strongly heated. These substances are *primitive constituents* of such rocks as well as the silicates. Therefore, it is probable that there were more of these substances present during the eruptions of the rock, especially also sulphureted hydrogen, as we observe them during volcanic eruptions nowadays. The same gas is produced by means of organic matter reducing the sulphates of alkalies to sulphides, which change the salts of metals to sulphides. And in what state do we find the metals of our own ores generally? In that of sulphides.

Organic matter still occurs in many veins; for instance, in the state of asphaltum in the cinnabar mines in the Bavarian Palatinate; in that of petroleum in mines in California, Nevada, and Hungary; in that of anthracite and graphite in mines in Transylvania, Portugal, Derbyshire, Calcutta, Saxony, Baden, etc.; and plentifully in the petrified organic bodies of sedimentary rocks, and as coloring ingredient of fluorspar, amethyst, and smoky quartz in many mines.

It is an evident fact that in many mines the quantity and richness of the ores depend on the occurrence of organic matter, which is only the remains of larger quantities of it, present in a state of decay in former times. To this day, sulphureted hydrogen is very common among the gas exhalations found on and in our earth, and is easily absorbed by the circulating waters therein. But if that organic matter did not contain more or less sulphur, it could not therefore produce much sulphureted hydrogen; and hence, in regard to *ore-building*, those sediments were more favorable which contained the remains of *animal* bodies; for instance, the upper bed of the blue limestone at Leadville; while we find no unusual concentration of metallic matter in the great beds of bituminous shale in the Paleozoic rocks, the carbonaceous matter of which has been derived from the remains of sea-weeds.

The more the leaching process we have described advanced, the more were the bicarbonates changed into monocarbonates, and the more were the dissolved salts of lime, baryta, etc., enabled to crystallize out of their solution. Thus, we find as ultimate result of that process those different minerals constituting the "gangue;" for instance, the various carbon spars, the heavy-spar, and fluorspar. And thus we find just those veins to be the latest in origin, in which these spars predominate; they cross the other veins in which quartz and ores predominate. Therefore, we may suppose that many dissimilar so-called vein-formations are in the main but formations of different leaching periods. In veins with banded or combed structure, we almost always observe that quartz has opened the period of deposition; the veins of the "noble quartz formation" are indeed the oldest *among the vein-formations.* Then followed a period of segregated metallic sulphides, and the different spars terminated the more or less close filling of the fissure. Then began the period of secondary mineral products, which is still going on before our eyes. Meanwhile, rocks which had covered the top of such vein-regions were carried off by erosion, in consequence of which the meteoric waters containing air got access to the vein and began their oxidizing and chloridizing work on the minerals. Thus we often find in the upper parts of veins a zone of oxidized metals and their compounds with acids, constituting the "gossans," the "iron hat," the "pacos," etc. In many cases, this zone is a zone of enrichment; for instance, in the ore-deposits of Chili, of Leadville, of the gold-bearing veins of Colorado, etc.

Many of these upper zones and their wall-rocks may have reached farther up in former times; but they were also carried off by erosion, the products of which we find in veins, although they are rare. For instance, in Pennsylvania there is a vein between walls of propylite, which itself contains breccia of quartz porphyry, mica slate, and various kinds of sandstone. In Bolivia, there occurs a vein in porphyry, which contains breccia of argillaceous slate. In a vein at Schemnitz, Hungary, quartz pebbles occur extending to the depth of 930 feet. Fossils and other foreign bodies have also been found in mineral veins. But the most interesting occurrence of this kind is that of literally conglomerate veins in Colorado and Utah. There, the spaces between the round pebbles and boulders were filled with a mineral solution cementing the pebbles and boulders together into a conglomerate ore. In the Bassick mine, near Silver Cliff, Colorado, the pebbles consist of various kinds of eruptive rock, mingled with which are masses of silicified wood and charcoal; the

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ore consists of rich tellurides of gold and silver, free gold, and the argentiferous sulphides of lead, zinc, copper, and iron. In the Bull-Domingo, near Silver Cliff, Colorado, and in the Carbonate mine at Frisco, Utah, the cementing matter is argentiferous galena.

How were the precipitated metallic sulphides segregated and consolidated in depth? The books say only that the fissures have been filled by mineral springs; but they do not tell how. There are many mineral springs carrying free carbonic acid, sulphates, sulphureted hydrogen, or organic matter, arising from the selvages of ore-veins, using the latter like other fissures as their shortest way to the surface of our earth. Hence, the conclusion was drawn that a causal connection may exist between these springs and the minerals in the vein. But Professor Sandberger had, several times, opportunities to pump out such springs, and to examine the fissures through which the springs were ascending: he never found a single trace of a sediment on the walls, although they cause large sediments of minerals on the surface, where the air has access.

Those who are acquainted with the rules of ore concentration know how slowly a current of water will carry off fine grains of minerals, no matter how high their specific gravity may be. The segregation of the fine particles in such precipitates would take place only in *stagnating* water containing a larger amount of organic matter than those springs contain. Those springs have never caused the formation of a mineral vein; they have only carried off from them. But they cause precipitation and fixation of the precipitated sulphides by *filtering* through a material offering *a great surface*. An instructive example of this was given by a mineral spring in the vicinity of Fulda, Germany; its upper part had caved in, and the water was then flowing between the pebbles of the alluvium, coating them with pyrites as nicely as the galvanic process does.

The miner has not very often to do with regular fissure-veins; he rather has to take out his ores from more or less decomposed zones of rock containing ore-segregations or crossed by numerous little fractures filled with ores. Even in fissure-veins the fragments of wall-rock, fine or coarse, are mostly still the main material; through this the mineral solution has had to filter either from above or from below. And in this material the solutions had easier play, because the loose rock-fragments in the fissure facilitated the chemical action. Especially if the vein-region was located very deep below the former surface, perhaps under a former sea, the meteoric waters could not penetrate directly from above, but must come indirectly from below by hydrostatic pressure; or the sea itself had access to fissures. We need only remember that in the sea-water, by analyzing the residues in the boilers of transatlantic steamers, nearly half of all our chemical elements have been found (among them, for example, silver); and that chemical compounds are more easily dissolved under pressure and in a higher temperature, and that the temperature in our earth's crust increases one degree Centigrade for every thirty-three meters of depth. But wherever the speed of the mineral solutions was not stopped by impediments—for instance, by the fragments of rocks in the fissures—the sulphides, precipitated in the cooler upper regions, could not be deposited, and hence were lost for mining. The higher the springs had to ascend, the greater was the decrease of pressure and temperature; and as the different sulphides of metals are precipitated from a solution of sulphides of alkalies at different pressures and temperatures, this may, in some cases, explain why in one and the same vein the kinds of metals deposited vary with the depth. As even the deepest mines have not yet reached a depth of four thousand feet, we can not have a great many striking examples for the change of metals with the depth.

Thus we observe, that the circumstances under which ore-deposits came into existence were manifold, for physical and chemical reasons; but that the process of ore-deposition in itself always was the same.

If a fissure strikes through different kinds of rock, it may contain their different leaching products. The same may be the case where fissures cross each other. In such instances, a remarkable change in regard to the quality and quantity of ore may often be observed, and mostly a favorable change, because not only greater quantities, but also different characters, of solutions met at such points; therefore, the chances for a denser precipitation and segregation were greater.

It is well known that the same vein within the same wall-rocks may show a very different distribution of ores. This may be explained partly by the configuration of the foot-wall, forming synclinals and anticlinals (the former having a favorable, the latter an unfavorable influence on the deposition of ore); partly by other irregularities in the fissure and on the wall-rocks; partly by dikes crossing the veins and checking the speed of the solutions; and partly by the different and more or less numerous affluxes from the wall-rocks to the fissure. In this respect, I mention "ore-chimneys" and "ore-pockets."

We find the wall-rocks either fractured, or decomposed, changed in color, bleached, or silicified. Such zones are identical with those from which the leaching products were conveyed into the vein. The solutions could flow through comparatively unhindered until the porosity of the rock was diminished by the increase of decomposition to kaolin or other clayey masses. Then they could pass along main ways only—for instance, on the jointing planes of the rocks, where they sometimes formed a zone of ore-impregnation, such as leads the miner to conclude that a vein is nea:.

Very important for miners and prospectors is an examination of th facilities offered the meteoric waters to penetrate and permeate the rocks. In fissured or fractured rocks, the leaching process was facilitated, as more surface was offered, and the solutions were enabled easily and plentifully to descend to a region of accumulation. A similar effect was caused, if the outcrop of a vein was so situated that the surface waters could freely and plentifully enter. Steep mountain slopes, for instance, will never be so favorable as gentle ones. And if the jointing planes of a sedimentary rock dip toward a vein, this condition must have been better for its development than if they had dipped in a divergent direction. I am sorry to say that our prospectors hardly study such indications.

As we have to take it for granted that the metals contained in veins were principally contained as silicates in the eruptive rocks; as the chemical and physical process of ore-deposition always was the same; and as the water penetrates all kinds of fractures and cavities, it will always be a useless attempt to establish classes of ore-deposits on the basis of the kind of their metals and minerals, or on the basis of the form of the deposits. I can not see any other essential distinction between the ore-deposits than in the manner of their origin, either in consequence of fissures caused by subterranean movements, or *without* fissures, merely by solution, removal, and replacement of the material of their wall-rocks. Thus we may divide the ore-deposits into three main classes: 1. Fissure-veins; 2. Veins of replacement; and 3. Secondary deposits, having been derived from former deposits or segregations. The latter distinguish themselves from the other two classes by not showing periodical segregations of quartz, ores, and spars. To these belong, for instance, the ore-beds deposited in the sedimentary formation; also the lead ore-deposits of the Upper Mississippi, and at Raibl in the Austrian Alps; and the quicksilver deposits in California.

Statistics show that the greater part of the mining in the world is done in the deposits belonging to the last two classes, *not in fissure-veins*. It is strange to find in this country so much prejudice in favor of the fissure-veins. I mention only some of the most famous veins of replacement: those at Leadville, and at Christiania in Norway; the celebrated Veta Madre, near Guanajuato, in Mexico (490 feet thick, with ore-pockets of from 100 to 180 feet thickness).

The time will come when our successors will be enabled by the sum of certain coincidences of geological conditions to predict the presence of certain ore-deposits. It will arrive so much the earlier, the more our mining engineers take pains to elaborate and publish monographs on mines and mining districts and accompany them with correct maps and with statements furnished by competent analytical chemists and microscopists. The U. S. Geological Survey, although only two years old, has already accomplished excellent work—in scientific treatment equal to the work of the geological surveys of the European states, but in regard to practical application superior to them. The published abstract of the report to be issued next year, upon the geology and mining industry of Leadville, Colo., by S. F. Emmons, Geologist in charge of Rocky Mountain Division, U. S. Geological Survey, is a striking example. This treatise will be most highly appreciated by those who are acquainted with the extremely complicated nature of the geology of the region examined.

The purpose of the foregoing essay is to guide mining operators to independent observations; to instruct them how to judge of the reports prepared by mining experts; to induce mining engineers to prepare thorough monographs on their mines; and also to check the absurd worship of fissure-veins.

THE VALUE OF FOREIGN COINS.

Mr. Horatio C. Burchard, Director of the Mint, has issued the following estimate of the values of foreign standard coins:

COUNTRY.	Monetary unit.	Standard.	Value in U. S. money.	Standard coin.
Argentine Rep..	Peso	G. and S.	.96·5	1-20, 1-10, 1-5, ½, and 1 peso, ½
Austria	Florin	S.	.40·1	[argentine and argentine.
Belgium	Franc	G. and S.	.19 3	5, 10, and 20 francs.
Bolivia	Boliviano	S.	.81 2	Boliviano.
Brazil	Milreis of 1000 reis	G.	.54·6	
Brit. Pos. in N. A.	Dollar	G.	1.00·0	
Chili	Peso	G. and S.	.91·2	Condor, doubloon, and escudo.
Cuba	Peso	G. and S.	.93·2	1-16, ⅛, ¼, ½, and 1 doubloon.
Denmark	Crown	G.	.26·8	10 crowns and 20 crowns.
Ecuador	Peso	S.	.81·2	Peso.
Egypt	Piaster	G.	.04·9	5, 10, 25, 50, and 100 piasters.
France	Franc	G. and S.	.19·3	5, 10, and 20 francs.
Great Britain	Pound sterling	G.	4.86·6½	1/5 sovereign and sovereign.
Greece	Drachma	G. and S.	.19·3	5, 10, 20, 50, and 100 drachmas.
German Empire	Mark	G.	.23·8	5, 10, and 20 marks.
Hayti	Gourde	G. and S.	.96·5	1, 2, 5, and 10 gourdes.
India	Rupee of 16 annas	S.	.38·6	
Italy	Lira	G. and S.	.19·3	5, 10, 20, 50, and 100 lire.
Japan	Yen	S.	.87·6	1, 2, 5, 10, and 20 yen, gold, and
Liberia	Dollar	G.	1.00.0	[silver yen.
Mexico	Dollar	S.	.88·2	Peso or dollar, 5, 10, 25, and 50
Netherlands	Florin	G. and S.	.40·2	[centavo.
Norway	Crown	G.	.26·8	10 and 20 crowns.
Peru	Sol	S.	.81·2	Sol.
Portugal	Milreis of 1000 reis	G.	1.08.0	2, 5, and 10 milreis.
Russia	Ruble of 100 copecks.	S.	.65.0	¼, ½, and 1 ruble.
Spain	Peseta of 100 centimes	G. and S.	.19·3	5, 10, 20, 50, and 100 pesetas.
Sweden	Crown	G.	.26·8	10 and 20 crowns.
Switzerland	Franc	G. and S.	.19·3	5, 10, and 20 francs.
Tripoli	Mahbub of 20 piasters	S.	.73·3	[ters.
Turkey	Piaster	G.	.04·4	25, 50, 100, 250, and 500 pias-
U. S. of Colombia	Peso	S.	.81·2	Peso.
Venezuela	Bolivar	G. and S.	.19·3	5, 10, 20, 50, and 100 bolivar.

THE PRESSURE OF GAS IN THE SOLID COAL.—M. E. Mallard, referring to Mr. Lindsay Wood's experiments showing the pressure of gas in the solid coal, says that the theory put forward by Mr. Wood, that the maximum pressure of the gas varies as the square root of the depth of the hole, he considers approximative only, and goes into an elaborate calculation to show that it would require to be somewhat modified. These formulas are carried out and the results placed alongside the actual pressures observed, to which they very closely assimilate. He considers that the experiments show that the coal must have been formed and covered before, and even long before the formation of the gas, since the overlying strata must at the time have had sufficient thickness and strength to resist its pressure. Where the seam of coal is exposed to the air at its outcrop, the fire-damp expands at first rapidly, and lastly almost inappreciably into the atmosphere; but the seam may be divided into distinct and separate divisions by faults, in some of which gas may be found, while closely adjacent divisions contain none. The pressure of gas may also vary on account of variations in the permeability of the coal in different places. In conclusion, he considers the experiments fully explain the mode in which the sudden outbursts of gas occur in Belgium, and finishes by saying that the most useful thing to do now is, to determine by experiments the quantity of gas exuded from the coal, and the relative permeability of the coal in a number of mines; that is, the volume of gas given off per unit of surface at the face at any time, and the coefficient of permeability of the coal with respect to the gas.

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A SAFE SAFETY-LAMP.

M. Marsaut, member of the Société de l' Industrie Minérale de Saint Etienne, has been experimenting with various so-called safety-lamps, especially the Mueseler, with a view to ascertain why it is that they do not afford an absolute guarantee of safety. He found that, in a state of repose in an explosive mixture of air and gas, the explosion which takes place under the diaphragm of the Mueseler lamp and which generally extinguishes it, passes through the diaphragm on an average fifteen times in a hundred, and communicates the explosion to the exterior almost once in every hundred times. The number of times that the flame passes through the diaphragm is nearly fifty per cent of this number in a certain series of tests, and explosions occur on the outside in five per cent of the cases. This discovery easily accounts for many accidents, the causes of which have until now remained a mystery. As the results of these investigations, M. Marsaut has constructed a modified type of lamp in which no less than 5500 explosions have taken place without their being communicated to the outside, and under conditions in which the other lamps, including the Mueseler, failed to stand the test. The special feature of this new lamp is a metal shield formed by a hollow cylinder of sheet-iron, closed at the top by wire gauze, which completely surrounds the ordinary gauze of the lamp. At the lower portion of the shield is a series of apertures which permit the air necessary for supporting combustion to enter the lamp. This air, in order to reach the flame, must follow a tortuous course, and thus the danger caused by oblique, downward, and rapid currents is completely neutralized. The horizontal diaphragm, which is one of the characteristics of the Mueseler lamp, is suppressed, and is replaced by a simple washer for supporting the chimney. A wire gauze with 929 meshes to the square inch completely envelopes the chimney of the Marsaut lamp, and takes the place of the diaphragm in the Mueseler.

THE SIEMENS DIRECT PROCESS.

Mr. James Davis, mill manager of the New Steel-Works, Landore, Wales, writes as follows to the *Engineer:* In this letter I desire to embody the result of a long practical experience of the working of Siemens's direct process, by making wrought-iron directly from the ore, and of making metallic iron for the Spongy Iron and Purifying Company, at Landore and Towcester respectively.

The ore to be smelted is broken up into fragments not exceeding the size of peas or beans; to it is added lime or other fluxing material, in such a proportion that the gangue contained in the ore and flux combines with only a little oxide of iron into fluid slag. A charge, say 20 cwt. of ore, 12 cwt. of roll or hammer-scale, together with 6 cwt. of soft free coal well mixed together, is charged into the furnace when fully heated. The coal is charged with the ore; during the first hour, very little gas is required; but after this, the rotative velocity is increased, together with the heat, for a short time. At this stage, a rapid reaction is the result; the peroxide of iron, being reduced to magnetic oxide, begins to fuse, and at the same time metallic iron is precipitated by each piece of carbon while the fluxing materials form a fluid slag with the siliceous gangue of the ore. The slow rotative action is again resorted to, whereby the mass of iron is turned over and over, presenting continually new surfaces to the heated lining and to the flame within the rotator. As soon as the metal is gathered together a little, the slag is tapped, which brings with it sulphur and phosphorus. The velocity at this point is increased to one revolution in five minutes, so as to gather up the loose masses of iron into five or six metallic balls. These are taken and shingled with a steam-hammer or squeezers into a bloom, which, when reheated, will roll into a bar similar to an ordinary puddled one. I may say that the balls must be worked as quickly as possible, and then the product will stand as much work as common puddled iron.

With reference to the amount of coal used in the producers, the abstract report shows that I have succeeded in making what Dr. Siemens said could be done in his paper before the Mechanical Engineers in 1873, that is, one ton of iron made to one ton of producer coal used. With the direct process, I would suggest that Siemens's open-hearth furnaces are worked in connection with this process, as all the small ore can be utilized and the blooms can be used also to a great advantage and profit. As regards the statement made by Mr. G. W. Maynard, that the blooms are only fit for the open-hearth furnace, I must differ, as I have worked the blooms which have been rolled into good merchant bars. The following is the analysis: Iron, 99·1988; silicon, ·400; carbon, ·150; phosphorus, ·0502; sulphur, trace; manganese, ·201; fracture, good.

A great deal has been said respecting the class of bricks to be used in the lining of these rotative furnaces. Experience has proved that the drum should have a 3½-inch fire-brick all around, the ends to have a few bauxite or magnesia bricks just where the balls are mostly wearing. After testing the magnesia bricks made at Landore side by side with the bauxite, I find that the magnesia stand the best. Added to this is an oxide lining of about 2 inches in thickness, made with scale and ore. Then I venture to state that, with proper care and management, the rotators can be kept in working order for at least three months without stoppage; at the end of that period, probably the rings may want renewing, which would only cause a delay of about three days; so that, the cost being so low and the output good, as the table shows, it must necessarily be a commercial success. It has been proved beyond doubt that the chemical results are all that could be desired.

The furnace is arranged in the following manner: The gas is made in two ordinary Siemens producers, size, 8 feet by 7 feet by 7 feet, which are at the back of the regenerators. The gas comes through a fire-brick flue straight into the furnace. There are two chambers filled with bricks forming a checker-work from top to bottom, size, 19 feet 6 inches high, by 7 feet 6 inches wide, by 10 feet long. These are called regenerators, and are worked alternately, the waste heat from the furnace passing through first one chamber, and then the other, for certain periods, making the checker-work hot; by this means, we get hot air, and thus the furnace is heated to a high temperature. The drum or rotator is 10 feet 4 inches diameter inside, and 10 feet 4 inches long; there are four 1¼-inch diameter pipes for circulating water front to back, keeping the tubes cool, which have two large bends in for turning over he metal and for dividing it into five or six balls.

This is one of the greatest improvements that has been made since the working of plant at Towcester, as there is no danger now of having a sliding charge. There is also a water cylinder at the back of the furnace, connected with the front by means of the four 1¼-inch pipes, which serves as a reservoir, for keeping top pipes full of water, and especially for keeping the ring and back end of the furnace cool.

The furnace is revolved on four wheels, driven by a small pinion, working in a large spur-wheel, which is in segments, and fixed to the furnace by means of brackets. The furnace is carried on a movable carriage for convenience of removing, for repairs, etc. The charge is taken up by elevators, and deposited in a tank during the time the furnace is working, and when ready to charge, a slide is removed, and the furnace is charged in about ten minutes.

Abstract Reports of Rotator at Landore.

DATE.	No. of heats.	CHARGES. Particulars of charge.	Ore.	Coals for reducing.	Scale.	Coals delivered to gas-producers.	Product. Weight of blooms.
1882.		dys. hrs.	tns.	tns. ct. qr.	tns. ct.	tns. ct.	tns. ct. qr
May 22d, 6.30 A.M., to May 27th, 11.30 P.M.	32	5 5	32	9 12 0	19 14	38 0	35 8 2
May 31st, 8.30 A.M., to June 3d, 1.30 P.M.	20	3 5	20	6 0 0	12 0	24 0	22 4 1
June 5th, 6.30 A.M., to June 10th, 11.30 A.M.	32	5 5	32	9 12 0	19 14	37 0	35 2 2
June 12th, 6.30 A.M., to June 17th, 12.30 P.M.	32	5 6	32	9 12 0	19 14	36 0	34 19 1
June 19th, 6.30 A.M., to June 24th, 12.30 P.M.	31	5 6	31	9 6 0	18 12	34 0	33 3 3
June 26th, 10.30 A.M., to June 29th, 5.30 A.M.	23	3 19	23	6 18 0	13 16	25 0	24 7 0
July 3d, 9 A.M., to July 8th, 8 A.M.	30	4 23	30	9 0 0	18 0	33 0	32 0 0
		32 21	200	60 0 0	120 0	227 0	217 5 1

I give the following as an approximate cost of a ton of iron made by this process—that is, by working two rotators jointly:

	£.	s.	d.
Small Sommerostro ore, 1 ton, at 8s. per ton	0	8	0
Hammer or roll scale, 12 cwt., at 10s. per ton	0	6	0
Producer coal, 1 ton, at 7s. per ton	0	7	0
Reducing coal, 6 cwt., at 6s. per ton	0	1	9
Repairs and sundries, at 5s. per ton	0	5	0
Wages for labor, at 5s. per ton	0	5	0
Total	£1	12	9

NEW PUBLICATIONS.

ANNUAL REPORT OF THE COMMISSIONER OF MINERAL STATISTICS OF THE STATE OF MICHIGAN FOR 1881. Lansing, Mich. 8vo, pp. 266. (*Ind'x.*)

Mr. Charles E. Wright's second annual report as Commissioner of Mineral Statistics of the State of Michigan is in many respects an improvement on the first so far as fullness of details concerning the copper and iron mines of the State are concerned. We have been particularly interested in the review of work in the copper mines, which we understand is from the pen of Prof. C. D. Lawton, because it is the only record of that kind which we possess in that form. The iron mines of the State have a very experienced and reliable local historian in Mr. Swineford, editor of the Marquette *Mining Journal*, whose annual review largely anticipates that of Mr. Wright. Both are valuable, and supplement one another so well that we would not like to miss either. Mr. Wright's report, although ostensibly for 1881, in reality gives the condition of the mines six months after the close of that year. The greatest interest, of course, attaches to the developments in the younger districts, some of which have rushed into prominence during the last few years. There are full accounts of the work done in the mines of the Teal, the North, and the Cascade ranges, the great Menominee range, the Felch Mountain, and the Agogebic districts, the latter two being the latest fields opened by prospectors.

The report on the copper districts is very full and complete, and is elaborated in much the same manner as it was during the preceding year. It shows a very great activity in the mining industry of that section, and gives promise of even greater returns during the coming year. We are informed by the very best of authority that the Lake mines will this year come very near a product of sixty millions of copper. The majority of the large producing mines have increased their output. Next year will witness a further addition, as the Conglomerate is getting ready for a large output, the Phœnix will do well, the Peninsula is equipping for 200 tons of rock per day, and the Wolverine is starting in in a moderate way.

We notice, with pleasure, that Mr. Wright has this year added gypsum, sandstone, clay, and coal to the subjects treated. So very little is known concerning the occurrence of coal in Michigan, and so little has apparently been done to develop it, that the opinion quite generally prevails that Michigan has no mineral fuel. The extent of the Michigan coal-field is embraced in a circle with a radius of fifty miles, having its center southeast of the village of St. Louis, in Gratiot County, and its southern boundary passing a few miles south of the city of Jackson. The coal formation has an estimated maximum thickness of about 300 feet, and what little exploration has been carried out has proved the existence of one workable bed, running as high as 4 feet in thickness, but averaging generally not more than from 2½ to 3 feet. The first discovery of coal dates back to 1835, when it was found in Spring Arbor township, Jackson County, and that mine, called the Hayden, was worked for some time; in 1857, a new mine, the Woodville, was opened near it, and some work was done for many years by the Detroit & Jackson Coal Company, which, however, shut down in 1872. Mining was resumed by lessees, R. H. Emerson & Co., in 1881. In 1879, a company was formed, called the Michigan, near the Woodville, and although considerably troubled by water, mining is going on as steadily as the car supply and the market will allow. The largest Michigan coal mine is

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the Slope, opened in 1879, when 54,635 net tons were produced. In the following year, the output rose to 74,743 tons, but in 1881 fell off to 69,066, because the buildings were destroyed by fire. The only other mine working in Jackson County is the Eureka, begun in 1879. The total product of the county for 1881 is estimated at 130,530 tons. The only other mines in the State which are now in operation, besides those mentioned, are near Corunna, Shiawassee County. Work was done in a desultory way for many years until, in 1870, Youngstown capitalists took hold. The caving in of the shaft in 1875 stopped mining until, in 1878, a new mine was opened near the old one, but which proved unprofitable. In 1881, the sinking of a new shaft was begun under more favorable auspices. It is not expected that the coal mines of Michigan will ever possess more than a local importance. Still, it is of interest to note that this State, even though in a modest way, should rank among the coal-producing States in the country.

POWER versus HAND-DRILLING ON LAKE SUPERIOR.

Mr. Frank Klepetko, of the Northwest mine, now belonging to the Conglomerate Mining Company, of Philadelphia, has furnished the Commissioner of Mineral Statistics of Michigan with some interesting figures on the comparative cost of drifting by hand and by power-drills on the amygdaloid of that mine. These will supplement the data which we printed in our issue of August 29th, 1882, page 221, on the comparative cost on conglomerate rock.

The following table gives the comparative cost of drifting on amygdaloid:

Items.	Drifting by hand.	Drifting with power-drills.
Day's labor per foot (men)	$4.79	$2.18
" " (boys)		.53
Contract cost per foot	11.95	10.04
Cost supplies per foot	2.07	4.12
Less profit on supplies, 25 per cent.	.52	1.03
Net contract cost per foot	11.43	9.01
Compressor cost per foot		1.64
Interest on compressing plant		.62
Total cost per foot	11.43	11.17
Wages earned by miners per day	2.06	2.50
" " boys "		.96

The wages were high, because the mine, at that time, in 1880, had not been working regularly, and better rates had to be offered to induce men to work. The compressor cost includes repairs on compressor and drills, wages of the men running the compressor, fuel, oil, packing, etc. The cost per foot drifted was obtained by dividing the compressor cost for the seven months that the Rand drills were running, by the entire number of shifts worked by the miners with the drills. This quotient was multiplied by 2·18, the number of shifts to each foot drifted. The cost is high because the full number of drills was not run continuously; but on the other hand, the repairs were light. The interest on compressing plant was obtained by reckoning interest at 10 per cent for seven months on $15,000, including the whole plant and 10 drills. In 104 shifts, in one month, the advance was 21·07 feet for drifting by hand, and 47·07 feet by drills, or 2·2 times as much. The apparent saving is 26 cents per foot in favor of the drills, not taking into account the increased speed. This reduces the fixed expenses, such as salaries, pumping, etc., equal to a saving of $3000 per annum. An allowance must also be made for the fact that the hand drifts are carried through 6 feet by 5 feet, while the machine drifts are 7 by 8 feet or more. In ore-bearing ground, this amounts to an increase of excavation of from 3000 to 5600 cubic feet of rock per 100 feet of drift run, or 12 cubic fathoms. In the case of the Northwest, this would amount to $15 per cubic fathom, or $1.80 per lineal foot, which would reduce the cost of drifting with power-drills in ore ground to $9.37 per foot, or $2.06 less than hand drifts.

The following figures show the comparative cost of stoping with Rand drills when the work is done by contract by the fathom or by contract by the foot of hole drilled:

	By fathom, contract.	By length of hole, contract.
Day's labor per fathom (men)	$2.38	
" " " " (boys)	.98	
" " " " (miners)		$1.71
" " " " (blasters)		.35
" " " " (boys)		.60
Contract wages per fathom stoped	5.54	3.30 (cost of holes)
Wages paid to blaster and helper		1.06
Supplies used by miners	5.77	.33
Supplies used by blasters		6.21
Compressor cost per fathom stoped	1.79	1.28
Interest on compressor plant	67	.48
Total cost per fathom stoped	13.77	12.76
Less profit in supplies, 25 per cent.	1.44	1.63
Net cost per fathom	12.33	11.03

In contracts per foot of hole drilled (12 cents per foot), the miners furnish light and the oil for the drill, while the company pays for power-drills, caps, and fuse, and hires the charger, who measures the depth of the hole when he inserts the charge. In contracts by the fathom, the men pay for all the supplies, and the company only furnishes the drills and the power to run them. By the latter method, the men earn $1.93 per day, as against $1.68 by the former; the quantity of rock broken per drill and four men being 43·7 for the fathom contract to 60·8 for the other.

THE BULL DIRECT PROCESS.

A process for manufacturing iron and steel directly from the ore, invented by Mr. H. C. Bull, is attracting some attention in England. The furnace is worked exclusively with gas, delivered into it in a very highly heated state directly from the producers. Highly heated air is also introduced in sufficient quantities to burn about 10 per cent of the gas, and maintain the furnace at the high temperature necessary to allow the withdrawal of the iron or steel and cinder in a fluid state. Under this system, the gases rising through the ore and flux are carbonic oxide and hydrogen, in equal volumes, together with the nitrogen derived from the air which is blown into the furnace. These gases being produced entirely outside the furnace, there is no zone of gasification, but only the zones of fusion, reduction, and carbonization.

During the year 1881, the Société John Cockerill, of Seraing, Belgium, built an ordinary blast-furnace 6 feet in diameter in the bosh, and 21 feet high, fitted with Cowper hot-air blast stoves, and ordinary water-gas producers of the cupola type, when 3534 kilograms of iron were produced in twenty-four hours, under this process with the gas, as against 645 kilograms by means of the ordinary blast-furnace without the gas. The silicon was reduced from 3·40 to ·15, the sulphur from 1·61 to ·33, the phosphorus from 1·76 to 1·10, the manganese to *nil*, the combined carbon to ·52, and the graphite to ·17, which proved that the mildest grades of ingot iron and steel, suitable for rails, cutlery, and the highest class tools, could be produced from the most inferior ores directly in the blast-furnace. At the same time, the output from the furnace was increased enormously, and the quantity of fuel required was decreased in almost the same ratio.

THE WHITWELL STOVE FOR CHARCOAL FURNACES.

Mr. Horace E. Burt, manager of the Martel furnace, St. Ignace, Michigan, has written a very valuable letter giving the result of the work of Whitwell stoves for a charcoal furnace. This letter was contributed to the Charcoal Iron-Workers' Association, and is printed in the last issue of its well conducted *Journal*. Mr. Burt says:

This furnace is 53 feet by 10 feet 6 inches. There are two Whitwell stoves, each 60 feet by 15 feet. The fuel used is charcoal, made in round kilns, constructed of brick, arched or dome tops. These kilns, 30 in number, are located, 10 at Allenville, twelve miles distant, and 20 at Johnson, twenty-five miles distant from the furnace. The coal is transported in box-cars, and the receipts of one day used the next, being unloaded directly from the cars, over screens, into the coal-charging buggies. All coal, as well as all the ore, is weighed in the charging-buggies, on scales provided for the purpose.

The furnace was put in blast August 16th, 1881. Stoppage occurred at noon on the 25th, owing to an accident to the hoisting machinery, and continued until eight P.M. on the 29th. At time of stopping, the temperature of blast was 1000°. On starting up, the temperature was 800°, the result of extra firing with wood in the largest combustion-chambers of the stoves. In the following week, the temperature of blast went up to 1300°, when 266 tons of iron were put out with a consumption of 90 bushels charcoal to the ton of iron. Up to the end of September, 1882, the furnace had been in blast $322\frac{11}{24}$ working days, averaging about 40 tons of pig-iron per day for the time in blast. The $87\frac{13}{24}$ days of idleness cover stoppages for Sundays and for flue cleanings, and want of charcoal, including the 4 days and 8 hours for repairs, previously mentioned. I will give you a summary for the month of September last past:

In blast 24 days and 14 hours.

Ore used, 3,571,200 pounds; percentage of yield, $59\frac{6}{10}$.

Coal used, 1,420,250 pounds = $1494\frac{1}{2}$ pounds per ton of iron.

Pig-iron produced, 2,148,090 = $950\frac{1080}{2240}$ tons pig-iron.

Of this output, $3\frac{1}{2}$ per cent was No. 1; $57\frac{1}{2}$ per cent, No. 2; $19\frac{1}{4}$ per cent, No. 3; 10 per cent, No. 4; $9\frac{1}{4}$ per cent, No. 5; and $\frac{3}{4}$ per cent, No. 6, pig-iron.

As to the temperature of the blast, the last week of September is a fair sample of each week in that month. On Monday, at one o'clock A.M. (time of putting on blast), the west stove showed 900°; at six A.M., the same stove showed 1200°, after one change; at midnight, the same stove showed 1400°. The east stove kept pace with the west. There are regularly 12 changes in 24 hours. On Tuesday, the temperature, lowest, 1400°—highest, 1460°; on Wednesday, the temperature, lowest, 1440°—highest, 1460°; on Thursday, lowest, 1440°—highest, 1480°; on Friday, lowest, 1440°—highest, 1500°; on Saturday, lowest, 1440°—highest, 1480°. The vertical flues of the west stove have never been cleaned. In the east stove, after running six months, no dirt or soot was found, and the stoves respond as readily to the burning gas as they ever did.

It may not be generally known that this furnace was constructed with the settled purpose of resting on Sunday. In accordance with this principle, growing out of the religious convictions of the proprietors that it was their duty as Christian men, in the furnace business as well as in all other kinds engaging them, to rest the furnace and their employés on the Christian Sabbath, it has been the practice to cast at eleven o'clock Saturday nights and put the furnace in course of Sabbath observance by midnight, and so continuing until twelve or one o'clock on Monday morning. This practice has given general and positive satisfaction to all concerned, and I most cordially recommend the same to all furnace men. With the Whitwell stoves, it is entirely practicable. I deem it small excuse for any one with means ample for the construction of a modern furnace plant, to allow the extra expense of these stoves over cast-iron or any other than fire-brick stoves to stand in the way of the possibility of Sunday stoppages. It has been thought that the high temperature of the blast would prove injurious to the product. On the contrary, so far as our experience goes, no stronger iron is made. We are aiming to make the best brand of car-wheel and malleable iron, from Lake Superior ores, to be found anywhere.

As to strength, a test piece of size suitable to be tested in a Thurston torsion testing-machine, cast in the pig bed and broken from the under side of a soft 2-chill pig, on May 31st, is reported to have been turned up in the center to $\frac{5}{8}$ diameter × 1 inch long, and placed in D. F. & Co.'s machine at Erie, with the following result: 30,000 pounds per square inch tensile strain and 14° deflection before breaking. The cast from which this was taken was made on a temperature of 1360 of blast, the engine making 16 and 17 turns.

There is one matter which I am inclined to touch upon before closing. At the last annual meeting, I noticed the discussion as to the value of dolomite as a flux. We have used nothing else since going into blast. Our limestone is quarried within a quarter of a mile of the furnace. It shows by analysis 55·55 per cent of carbonate of lime, 41·72 per cent of carbonate of magnesia. We are using about eighty-eight pounds to the ton of iron, a very low percentage. It may be, some of the members can vouch for the correctness of my theory, that while dolomite is an excellent flux for the ores I am using, it is the active enemy of the hearth-bottom, which has during the time of this blast been eaten out to a depth of eighteen inches. The hearth-bottom was originally a double layer of eighteen inch brick. It has been found necessary to drop the casting-trough low enough to draw off the iron from the surface of the first layer of bottom brick.

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GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

Recent dispatches state that work on the Phœnix mine has been resumed. This mine adjoins the Stonewall and Contact mines, and bids fair to become a good producer. The force of miners on the Lucky Cuss has been reduced. There is enough ore in the bins to keep the smelter running for two months. The hoisting-works from the French mine, at Harshaw, are on the road to this point, for the Ingersoll mine. Thirty-three tons of ore from the Little Devil netted $1100, after all expenses were paid, at the Head Center mill. The Bunker Hill, Rattlesnake, and Mammoth claims were sold a few days ago for $60,000. Work on the Grand Central South is to be resumed on the return of Lieutenant Hall. The Gilded Age has resumed work.

GILA COUNTY.

MACK MORRIS.—Work has been stopped on this mine, and the company is taking ore out of the La Plata, an adjoining claim.

OLD DOMINION.—Operations at the smelting-works are satisfactory, and the mine offers an abundance of ore. A dispatch says that Colonel Newcomb, of the Emeline Mining Company, and Frank Simpson, who is interested in the Old Dominion Copper Company, are now there examining the mines.

TACOMA.—This property shows good prospects. The company has leased the Carrie furnace, and is accumulating ore and coke on the dump, with a view to produce copper at an early day.

CALIFORNIA.

The San Francisco *Bulletin*, in speaking of the mining interests of California, says that the past year has been one of fair prosperity. The quartz claims have averaged well. The gravel claims have been embarrassed to some extent by the *débris* question. The product of some of these claims this year has been much less than formerly. If the mine-owners can devise some way of taking care of the sand washed down in the pursuit of gold, their work will go on the same as of old. But until that question is settled, and settled in a way satisfactory to agriculturists, there will be impediments to the full and free development of the gravel claims of the State. Quartz mining holds its own quite well, and is likely to be one of the prominent industries of the State for some time. Mines of this character are now open in about twenty counties. The facilities for getting the rock and extracting the precious metal are every year becoming perfected and cheapened. During the past year, 68 mines levied 121 assessments, amounting to $1,547,467; in 1881, 93 mines levied 151 assessments, amounting to $2,237,850. The total amount of dividends paid in 1882 amounted to $1,715,408, as against $2,654,784 paid in 1881.

INYO COUNTY.

INYO CONSOLIDATED.—The mill at Darwin was burned to the ground on the evening of December 19th. It was erected in 1874–75 by the Surprise Valley Water Mining and Milling Company. It is said to have cost the present management about $50,000, and was insured for $40,000.

PLUMAS COUNTY.

TAYLOR-PLUMAS.—The mill is almost finished, and will start up early in January. In the mine, work is pushed ahead as rapidly as possible, and new ground is opening up that will supply a large amount of ore as soon as needed. The ledge continues to maintain the same average width, and looks as well as heretofore.

CANADA.

NOVA SCOTIA.

BOSTON & HALIFAX.—This company, whose property adjoins the Hall-Anderson, has contracted for its machinery, and it is expected it will be in place when the road is finished, or soon thereafter.

HALL-ANDERSON.—Despite the late fall of snow of about fourteen inches, the work on the government road to the Hall-Anderson mine is still in progress. It is expected that it will be finished in the next sixty days. The new hoisting-works are now in operation, and the Orion lode is steadily improving. The mill is temporarily idle to admit of putting in a new heater for the water supply for the batteries.

NONPAREIL.—Active developments on the Nonpareil property, which also joins the Hall-Anderson immediately on the west, are in progress, and the Leslie lode, which is partially developed on the Hall-Anderson, has been tapped at various points covering a distance of six hundred feet. The lode is about two feet thick, and in every opening, thus far, shows free gold in paying quantities.

OXFORD.—The Oxford Company has received a gold brick of $2550 from ten days' run of its ten-stamp mill. The contract-work for sinking the main shaft seventy-five feet deeper is now in rapid progress, with the aid of the new steam-pump, which is working satisfactorily, and the lode is gradually increasing in width and quality. A test lot of ore from the newly-discovered Split lode will be milled, and, from the appearance of the quartz, large results are expected. Sinking has been commenced upon the Oxford lode, and the company is preparing to put hoisting-works upon the same.

STATHER.—Recent developments upon the Stather property which lies north and west of the Oxford, prove it to be of extraordinary promise. Negotiations are in progress for the purchase of this property, and it is expected that in the spring twenty stamps will be in operation thereon. From the developments thus far, this district seems destined to mark a new era in Nova Scotia gold mining, from the fact that, whereas in other districts the gold is notably coarse, it is here fine gold as a rule, and the milling results of the ore prove the yield to be much more uniform than in any other district in the province.

COLORADO.

The Denver *Tribune* gives the following table of the bullion product of Colorado for 1882:

County.	Amount.	County.	Amount.
Boulder	$550,000	La Plata, San Juan	$675,000
Chaffee	225,500	Ouray	329,760
Custer	705,116	Park	283,564
Clear Creek	2,001,629	Pitkin	100,000
Dolores	125,000	Rio Grande	310,000
Fremont	19,980	Routt	100,000
Gilpin	2,006,516	Saguache	52,000
Grand	10,000	Summit	1,250,000
Gunnison	600,000		
Hinsdale	275,000	Totals	$26,750,898
Lake	17,131,853		

The product for 1881 was $22,203,509, showing an increase this year of $4,547,389.

The following statement shows the business of the smelting-works named during 1882:

Golden Smelting-Works, Golden.

County.	Tons.	Gold.	Silver.	Lead.	Total.
Clear Creek	1,921	$4,133	$282,335	$33,386	$319,854
Gilpin	3,602	117,380	38,940	10,320	166,641
Boulder	463	66,141	25,213	....	91,354
Lake	812	....	32,296	23,422	55,718
Summit	75	....	7,702	2,503	10,205
All other sources	106	3,249	7,492	4,644	15,386
	6,979	....	....	....	$659,161

Boston & Colorado Smelting-Works, Argo.

County.	Gold.	Silver.	Copper.	Total.
Gilpin	$364,000	$98,000	$93,000	$555,000
Clear Creek	26,000	509,000	23,000	558,000
Boulder	140,000	82,000	....	222,000
Lake	....	336,000	....	336,000
Summit	....	443,000	....	443,000
Park	6,000	96,000	....	102,000
Gunnison	....	136,000	3,000	139,000
Custer	126,000	93,000	....	219,000
San Juan country	4,000	83,000	8,000	95,000
Montana	7,000	538,000	159,000	704,000
Utah	12,000	85,000	84,000	181,000
Arizona	....	16,000	2,000	18,000
New Mexico	....	59,000	7,000	66,000
All other sources	2,000	21,000	7,000	30,000
Total	$687,000	$2,595,000	$386,000	$3,668,000

The production for 1881 was $3,081,000; increase this year, $587,000.

Miners' Smelting-Works, Golden.

County.	Gold.	Silver.	Copper.	Total.
Lake and Park	$2,350	$166,060	....	$168,410
Gilpin	105,763	19,500	$12,850	138,113
Clear Creek	32,350	291,285	17,134	340,769
All other sources	14,270	20,430	15,648	50,348
Total	$154,733	$497,275	$45,632	$697,640

Moore Mining and Smelting Company, Golden.

The statement published below is from the 1st of January, 1882, to the 31st of October, 1882, the works having closed down at that date for the purpose of changing and enlarging their capacity:

County.	Tons.	Gold.	Silver.	Lead, Copper.	Total.
Gilpin	3,410	$72,740	$59,857	$4,528	$137,126
Clear Creek	1,166	2,742	223,712	9,276	235,730
Lake	800	3,605	34,742	7,655	46,003
All other sources	665	....	70,792	2,750	73,542
Total	6,041	$79,087	$389,103	$24,209	$462,401

The production for 1881 was $678,505.

Grant Smelter, Denver.

The production of these works for seventy days of 1882 was as follows:

Locality.	Gold.	Silver.	Lead.	Totals.
Arizona	....	$123,000	$3,000	$126,000
New Mexico	$20	10,000	600	10,620
Idaho Territory	....	500	200	700
Clear Creek County	400	1,600	1,200	3,200
San Juan County	4,000	17,200	6,100	27,300
Chaffee County	200	4,000	2,000	6,200
Pitkin County	....	2,200	1,700	3,900
Custer County	18,300	5,600	400	27,300
Park County	3,100	7,100	2,600	12,800
Summit County	300	4,500	2,800	7,600
Ouray County	800	12,300	2,500	15,600
Gilpin County	....	3,500	300	3,800
Gunnison County	....	900	300	1,200
Boulder County	800	300	700	1,800
Lake County	....	558,000	512,400	1,070,400
All other sources	1,500	16,000	4,300	21,800
Grand total	$29,420	$766,700	$541,100	$1,337,220

BOULDER COUNTY.

WARD H. LAMON.—This lode, the extension of the Mountain Lion mine, is worked extensively. It is yielding immensely, the nature of the mineral being a very soft, decomposed pay, over a foot wide, milling 15 ounces gold per ton.

CLEAR CREEK COUNTY.

The bullion production of this county for the year 1882 is said by the Georgetown *Miner* to have amounted to $2,001,629.

DIAMOND TUNNEL.—The tunnel has cut a five-foot vein of mineral at its intersection with the Corry City lode, which assays from 42 to 821 ounces silver per ton. Work will be begun on the vein as soon as the tunnel head is far enough advanced to admit room.

LAKE COUNTY.

The following table gives the bullion output of Leadville for the year ended December 30th, 1882:

Quantity.

	Pounds of bullion.	Pounds of lead.	Tons of ore.	Ounces of silver.	Ounces of gold.
Total first quarter	23,487,182	23,380,743	12,924	2,042,323	3,056
Total second quarter	20,510,096	20,415,647	12,175	1,838,596	2,886
Total third quarter	22,713,006	22,605,015	28,050	1,743,876	6,548
Total fourth quarter	19,747,065	19,646,027	36,953	1,648,454	3,923
Total for year 1882	86,457,349	86,047,412	90,101	7,273,249	16,413

Value.

	Value of lead.	Value of silver.	Value of gold.	Value of ore.	Total value.
Total first quarter	$1,169,037	$2,328,248	$61,120	$485,762	$4,044,167
Total second quarter	1,020,779	2,093,301	49,720	599,059	3,773,772
Total third quarter	1,130,251	1,988,142	130,960	1,326,111	4,575,334
Total fourth quarter	942,977	1,827,561	78,457	1,885,134	4,734,129
Total for year 1882	$4,263,044	$8,237,252	$320,257	$4,296,066	$17,127,402

Total for 1881 amounted to $13,170,576, showing an increase this year of $3,956,826. In figuring the commercial value of the last quarter's product, silver is calculated at $1.11 per ounce, and lead 4·8 cents per pound. Previous productions were calculated on a fair average of the ruling quotations at the time.

CHRYSOLITE.—The results obtained in the recent concentrating experiments are said to be satisfactory. They show that a high percentage of lead is saved; that working without settlers or buddling a fair percentage of silver is saved; and that the ore is beneficiated, that is to say, silica is lost and the percentage of iron increased. The experiment has been made on lots of ore weighing over one hundred tons in all. As a rule, eight tons have been concentrated into one. The result on one lot of forty-five tons yielded the following results: The original lot assayed in silica 36 per cent; in iron, 25 per cent; and in lead, 2 per cent. The concentrates assayed in silica 18 per cent; in iron, 30 per cent; and in lead, 15 per cent. The concentrates have been sold to Cummings & Finn as fast as made.

SAGUACHE COUNTY.

HORTENSE.—Another strike is reported. Out of 500 pounds of ore, the mill returns gave 1017 ounces in gold and 524 in silver, aggregating over $20,000.

SUMMIT COUNTY.

GREER SMELTER.—Operations will be resumed shortly. The smelter is closed at present for the purpose of putting in jigs.

WHITE QUAIL.—It is stated that this company will resume work.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended December 24th: Ore produced, 1050 tons. Header advanced five feet; total, twenty-six feet. North drift advanced eight feet; total, thirty feet. Have let contracts to run header and drift, as it can be done cheaper than by day's pay.

FATHER DE SMET.—The superintendent reports under date of December 19th,

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as follows: Herewith express company's receipt for bar No. 149, containing 1263 $\frac{53}{65}$ ounces gold bullion, the result of run of mill for the first half of December. On the 15th, I drew for $21,500, which amount was for all expenses of November. The mill is doing good work. The rock-crushers require much repairing, on account of the hardness of the ore we are now working. The mine is looking well at all points where work is done, and good results may be expected during the winter.

IDAHO.

The business depression, says the Idaho *Avalanche*, which has existed in the community for the past two months by reason of the condition of the roads, has ceased, and we can now look forward for some activity in mining matters.

IDAHO DEMOCRAT.—The shaft is down 105 feet, in the ledge, which shows up five feet in width, one foot of which is solid galena. At the depth of 60 feet, the shaft is intersected by a tunnel, which secures good ventilation.

MAINE.

SULLIVAN.—The mill has shut down for the winter, after a successful run of several months. Work in the mine is at present concentrated in the Waukeag shaft, which is driven night and day by three eight-hour shifts. The present depth is about 360 feet. Twenty-five men are employed.

TWIN LEAD.—The directors held a meeting in Bangor recently, at which it was decided to resume operations at the mine at once. A large force will at once be put on, and work will be carried forward vigorously.

MEXICO.

The Magistral Copper District, in the Magistral range, 25 miles north of Chihuahua, on the line of the Mexican Central Railroad, under recent developments, is reported to be yielding ore assaying 60 per cent copper and 1300 ounces silver to the ton.

From Vaca Ortiz, Durango, Mr. George Wilson writes us, under date of December 7th:

Within the last few weeks, the usual winter influx of miners and prospectors, driven from the north by snow and cold, has begun to reach this more favored section of the great mining region of the Rockies. Many capitalists, seeking for good and, at the same time, cheap mines, have also put in an appearance, some of whom have bought, others bonded, and still others have already begun work on their pr perty. At Guanacevi, the Peoria (Illinois) Company, under the able control of Messrs. Gift, manager, and Hotchkiss, superintendent, is making fair progress, and its operations are meeting with the most gratifying results. On one of its seven mines, the Leon, it is driving a tunnel or drift on the course of the vein, showing up from 10 to 12 feet wide of ore. The assays from this mine have so far run over 200 ounces per ton; sometimes over 400 ounces silver per ton has been the yield. Above this drift, it has over 500 feet of ore in hight, by 2000 feet along the vein, which has been thoroughly proved along its outcrop by numerous shafts from 50 to 100 feet deep. The company has six other mines, all of which are known to be valuable, and by good miners who know each one they are said to be each as valuable as the Leon. This company was the pioneer in Guanacevi, and was fortunate enough to secure its property for less than $300,000; and the actual cost of the work which has developed such a noble ore-body does not exceed $5000. Within the last week, over thirty mines have been bonded or bought in Guanacevi, and it seems as if it would prove the Comstock of Durango.

At Metates, the famous Candelaria seems about to enter on a new period of prosperity. In the hands of its late Mexican owners, who were completely sated by its twenty years of rich yields, the proper development-work in advance of ore-extraction had been somewhat neglected, and with the usual results of such a course; but under the new administration, the most satisfactory results are becoming apparent. In the lower tunnel, which, near its northern extremity, was driven at first on 100-ounce ore, the mineral has recently improved to from 800 to 1000 ounces silver per ton, with a 15-foot face in the drift. The present owner has, in less than two months' work, paid off the arrears of debt of the previous year, left him as a legacy by the former owners. The neighboring mines are opening up with good results, and here again is an excellent opportunity for investment in mines which will pay "to work" as well as "to sell."

Northern capitalists have also been here recently, looking up the prospects for successful cattle-raising, and so thoroughly well pleased were they with the outlook that they entered into a contract for some 300,000 acres of land, and are about returning home to arrange for at once stocking it with from 50,000 to 60,000 head of cattle. As cattle doubled in value here within the last year, and are fully expected to advance another $10 per head this year, it is clear they have a good thing in hand.

MICHIGAN.

The Concentrating Company, says the Marquette *Mining Journal*, shipped a product of 1177 tons of concentrated ore as a result of an experimental run of its works at Negaunee—a fact which proves conclusively that the works are a success, or can, with a few changes, be made such. The works are now idle, and will remain so until spring, it being the intention to make some necessary changes and improvements during the winter.

NATIONAL.—This mine, which has recently been unwatered, shows, says the *Miner*, a good block of ground in the bottom drift, both east and west of the shaft. A large amount of work remains to be done, however, before the workings will be in shape for an active prosecution of mining operations.

TAMARACK.—The Houghton *Mining Gazette* says that the shaft has passed through the well-charged copper lode which was struck a few days ago. The deposit, as seen in the shaft, gives every indication of being highly metalliferous, and will no doubt receive exploration on its length in due time.

MONTANA.

SUMMIT VALLEY DISTRICT.

The Butte *Miner* reports as follows:

ALICE.—Development-work is prosecuted on the 700 and stoping as usual on the upper levels. A large force is working the Magna Charta, and 40 tons of ore per day are hoisted. The high-grade ore mentioned recently as being uncovered in the north drift of the 200 and 300 holds out as to quantity and grade. Work is prosecuted in the winzes from both these levels, to run down on the ore-body, and another winze has been started from the 400-foot level, to intercept the ledge.

ANACONDA.—It is expected the new works will be completed by January 1st, when active underground operations will be commenced. At present, a large amount of surface work is doing.

CLEAR GRIT.—The chute of high grade in the west 217 holds good, and hoisting from this ore-body will be started soon. A track has been laid in the 217, to facilitate handling the ore, and a stull stope is pushing through from the shaft to the face of the drift, to improve the air-current. A level has also been started on the hanging-wall side of the ledge, to open out the west drift.

COLUSA.—A full force is worked in the stopes of the 260-foot, where a large body of high-grade ore has been uncovered, some of which is shipped East for reduction, being sufficiently high grade, both in silver and copper, to make the shipments profitable.

LEXINGTON.—Sinking for a 500-foot level is vigorously prosecuted. The stopes of the 200 and 300 are producing their usual output of ore, and the mill is making a steady run.

MOULTON.—During the week, a winze has been started from the 200 at a point 200 feet east of the air-shaft, and directly under the big body of ore penetrated in sinking that shaft; a 2½-foot vein has been uncovered in the new winze, which mills 50 to 60 ounces. On the 300, in the cross-cut to the south vein, 575 feet west of the main shaft, soft ground has been struck after having run through a very hard reef of rock. The cross-cut has reached a point 75 feet south of the center vein, and it is expected the big vein which showed on the surface at that point will be penetrated any day. Progress in drifting on the 500 has been slow during the past week, the quartz being very hard and the water in the breasts troublesome.

ORIGINAL.—Sinking is to be pushed vigorously, in order to open the 300, 400, and 500 levels. The mine has heretofore been worked only to the 200-foot level.

NEVADA.

The joint Ophir-Mexican winze has passed through porphyry boulder into quartz again. The cross-cut east in the Sierra Nevada and Mexican shows no material change. The diamond drill will be started next week in the east cross-cut on the 2700 level of Sierra Nevada. Quartz carrying metal has been cut in the joint Savage-Norcross drift on the 2600 level. The fire in the Sutro Tunnel is reported to have done little damage.

NEW MEXICO.

A new mining district, known as the Hueco, has been organized about forty miles southeast of Shedd's Ranch, in the East Organs. The vein croppings assay $70 gold per ton.

MAGDALENA.—The Lake Valley *Herald* says that this company has just concluded a contract for 10,000 tons of ore from the famous Hardscrabble mine, to be delivered as quickly as possible, and that the smelter will begin active operations on the 1st of January. A contract has also been concluded for the product of the Junieta mine. One smelter of forty tons capacity is all ready for the ore, and another of equal capacity will be erected by this company at once.

SHAKSPEARE SMELTER.—A $40,000 smelter and refiner has been contracted for at Deming.

TORRENCE.—This company is said to be negotiating for neighboring property on Socorro Mountain.

VALVERDE MINING AND SMELTING COMPANY.—The following figures show the production of copper for the months mentioned:

Month.	Pounds of ore.	Pounds of matte.	Pounds blister.	No. of furnace run.
June	311,600	31,825	6,792	1
July	224,010	48,887	29,876	1
August	471,699	102,534	64,855	2
September	403,243	84,340	68,741	2
October	505,533	57,235	38,556	3
November	276,630	57,578	39,978	2

NEW YORK.

BENSON GRAVEL MINING COMPANY.—Extensive operations will be begun on this property, situated in Fulton County, shortly. Owners of gold mining prospects in the Adirondacks are awaiting with considerable anxiety the beginning of this work, as it is supposed that it will furnish an important test of the mineral value of the Adirondack region.

PENNSYLVANIA.

A large deposit of mica was recently discovered on the South Mountain, Berks County. The present lessee is said to have been offered $100,000 for his lease.

TENNESSEE.

EAST TENNESSEE VALLEY ZINC COMPANY.—This company, which organized a short time ago with a capital of $300,000, has let contracts for the erection of the furnaces and buildings in Knoxville. Several thousand tons of zinc ore are already on the dump a few miles from Knoxville. The furnaces will be in operation by next spring.

UTAH.

The Salt Lake *Tribune* says:

EMMA.—Twenty men are employed, sinking the shaft at the head of the Bay City tunnel. The new engine for hoisting, placed near the shaft, has been in operation some time, and works finely. The shaft is down 90 feet, and is to be driven 200 before cutting a station. At that depth, the vein will be cut, provided the dip remains the same; if not, it will be drifted for. Very little water has been encountered as yet. Work will go on all winter.

MAMMOTH.—Six furnaces are now running; two more are to be started shortly; and the number is to be increased to seventy-six. When the furnaces are all up, they will reduce 200 tons of ore per day, and by buying ores that can be had in plenty in the district, the company expects to combine qualities which will, with its own, make a perfect flux.

YOSEMITE.—The concentrator started up last week. It has a capacity of eighty tons a day. Its operations make available much low-grade ore in the Bingham District, which has long waited some such cheap and thorough process as this.

VERMONT.

A correspondent of the Boston *Journal* states that the amount of marble quarried, sawed, finished, and sold in 1882 by the Rutland dealers and companies was 5,000,000 two-inch feet. The average price received per two-inch foot was 40 cents, or an aggregate sum of $2,000,000 for the year's product.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED DECEMBER 26TH.

269,525. Cable Tramway. Charles M. Huson, St. Louis, Mo.
269,563. Ore Concentrator and Amalgamator. William P. Davis, Spring City, Nev.
269,573. Rolling-Mill. Uri Haskin, Pittsburg, Pa.
269,574. Gearing for Trains of Metal Rollers. Uri Haskin, Pittsburg, Pa.
269,583. Boring-Machine. Fritz Kade, Sandusky, O.
269,599. Regulator for Compressed Gas. Julius Schülke, Berlin, Germany.
269,616. Composition for Removing Scale in Boilers. Charles R. Bacon and Frank Queen, St. James, Minn.
269,619. Rock-Drill. William J. Barber, Covington, Ind.
269,626. Union or Coupling for Pipes and Tubes. Julius L. B. Bodel and Joseph L. F. Brauer, Paris, France.
269,632. Mining Machine. Richard Bromley, Columbus, O.
269,640. Fuel. James M. Cooper, New York City.
269,645. Dry Amalgamator. Affonso de Figaniere, Philadelphia, Pa., Assignor of one half to John W. Bailey, Denver, Colo.
269,667. Ore-Pulverizer. August Heberle, Sala, Sweden.
269,676. Portable Pump. William J. Johnson, Newton, and Frank C. Johnson, Boston, Mass.; said William J. Johnson Assignor to the National Manufacturing Company, Worcester, Mass.
269,690. Boiler and Furnace. James H. Mackintosh, Paterson, N. J.
269,720. Furnace. Claus Russmann, Hamburg, Germany.
269,730. Apparatus for Compressing and Pumping Air. Elmer S. Smith, Erie, Pa., Assignor of one half to Ray V. Pierce, Buffalo, N. Y.
269,739. Mining-Auger. William N. Talley, Hampton, West Va.
269,742. Hydraulic Process of and Apparatus for Reducing and Concentrating Metallic Ores. Francis Taggart, Brooklyn, N. Y.
269,787. Machine for Rolling Rails. Uri Haskin, Pittsburg, Pa.
269,813. Gas-Engine. Lewis C. Parker, Robinson, Kan.

By the unanimous consent of the stockholders, the name of the Northwestern Reduction and Chemical Works has been changed to the Chicago Copper Company. The brand of the copper produced in its refining operations will be "Chicago Copper." The officers are Charles Ray, President; D. S. Wells, Vice-President; H. L. Norton, Treasurer; P. P. Austin, Secretary; and W. R. Roney General Manager.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Jan. 5.

There is nothing of interest to report at the Mining Exchanges. Most of the business has been monopolized by the Pipe Line certificates, and what has been done in mining shares is almost featureless. Sierra Grande has grown remarkably weak under large transactions, and fallen to its lowest price to-day. It recovered, however, and closed steady. The low-priced stocks have fallen off considerably in business, but prices have been steady. The Leadville stocks have been strong, and the Comstocks show a little improvement under small transactions. Robinson Consolidated continues to do a large business, but has been very irregular. Below will be found a summary of the market. The sales of mining shares at all the Exchanges aggregate 419,070 shares, as against 376,710 last week.

The Comstock shares have been very quiet at about steady prices. California has been quiet and steady, selling from 20@24@23c. Consolidated Virginia records a moderate business at stronger prices; it sold from 38@47c., with a business of 7900 shares. Sierra Nevada was quiet and steady, selling from $3.50@$3.75, assessment-paid shares, and from $2.25@$2.63, assessment-unpaid shares. Union Consolidated sold to the extent of 300 shares at $2.90. Mexican was quiet and strong at $2.50@$3.15. Ophir sold at $1.80 and Consolidated Imperial at 2c. Sutro Tunnel had an active business at irregular prices, selling from 17@25@20c.

The Leadville stocks were quiet at strong prices. Amie had an active business and was strong, selling from 14@20@19c. Chrysolite was also strong, under a moderate business, selling from $1.50@$1.40, with a business of 6100 shares. Hibernia sold at 1c. @2c. Iron Silver, under a moderate business, was a little weak; it sold from $2.40@$2.30. Little Chief was quiet and steady, selling from 40@38c. Little Pittsburg records transactions of 1100 shares at 65 @60c. Big Pittsburg was quiet and steady at 10@ 14@13c.

The Bodie stocks were very quiet and irregular. Bodie sold from $2.25@$2.10@$2.20, with transactions of 250 shares. Standard records only one small transaction at $6⅞. Bulwer was quiet and irregular, selling from $1.20@90c.@$1.05.

The Tuscarora stocks were quiet and strong. Grand Prize sold at 30c. Tuscarora was very quiet at 8c. Belle Isle records only moderate transactions at steady prices, selling at 56@58c. Navajo was quiet and strong, selling from $8⅛@$8¼, with a business of 1600 shares. North Belle Isle, with small transactions, sold at 40c., assessment-paid shares, and at 20c., assessment-unpaid shares. Independence was very quiet at 61c.

In the miscellaneous list, the Green Mountain stocks have been very quiet at steady prices. Gold Stripe sold at 5@4c. Green Mountain, at 41@39c. Rising Sun, at 6@7c. Cherokee, at 6c. Hall-Anderson had a fair business at strong prices; it sold from $1.25@$1.55. Horn-Silver was very quiet at $6.63@$6.38. Hukill, under a moderate business, was strong at 14@15c. Robinson Consolidated had an active business at very irregular prices; the sales aggregate 44,400 shares at $1.20@$1.40@$1.30. Sierra Grande has been the most active stock on the market, but has been very weak; it sold from $3.70 @$2.55, closing to-day at $3.

Alta-Montana declined slightly from its strong price, under a moderate business, and sold from 29@ 25c. Barcelona was very active on the American Board at irregular prices, selling from 23@28@22c. Bradshaw was quiet and a little weak, selling from 40@38c. Caledonia, B. H, had a small business, but was weak; it sold from $1.20@$1. Central Arizona was quiet and steady at 39@37c. Decatur records an active business at steady prices; it sold from 10@9c. Elko Consolidated was quiet and steady at 9c. Hortense, with a moderate business, was steady at 11@10c. Oriental & Miller had an active business at steady prices, selling at 13@12c. Silver Cliff has been a little weak, under a moderate business, selling from 38@35c. South Pacific was active and steady at 10@9c. The State Line stocks have been fairly active at steady prices; Nos. 1 and 4 sold at 3c., and Nos. 2 and 3 at 8@6c. Taylor-Plumas records a very active business at the American Board, at prices a little weak; it sold from 23@19c. Fannie Barrett is the name of a new mine on the American Board this week, and has sold to the extent of 1900 shares, at $2@$2.05.

The Excelsior Water and Mining Company has levied an assessment of one dollar and fifty cents per share, payable immediately and delinquent January 29th.

MEETINGS.

Northern Chief Mining Company, No. 2 New street, New York City. Annual meeting of stockholders and election of trustees January 10th at twelve o'clock M.

South Silver King Mining Company, Room 84, Tribune Building, No. 154 Nassau street, New York City. Annual meeting of stockholders and election of trustees, January 13th. Polls open at three P.M., and close at four P.M.

Torrence Mining Company, Room 31, No. 3 Broad street New York City. Annual meeting of stockholders and election of trustees January 10th, at twelve o'clock M.

Vandewater Gold and Silver Mining Company, Room 147, No. 115 Broadway, New York City. Annual meeting of stockholders and election of trustees, January 9th, at eleven o'clock A.M.

DIVIDENDS.

The Castle Creek Mining Company, of Idaho, has declared dividend No. 8, of three per cent, payable January 16th. Transfer-books close January 10th, and open January 17th.

The Prussian Mining and Milling Company, of Colorado, announces its regular monthly dividend (No. 10.) of ten cents per share, payable January 10th, at the office of Simpson & Son, No. 18 Wall street, New York City.

The Shoshone Mining Company, of Idaho, has declared its regular monthly dividend (No. 2) of one per

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	SHARES. No. in 1000's	SHARES. Par Value.	ASSESSMENTS. Lev'd to date in 1000's.	ASSESSMENTS. Date and amount per share of last.	DIVIDENDS. Total paid in 1000's.	DIVIDENDS. Date and amount per share.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Dec. 30. H.	Dec. 30. L.	Jan. 1. H.	Jan. 1. L.	Jan. 2. H.	Jan. 2. L.	Jan. 3. H.	Jan. 3. L.	Jan. 4. H.	Jan. 4. L.	Jan. 5. H.	Jan. 5. L.
Alice, Mon.	400	25	*		400	De 81 10												
Amie Con., Co.	500	10	*		805	My 80 10	.14				.15	.14	.15		.19	.17	.20	.18
Atlantic, Mich.	40	25	280	Ap 75 1 00	140	Fe 82 2 00												
Argenta, Ne.	100	100	225	No 82 25	40	Fe 80 20												
Bar & Walker, Ut.	100	10	*		60	No 80 10												
Bassick, Co.	100	100	*		25	Fe 80 25												
Belle Isle, Ne.	100	100	65	My 82 10	300	De 79 25									.56		.58	
Black Bear, Ca.	90	100	15	Se 79 50	859	Se 82 30												
Belcher, Ne.	104	100	2562	Se 82 25	15397	Ap 76 1 00												
Bodie Cons., Ca.	100	100	125	De 81 50	1295	No 82 20					2.25		2.10		2.10		2.20	
Bos'n & Mon, Mon.	200	10			310	Ja 83 05												
Breece, Co.	200	25	*		2	Fe 80 1												
Bulwer, Ca.	100	100	80	De 77 50	140	Ja 83 10	1.20	1.00			.90						1.05	.90
California, Ne.	540	100	658	No 82 20	31320	De 79 10	.20						.21		.24	.20	.23	
Cal. & Hecla, Mch.	100	25			22350	No 82 5 00												
Caribou Con., Co.	100	10	*		50	Mr 80 10												
Carolina Q'n, N.C.	100	2			8	Oc 82 02												
Castle Creek, Id.	100	1			24	Ja 83 03												
Catalpa, Co.	300	10	*		210	De 82 10												
Central, Mich.	20	25	100	Se 61 6	1010	Fe 82 25												
Chrysolite, Co.	200	50	*		1000	De 81 50	1.50	1.40			1.50	1.45	1.45		1.45		1.50	1.49
Climax, Co.	200	10	*		180	Au 80 30											.10	
Cons. G. Mg., Ga.	100	5	*		30	De 82 04												
Cons. Va., Ne.	540	100	897	Au 82 30	42030	Au 80 50	.40	.38			.40		.45	.44	.46	.42	.47	
Contention, Ariz.	250	50			2087	De 82 25												
Copper Queen, Ar.	250	10	*		850	Ja 83 50												
Crown Point, Ne.	100	100	2673	Fe 82 25	11588	Ja 75 2 00												
D'dw'd-Terra, Dk	200	25	*		880	De 82 10												
Dunkin, Co.	200	25	*		200	Ju 81 7½												
Eureka Cons., Ne.	50	100	100	My 76 1 00	4817	Jy 82 25									9.00			
Evening Star, Co	50	10	*		1225	Oc 82 50												
Excelsior, Ca.	100	100	300	Ja 82 1 00	875	Oc 80 25												
Fa. de Smet, Dk.	100	100			530	De 82 20	4.25											
Findley, Ga.	200	1	*		8	My 79 10												
Freeland, Co.	200	25	*		50	My 80 25												
Glass-Pend., Co.	250	20	*		25	My 81 10												
Gold Stripe, Ca.	150	10	*		76	Jy 81 15	.05						.05		.05		.04	
G'ld & Curry, Ne.	108	100	3478	Se 82 50	3826	Oc 70 $10												
Grand Prize, Ne.	100	100	420	No 82 25	450	Se 80 25									.30		.30	
Great Eastern, Dk	300	1	*		16	Jy 80 01	.03											
Gr. Mountain, Ca.	125	10	*		212	No 81 7½					.39		.41	.40	.39			
Hale & Nor., Ne.	112	100	4008	Se 82 50	1598	Ap 71 5 00												
Hall-And's'n, N.S.	150	1			7	Ja 82 05					1.30	1.25	1.45		1.55	1.50		
Hecla Con., Mon.	30	50			337	No 82 50												
Hibernia, Co.	300	25	*		130	Jy 81 40									.01		.02	
Homestake, Dk.	100	100	200	Ju 78 1 00	1762	De 82 40												
Horn-Silver, Ut.	400	25	*		1700	No 82 75	6.63	6.38										
Hukill, Co.	200	5	*		210	De 78 10	.15	.14							.15	.14	.15	.14
Inden., Ne.	100	100	185	Fe 82 15	225	Se 79 25									.61			
In. Queen, Ne.	12?	2			365	No 82 02												
Inyo, Ca.	100	5	*		45	Ap 82 05												
Iron Silver, Co.	500	20	*		930	De 82 20					2.40	2.35	2.40		2.40	2.30	2.35	2.30
Jocuistita, Mex.	100	100			750	No 82 1 00												
Kentuck, Nev.	30	100	342	No 81 30	955	Fe 70 5 00												
La Plata, Co.	200	10	*		610	Se 82 30												
Leadville C., Co.	400	10	*		250	No 82 05												
Leeds, Ut.	60	100	87	Ju 82 50	78	Oc 78 15												
Little Chief, Co.	200	50	*		700	Au 80 50	.40	.39					.39	.38	.40	.39	.38	
Little Pitts., Co.	200	100	*		1050	Mr 80 50	.65				.65				.65	.60		
Martin White, Ne	100	100	950	Se 82 25	90	Jy 79 30												
Min.s Nu'v'a, Mex	100	3	*		20	Jy 82 10												
Moose, Co.	200	10	4		550	Mr 78 25												
Morning Star, Co.	100	10			565	De 82 25												
Navajo, Ne.	100	100	235	Mr 82 20	100	De 82 25	8.25				8⅛				8.50		8.50	8¼
N. Y. & Colo., Col.	50	21			25	Jy 79 10												
N'h'n Belle, Ne.	50	100			2300	No 82 20											9.75	
N. Belle Isle, Ne.	100	100	75	No 82 20	45	Se 82 15	.20								.35		.40	.20
Ontario, Ut.	150	100			4927	Ja 82 50												
Ophir, Ne.	100	100	3495	De 82 1 00	1695	Jy 82 1 00									1.80			
Osceola, Mich.	50	25	480	Ap 76 1 60	785	De 82 1 00												
Pleasant Val., Cal	100	100			30	De 82 05												
Plumas, Ca.	100	10	*		151	Jy 79 8												
Quicks. Pref., Ca.	43	100			654	Ju 82 6 00												
" Com., Ca.	57	100			151	Ju 82 40												
Quincy, Mich.	40	25	200	De 62 5 00	3330	Au 82 5 00												
Rising Sun, Ca.	150	5	*		52	My 81 7½	.06								.06		.07	
Robinson Bar, Id.	100	1	*		9	De 82 03												
Robinson C., Co.	200	50	*		575	No 81 50	1.25	1.20			1.25		1.35	1.20	1.40	1.35	1.36	1.3
Robt. E. Lee, Co.	500	500			100	De 82 10												
Savage, Ne.	112	100	5484	No 82 50	4480	Ju 69 3 00												
Shoshone, Id.	150	1			3	No 82 01												
SierreGrande, NM					300	Ja 83 25	3.70	3.20			3.65	3.00	3.30	3.10	3.15	2.85	3.25	2.55
Sierra Nev., Ne.	100	100	5150	De 82 1 0	102	Ja 71 1 00	3.70	2.25					3.50		3.75	2.63		
Silver King, Ar.	100	100			1125	De 82 25					10¾							
Silver King, Co.	500	2			50	Au 81 10												
Socorro, N. Mex.	2.5	100			4	Mr 82 ¾												
Spr'g Valley, Ca.	200	1	*		50	Ja 81 25												
Standard, Ca.	100	100			4050	Ja 83 25					6¾							
Starr-Grove, Ne.	200	10	*		160	Ju 81 10												
Stormont, Ut.	200	1	*		155	No 81 05												
St. Joseph, Mo.	100	10	*		390	De 82 20												
Tip Top, Ar.	100	100	170	Mr 80 50	100	No 81 20												
Tombstone, Ar.	500	25	*		1250	Ap 82 10												
Vizina, Ar.	200	25			140	Mr 82 10												
Yellow Jacket	120	100	5358	Fe 82 1 00	2184	Au 71 2 50											1.00	

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ 4817·5.

SALES.—Amie Consolidated, 65,200; Belle Isle, 500; Bodie Consolidated, 250; Bulwer, 1350; California, 1550; Chrysolite, 6100; Climax, 300; Consolidated Virginia, 7900; Eureka Consolidated, 100; Father De Smet, 100; Gold Stripe, 4900; Grand Prize, 900; Great Eastern, 1000; Green Mountain, 500; Hall-Anderson, 8500; Hibernia, 4200; Horn-Silver, 300; Hukill, 1800; Independence, 500; Iron Silver, 2550; Little Chief, 2600; Little Pittsburg, 1100; Navajo, 1600; Northern Belle, 200; North Belle Isle, 3400; Ophir, 50; Rising Sun, 1600; Robinson Consolidated, 44,400; Sierra Grande, 50,470; Sierra Nevada, 765; Silver King, 100; Standard, 20; Yellow Jacket, 100. Dividend shares sold, 213,910.

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cent, payable January 16th. Transfer-books close January 10th, and reopen January 17th.

The Standard Consolidated Mining Company, of California, has declared its fiftieth dividend of twenty-five cents per share, payable January 12th, at the Farmers' Loan and Trust Company. Transfer-books closed January 4th, and open January 13th.

The Ontario Silver Mining Company, of Utah, has declared its usual monthly dividend (No. 87) of $75,000, payable January 15th. Transfer-books close on the 10th.

UNLISTED QUOTATIONS.

Mr. Alexander C. Lassen, No. 61 Broadway, under date of January 5th, three P.M., reports the current quotations of unlisted stocks as follows:

	Bid.	Asked.		Bid.	Asked.
Bodie Tunnel	$0.25	$0.75	Hibernia Silver, (New)	$0.16	$0.21
Barcelona	.22	.24	Hond. Rosario	1.25	5.00
Buckeye Water	.50	....	Little Rapids	....	1.00
Bunker Hill	.99	1.00	London Cons	.90	1.35
Borva Copper	....	2.00	Mack Morris	....	.75
Batopilas Pref	9.00	24.00	Madre	.50	2.00
Berkshire	....	.35	Moulton	....	4.00
Calif'rnia Wat'r	.25	....	Santa Maria	.40	1.10
Centennial	....	.20	Stormont, new	.20	.30
Col. & Beaver	.05	.10	Satemo	.50	.75
Contention	3.00	8.00	Sierra Apache	.25	.30
Dahlgren	.40	....	Sierra Bella	.40	.50
Empire Gold	2.00	....	Terrible	1.75	....
Eureka Tunnel	.60	1.00			
Grand Central	1.50	....			

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been dull and featureless. There is no improvement in the Comstock shares. Telegraphic dispatches state that Senator Fair, when interviewed by the Stock Exchange Investigating Committee, concerning the mines, said he still had great hopes of developing more bonanzas in the lower levels. He was not surprised that stockholders were growing impatient; but stated that every thing possible was doing for their relief, and that the mines and managers' books were open to the committee for investigation. The efforts of the committee have resulted in the managers materially reducing the salaries of mining officials. The *Tribune* publishes the following dispatch:

SAN FRANCISCO, Dec. 29.—The *Post* announces, by authority, to-day, that at a recent meeting of presidents of the Comstock mining companies, under control of the Bonanza firm, measures for the alleviation of the situation were discussed, and are likely to be speedily acted upon. A plan to reduce expenses at the mines without curtailing important exploratory work is under consideration. If it is carried out, assessments in future will be smaller and levied at less frequent intervals.

Senator Sharon has not as yet carried out his threat to take the mining stocks under his control from the list. The Tuscarora stocks remain the strongest on the market, and are held for advanced prices. The Alta Mining Company has levied an assessment of twenty-five cents per share.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Dec. 29.	Dec. 30.	Jan. 1.	Jan. 2.	Jan. 3.	Jan. 4.
Alpha	27-32	27-32	....	....	27-32	1
Alta	¼	¼	....	¼	3-16	5-32
Bechtel	....	....	....	....	....	....
Belcher	11-16	11-16	....	....	....	....
Best & Belcher	3⅞	3⅞	....	4	3⅞	4
Bodie	1⅞	1⅞	....	2	1⅞	2
Bullion	13-16	13-16	....	27-32	1	15-16
Bulwer	....	....	....	....	....	....
California	3-16	3-16	....	3-16	¼	¼
Chollar	1⅛	1⅛	....	1⅛	1⅛	1¼
Con. Virginia	13-32	13-32	....	⅛	13-32	⅛
Crown Point	29-32	29-32	....	....	¾	¾
Eureka Con	9	9	....	....	....	....
Exchequer	3-16	3-16	....	3-16	3-16	....
Gould & Curry	1¾	1¾	....	1⅞	1¾	1⅞
Grand Prize	11-32	11-32	....	....	....	5-16
Hale & Norcross	1⅛	1⅛	....	1⅛	1	1⅛
Manhattan	....	....	....	....	....	....
Martin White	3	3	....	3	3	3
Mexican	2¾	2¾	....	2¾	3	3
Mono	3-16	3-16	....	5-32	....	....
Mount Diable	3⅞	3⅞	....	4	4	4
Navajo	....	....	....	7¾	8	8½
Northern Belle	9½	9½	....	9½	9½	9½
Noonday	....	....	....	....	....	....
Ophir	1¾	1¾	....	2	1¾	1⅞
Oro	....	....	....	....	....	....
Overman	3-32	3-32	....	3-32	....	5-32
Potosi	1⅛	1⅛	....	1⅛	1⅛	1⅛
Savage	13-16	13-16	....	¾	¾	27-32
Scorpion	⅛	⅛	....	....	9-16	19-32
Sierra Nev	2½	2½	....	2½	2⅝	2
Silver King	....	....	....	10	10	....
Tip Top	....	....	....	....	....	....
Union Con	3⅛	3⅛	....	3¼	3⅛	3⅛
Wales Con	3-16	3-16	....	3-16	3-16	3-16
Yellow Jacket	1⅛	1⅛	....	1⅛	1	....

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Jan. 4.

The market the past week has been dull and inactive, as usual at the close of the year. We look for a better business in mining stocks the coming year, and shall be disappointed if, at its close, our expectations are not realized. The really good mines are sought for for investment purposes, and where good dividends are assured, it is as easy to sell them as it is railroad or other sound stock, and the record of some of our copper stocks shows that the dividends are fully as reliable. Calumet & Hecla continues to be in good demand, and maintains its position in the market, as A 1, and all the stock put on the market finds ready purchasers at $250@$252 per share. Franklin has advanced from $15@$15¼, and is wanted at this price, but very little is offering. This mine will soon take its place among the dividend-paying mines, and sell at much higher figures. Pewabic is heavy, and declined to $10 on free sales. The reports from the mines are good. The mass of copper recently uncovered proved to be very pure, yielding from 95 to 97 per cent pure copper. Quincy declined from $64½ (December 28th) to $62¾, but latter rallied to $64, buyer 60, for 25 shares. Osceola sold at $33. Huron sold at $2. Allouez sold at $2½, assessment 50c. paid. National sold at $1⅛. Brunswick Antimony at $14.

In silver stocks, Bonanza steady but dull at $2¼. Catalpa declined from 80@75c. Sullivan sold at $1. Silver Islet, $5½. San Pedro advanced from 30@47½c. Napa Quicksilver declined from $3½@$3¼.

At the Boston Mining and Stock Exchange, there has been a fair amount of business transacted, but the market is lacking in activity. The Board occupied its new quar-

NON-DIVIDEND PAYING MINES.

NAME AND LOCATION OF COMPANY.		NUMBER OF SHARES.	Par.	ASSESSMENTS. Total levied to date.	Date and amount of last.		HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Dec. 30. H.	L.	Jan. 1. H.	L.	Jan. 2. H.	L.	Jan. 3. H.	L.	Jan. 4. H.	L.	Jan. 5. H.	L.
Advance	..												30c	....			30c	....
Albion, s. L	Nev.	150,000	100	397,500	Jun. 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Allouez	Mich	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Alpha	Nev.	....	....	420,000	Mar. 82	50	....	....	....	....	....	....	....	....	....	....	....	....
Alta	Nev.	100,800	100	1,366,890	Dec. 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Alta-Montana, G	Mon.	500 000	10	"	....	....	29c	27c	....	....	28c	....	29c	26c	28c	....	28c	25c
Am. Flag, s	Colo	125,000	10	300,000	Jun. 77	25	....	....	....	....	....	....	....	....	....	....	....	....
Barcelona, G	Nev	200,000	25	"	....	....	24c	23c	....	....	23c	23c	....	....	27c	24c	25c	22c
Battle Creek	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bear Creek	Cal.	300,000	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Beauce	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bechtel Con., G	Cal.	100,000	100	175,000	Oct. 82	10	....	....	....	....	....	....	....	....	....	....	....	....
Best & B'lcher, G, s	Nev.	100,800	100	1,345,790	No. 82	50	....	....	....	....	....	....	....	....	....	....	....	....
Big Pittsburg, s, L	Colo	200,000	100	"	....	....	10c	....	....	....	....	....	10c	....	14c	10c	13c	....
Black Jack, G	Cal.	100,000	2½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bonanza Chief	Mon	1,000,000	1	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bondholder	Colo	200,000	2½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Boston Con., G	Cal.	100,000	100	95,000	Oct. 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Boulder Con	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradshaw, s	Ariz	225,000	10	....	....	....	39c	....	....	....	40c	....	40c	....	....	....	37c	36c
Buckeye	Colo	400,000	5	"	....	....	....	....	....	....	....	....	....	....	....	....	1c	....
" pref	....	....	....	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bull-Domingo, s L	Colo	200,000	50	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bullion, G, s	Nev.	100,000	100	3,747,000	Oct. 82	50	....	....	....	....	....	....	....	....	....	....	....	....
Bye and Bye	Ariz	100,000	10	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Calaveras, G	Cal.	500,800	1	"	....	....	....	....	....	....	3c	....	....	....	....	....	....	....
C'lav'r's W. & M. Co	Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....	8c	7c	1.05	1.00
Cal., B. H., G	Dak.	100,000	100	480,000	Au. 82	15	....	....	....	....	....	....	1.20	....	....	....	....	....
Carbonate Hill, s L	Colo	200,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Catskill, s	Nev.	300,000	5	....	....	....	....	....	....	....	....	....	30c	....	....	....	....	....
Central Ariz'na, s	Ariz	100.000	100	....	....	....	37c	....	....	....	39c	....	....	....	....	....	37c	....
Chapparal	Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherokee, G	Cal.	150,000	10	....	....	....	6c	....	....	....	....	....	....	....	6c	....	....	....
Chollar	....	....	....	....	Sep. 82	50	....	....	....	....	....	....	....	....	....	....	....	....
Clarence	Can.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Colorado Cent'l, s	Colo	300,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Col'mb'a Con., G, s	Nev.	100,000	50	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cons. Imp'ri'l, G, s	Nev.	500,000	100	1,425,000	Jan. 82	10	....	....	....	....	....	....	....	....	2c	....	2c	....
Con. Pacific, G	Cal.	60,000	100	141,000	Au 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Crescent, s L	Colo	300,000	10	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Crowell, G	N. C.	500,000	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dahlonega, G	Ga.	250,000	1	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dardanelles, G	Cal.	100,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur	....	....	....	....	....	....	10c	9c	....	....	9c	....	9c	....	10c	9c	10c	9c
Dunderberg, s	Colo	150,000	10	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Durango, G	Dak.	500,000	1	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eastern Oregon	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elko Cons	....	....	....	....	....	....	....	....	....	....	....	....	9c	....	9c	....	9c	....
Empire, s	Ut'h	100,000	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Enterprise	Colo	....	....	....	....	....	....	....	....	....	60c	....	60c	....	....	....	60c	58c
Exchequer	Nev	100,000	100	630,000	Jan. 82	25	....	....	....	....	....	....	2.05	2.00	....	....	....	....
Fannie Barret	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Globe Copper	Ariz.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Placer, G	Colo	200,000	25	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Goodshaw, G	Cal.	100,000	100	200,000	Oct. 82	10	....	....	....	....	....	....	....	....	....	....	....	....
Granville, G	N. C.	800,000	1	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Harshaw, s	Ariz	100,000	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Head Center, s	Ariz	100,000	100	180,000	May 82	20	....	....	....	....	....	....	....	....	....	....	....	....
Hortense, s	Colo	200,000	10	....	....	....	10c	....	....	....	11c	....	11c	10c	10c	....	....	....
Index	Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Julia, G s	Nev.	110,000	100	1,394,000	Jan. 82	20	....	....	....	....	....	....	....	....	....	....	....	....
Kossuth, G s	Nev.	108,000	100	421,200	Aug. 77	15	....	....	....	....	....	....	....	....	....	....	....	....
Lacrosse, G	Colo	100,000	10	"	....	....	....	....	....	....	....	....	....	....	....	....	15c	....
Leviathan, s	Nev	100,000	100	380,000	Sep. 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Lucerne, s	Colo	500,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mariposa Pref., G	Cal.	50,000	100	1,687,500	Dec. 81	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., G	Cal.	100,000	100	1,950,000	Feb. 82	....	....	....	....	....	....	....	....	....	....	....	....	....
May Belle, G	Cal.	100,000	100	84,000	Dec. 81	20	....	....	....	....	....	....	....	....	....	....	....	....
Mayflower, s	Colo	100,000	100	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, G, s	Nev.	100,800	100	2,146,600	Oct. 82	$1	2.50	....	....	....	....	....	3.15	....	....	....	....	....
Michoacan Synd	Mex.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Miner Boy, G s L	Colo	500,000	10	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Miller	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mono, G	Cal.	50,000	100	525,000	Oct. 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Moose Silver, s	Colo	300,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nevada Syndi	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Standard, G	Cal.	100,000	100	20,000	Nov. 81	10	....	....	....	....	....	....	....	....	....	....	....	....
N. Horn-Silv'r, s L	Utah	400,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Noonday	....	60,000	16	208,000	Dec. 82	$1	....	....	....	....	....	....	....	....	....	....	....	....
Old Dominion, G	Ariz	200,000	100	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oriental	Nev.	200,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ori'nt'l & Miller, s	Nev.	400,000	25	....	....	....	13c	12c	....	....	12c	....	12c	....	12c	....	13c	12c
Overman, G s	Nev.	115,200	25	3,604,700	May 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Potosi	Nev.	112,000	100	500,640	Nov 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Prussian	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Quartz Creek	....	....	100	....	....	....	3c	....	....	....	3c	....	3c	....	3c	....	9c	....
Rappahannock, G	Va..	250,000	....	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Red Elephant, s	Colo	500,000	1	"	....	....	....	....	....	....	5c	....	5c	....	....	....	....	....
Retort	....	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
San Pedro, G s L	N. M	400,000	....	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cliff, s	Colo	200,000	25	"	....	....	37c	35c	....	....	38c	....	38c	35c	35c	....	35c	....
Silver Islet	Can.	....	50	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con	Mex.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Bodie, G	Cal.	100,000	....	100,000	Mar. 82	15	....	....	....	....	....	....	....	....	....	....	....	....
South Bulwer, G	Cal.	100,000	100	195,000	May 81	25	....	....	....	....	....	....	....	....	....	....	....	....
South Hite	Cal.	100,000	100	....	May 82	10	....	....	....	....	....	....	....	....	....	....	....	....
South Pacific	Cal.	....	5	....	....	....	10c	9c	....	....	9c	....	9c	....	10c	9c	9c	....
State Line No. 1, s	Nev.	200,000	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" No. 2, s	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" No. 3, s	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" No. 4, s	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" Nos. 1 & 4, s	Nev.	....	25	....	....	....	....	....	....	....	....	....	3c	....	3c	....	3c	....
" Nos. 2 & 3, s	Nev.	....	....	....	....	....	....	....	....	....	7c	....	8c	7c	8c	7c	8c	6c
Sutro Tunnel	Nev.	2,000,000	....	"	....	....	17c	....	....	....	18c	....	25c	17c	20c	19c	22c	20c
Taylor-Plumas	....	....	10	....	....	....	23c	22c	....	....	22c	22c	21c	19c	21c	20c	19c	....
Tioga, G	CC.	100,000	....	285,000	Oct. 82	10	....	....	....	....	....	....	....	....	....	....	....	....
Tuscarora, s	Nev	100,000	100	110,000	Oct. 81	15	....	....	....	....	....	....	....	....	8c	....	8c	....
Unadilla, s	Ariz	500,000	100	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Cons., G, s	Nev.	100,000	1	1,460,000	Oct. 82	$1	2.90	....	....	....	....	....	....	....	....	....	....	....
Utah	....	20,000	100	1,360,000	Dec. 82	$1	....	....	....	....	....	....	....	....	....	....	....	....
Vandewater	Nev.	200,000	100	"	....	....	32c	31c	....	....	31c	....	30c	....	32c	....	32c	....
Washington	Ariz.	200,000	10	....	....	....	12c	....	....	....	....	....	12c	....	....	....	....	....
Whalen Copper	Nev.	100,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wide West	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Willshire	Cal.	50,000	5	"	....	....	....	....	....	....	....	....	....	....	....	....	....	....

SALES.—Advance, 200; Alta-Montana, 4800; Barcelona, 20,300; Big Pittsburg, 3000; Bradshaw, 2500; Buckeye, 100; Calaveras, 100; Calaveras, W. & M. Co., 400; Caledonia, B. H., 250; Catskill, 100; Central Arizona, 600; Cherokee, 900; Consolidated Imperial, 1300; Decatur, 11,300; Elko Consolidated, 4300; Enterprise, 3000; Fannie Barrett, 1900; Hortense, 1300; Lacrosse, 100; Mexican, 110; Oriental & Miller, 12,600; Quartz Creek, 6900; Rappahannock, 1000; Red Elephant, 1900; Silver Cliff, 6800; South Pacific, 19,300; State Line, Nos. 1 & 4, 2900; State Line, Nos. 2 & 3, 29,800; Sutro Tunnel, 15,400; Taylor-Plumas, 43,700; Tuscarora, 2100; Unadilla, 3500; Union Consolidated, 300; Vandewater, 1900; Washington, 500. Non-dividend shares sold, 205,160. Total shares sold at all the Exchanges, 419,070.

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BOSTON MINING STOCKS.

	Dec. 29.		Dec. 30.		Jan. 1.		Jan. 2.		Jan. 3.		Jan. 4.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	2.12½						2.50	2.12½					400
Atlantic	16.75												20
Aztec													
Best & Bel											2.25		50
Bodie Con.													
Bonanza D.	2.18¾	2.12½	2.25	2.12½			2.25						1,400
Bruns. Ant.							14.00				14.00		80
Bulwer	1.20												100
California													
Cal. & Hec.	250						251		252		252		19
Carbon. Hill													
Catalpa	.55	.50	.50				.50		.77½		.77½	.75	4,270
Central Ariz													
Cherryfield							.25		.25		.25		1,200
Chrysolite													
Con. V'ginia	.52										.45		600
Copp'r Falls									2.00				100
Crescent													
Cumberl'd													
Deer Isle	.17		.15	.12½			.19½	.11	.10		.13	.11	9,100
Denver City													
Douglas													
Duncan													
Dunkin													
Empire	.27		.27				.30	.28	.30		.30		5,550
Eureka Con.													
Franklin	15.00						15.00		15.50	15.00	15.50		292
Gila County	.23						.23		.23		.24	.23	4,200
Hancock G.							9.12½						200
Harshaw													
Horn-Silver									1.87½				525
Huron	2.00												
Independ'ce													
Indian Q'n													
Little Pitts													
Madison													
Mammoth													
Mass. & N.M.	.18	.17	.17				.19	.17	.19	.18	.20	.19	19,400
Milton													
Napa	3.50		3.37½				3.25						450
National							1.50		1.50				250
North. Belle													
Osceola							33.00						5
Penn-Breck													
Pewabic	11.00		10.00						10.25	10.00			595
Pine Tree											.15		500
Plymouth													
Quincy							63.00	62.75	63.00	62.75	63.50		246
Ridge													
Robinson													
San Pedro	.30		.30				.40	.35	.50		.47½		2,300
Silver Islet							5.50						120
Silver King													
So. Pacific													
Standard	7.25								7.37½		7.25		44
State Line													
Nos. 2 & 3													
Sullivan	1.00								1.00				250
Sutro Tun	.20												500
Sycamore													
Twin Lead			.40	.38					.35		.35		1,700
Vizina													

PHILADELPHIA MINING STOCKS.

	Dec. 29.		Dec. 30.		Jan. 1.		Jan. 2.		Jan. 3.		Jan. 4.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American													
Argent	.12		.13	.12			.13		.14	.13	.13	.12	35,200
Arizona So.													
Aztec													
Battle Mt.	.02								.02		.02		15,000
Black Sul.													
Bodie													
Buena							.04				.04		7,000
California													
Calista									.05				2,000
Cincinnati	.13	.12	.13	.12			.11		.12				16,700
Comprom'e	.32½	.30	.30				.32½	.30			.32½		6,000
Dauntless	.02												1,000
Del Monte							.10		.11		.11		1,500
Denver City									.22	.21	.21		3,150
Fairview													
Eureka													
Girard	.18	.17	.18	.17			.16	.14	.17		.17		14,400
Golconda													
Golden Age													
Governor			.05								.05		1,400
Grand Uni'n	.09						.10		.10				10,200
Gunnison													
Hancock													
Intervener													
Iowa Gulch	.07		.08				.07		.08		.09		13,750
King Bul'on													
Little Pitt'd													
Little Maud											.04		1,100
L'g & D'y Hl													
McCullough													
Magnolia													
Montana													
Mt. Lincoln													
Mt. Sheridan			.08										1,100
National													
Orion			.10								.06		1,230
Palmetto E.													
Pembina	.13										.15		2,050
Penn-Breck	.10		.10						.18	.10	.18		10,900
Permanent													
Pizarro													
Pizarro Ex													
Potosi													
Rara Avis	.40						.40		.42½	.40	.40		3,600
Rara Avis E.			.08				.08		.04				7,500
Record	.10												
Rico Pion'r													
San Pedro													
Sierra G'nde	4.00	3.75	3.50	3.10			3.37½	3.00	3.15	3.10	3.15	2.95	10,250
Silver Cord	1.20		1.22½	1.12½			1.25		1.30	1.25	1.30		7,700
Silv'r Plume													
Silver Rock													
Sovereign													
Standard													
Sultana	.05		.05	.05			.06		.06		.05		26,200
Sutro Tun'l													
Tombstone			.87½	.85			.87½						1,800
Tranquilli'y													
Tyrone													
Victor							.01						4,600
Yale Mt.													

ters in the parlors of the Board of Trade, at the opening of the new year, and the change, it is hoped, will be beneficial to the members in the increased facilities enjoyed for doing business. Massachusetts & New Mexico is firm at 18@19c. Empire advanced to 30c. Deer Isle declined to 10c.

3 P.M.—There was no life to the market this afternoon. Calumet & Hecla sold at $252. Catalpa sold at 77½c. Quincy declined to $63½. San Pedro sold at 47½c. Allouez, $2½ bid, $2¾ asked. Atlantic, $17 asked. Antimony, $14 bid, $15 asked. Huron, $1¼ bid, $2 asked. Osceola, $32 bid, $33 asked. Pewabic, $10¼ bid. Silver Islet, $5 bid, $6 asked.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 5.

The Eastern manufacturers of pig-iron for the open market held so protracted a meeting at the rooms of the Iron and Metal Exchange to-day that we could not obtain a report before going to press.

American Pig.—We hear that in the earlier part of the week contracts for about 4000 tons of Foundry have been closed at our quotations. It is proper to say, however, that the figures could probably now be shaded, the market being weaker and in buyers' favor. We quote at tide-water, standard to choice brands, $24.50@$26.50 for No. 1 Foundry; $22.50@$23 for No. 2; and $20.50@$21 for Gray Forge. Foreign Bessemer pig is still held at $22.50 ex ship, with no takers, and spiegeleisen is unchanged on the basis of $34@$34.50 for 20 per cent.

Scotch Pig.—With the demand slackening further, continued low freights, further quantities of arrivals going into store and forced sales, Scotch pig is declining steadily. During the week, transactions foot up to about 750 tons, in some cases even below our reduced quotations, which are, for spot; Coltness, $25.75@$26.25; Summerlee, $24.50@$24.75; Glengarnock, $22.75@$23; and Eglinton, $21@$21.25. At the Wall Street Exchange, the cables to-day are as follows, showing only a slight change in Eglinton: Carnbroe, 56s.; Gartsberrie, 64s.; Summerlee, 63s.; Coltness, 67s. 6d., Langloan 67s; Glengarnock, 55s. 6d.; and Eglinton, 50s. 9d. Warrants are unchanged at 49s.

Steel Rails.—Very little has been done. Makers feel that the low prices have secured them nearly the whole field formerly occupied by iron rails, and that they have caused a cessation of the rolling of blooms abroad for our market. They do not look for any marked changes in the near future. We quote $40 at mill.

Old Rails.—We have not heard of a single sale, and quotations remain nominally $25@$25.50 for Ts.

Scrap.—Nothing has been done. Nominally, we quote $26@$26.50 ex ship for No. 1.

Philadelphia. Jan. 5.

A more confident expression of opinion has been heard within the last two or three days among iron manufacturers and brokers than for several weeks. In some cases, the expression may be dictated by a desire for better business, but an impartial review of the situation seems to justify the expectation of an improving trade, and in some cases of improving prices. No general upward tendency has exhibited itself, and none is likely for a while; but the unfavorable tendency in prices has certainly disappeared, and if nothing better can be expected, the market will be at least steadier. A greater confidence prevails, and every body is satisfied with the present situation and the immediate future of trade. Business is not as large as is desired, but the inquiries coming to hand point to an early revival of trade, such as has been predicted for weeks past.

Pig-Iron.—In pig-iron, there has been a great deal steadier demand, which absorbs the production, especially of standard brands, as fast as produced. In a few cases, some better quotations have been named to outside buyers; but to the general trade the same quotations continue, namely, $25@$26 for No. 1. No. 2 is unchanged. Gray Forge is quoted at $19@$21 at furnace. Large buyers have been in the market within forty-eight hours, and have bought freely from parties who were anxious to sell. Concessions have been extended in a few cases, but the disposition to sell in that way is not as strong as before the holidays.

Forge Iron of good brands is easily sold at $20.50@$21 at furnace; a number of small lots sold at $19. As soon as the weaker parties have unloaded all they have, a better feeling will prevail, and asking prices will be obtained. This is the sanguine view of the situation. The other side has been represented by careful brokers to be about this: that, in view of the reduction of tariff duties and the uncertainties as to the winter and spring supply of pig, coupled with the possibility of importations, crude iron will have a declining tendency, and nothing better than current rates may be expected. Bessemer pig has been under negotiation, and some business is done. Quotations, $22.50@$23.

Manufactured Iron.—Storekeepers report a fair demand in small lots at card rates. Large buyers are ready to place contracts if lower than quoted figures are accepted. There is a good deal of business of this character in hand, which will be placed, if terms are agreed upon, before Saturday. Buyers, if their terms are accepted, will place orders, while manufacturers feel that it is not wise to load up at present inside figures, since the least amount of business is accepted at some of the low rates prevailing.

Muck Bars are quiet, and selling between $39 and $40. A few blooms sold to-day at $66. Prices are weak. Skelp iron is weak and fluctuating.

Nails are quoted all the way from $3.50@$3.60. Some large inquiries have been received within a day or two, but the offers are very low. Jobbers are willing to buy car-load lots, if their terms are accepted, as they believe that the probabilities are, under a restricted policy, that makers will be able to command better terms. A season of activity is anticipated in the spring, and they are preparing to secure stocks for a sharp demand. Structural iron is under good inquiry, and specifications have arrived for late winter delivery; but nothing definite has been closed. Angles are quiet at 2·6@2·7c.; Tees, 2½c.; Beams, 4c.; Channels, 4·2c. Tank is quoted all the way from 2½@2¾c.; Sheet and Flange at like concessions; Bridge and Boiler-Plate iron have been inquired for, and current rates have been accepted for small lots for February delivery.

Steel Rails are moving mostly in small lots. Inquiries for a few large lots have been under consideration for two or three weeks, and, when some details as to delivery can be arranged, orders will be definitely placed. Old rails are weak, and fluctuating downward. Scrap is selling at $28 for best; $26@$27 for Medium; $22.50 for Crop Ends; $19.50 for Cast.

METALS.

NEW YORK, Friday Evening, Jan. 5.

Copper.—There is nothing new to report. The copper mills have not finished their repair work,

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usually done during the first weeks of the year, and are not even buying small lots to cover an occasional deficiency. Lake is nominally held at 18c., while Western is selling in a small way at 17¼c. London cables at the close £72@£72 5s. for Best Selected, and £65 10s.@£65 15s. for Chili Bars.

Preliminary estimates of a large number of Lake Superior mines, including the Calumet & Hecla, Osceola, Quincy, Conglomerate, Central, Atlantic, Allouez, Ridge, Franklin, Pewabic, Huron, and National, aggregating 54,600,000 pounds refined copper, entitle us to believe that the product for the year 1882 will range between 58 and 59 millions. Elaborate returns from the West and East indicate an additional product of at least 30 millions, so that the total output of the country will foot up to at least 88 and possibly 90 millions, of which, however, about five millions did not reach the market.

Tin.—Tin has been increasing in firmness, the bulk of the spot stock being held by strong parties. Sales during the week aggregate about 100 tons. Yesterday, cash sales of from 30 to 40 tons were made on the basis of 21⅛c.; and to day a transaction was made, 30 days, at 21¼c. We quote at the close, 21⅛@21¼c. England, which was down to £92 yesterday, reached to-day £94, spot Straits.

Lead.—The market is in a peculiar condition, but decidedly firmer. In a jobbing way, 4·75@4·80c. is asked and obtained readily for Common. In large lines, 4·65c. is freely offered, but 4.75c. is firmly held. We hear of no transactions.

Messrs. John Wahl & Co., of St. Louis, wire us to-day as folllows:

Our market is unchanged. Soft Missouri is quoted 4·30c., and Hard Lead 4·25c.

Spelter.—This metal continues to drag along. We hear occasional rumors of low figures, but can not learn that the basis of actual transactions is lower than 4⅛@4⅝c. for Domestic, which we quote.

Antimony.—Antimony is quiet and dull at 10½c. for Hallett's, and 11½c. for Cookson's.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 5.

Anthracite.

The anthracite coal trade continues quiet under the influence of unseasonable weather, which, however, now promises to turn for the better. Prices remain fairly steady, only occasional lots, which can not be looked upon as representing the market, going off at lower figures. There seems to be a growing conviction that matters will be so shaped that the prices will be maintained as they stand now, and the scarcity of some sizes, together with the fact that tide-water stocks are low, encourages this view. It is urged with some persistence, and we believe with much justice, that production should be restricted. On the other hand, it can not be denied that the dry weather in the coal regions is naturally producing that effect. We hold, however, that this is not sufficient, and are of the opinion that a short stoppage, at least, should be decided upon, if it were only to convince buyers that there is no prospect of the "break" which they are apparently waiting for.

The production of anthracite for the week ended December 30th was 453,882 tons, as compared with 608,370 tons the previous week, and 594,845 tons for the corresponding week of 1881. The total product from January 1st to December 30th was 29,316,387 tons, as against 27,991,164 tons for the like period of a st year, showing an increase this year of 1,325,223 tons.

A gentleman prominently connected with the coal trade of Philadelphia sends us the following, under date of the 4th:

The local trade has held on remarkably well for this season, but shows signs of weakness on account of the continuance of mild weather. Restriction for one or two weeks this month is now agitated, and will no doubt be shortly determined upon.

Shipments are very light. The freight to Boston remains at $2, and orders at that rate must remain scarce while charters are made at $1.25 in New York.

Until the winter sets in in earnest, if we are to have any winter, the trade here will be very quiet.

Bituminous.

The bituminous coal trade is quiet, but it must be noted that there are inquiries from parties who do not usually enter the market at this time of the year. This is particularly the case with certain Eastern railroads, which, it is stated, are buying Cumberland coal because the parties who contracted for their supply are not able to fill them as fast as desirable. The Clearfield operators are doing a little better so far as the supply of cars is concerned, and are taking less Cumberland coal than for some time past. Freights are generally easier, and prices here are a little weaker. We quote Cumberland, according to quality, $4.65@$4.85.

BULLION MARKET.

NEW YORK, Friday Evening, Jan. 5.

Under an active and enlarged demand for Eastern Exchange, the India Council has sold, at improved rates, a large amount of its bills within the past fortnight. This has checked the decline in silver, and it is inquired for at an advance of a cent an ounce. From present appearances, another advance seems probable.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Dec. 30....	50	108⅝	Jan. 3.....	50¼	108⅞
Jan. 1....	50⅛	Hl'day.	Jan. 4.....	50⅜	109⅛
Jan. 2....	50 3-16	108⅝	Jan. 5.....	50 7-16	109¼

BULLION PRODUCTION FOR 1882.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1882.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13½ per cent to arrive at actual value.

MINES.	States.	For the week.	Month of December.	Year from Jan. 1st, 1882.
*Alice, G. S.	Mont.	.....	.....	$789,591
*Alta-Montana, S. L.	"	.....	.....	343,290
Barbee & Walker, S.	Utah	.....	.....	84,262
*Belmont	Mont.	.....	.....	26,916
Betty O'Neal, S.	Nev.	.....	.....	59,159
*Black Bear, G.	Cal.	.....	.....	69,015
Bodie, G. S.	"	.....	$21,444	414,425
*Boston & Montana, G.	Mont.	.....	.....	265,615
*Caledonia, G.	Dak.	.....	.....	76,655
*Caribou, S.	Colo.	.....	.....	126,918
*Central Arizona, S.	Ariz.	.....	.....	180,858
*Christy, S.	Utah.	.....	.....	334,114
*Chrysolite, S. L.	Colo.	.....	.....	289,578
Cons. Bobtail, G.	"	.....	.....	99,784
*Contention, S.	Ariz.	.....	.....	1,692,604
Crismon-Mammoth, G.	Utah.	.....	.....	63,579
*Custer, G. S.	Idaho.	.....	.....	882,331
*Deadwood-Terra, G.	Dak.	.....	.....	551,052
*Derbec Blue Grav., G.	Cal.	.....	.....	133,781
*Eureka Con., G. S. L.	Nev.	.....	.....	903,538
Evening Star, S. L.	Colo.	.....	.....	862,520
*Father de Smet, G.	Dak.	.....	$21,288	391,269
*Frisco M. & S. Co., S. L.	Utah.	.....	.....	348,574
Girard, S.	Ariz.	.....	.....	90,964
Grand Central, S.	"	.....	.....	1,136,719
*Hall-Anderson, G.	N. S.	.....	.....	13,050
*Head Center, S.	Ariz.	.....	.....	145,636
*Hecla, G. S. L.	Mont.	.....	.....	77,945
*Homestake, G.	Dak.	.....	.....	1,114,568
Horn-Silver, S. L.	Utah.	92,500	204,500	3,539,516
*Hope, S.	Mont.	.....	.....	304,067
Idaho, G.	Cal.	.....	.....	395,540
*Independence, S.	Nev.	.....	.....	152,527
*Indian Queen, S.	"	.....	.....	183,650
*Inyo Cons., G.	Cal.	.....	.....	59,421
Ingersoll, S.	Ariz.	.....	.....	90,000
Iron Silver, S.	Colo.	.....	.....	885,436
*Jocuistita, S.	Mex.	.....	.....	700,585
*Kentuck	Nev.	.....	.....	8,526
*†Leeds, S.	Utah.	.....	.....	11,988
Lexington, S.	Mont.	.....	.....	88,508
*Little Pittsburg, S. L.	Colo.	.....	.....	134,538
Manhattan, S.	Nev.	.....	.....	64,300
Morning Star, S. L.	Colo.	.....	.....	478,626
Mount Diablo, S.	Nev.	.....	.....	294,397
*Navajo, G. S.	"	.....	.....	364,193
New York Hill, G.	Cal.	.....	.....	105,136
Noonday, G.	"	.....	.....	67,818
North Noonday, G.	"	.....	.....	83,456
Northern Belle, S.	Nev.	.....	.....	749,012
†Ontario, S. L.	Utah.	.....	.....	2,221,303
Ophir, G. S.	Nev.	.....	.....	39,472
*Oxford, G.	N. S.	.....	.....	15,564
Pascoe, S.	Utah.	.....	.....	4,575
*Pleasant Valley, G. S.	Cal.	.....	.....	46,360
Robert E. Lee, S.	Colo.	.....	.....	292,550
*Satemo, G.	N. S.	.....	.....	11,095
Savage, S.	Nev.	.....	.....	33,281
*Silver Bow, G. S.	Mont.	.....	.....	330,182
Silver King, S.	Ariz.	.....	.....	711,405
*Spring Valley, G.	Cal.	.....	.....	152,000
Standard, G.	"	.....	30,700	1,101,874
Star, S.	Nev.	.....	4,615	61,716
Stormont, S.	Utah.	6,430	19,690	283,934
*Sullivan, S.	Maine.	.....	.....	4,536
Syndicate, G.	Cal.	.....	.....	38,509
Tintic M. & M. Co.	Utah.	3,170	10,576	58,449
*Tip Top, S.	Ariz.	.....	.....	209,428
*Tombstone, G. S.	"	.....	.....	889,896
*Union Con., S.	Nev.	.....	.....	318,291
Vizina, S.	Ariz.	.....	.....	165,200
Total amount of shipments to date				$26,999,170

* Official. † Net. ‡ Assay value. *G Gold. S. Silver L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended January 5th, as compiled from various sources, amounted to $496,579.80, as against $472,178.80 reported for the previous week. The receipts from January 1st, 1883, to date, are $496,579.80.

Foreign Bank Statement.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 5 per cent. During the week, the bank lost only £45,000 bullion; but the proportion of reserve to its liabilities was reduced from 36 1-16 to 29⅞ per cent, against 31⅝ per cent at this date in 1882. January 4th, the bank gained £6000 bullion on balance. The weekly statement of the Bank of France shows an increase of 9,575,000 francs gold and 8,500,000 francs silver.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended December 30th, and year from January 1st:

TONS OF 2240 LBS.	1882. Week.	1882. Year.	1881. Week.	1881. Year.
Wyoming Region.				
D. & H. Canal Co.	.....	3,581,973	81,443	3,581,781
D. L. & W. RR. Co.	77,104	4,595,518	97,818	4,271,953
Penna. Coal Co.	28,007	1,438,821	27,621	1,406,659
L. V. RR. Co.	12,333	1,095,266	27,371	1,155,492
P. & N. Y. RR. Co.	2,979	194,680	3,501	105,454
C. RR. of N. J.	52,023	2,294,234	47,088	2,282,160
Penna. Canal Co.	.....	529,026	.....	457,260
	172,446	13,729,518	284,842	13,260,159
Lehigh Region.				
L. V. RR. Co.	84,334	4,913,818	105,066	4,519,907
C. RR. of N. J.	55,465	2,270,168	46,751	2,175,906
S. H. & W. B. RR.	.....	51,756	.....	10,026
	139,799	7,235,742	151,817	6,706,739
Schuylkill Region.				
P. & R. RR. Co.	117,744	7,047,360	156,878	6,945,243
Shamokin & Lykens Val.	22,618	1,238,842	.....	1,014,823
	140,362	8,286,202	156,878	7,960,066
Sullivan Region.				
St Line&Sul.RR.Co.	1,275	64,925	1,308	64,200
Total	453,882	29,316,387	594,845	27,991,164
Increase	.....	1,325,223	.....	.....
Decrease	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1877.....20,134,739 tons.
" " " " 1878.....17,127,681 "
" " " " 1879.....25,769,385 "
" " " " 1880.....23,096,111 "

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 896,452 tons, as compared with the corresponding period in 1881.

Belvidere-Delaware Railroad Report for the week ended December 30th:

	Week.	Year. 1882.	Year. 1881.
Coal for shipment at Coal Port (Trenton)	2,843	101,786	84,399
Coal for shipment at South Amboy	10,822	832,743	777,950
Coal for distribution	18,023	778,407	732,083
Coal for company's use	3,030	133,473	115,851
Total	34,718	1,846,409	1,710,283
Increase	.....	136,126	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended December 23d was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons
Cumberland Region, Md.		
Tons of 2240 lbs	41,999	1,471,151
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	7,663	397,314
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	5,551	266,274
East Broad Top	2,383	91,061
Clearfield Region, Pa.		
Snow Shoe	4,363	229,276
Tyrone and Clearfield	52,756	2,743,313
Alleghany Region, Pa.		
Pennsylvania RR.	6,659	514,918
Pittsburg Region, Pa.		
West Penn RR.	12,743	361,788
Southwest Penn. RR.	3,043	108,287
Penn & Westmoreland gas-coal, Pa. RR	26,308	1,248,465
Pennsylvania RR.	14,581	634,135
Total	178,049	8,065,982

The Transportation of Coke over the Pennsylvania Railroad for the week ended December 23d and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	2,175	108,739
West Penn. RR	2,527	116,361
Southwest Penn. RR	39,292	1,759,916
Penn. & Westmoreland Region, Pa. RR	6,080	272,263
Pittsburg, Penn. RR.	16,103	548,149
Snow Shoe (Clearfield Region)	256	20,747
Total	66,433	2,826,175

Horsford's Acid Phosphate.

Mental and Bodily Exhaustion, etc.

DR. G. KAISER, Indianapolis, Ind., says: "I have prescribed it for dyspepsia, impotency, and mental and bodily exhaustion; and in all cases it has given general satisfaction."

ONTARIO SILVER MINING COMPANY,
No. 18 Wall Street,
NEW YORK, Jan. 5, 1883.

DIVIDEND NO. 87.

The regular monthly dividend of FIFTY CENTS per share has been declared for December, payable at the office of the Transfer-Agents, Lounsbery & Haggin, 18 Wall Street, on the 15th inst. Transfer-books close on the 10th inst.

LOUNSBERY & HAGGIN,
Transfer-Agents.

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RICHARD P. ROTHWELL, C.E., M.E., }
ROSSITER W. RAYMOND, Ph.D., } Editors.
CHARLES KIRCHHOFF, Jr., M.E., }

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WE have been shown this week the first bar of Alabama tin, which, according to all appearance, is a very fair metal.

NOVA SCOTIA is now taking the lead of us in one very important matter, having made a new departure in requiring underground over-men to pass examinations before they can hold certificates. This is a course which has always been urged by those who have the best interests of the miners and of the operators at heart. No one feels as pointedly as the engineer of a mine himself the necessity of having the support of trained and reliable men as his aids. The local government of Nova Scotia has made a step in the right direction, but, we believe, should not halt there. It should establish schools in the mining districts where prospective candidates could acquire some theoretical knowledge, and where they would be afforded the means of qualifying themselves as mine-bosses or over-men.

THE annual meeting of the Philadelphia & Reading Railroad, held at Philadelphia recently, has given much encouragement to the stockholders, as the reports submitted made an exceptionally good showing; and as it is now certain that the receivership will soon terminate, the deferred income scheme turns out to have been far more successful than was generally believed. Of the entire amount of the subscription offered, ten million dollars, the sum of $7,605,491.30 has been paid in cash, of which the bulk, $6,643,505 was raised in England. Mr. FRANKLIN B. GOWEN, to whom the credit of this extraordinary financiering achievement is due, has been re-elected president. The rumors that he will resign as soon as the dissolution of the receivership is attained have been authoritatively denied.

IT has been frequently urged that civil and mining engineers, who often have charge of large bodies of men engaged in perilous work in inaccessible regions, should possess at least a limited knowledge of operative surgery. They should certainly know enough of the art to be able to tie an artery, stanch the flow of blood, or give temporary relief to those who are suffering from burns or scalds. The Society for the First Aid to Injured has been doing very good work in a general way in this direction in this city; but until now, so far as we know, though it has been agitated, no provision has been made in any of our technical colleges for this branch of instruction. We are pleased to note that the Trustees of the University of Pennsylvania, recognizing the importance of the subject, have arranged for a series of lectures before the senior classes of the technical department. We trust that the good example so set will be soon followed by other institutions.

MANUFACTURERS of copper have again entered into the usual contract for their supply of Lake, and have taken twelve millions of pounds for delivery during the next four months at the price of 18 cents. Probably this was done with the usual understanding that first hands maintain that figure during the interval, and we shall seek Lake copper lifeless and unchanged for the next four months. The fact that manufacturers were willing to pay the price named is very encouraging to the producers of Lake copper, and, to a certain extent, to makers of outside brands. It should not be forgotten, however, that the real state of the market is reflected by the quotations of Baltimore, Star, and other brands, which have not yet succeeded, however much they may desire it, to obtain the recognition for quality which Lake enjoys. The latter is considered absolutely indispensable by manufacturers of rolled metal, and, therefore, the growing quantity of Western refined metal must struggle for the remainder of the demand, and it may well happen that, for a time at least, the differences in prices between the two grades will become much greater than their relative merits will warrant. A year ago, it was half a cent per pound; now, it is nearly if not fully double that. This can not, of course, go on indefinitely, as every fraction of a decline in Western coppers will win over to them new friends, which careful refining and straightforward dealing will secure as permanent customers. We are far from taking a gloomy view of the future of copper, even considering that the Lake companies are producing 4,750,000 pounds per month, and have an assured market for the next four months for only 3,000,000 pounds. We fully appreciate the regulating influence which the handling of nearly two thirds of the entire product of the country by a harmonious body of producers exercises. On the other hand, however, we have every evidence of the growing increase in the production of other sections. The market for Western copper and the situation abroad will therefore be watched with the closest attention during the coming months. Any pressure here will be promptly relieved by shipments of matte and possibly crude copper to England, unless the market in England should take an exceptionally unfavorable turn.

WE have just received the first of the series of maps compiled by the Anthracite Survey, organized in the summer of 1881, under the direction of Mr. C. A. ASHBURNER. They are of a uniform size, 26 by 32 inches, and include a general preliminary map of the anthracite coal regions, with columnar sections through the various coal-fields, showing the identity of the beds so far as traceable, a sheet giving the well-known production diagram, and the entire set relating to the Panther Creek region of the Southern field, extending from Tamaqua to Mauch Chunk. The latter are very elaborate and complete, and serve well to illustrate the grand plan followed by the Survey. There are, first, three sheets giving the mine workings and the structure of the coal-beds in the Panther Creek basin, and the shape of the floor of the Mammoth bed where mined, and its most probable structure in undeveloped areas, by underground contour curves 50 feet vertically apart, on a scale of 800 feet to one inch. Another sheet reproduces Mr. RICHARD P. ROTHWELL'S topographical map of the Panther Creek basin, made in 1869; and a fifth shows a diagram of the surface area of the basin underlain by the Mammoth bed, and the actual area of the floor of that coal-bed developed into the horizontal plane, on a scale of twenty-four hundred feet to an inch. This sheet possesses particular interest, being, we believe, the first attempt of that kind in so exhaustive a way. The area of the bed is developed in horizontal shaded bands, each band indicating the area of the floor of the bed, contained between contour curves drawn every 200 feet vertically apart, referred to a tidal datum, due record being made of the local overturned part of the bed, and of a small acreage eroded. From tables accompanying the map, we learn that the surface area of the Panther Creek basin, underlain by the Mammoth bed, is 6844·45 acres, the total area developed horizontally being estimated at 10,858·43 acres. Corresponding figures for the Buck Mountain bed are 8028·08, and 12,767·86 acres; for the Lower Red Ash bed, 5641·15 and 8920·62; and for the upper Red Ash bed, 3949·64 and 6219·61 acres. There are a large number of sections of the basin, and of the coal-bed themselves,

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and columnar sections of the coal measures, showing the relation of the beds and the character of the rock intervals in the greater number of cases. We understand that, besides the Panther Creek series now issued, there are ready for the printer a number of the sheets for the Northern coal-field, between Shickshinny and Wilkes-Barre; the Green Mountain, Black Bear, and Hazleton basins, in the Eastern Middle coal-field; and that portion of the Mahoning and Shenandoah basins of the Western Middle coal-field lying between Delano and Ashland.

Much valuable material to place on record such a mass of data was tendered to the survey by individual and corporate producers of anthracite coal, some of it available only after critical examination and careful revision. Nevertheless, as the plan is much more comprehensive than originally foreseen, the work has occupied more time, and has called for more money than the present appropriation will allow. The Anthracite Survey costs $17,500 per annum; and it is estimated that, to finish the work as now begun, it will require, inclusive of surface topographical work in some districts as yet correctly surveyed, $50,000, to be distributed over at least three years. The appropriation made in 1881 will be exhausted in November, and no funds will be available for winter work, to publish the records of the field-work of this year.

In view of the great practical importance of this excellent work, it seems almost superfluous to urge the necessity of providing for its continuance by a prompt appropriation of the sums needed to carry it to completion. The anthracite interests of the State of Pennsylvania are of such magnitude, and all that affects them so directly influences the prosperity of that great State, that we can not conceive how its claims could be overlooked or denied. We trust that we may soon be able to announce that every shadow of a doubt concerning the future of the Anthracite Survey will soon be removed. It is an enterprise broadly conceived, and diligently, intelligently, and faithfully carried out thus far. The work already done will prove the most eloquent advocate for the continuance of the survey as at present conducted.

REVIEW OF THE COAL TRADE IN 1882.

Anthracite.

The year 1881 was one of exceptional prosperity so far as volume of business in anthracite coal was concerned, and it was satisfactory too in regard to values. The impulse of that year was continued into 1882, and notwithstanding many adverse circumstances, it was so well maintained that 1882 now stands on the records of the trade as the "banner" year. The shipments have aggregated fully 29,500,000, or at least one million of tons more than last year, and the production has, therefore, been at least 31,000,000, including colliery consumption. The year has been remarkable for a number of important occurrences, which are calculated to largely extend notably the Western markets for anthracite coal. This field, upon the supreme value of which the conductors of the *Engineering and Mining Journal* and COAL have insisted for many years, is now attracting the attention of railroad managers, and the year 1882 has seen mature important projects looking to its better exploitation. The Philadelphia & Reading Railroad has, through its alliance with Vanderbilt, secured Western connections; the Delaware, Lackawanna & Western has completed its western extension; and the New York, Lake Erie & Western has made additional arrangements to obtain a larger share of Westbound anthracite tonnage. The only rival which anthracite now has in certain portions of the West is the Connellsville crushed coke, which has been gaining ground steadily, in a limited way, and which we believe is destined to play quite an important part in the future. In some sections of the country, notably in some of the Southern interior States, where coking coals are available and anthracite is too costly, crushed prepared coke may become a valuable household fuel.

On the whole, the year has been a prosperous one for the producing and carrying interests. The quantity of coal mined and handled has been heavy, and the prices obtained have been satisfactory. There has been concerted action among the leaders of the coal trade, though perhaps not as much harmony as might be desirable. While the policy pursued has turned out to be favorable to the large producers, it can not be denied that it has been hurtful to other allied interests, particularly the smaller retail dealers who have little capital.

In detail, the course of the market was as follows, from month to month:

JANUARY.—The month opened with fair weather and a hopeful feeling, which, however, a continuance of mild days dispelled. Prices became unsettled, and were falling lower and lower, when, in the middle of the month, it was decided to stop three days each week during the last two weeks of the month. This produced a better feeling, temporarily, but also led to the first signs of uneasiness among the miners. Although the production for the month was only 1,833,910 tons, the stock at tide-water increased from 497,024 tons at the beginning of the year to 586,933 tons at the close of the month.

FEBRUARY.—The trade being in an unsatisfactory condition, it was decided to work full only during the first week of the month, and restrict work to three days per week during the remainder. Although, in addition to this, production was hampered by snow-storms during a part of the month, and an improved demand, business dragged along until the close, when the market was getting into better shape. There was some irregularity during the last days, chiefly owing to the fact that no announcement as to the arrangements for curtailing in March had been made. The February tonnage was only 1,605,243 tons. The stock had declined to 546,315 tons.

MARCH.—Buyers, confident that matters would shape themselves in a manner favorable to their interests, continued to follow the policy of purchasing only from hand to mouth, even after it had been decided that work at the mines should stop nine days during the month. There was considerable agitation among the miners, and much apprehension of labor troubles, especially as strong efforts were making to rally the men under one general organization. This uneasiness was chiefly confined to the Wyoming and Lackawanna fields; but wiser counsels prevailed among the men, and they abandoned any attempt to enforce an increase of wages, while the trade was in so unsatisfactory a condition. The production during the month had been 2,101,759 tons, and stocks had grown to 666,318 tons at tide-water.

APRIL.—This month opened with the announcement of a stoppage of six days and the issuing of circulars showing a reduction in prices, which had the effect of increasing the timidity of buyers and demoralizing the market. The trade continued dull during the month, the apathy in business, and the hesitation as to the probable outcome of the crops contributing much toward that result. The stock at tide-water increased to 752,865 tons, while the production was 2,135,802 tons.

MAY.—Late in April, a restriction of six days during the beginning of the month was ordered, and yet the dullness continued unabated. There was frequent allusion to "restriction which does not restrict," and the fact that the production was 2,266,097 tons during the month, although half-time was ordered for the last two weeks of the month also, making twelve idle days in all, proves that there is some truth in such accusations. The tide-water stock was reduced to 611,441 tons, and the tonnage 2,266,097 tons. During the closing week of the month, there was more activity, it being understood that an advance in the price was contemplated.

JUNE.—This month opened with the threatened advance, which turned out to be the startling rise of ten cents average per ton. This inaugurated a policy followed for many months afterward of steadily advancing the price in the face of an unwilling market, which on an average was a month behind the published rates. It resulted in concentrating all the buying into a few days preceding the close of the month, though much of it simply took the form of an extension of contracts entered into during previous months. The growing uneasiness of labor induced the companies generally to concede a just advance in wages of ten per cent, to go into effect on the first of July. The June product was very heavy, being 2,625,039 tons; the stock on hand at the close being 588,986 tons.

JULY.—An advance of the circular was made, equivalent approximately to the increase in wages, and therefore perfectly legitimate. It had, however, been thoroughly discounted during the previous month, and trade went on very quietly. During the last weeks of the month, it was quite generally understood, through unofficial utterances, that a further advance was contemplated, but without stimulating buyers as largely as the same tactics have done before. The July tonnage was 2,757,249 tons, the stocks at the close being 575,537 tons.

AUGUST.—Although the threatened increase in the circular price was carried out, resulting in a nominal advance of from ten to fifteen cents per ton, it fell flat, and did not in reality form the basis for more than a few transactions. The business continued so dull that it was deemed advisable to take some decisive steps to make buyers realize that the companies were in earnest, and accordingly it was arranged to restrict six days toward the end of the month. Notwithstanding this action, occasional cheap lots were offered in the open market, and good buyers found little difficulty in "extending" old contracts at rates for previous months. Production was 2,894,703 tons, and stocks at the close 603,042 tons.

SEPTEMBER.—September opened with another advance, but business was quiet, and it was not till the middle of the month that August prices could be said to be ruling figures. The shipments of the mines were reported by Mr. Jones to be 2,558,443 tons, and the stocks at the close 513,934 tons.

OCTOBER.—The gradual improvement in general business, due to the assurance that the country was again blessed with an ample harvest, and a feeling of prosperity and confidence in all sections of the country, should have developed a lively inquiry. Nevertheless, the usual monthly advance fell flat, because in the past the future had been already heavily discounted, and consumers had quite generally heavy quantities of coal on hand or contracted for. Production ran up to 2,945,087 tons, while the stocks at tide-water were only 524,050 tons.

NOVEMBER.—In November, the trade was fair and started off with good hopes and in an expectant attitude, as one or two cold periods seemed to promise a severe winter. As day after day passed by, however, uniformly pleasant, the trade began to droop and prices commenced to get very decidedly "mixed." Buyers more than ever before declined to purchase except for immediate wants, looking forward to an early and general decline. Production was less heavy, shipments aggregating 2,797,372 tons, while stocks remained nearly stationary at 535,891 tons.

DECEMBER.—This month was a continuance of the preceding one so far as the attitude of the producers and consumers was concerned. In the middle of the month, the Pennsylvania Coal Company announced, alone, a reduction, earlier than anticipated. The figures quoted were very near those actually ruling, although the nominal quotations of the other companies were not changed.

The following tables will show the variations in the circular prices of the various companies during the year:

CIRCULAR PRICES OF WILKES-BARRE COAL AT PORT JOHNSTON IN 1882.

Month.	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
January	$3.90	$3.90	$3.90	$4.05	$4.20	$3.90
February	3.90	3.90	3.90	4.05	4.20	3.90
March	3.90	3.90	3.90	4.05	4.20	3.90
April	3.90	3.90	3.90	3.90	4.00	3.90
May	3.90	3.90	3.90	3.90	4.00	3.90
June	4.00	4.00	4.00	4.00	4.10	4.00
July	4.10	4.15	4.15	4.15	4.30	4.20
August	4.30	4.30	4.30	4.30	4.45	4.35
September	4.30	4.30	4.30	4.45	4.65	4.55
October	4.30	4.30	4.30	4.55	4.85	4.75
November	4.30	4.30	4.30	4.55	4.85	4.75
December	4.30	4.30	4.30	4.55	4.85	4.75

CIRCULAR PRICES OF LACKAWANNA COAL AT WEEHAWKEN IN 1882.

Month.	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
January	$3.90	$3.90	$3.90	$4.05	$4.20	$4.10
February	3.90	3.90	3.90	4.05	4.20	4.10
March	3.90	3.90	3.90	4.05	4.20	4.10
April	3.90	3.90	3.90	3.90	4.00	4.05
May	3.90	3.90	3.90	3.90	4.00	4.05
June	4.00	4.00	4.00	4.00	4.10	4.15
July	4.00	4.00	4.15	4.15	4.30	4.35
August	4.15	4.15	4.30	4.30	4.45	4.50
September	4.15	4.15	4.30	4.45	4.65	4.70
October	4.15	4.15	4.30	4.55	4.85	4.90
November	4.15	4.15	4.30	4.55	4.85	4.90
December	4.15	4.15	4.30	4.55	4.85	4.90

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CIRCULAR PRICES OF PITTSTON COAL AT NEWBURG IN 1882.

Month.	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut
January	$3.95	$3.95	$3.85	$3.90	$4.05	$3.90
February	3.95	3.95	3.85	3.90	4.05	3.90
March	3.95	3.95	3.85	3.90	4.05	3.90
April	3.75	3.75	3.60	3.60	3.75	3.70
May	3.75	3.75	3.60	3.60	3.75	3.70
June	3.75	3.75	3.60	3.60	3.75	3.70
July	3.95	3.95	4.05	4.05	4.25	4.25
August	3.95	3.95	4.05	4.05	4.25	4.25
September	4.05	4.10	4.10	4.20	4.40	4.40
October	4.05	4.10	4.10	4.30	4.55	4.55
November	4.05	4.10	4.10	4.30	4.55	4.55
December (at Weehawken)	4.05	4.10	4.10	4.10	4.55	4.55

CIRCULAR PRICES OF SCRANTON COAL AT HOBOKEN IN 1882.

Month.	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
January	$3.90	$3.90	$3.90	$4.05	$4.20	$3.90
February	3.90	3.90	3.90	4.05	4.20	3.90
March	3.95	3.90	3.90	4.05	4.20	3.90
April	3.90	3.90	3.90	3.90	4.00	3.90
May	3.90	3.90	3.90	3.90	4.00	3.90
June	3.90	3.90	3.90	3.90	4.00	3.90
July	3.90	3.90	3.90	3.90	4.00	3.90
August	3.90	3.90	3.90	3.90	4.00	3.90
September	4.30	4.30	4.30	4.45	4.65	4.65
October	4.30	4.30	4.30	4.55	4.85	4.85
November	4.30	4.30	4.30	4.55	4.85	4.85
December	4.30	4.30	4.30	4.55	4.85	4.85

CIRCULAR PRICES OF HARD WHITE ASH COAL AT ELIZABETHPORT IN 1882.

Month.	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
January	$4.85	$4.85	$4.25	$4.25	$4.25	$3.90
February	4.85	4.85	4.25	4.25	4.25	3.90
March	4.85	4.85	4.25	4.25	4.25	3.90
April	4.85	4.85	4.25	4.25	4.25	3.90
May	4.85	4.25	4.25	4.25	4.25	3.90
June	4.85	4.85	4.25	4.25	4.25	4.00
July	5.00	5.00	4.35	4.35	4.35	4.15
August	5.15	5.15	4.50	4.50	4.50	4.30
September	5.15	5.15	4.50	4.60	4.70	4.50
October	5.15	5.15	4.50	4.70	4.90	4.70
November	5.15	5.15	4.50	4.70	4.90	4.70
December	5.15	5.15	4.50	4.70	4.90	4.70

Bituminous.

The existence of many local fields of bituminous coal throughout the country, each catering to special markets of its own, makes it impossible to speak in any thing but the most general terms of the record of coal mining throughout the country during the year just passed. The sharpest struggles in our section reflecting upon the markets tributary to it may leave others nearly untouched. Great prosperity may aid in the rapid development of one field, while another is languishing under adverse circumstances. On the whole, however, the year has been a favorable one. Production, although frequently interfered with by labor troubles, has been very large, and consumption, sometimes affected by similar mishaps, has grown wonderfully. There has been an unusual amount of railroad building, notably in the West, and much of it has directly or incidentally opened out new sources of supply. There have been very heavy investments by strong parties, especially in the Clearfield, Connellsville, and other regions in Pennsylvania, in Virginia and West Virginia, and some of the Southern States. The progress in our Rocky Mountain States has been particularly noteworthy, and the developments already made in Colorado, Montana, Wyoming, Arizona, and New Mexico give promise of a very important industry, which will reflect very favorably upon the precious and base metal mining ventures in those territories.

THE CUMBERLAND DISTRICT.—The year 1882 will be memorable in the annals of the trade of this district as the one in which the operators engaged in a prolonged conflict with the miners, and succeeded in breaking a power which threatened to destroy the supremacy of the Cumberland coal in the markets of the Eastern seaboard.

The trade moved along quietly from the beginning of the year, opening at $5@$5.25 alongside, until the middle of February, when the executive officers of the Knights of Labor of the Cumberland District issued an appeal to the miners of the Clearfield region, asking them to demand an increase of wages from 50 cents to 65 cents per ton—an appeal which did not, however, seem to meet with any favorable reception. A week later, a meeting of the Cumberland producers was held, the outcome being that it was decided unanimously to announce a reduction of wages to 50 cents for mining, to take effect on the 15th of March, and as the men declined to work at those terms, a lock-out was begun at that date. The miners began a counter-move by trying to induce the men of rival regions to strike for an advance. They succeeded temporarily in the Meyersdale region; but the effort of the Clearfield men to stop after the 15th of April fell flat. Meanwhile, the companies maintained a firm stand, notwithstanding the fact that one large contract after the other was carried off by Clearfield operators. After a long period of hesitation, due to very natural fears, the Cumberland companies decided that the only means of attaining their end was to bring in foreign labor. Arrangements to that effect were completed toward the close of May. Meanwhile, another futile effort was made to stir the Clearfield men out of their apathy, and the middle of June was reached with growing excitement in the Cumberland region over the introduction of new labor. The flagging hopes of the men were revived by a partial suspension toward the close of June by the Clearfield miners; but prompt measures on the part of their employers put an end to that effort toward the end of July, while the refusal of the Baltimore & Ohio Railroad to carry 65-cent coal from the Meyersdale region broke the back of the strike there. Meetings of the men became more numerous in the Cumberland region, and a growing feeling of weakness became manifest. The men were guilty of some excesses. The companies declined to treat with the representatives of the Knights of Labor, and to make any promises in regard to the dismissal of the new men; and seeing that their efforts were in vain, the men finally surrendered unconditionally, work being resumed in a small way on the 1st of September, after a strike of twenty-four weeks. The significance of this protracted struggle is not measured by the reduction in wages from 65 to 50 cents per ton. It was a question whether the companies or the men should be masters of the situation, and its long duration is largely due to the fact that the men were led by their leaders to believe that harmony could not prevail among the companies, and that the Clearfield miners would come to their aid. The men, having had many years of prosperity, were, as a rule, financially stronger than those in any other region. The companies have suffered a severe loss, not only through a very considerable reduction in their tonnage, but also through the transfer of nearly all the great annual contracts to the Clearfield region. Since the cessation of the strike, the fair demand for Cumberland coal, under such adverse circumstances, has proved that it has a very strong hold upon consumers. The production of the Cumberland region, in 1882, was 1,512,519 tons, against 2,231,453 tons during the previous year, showing a falling off of 718,934 tons.

CLEARFIELD REGION.—The year 1882 has been one of agitation for the producers in this district. It opened with the usual complaints of scarcity of cars and with a fair business, until the beginning of the Cumberland strike concentrated almost the entire demand of the seaboard and East for bituminous coal in the hands of the Clearfield producers. All the efforts of the men of that district to enforce an increase of wages, and thus relieve the Cumberland miners, were promptly checked by strong measures, which previous experience in such struggles had taught the Clearfield operators to use with effect. The Clearfield region, during the suspension of mining in Maryland, carried off all the contracts for the supply of Eastern railroads; but although apparently in the best of positions to command good prices, the acknowledged quotations were very low, and later developments proved that they were considerably above the actual rates in special cases. While, in the beginning of March, $4.80@$5 was the ruling alongside price in New York, it was $4.70@$4.90 in the beginning of April, it was $4.50@$4.60 in the beginning of May, $4.35@$4.50 in the first days of June, and $4.25@$4.40 a month later, with considerable shading of these figures during the entire period, some transactions being based on figures lower than $4. In July, prices were a little better, averaging $4.40, remaining fairly steady at rates a trifle lower during August. In the beginning of September, prices increased again, owing chiefly to resumption in the Cumberland field, and very low figures were again reported, with market quotations at $4.25@$4.40. A steady improvement took place in September, and in the first week of October $4.60@$4.70 was the ruling range. The extraordinary course of the market for Clearfield coal had been inexplicable to all in the trade, until in October the announcement that exceptional unauthorized freight contracts had been entered into by the officials of the Pennsylvania Railroad with some of the shippers, thus enabling them to make sales at figures which under ordinary circumstances would have been ruinous. The railroad company promptly repudiated these contracts, and declined to carry coal except for schedule rates, which practically shut Clearfield operators out of the market. After some months of negotiations, an adjustment was reached so far as the carrying of coal on old contracts was concerned, and later arrangements were perfected with some of the shippers for special rates on current business. Until the close of the year, however, Clearfield operators were largely buyers of Cumberland coal at figures ranging quite steadily between $4.60@$4.80. The output of the Clearfield region has been very heavy, aggregating 2,798,000 tons, against 2,382,621 net tons in 1881. The output of the Snow-Shoe region was 233,500 tons of bituminous coal, and 21,000 tons of coke. It was limited by the carrying capacity of the railroad. During the year, several projects have been started and are now under way to afford new and competing outlets to the region, and it is a noteworthy fact that Vanderbilt has within the last few weeks invested heavily in lands in that section.

OTHER PENNSYLVANIA FIELDS.—The great bituminous fields tributary to Pittsburg have been subject to many vicissitudes during the year, labor being a very disturbing element. The winter being open, and freshets occurring at frequent intervals, the river pits along the Monongahela sent out large quantities of coal to swell the heavy stocks at lower points, and the business continued so dull that in the beginning of April some of the largest river mines were closed. Slight rises of the river in April, and a heavy rise in the early part of May, sent additional heavy shipments forward, prices being 5½@6½c. per bushel for river lump at Pittsburg. The strike in the iron mills added to the dullness, and river pits worked along in a languid way, the season closing with lower prices at the end of June, even though the stage of the water remained favorable during a part of July. August, in a very exceptional manner, witnessed two rises; and in the middle of September, Pittsburg witnessed another unexpected and unusual coal shipment by river, followed by a second one during the last days of the month, so that the year 1882 stood unparalleled in this respect. During October and November, the river continued low, and toward the close of the latter month the fact that empty craft were all loaded led to a general suspension of mining, more than 1,200,000 tons of coal being stored in boats in the middle of December, ready to be carried out by the first rise. The close of the year was marked by the unanimous decision on the part of the river operators to reduce mining to three cents a bushel, against which the men have struck.

To the railroad operators in the Pittsburg District, the year has been one of much anxiety. Trade was dull during the first months of the year, and there was a growing conviction that the price of mining must recede, which culminated in the announcement that, after the 1st of April, 3½ cents per bushel, or 92 cents per ton, would be paid for mining, a demand that did not seem unreasonable when in rival fields, east, south, and west, from 60 to 80 cents were paid. The miners struck, and during the month hoped that the Ohio miners would come to their relief by standing out for higher prices, in which they met with disappointment. The operators, after six weeks' duration of the struggle, began to import colored miners, and their position was much strengthened by the fact that on the 1st of June all the rolling-mills of the Pittsburg District and west of that city were closed down on account of the memorable iron strike, thus greatly reducing consumption. Miners' camps were established to lessen the strain upon the resources of the union, for the maintenance of the striking men. They held out for months, until in the middle of August the men on the Pan Handle road succumbed, and the beginning of September saw all the men again at work at the reduction, after nearly five months' cessation of work.

In the Connellsville coke region, the year has been an exceedingly busy one, and property in that section has advanced with a "boom." Large tracts have passed into the hands of enterprising capitalists, and very considerable additions have been made to existing shipping facilities and to plant. A year ago, the region possessed about 9000 coke-ovens; now, a moderate estimate places the number at 11,000, not counting those in

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course of construction. The Connellsville region has become the objective point of view. Railroad lines and the young industry of preparing coke for domestic purposes by crushing have made rapid progress. During the first three months, with a good demand and full production, the price ranged steadily between $1.70 and $1.80 at oven; in May it weakened, and in June had fallen off to $1.45@$1.60, declining, owing to the unfavorable outlook in the iron trade, until, with an unsettled market, it had fallen to $1.35@$1.50 at the end of July. During August, only half the capacity of the works was employed, and though a trifle steadier, the beginning of September saw prices at $1.20@$1.35 at oven. During the end of the month, with a production of 600 cars per day, the price had rallied to $1.30 @$1.50, at which figure it remained until the close of the year. The production, though restricted by a limited car supply, went up to 700 and later 750 cars per day, the capacity being estimated at 900 cars.

Trade in the coal-fields of Ohio, Illinois, Indiana, and Missouri was hampered during the year by many local disturbances, none of which, however, assumed the serious character of the strikes in Maryland and Pennsylvania. We note a steady increase in the number of mines, their facilities for shipment, and their equipment and management. Among the youngest coal-producing sections that have shown exceptional activity is Rich Hill, Missouri, which is credited with an output of 1,040,000 tons during the year 1882. There has been a very strong agitation in almost all the large cities of the West on the smoke nuisance question, and, so far as we can learn, it is likely to bear good fruit in inducing greater attention to furnace construction and preventing much waste.

In the Southern States, much effective work has been done in attracting capital to the coal and iron lands, and important projects are approaching completion or are contemplated. This is particularly true of Virginia, Alabama, and Tennessee. The Chesapeake & Ohio Railroad has completed its terminal facilities at Newport News, and the shipment of coals from that point, particularly to the East, is beginning to be a factor in the Eastern trade, where the quality of the coal is well spoken of.

The Rocky Mountain States have made wonderful strides during the past year. The northern section of Colorado, including the mines of Jefferson, Boulder, and Weld counties, is credited with an output of 550,000 tons. The Gunnison field, young as it is, has a record of 45,000 tons; the Cañon District, 150,000 tons; while the southern section, including El Moro, Trinidad, and Starkville, has produced upward of 500,000 tons and 80,000 tons of coke. Utah and Wyoming have done very well, and the mines of Montana, New Mexico, and Western Texas promise well.

"CONTROLLED COMBUSTION."

Some time since, a very wordy and enthusiastic account of some alleged inventions in the construction of fire-places appearing in one of our great daily papers, challenged attention; but little importance was attached to the subject by those familiar with matters, probably chiefly on account of the medium through which it was brought forward. The great inventions likely to revolutionize modern methods of generating steam for power, etc., have now been described in a more dignified and accessible form in the Journal of the Franklin Institute, of Philadelphia, by Mr. E. J. Mallett, Jr., the fortunate originator of the principles of "controlled combustion," as he is pleased to call it, and the inventor of the devices by which practical results are obtained by their application. In the paper referred to, Mr. Mallett goes to work systematically, although his presentation of his principles is encumbered with a good deal of verbiage. He goes into a review and study of each cause of loss of heat in the combustion of fuel, and succeeds in enumerating thirteen different causes. He seems to delight in enumeration, and we shall not quarrel with him on that point, and may merely remark that this part does not contain any thing that has not been said before, and better, by many writers on the subject. Mr. Mallett then proceeds to enumerate twelve "experimental principles," which we shall simply quote, as Mr. Mallett does not bring forward the details of any experiments upon which these principles are based, and discussion is therefore out of question:

"I. Hydrocarbon fuel tends to burn with less carbonic oxide and smoke, proportionately as its environing atmosphere diminishes in tension.

"II. Hydrocarbon fuel tends to evolve carbonic oxide and smoke, if burned in a furnace, until the temperature of the fuel reaches a certain elevation.

"III. The tension of fuel gases within a furnace is never less than that produced by the burning of the fuel itself by natural draught, and is never sufficiently low, when compared with the rate of combustion, to prevent the origination of smoke.

"IV. What was considered probable by Rankine, Peclet and others is demonstrated in 'Controlled Combustion,' namely, that air for dilution in furnace combustion would be rendered unnecessary, providing chimney draught could be dispensed with, and providing also that without such draught a supply of sufficiently heated air, in divided currents, could enter the combustion-chamber in regulable quantities.

"V. To maintain an atmosphere of the desired tension within a fire-box, an air-exhauster must supplant the chimney, and the influx of air into the ash-pit must be throttled.

"VI. When combustion is urged by a blast-fan, causing furnace air tension to be greater than normal barometric pressure, both physical and chemical actions result, differing from those created by a draught or flue-fan, incompatible with perfect combustion.

"VII. Hydrocarbon fuel, freshly charged into a furnace, must not be supplied with air to initiate its burning until the temperature of the fuel is sufficiently elevated; that is, the fuel must begin to distill before it begins to burn.

"VIII. To compel a rapid and intimate mixture of hot air with combustible fuel gases, generated within a boiler fire-box, these gases must not be allowed to ascend or envelop the boiler until after they enter the combustion-chamber through channels in close proximity to those conducting fresh heated air into the combustion-chamber.

"IX. The heat from escaping furnace gases, after leaving a steam-boiler, is more completely radiated for additional heating and boiling of water, if such gases are rendered athermous by being kept at their dew-point.

"X. It is possible, in practice, to superheat all the feed-water required by a steam-generator, from the waste heat of escaping gases, to a temperature equal to that of the water within the generator, and also to supply a portion of the feed in the form of steam.

"XI. The potential power of a steam-generator may be increased to a hitherto greater limit without diminishing the economic result.

"XII. To burn fuel rapidly, without creating a too high localized temperature, it should not be supplied with sufficient air to burn it at once to carbonic acid only, but considerable carbonic oxide should be produced, to be afterward burned in the combustion-chamber."

These "principles" look curiously like having been specially constructed to suit the exigencies of the apparatus, which aims to "control" combustion by substituting an exhaust-fan for a chimney, and taking advantage of the "low tension" of the gases when fresh fuel has been added by throttling the supply of air. Mr. Mallett heats the air for the combustion of the gases by passing it through the hollow grate-bars. He takes pains to mix air and gases well, and to provide ample combustion room. By these means, he aims to attain practically complete combustion, and it can not be denied that he has carefully considered every point that may cause loss of heat. He goes farther still, and makes an attempt to utilize as far as possible the waste heat of the gases. For this purpose, he charges them with moisture and passes them through a superheater, in which they impart a portion of their heat to water circulating in a series of coils. At what particular temperature the gases escape we have not been told. The only statements of fact that have come to our knowledge come from Mr. Clement Olhaber, Smoke Inspector, of Cincinnati, who tested boilers running on the "control combustion" system and in the ordinary way in this city. Mr. Olhaber ran three boilers with natural draught seven and a half hours with anthracite coal, and with 8142 pounds of coal evaporated 85,557·76 pounds of water from and at 212 degrees Fahrenheit, or 10·51 pounds per pound of coal, burning 13·97 pounds of coal per hour per square foot of grate. In the furnace fitted up with the Mallett apparatus, 5070 pounds of coal were used in the same time to evaporate 66,417 pounds of water, or 13·10 pounds of water per pound of coal. The rate of combustion was in this case 16·9 pounds per hour per square foot of grate surface.

THE BASIC OPEN-HEARTH STEEL PROCESS AT THE ALEXANDROWSKY WORKS, RUSSIA.

Some time since, we gave an account of the results obtained at Creusot, France, in using the basic process in the manufacture of open-hearth steel. Mr. O. T. Tellander has, in a recent issue of the *Jern Kontorets Annaler*, Sweden, given details on the work at the Alexandrowsky Steel-Works, St. Petersburg, Russia, which are particularly valuable because they give the experience gathered in producing more than 14,000 tons of ingots. The furnaces used are the same employed in the ordinary process, except that the hearth and walls are made of a mixture of dolomite and from 17 to 18 per cent of coal-tar. In rebuilding a furnace, the gas and air-flues are built up in the usual manner with Dinas brick, and upon them the bottom is rammed in form of a 7·2 inch layer of dolomite. Then wooden walls are erected parallel to the side walls of the furnace, leaving a space of 18 inches below and 12 inches above. This space is filled with the basic mixture in 2-inch layers; but in order to keep the Dinas brick and the basic mixture from running together, the joint of the two is made of a six-inch layer of a mixture of chrome ore and coal-tar. The roof is borne simply by the furnace casing. It is only touched by the side walls, and is made of Dinas brick as usual. When the furnace is finished, rail ends are laid as closely as possible over the whole of the bottom, and the rammed walls are protected by thin sheet-iron, held in place by struts of rail ends. By this means, the air is kept from the tar, so that it does not burn when the furnace is dried out, before the dolomite is well sintered. It prevents, too, swelling and foliating. The crop ends are allowed to remain in place as long as possible, until they show an inclination to weld together, when they are taken away. Firing is continued until the well sintered mass is hard, which takes 1½ days with gas, and 2½ days with wood. Charging is then commenced.

In the beginning of the work, a series of trial charges were made. Now the working appears to have settled down to the following as an average: 35 per cent of Cleveland pig (with 3 to 4 per cent of carbon, 0·70 to 2·20 per cent of silicon, 1·20 to 2·0 per cent of phosphorus, 0·06 to 0·15 per cent of sulphur), 10 per cent of cast scrap (3·50 to 4 C, 0·30 to 1 Si, 0·40 to 1·20 P, and trace to 0·05 S), 10 per cent iron rails (0·25 to 0·65 P, 0·04 to 0·20 S), miscellaneous wrought scrap (0·20 to 0·50 P), 4 per cent own scrap (0·30 to 0·45 C, trace to 0·02 Si, 0·03 to 0·10 P, 0·01 to 0·05 S, 0·4 to 0·8 Mn), 4·5 per cent of hematite pig (3 to 4 C, 0·7 to 1·2 Si, 0·03 to 0·05 P, 0·06 to 0·18 S), 6 per cent of spiegel (3·5 to 5 C, 0·03 to 0·05 P, 10 to 20 Mn), and 0·5 per cent ferro-manganese (5·5 to 6·75 C, 0·08 to 0·15 Si, 0·08 to 0·15 P, 50 to 80 Mn). In order to get cinder which would be sufficiently basic, lime to the extent of about six per cent of the total weight of the charge is added from the start. Toward the end of the charge, bricks pressed from a mixture of slacked lime and roll cinder are added, according to requirements. The phosphoric pig is first charged, followed by a layer of lime and as much scrap as the furnace will hold. This first lot generally melts in four hours, and the rest of the scrap is then put in as occasion requires, in lots of 320 kilograms. The level of the melted metal is kept pretty high, so that in the beginning, when the cinder is very fluid, a part of it will flow out of the working door when the charge is boiling. When all the scrap is melted down, and after the cinder has been drawn off as thoroughly as possible, the bath is stirred and a sample is taken, which is hammered and broken. If the fracture shows any traces of crystalline structure, 120 pounds of basic bricks, consisting of a mixture of 5 parts by volume of lime, and 4 parts of roll cinder, are added, and this is repeated until the desired quality is reached. The metal shows a tendency to rise in the molds. Repairs of the furnace after every heat, heating up and putting in the cold charge, take 2 hours 20 minutes, while the time for completing the charge is 9 hours 35 minutes, thus making it possible to make two casts during 24 hours. The basic hearth will stand from 150 to 200 charges, while the roof, walls, and flues must be repaired after from 30 to 40 heats. The time for working in a small 8-ton furnace is the same as for a large 10-ton furnace; the average product of the works is not therefore as great as it would be if all the furnaces were of the larger size. During the first five months of 1882, six furnaces, working 428 days, and making 854 charges, produced 6081 metric tons of ingots, using 1970 tons of Cleveland pig, 670 tons of cast scrap, 1409 tons of old rails, 2076 tons of miscellaneous scrap, 303 tons of hematite pig, 577 tons of spiegeleisen, and 35 tons of ferro-manganese, a total of 7040 tons. The consumption of coal was 5503 tons, and 458 tons of limestone and 120 tons of lime-cinder bricks were used besides. The yield in ingots was 86·4 per cent, and scrap 2·6 per cent, so that the waste was 11 per cent.

The following table gives the chemical composition of the various

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grades of steel produced, and their physical properties, as revealed by mechanical tests:

CHEMICAL ANALYSES.

Grade.	Manganese.	Carbon.	Silicon.	Phosphorus.	Sulphur.
Rail steel	0·40 to 0·80	0·30 to 0·45	Trace	0·03 to 0·07	0·01 to 0·03
Hard "	0·30 " 0·50	0·20 " 0·25	"	0·03 " 0·05	Trace
Soft "	0·20 " 0·35	0·10 " 0·15	"	0·02 " 0·03	"
Very soft steel	0·20 " 0·30	0·06 " 0·10	"	0·02 " 0·03	"

MECHANICAL TESTS.

Grade.	Tensile strength. Lbs. per sq. in.	Elongation. Per cent.
Rail steel	71,120 to 85,344	15 to 25
Hard "	56,896 " 71,120	20 " 25
Soft "	49,784 " 56,896	25 " 30
Very soft steel	42,672 " 49,784	More than 30

The average percentage of phosphorus in the raw materials of the charge was 0·50 per cent, thus showing an elimination to the extent of 80 per cent. The most striking fact in the series of analyses is the almost perfect removal of the silicon, so that in this respect the basic open-hearth process does not differ from the basic Bessemer process.

In conclusion, Mr. Tellander gives some details on the burning of the dolomite. The Alexandrowsky works have four cupolas with a sheet-iron shell, 11·48 feet high and 5·73 feet in diameter. At first, these shells were lined with the basic material used for the hearth of the steel furnace, but it was found that this lining would not last. After some experimenting, the best was found to be a lining of chrome ore from the Ural Mountains, containing 8 per cent of silica, 13·5 per cent of oxide of iron, 13 per cent of alumina, 51 per cent of chromic oxide, 1·5 per cent of lime, and 13 per cent of magnesia. The mortar used is a mixture of two parts by volume of the smalls of the ore, and one part by volume of lime. This cupola lining lasts from 3 to 4 months as against 15 days for the dolomite lining. In burning the dolomite, the charges are 560 pounds of dolomite to from 260 to 300 pounds of coke, the yield of a cupola being 6·4 metric tons of burnt dolomite, or 51 per cent of the raw rock charged. The burnt dolomite is sorted into three grades, the first being highly burnt and dense. The third grade, in quantity about 25 per cent of the whole, is porous and light, and is used only for patching without admixture of tar.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Important Amendment to a Circular.—On October 31st, 1881, the Commissioner of the General Land-Office issued a circular to guide registers and receivers and surveyors-general, entitled "United States Mining Laws and Regulations thereunder." September 22d last, the commissioner amended this circular with special reference to applications for patents to placer claims, and forwarded it to the different land districts; and now the Secretary of the Interior makes an important amendment of the eighth section of the last circular, rendering it necessary, to a clear understanding of the subject matter, to publish the whole as finally amended. This circular is to be considered in connection with paragraphs 53 to 60 of regulations contained in the circular of October, 1881. The circular is as follows:

1. The first care in recognizing an application for patent upon a placer claim must be exercised in determining the exact classification of the lands. To this end, the clearest evidence of which the case is capable should be presented. If the claim be all placer ground, that fact must be stated in the application and corroborated by accompanying proofs. If of mixed placers and lodes, it should be so set out, with a description of all known lodes situated within the boundaries of the claim. A specific declaration, such as is required by Section 2333 Revised Statutes, must be furnished as to each lode intended to be claimed. All other known lodes are, by the silence of the applicant, excluded by law from all claim by him, of whatsoever nature, possessory or otherwise.

2. Section 2395, Revised Statutes (subdivision 7), requires the surveyor to "note in his field-books the true situation of all mines, salt-licks, salt-springs, and mill-seats which come to his knowledge;" also "all water-courses over which the lines he runs may pass." It further requires him to "note the quality of the lands." These descriptive notes are required by subdivision 8 to be incorporated in the plat by the surveyor-general.

3. If these duties have been performed, the surveys will furnish a reasonable guide to the district officers and to claimants in prosecuting their applications. But experience has shown that great neglect has resulted from inattention to the law in this respect, and the regular plats are of very little value in the matter. It will, therefore, be required in the future that deputy surveyors shall, at the expense of the parties, make full examination of all placer claims, and duly note the facts as specified in the law, stating the quality and composition of the soil, the kind and amount of timber and other vegetation, the locus and size of streams, and such other matters as may appear upon the surface of the claims. This examination should include the character and extent of all surface and underground workings, whether placer or lode, for mining purposes.

4. In addition to these data, which the law requires to be shown in all cases, the deputy should report with reference to the proximity of centers of trade or residence; also of well-known systems of lode deposit or of individual lodes. He should also report as to the use or adaptability of the claim for placer mining; whether water has been brought upon it in sufficient quantity to mine the same, or whether it can be procured for that purpose; and finally, what works or expenditures have been made by the claimant or his grantors for the development of the claim, and their situation and location with respect to the same as applied for.

5. This examination should be reported by the deputy under oath to the surveyor-general, and duly corroborated; and a copy of the same should be furnished with the application for patent to the claim, constituting a part thereof, and included in the oath of the applicant.

6. In case of a proposed claim for lands not yet surveyed, the foregoing regulations will govern the application for survey.

7. In controversies hereafter to be determined respecting the mineral value of lands, their value for all purposes, whether agricultural or municipal, or as seats for towns, will be considered, without reference to the decisions heretofore made in particular cases. No decision finally executed, however, will be reconsidered under this modification.

8. No application by an association of persons for patent to a placer claim will be allowed to embrace more than one hundred and sixty acres; and not less than five hundred dollars' worth of work must be shown to have been expended upon or for the benefit of each separate location embraced in such application. If an individual becomes the purchaser and possessor of several separate claims of twenty acres each or less, he may be permitted to include in his application for patent any number of such claims contiguous to each other, not exceeding in the aggregate one hundred and sixty acres; but upon or for the benefit of each original claim or location so embraced, he or his grantors must have expended the sum of five hundred dollars in improvements.

9. Applications awaiting entry, whether published or not, must be made to conform to these regulations, both with respect to amount of ground and examination as to the character of the land. Entries already made will be suspended for examination by the commissioner, and such additional proofs as may be deemed necessary in each case will be demanded.

Rights of Railroad Companies versus *Mineral Claimants.*—The following case, just disposed of in the General Land-Office, determines some new points of general interest: The local officers at Sacramento, Cal., entertained the application of Charles R. Johnson for patent for the Charter Oak placer claim, which covers the east half of southeast quarter of section 25, township 16, north range 10 east. The township plat and survey was filed September 3d, 1874, and the land was returned as mineral. The tract is within the ten-mile limit of the grant to the Central Pacific Railroad Company, the withdrawal for which became effective October 3d, 1864. The railroad company appealed from the action of the local officers in filing and entertaining the application. The case is best stated in the following review, prepared by Archibald Young and adopted by the commissioner:

"The error alleged by the appellant is, that the company was not *specially* notified of the intention of the mineral claimant to apply for patent; and it is claimed that the practice of the local officers in allowing such applications to be filed without such notice is an injustice to the company and a great hardship to its purchasers. It is further alleged that the notices of applications for patents for mineral lands are generally published in papers having only a local circulation, and that they seldom reach the company or its grantors.

"Neither the laws nor the regulations of this office require an applicant for a mineral patent to give special notice of such application to the railroad companies within the limits of whose grant the land happens to lie. By the express terms of the grant to the Central Pacific Company, all mineral lands, except such as contain coal and iron only, are excluded from its operations, and, as the tract in question was returned as mineral, the presumption is, that it is of that character, and therefore excepted from the grant. The mineral claimants, however, before they can make a legal location, must first have discovered mineral on the land, and, in order to obtain a patent, they are required to give sixty days' notice by publication in a newspaper and by posting in the local land-office and on the claim. This is considered ample notice to pre-emption settlers and all other parties having adverse claim; and I see no reason why it should not be considered and treated as sufficient notice to railroad companies, especially after the land has been returned as mineral. If the land is not mineral, the company can, at any time prior to the issuance of patent, have a hearing ordered to determine its character, upon making the proper application and depositing a sufficient sum of money to defray the expenses of the proceedings.

"Your decision" [the letter is addressed to the register and receiver] "is accordingly affirmed."

Patenting by a Part Owner.—A Colorado miner who owned four fifths of a lode claim, and desired to have the same patented, but to which the co-owner refused his consent, asked the General Land-Office how to proceed. He was advised "that there seems to exist no good reason why you may not institute proceedings for patent in the joint names of yourself and co-owner, either with or without his consent. You may be able to enforce contribution from such co-owner for his proper proportion of the expenses of patenting in the courts. You can not receive patent for an undivided interest, and this office has no authority to compel a co-owner to join in an application."

Lode Claims on Agricultural Land.—A "sharp" in Oregon is trying to get possession of a tract of land under the following facts, as he states them: Many years ago—fifteen or twenty—the land was known as placer, and was returned as mineral in 1855, by the surveyor-general. A quartz mine was also discovered; but owing to the high price of labor at the time, its working proved to be unprofitable, and the place was abandoned for mining purposes. Subsequently it was sold as agricultural. Now that labor is cheaper, the "sharp" aforesaid seeks of the General Land-Office a mineral patent for the quartz lode. He receives no encouragement from the commissioner, who will not recommend that proceedings be commenced to annul the patent.

Coal Mines on Indian Reservation.—The Jicarilla Apache Indian Reservation was set apart by executive order, September 21st, 1880. During the summer before this order, different parties developed coal mines there. The original claimants of these mines worked there until September, 1881, and then sold their interest, whatever it was, to the Amagee Coal Company. And the Commissioner of Indian Affairs wishes to know whether the company has such a title as to warrant it to continue business. The Commissioner of the General Land-Office says the company has acquired no vested rights as against the United States, although a preference right was possibly acquired over other individuals, to become operative at such time as the land should become subject to sale; but he does not think Congress contemplated, where persons make the large expenditures necessary to the development of a coal mine, virtually confiscating their property by a revocation of the license in pursuance of which such expenditures were made; and that unless there is some pending public necessity for including these lands in the reservation, he is of the opinion that the order ought to be so modified as to restore these lands to occupation, "not as a matter of absolute legal right to which the company is entitled, but because not to do so is, to some extent, a violation of the good faith in which the occupation and improvement were made."

Rights of Mineral Claimants.—The Commissioner of the General Land-Office, in a recent decision, settles a matter which has heretofore caused considerable inconvenience as well as expense to mineral claimants, many of whom have submitted to the *ipse dixit* of a local officer rather than take the trouble to appeal to the superior official. This cases comes up rom Montana, where an erroneous survey was made of a lode claim,

not marking the claims in conflict; and when a demand was made for a re-survey, the request was refused by United States Surveyor-General John S. Harris, who used the following language in reponse to the General Land-Office: "It is held by this office that the reissuing of a claim returned from the department for amendment, involving, as this case does, the same amount of office work as the original survey, requires a deposit prior to the issue of the order, equal in amount to the original deposit." The applicants were Edward Hickey and John M. Steward, and the claim is known as the Rock Island lode, entered at Helena. True, the amount of money involved was comparatively small; but there was a principle which the applicants deemed it incumbent upon them to settle at once and forever, by an appeal to the commissioner, which was duly made.

In reviewing the case in all its bearings, the commissioner says: "I am of the opinion" [addressing the surveyor-general] "that you have misunderstood . . . as to where and upon whom the fault and responsibility rest for having made and approved the survey contrary to the rules and regulations governing the survey of lode claims."

After quoting the "rules and regulations," the commissioner says: "If, in the present instance, it can be satisfactorily shown that the applicants for the official survey of the Rock Island lode had control thereof; and that, under their direction, the survey was erroneously made, then the holding made by your office will seem fair, as far as this particular case is concerned; otherwise, it will not." And the commissioner concludes as follows; "The appeal of Edward Hickey and John M. Steward from the decision of your office is hereby sustained, and you are hereby directed to have the survey of the Rock Island lode amended, ... without requiring the appellants to make any deposit, or incur any expense whatever, in correcting what has been manifestly an error committed by an employé of your office. You will require the deputy to amend the survey, and if he shall refuse to do so, report the fact to the office." The opinion in this case is exhaustive, and covers eight closely-written pages. It was prepared by Mr. A. L. Pitney, of the Mineral Division, General Land-Office.

How to Prove Title.—The following case is mainly interesting as showing what the General Land-Office considers deficiencies in title: Ernest P. Bell, claimant of the Cataba lode, Leadville, Colorado, District, was called upon through the local officers for additional proof of title. He furnished the affidavit of Julius B. Bissell, who alleges that he is the attorney for the claimant and the other parties appearing by the abstract of title to have an interest in the property. No power of attorney from these parties appears in the case, and therefore his affidavit can not be accepted as evidence in the matter, as, without such authority, the claimant Bell is in no way responsible for his (Bissell's) acts. There is also furnished what purports to be a certificate of trust, referred to in the affidavit of Bissell, which declares that Bell is a mere trustee of the Cataba Mining Company, and by which he covenants to deed the property to the company. It is not shown that this instrument was ever filed for record, or acknowledged by Bell before any officer having authority; and even if it were, it would not be accepted as sufficient ground for issuing the patent to Bell; for the Cataba Mining Company is not shown to have any title whatever to the claim. By statements in the papers, Bell virtually admits that he owns only seven twentieths of the lode. In conclusion, the commissioner says: "There seems to be no object in making application for a patent in the circuitous, uncertain, and unsatisfactory manner adopted by the claimants, as shown in Bissell's affidavit. The proper way to have a patent issued to Bell for their benefit, if such was their desire, would have been to execute a deed of trust to him, and file it for record in the recorder's office, and then to forward the abstract, including such deed, and properly attested. The better way would be to join the parties referred to in my former letter in this case in the application, and have patent issue in the names of all the co-owners." The above is but a brief of the opinion prepared by Duane E. Fox.

COLORADO COAL-FIELD.

The Denver *Republican*, in its annual review, says that the deposits of coal in Colorado are practically exhaustless, and are found in every section of the State.

THE NORTHERN BELT.

North of the divide, whence Denver largely draws its supply of fuel, coal is found in Jefferson, Boulder, and Weld counties, in which region some twenty mines are worked. Among the principal of these are the Marshall, the Fox, the Welch, the Boulder Valley, the Northrop, the Stewart, the Superior, the Mitchell, the Garfield, the Briggs, the Jackson, the Star, and others. The coal from all these mines is a free-burning, semi-bituminous, of fair quality, answering very well for heating and domestic purposes. The product of this region for the year has been about 550,000 tons, worth at the mines about $2.50 per ton. Two thirds of this production were probably consumed in Denver. Some of this coal is now shipped East as far as Omaha, where it has been to some extent displacing in the market the Rock Spring coal, which the Union Pacific mines in Wyoming. Its value is fully as good as that much vaunted coal, and now that the Burlington & Missouri has made it possible to get into the market East, a rapid development of these mines may be looked for. Arbitrary and absolutely prohibitory railroad rates have retarded development; but as a more liberal policy is hoped for from the Burlington & Missouri, the owners of these mines are more cheerful.

THE MIDDLE REGION.

The middle coal region of the State is that lying between Denver and Colorado Springs, which has so far been developed only at Franceville, where the Denver & New Orleans Company is mining. The coal is of an average quality, semi-bituminous, and though it quickly decomposes once out of the mine, it is a good domestic coal. The mine has been worked since July only, with the following result:

	Lbs.	Tons.
July	2,243,425	
August	5,432,100	
September	9,836,440	
October	9,830,236	
November	10,017,700	
December (estimated)	10,017,700	
Total	47,388,601	33,694

Coal croppings are seen at numerous points in this region, but there has been practically no development, and no estimate can be formed as to the value and extent of the belt.

THE SOUTHERN BELT.

The southern region includes Trinidad, El Moro, and that entire region, rich in fine quality of coking coal. At Starkville, five miles from Trinidad, on the Atchison, Topeka & Santa Fé Railroad, 100,000 tons of coal were produced last year. Most of this coal was sent to the South and West. The value of this coal on cars at the mine is about $2 per ton. At the same point, forty coke-ovens are running, and these have produced about 225 tons of coke, worth $4.50, which has been sent wholly into Arizona. They have not been able to fill all their orders for either coal or coke. The mines at Eagle will have shipped about 400,000 tons of coal, worth $2 on cars at the mine at El Moro, and about 12,000 tons of coke, worth at El Moro $4.50 per ton. Chappell & John's mine, south of Trinidad, has turned out 20,000 tons. The output of this region is further set forth in the figures for the Colorado Coal and Iron Company, hereto attached.

THE CAÑON REGION.

The superior qualities of the Cañon coal are too well known to require notice in this hurried review. The belt includes the valley of the Arkansas, and is mainly, if not wholly, confined to Fremont County. The region is one of the oldest in the State, and the development is large, and the exhaustless character of the deposits has been proved. The output of this region for the year has been about 160.000 tons. The value at the mines is from $2 to $2.50 per ton.

THE GUNNISON COAL.

Gunnison County is the most important coal-field in the State, and there has been considerable development. The following figures are official:

SOFT COAL.

	Tons.
Production from mines of the Colorado Coal and Iron Company, at Crested Butte, for the year ended December 31st	40,000
Skinner & Jefferson's banks, Crested Butte	500
Richardson's banks, Mount Carbon	1,500
South Park banks, Mount Carbon	1,000
Sundry local banks	500
Total	43,500

ANTHRACITE COAL.

Anthracite Mesa Coal Company, Crested Butte	1,000
M. Rush Warner & Co., Crested Butte	500
Thompson Brothers	500
Total	2,000

Coke manufactured by the Colorado Coal and Iron Company, Crested Butte, 10,000 tons. No coke is made in the county except by this company.

The soft coal of Crested Butte, as shown above, is chiefly mined by the Colorado Coal and Iron Company, and the amount of territory underlain by this coal can not be more than three thousand acres.

There are five workable seams of coal in this portion, running all the way from three feet to ten feet in thickness. They all partake of the same properties; but some of them being more or less dry, are not so well adapted for coking purposes as others. The Colorado Coal and Iron Company is at present working the six-foot seam, which is a singularly pure coking coal, almost entirely free from sulphur and slate.

The following analysis, made by H. L. Wells, chemist at the steel-works, South Pueblo, will give a clearer idea of its qualities:

Water	·72
Volatile matter	23·44
Fixed carbon	71·91
Ash	3·93
	100·00

This coal should be used entirely for the manufacture of coke. The coke made from it being very free from impurities of all kinds, with a small percentage of ash (at most, eight per cent), lustrous, hard, and with an open cellular structure is capable of bearing an immense burden in furnace; but there is great demand for the coal on account of its great heating powers for engine and locomotive use.

Skinner & Jefferson are working the four-foot seam which, being drier than the six-foot seam, makes a better domestic coal. This coal, together with that mined at Richardson's bank and the South Park bank on Mount Carbon, is fully equal to the best grade of Cañon City coal, sold by the Colorado Coal and Iron Company in Denver.

Gunnison has so far been the market for these domestic coals; but the opening up of the Denver & Rio Grande Utah line promises an extensive market at Delta, Montrose, Grand Junction, and other points for the Crested Butte soft coal, which demand is already being manifested.

The producers on Mount Carbon have been anxiously awaiting the arrival of the Denver & Southern Pacific Railroad in their neighborhood, so as to commence the shipment of coal to Denver; but the road has stopped at Gunnison, within fifteen miles of the coal-fields, and exhibits no immediate intention of pushing on.

The area of soft coal land outside of Crested Butte is very extensive, coal of more or less degree of excellence being found under hundreds of square miles throughout Gunnison County; but so far, no coking coal has been found outside of Crested Butte.

The anthracite coal is found over an extensive territory, but much of it is inaccessible and of an inferior quality. The best coal is found at the head of Anthracite Creek, near Irwin, and on Slate River, about three miles from Crested Butte. An equally good quality is also found on Rock Creek; but the immense seams found down Anthracite Creek toward the North Fork of the Gunnison River hardly come up to the Pennsylvania standard of excellence. The anthracite trade is yet in its infancy. Early in the year, Mr. H. F. Smith shipped a large quantity of it to Denver, Pueblo, Colorado Springs, and other points along the line of the Denver & Rio Grande Railroad; but owing to a want of sufficient preparation, it was not well received by the consumers; but the Anthracite Mesa Coal Company is now erecting a large breaker with all improved machinery and screens, and expects shortly to begin shipments to Denver and the East of all the various merchantable sizes of anthracite coal. When once fairly under way, it will probably be able to furnish 200 or 300 tons per day, and the demand will inevitably increase. This coal is in all respects the equal

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of the Pennsylvania anthracite, chemical analysis and physical structure failing to show any material difference.

The company owned and managed by M. Rush Warner & Co. is also preparing to ship anthracite coal in merchantable shape; and as it is running from the same seams as the Anthracite Mesa Coal Company, we may expect competition and low prices for this most desirable article of domestic fuel.

The Thompson Brothers, of Irwin, have taken out considerable coal for local trade, the railroad being still eight or nine miles away from their bank; but the coal is undoubtedly the finest looking of any mined in the county; and as they are able to ship by rail, they will undoubtedly come in for their share of the trade. The property, it is understood, has lately been turned into a strong and reliable company, of which Thatcher, Geist, and Maugham, of Pueblo, are large holders as well as the original locators.

La Plata County is also very rich in excellent coal. The largest vein of coal is the Mammoth vein, near Durango, which is fifty-two feet in width. In this county, the seams are numerous and large, and for the most part so situated as to allow of cheap and expeditious mining. The character of the coal is mainly bituminous, and well adapted to coking, though some of the seams yield a steam coal of remarkably good quality. The development of these coal-beds has naturally, up to this time, been small, as the market for coal has been limited to that required for domestic purposes in Durango and vicinity; but such work as has been done has been sufficient to clearly demonstrate the extent, quality, and value of the deposits. The output in 1882 has been as follows:

	Tons.
The Florida mine	1,600
The Peacock mine	1,500
The Fairmont mine	1,300
The Graden mine	1,000
The other mines	500
Total	5,900

To this should be added the output of the railroad mine at Monero, which is in this belt, and which for the year has produced 12,000 tons, making a total of 17,900 tons for the county for the year.

OTHER POINTS.

At Como, in Park County, 75,000 tons of coal have been mined this year; but the coke produced, it has not been possible to ascertain. Walsen & Levy, at Walsenburg, have sent to the market 96,200 tons.

The following statement shows the total amount of coal produced during the year 1882:

	Tons.
The Northern region	550,000
Denver & New Orleans	23,694
Starkville	100,000
Eagle	400,000
Chappell & Johns	20,000
Fremont County	160,000
Crested Butte	43,500
La Plata	17,900
Walsen	96,200
Como	75,000
El Moro	215,449
Estimate	100,000
Total	1,821,743

Coal has been produced in other sections of the State, of which no returns could be secured, but it is believed that 100,000 tons will cover it all.

The coal output has, in other words, been nearly 2,000,000 tons, valued at about $4,000,000 at the mines.

The anthracite output has been nearly 2000 tons, value about $10 000.

The coke production has reached the sum of nearly 100,000 tons, valued at $4.50 at least, a total of at least $450,000.

Value of entire coal output, $4,460,000.

PROFESSOR JEVONS ON STRIKES AND CONSPIRACY.

Concerning the relative good and evil of strikes, Professor W. Stanley Jevons, in his recent work, *The State in Relation to Labor*, admits that on a superficial view the recurrence of strikes might be taken as an evidence of their success, since it is hardly to be supposed that workmen would venture on new strikes unless they were satisfied that advantage had been derived from previous strikes, and he does not doubt that in certain particular instances strikers have succeeded in gaining what they demanded, and even that other workmen of the same trade have profited from a corresponding rise of wages conceded in consequence from their employers. He concedes also that the wages of workmen have been greatly advanced since they acquired the right of striking at discretion. But he thinks it a mistake to argue that strikes are the cause of attainment. He points out that the rapid progress of mechanical invention has greatly increased production; that the capital of employers has grown vastly; that great changes have taken place in the purchasing power of money; and that the general rise of wages admitted to have occurred is by no means confined to trades which are united and addicted to striking, but extends, more or less, to all classes of employés. In special states of trades, particularly where there are violent oscillations of activity and depression, it is not improbable that a power of combination may temporarily secure to the laborer higher wages; but, on the whole, the author concludes that the economist incurs grave responsibility in expressing approval of any strikes.

In relation to the laws against industrial conspiracies, so-called—that is, laws imposing penalties upon persons conspiring to upset or obstruct the ordinary arrangements of trade—Professor Jevons is of opinion that it is impossible to accede to the demands sometimes made by unionists for their repeal. As he very truly says, a great city "might be reduced to starvation and anarchy by a well-devised combination of a few thousands of men," and this danger becomes more and more possible in proportion as the organization of society becomes more complex. He believes that the soundest possible solution of the labor question will be found in a system of industrial partnership under which the weekly wages would be regarded merely as subsistence money, or advances made by the employer to the laborer and his family, to tide over the interval between manufacture and sale, and the balance of the value produced would be paid at the end of the year or half-year in the form of a dividend or bonus consisting of a share of the surplus profits realized over and above the necessary expenses of production. The practicability of this system appears to be no longer open to doubt. In France, especially, it has surely and, of late, rapidly grown in favor; and several large enterprises are conducted there on the principle set forth above. The systems of arbitration and conciliation are regarded by Professor Jevons as affording no permanent settlement of the relations of employers and workmen. In his opinion, they should be considered as only forming stepping-stones to a sounder method of partnerships and participation in profits, such as that referred to above.

PRESENCE OF TELLURIUM IN COPPER.*

By T. Egleston, Ph.D., New York City.

Some months ago, samples of black oxide of copper and of pig-copper from Colorado were sent to me to examine for arsenic and antimony. I examined them both by the blow-pipe and in the wet way, but found none present. A quantity of this material was purchased by a large metallurgical works; but when they attempted to refine it, they pronounced it to be full of arsenic and antimony, so much so, that their furnaces were, as they said, "poisoned," and rendered unfit for refining. I then re-examined the samples, and at the same time some of the material which had "poisoned" the furnaces, and found no traces of arsenic or antimony when the usual amounts for analysis were used; but on taking very large amounts, I found traces merely, in some parts of the sample, but not in all. As it was a matter of interest to ascertain what the white substance that "poisoned" the furnace was, I sent to the works making the black copper, and obtained some of the matte from which the black copper was made. I took careful samples, both of it and the black copper and the refined copper. I then found the impurity to be tellurium, a substance not heretofore known as occurring in copper. I give below one analysis of the matte, two of the black and one of the refined copper:

	Matte.	Black copper.		Refined copper.
Copper	55·02	97·120	98·090	99·705
Gold	0·06	.....	.....	.....
Silver	0·40	0·132	0·128	0·135
Lead	17·87	0·777	0·757	none.
Zinc and nickel	2·22	0·070	0 100	0·024
Iron	4·18	0·130	0·080	0·031
Sulphur	20·02	0·236	†	trace.
Tellurium	0·12	0·093	0·097	0·083
Arsenic	†	0·006	†	0·091
Slag, etc	.....	1·270	0·192	.....
	99·89	99·834	99·444	100·069

The mattes and the black copper are results of the treatment of copper ores with the tellurium ores of Colorado. In the laboratory, no traces of white fumes were shown on charcoal; but when the metal in the furnace was subjected to the process of "dry roasting," as was unintentionally done, very dense white fumes were given off. When refined and cast into cake, it had the ordinary appearance of cake copper. It was then reheated for rolling in the ordinary way, showing no signs of impurity. At the first pass in the rolls, very fine cracks showed themselves, which opened in succeeding passes. At a thickness of about 0·03 meter, the cracks on each side nearly penetrated the cake, and at about 0·008 meter it began to fall to pieces. It was heated and rolled at different temperatures, but always with the same result. When cold, the metal is tough and malleable. Although the cakes in the molds showed no coating, when they were heated repeatedly and allowed to cool in the air they became covered with a white powder, which proved to be the oxide of tellurium. The copper, as it comes from the cake-molds, has every appearance of being good copper.

This is the first time, so far as I know, that the presence of tellurium has been detected in commercial copper. But very little of it is removed in the treatment, as the four analyses show. It is surprising how very small a quantity renders the copper red-short, and consequently worthless for rolling.

COMPARATIVE STEAMING VALUES OF BITUMINOUS COALS.

The following tests of the comparative evaporative values of English, Scotch, and American bituminous coals were all made in connection with the Babcock & Wilcox water-tube boilers, under the same general conditions, and all the figures worked up by the same formula, the steam in all cases being dry, but not superheated. No. 1 was Welsh coal, the test being made at the electric lighting station of the Edison Company, 57 Holburn Viaduct, London; No. 2 was Scotch coal, used at the sugar refinery of McEchran, Adam & Co., Greenock, Scotland; No. 3 was Third Pool, Pittsburg lump, used at the Mill Creek distillery, Cincinnati, Ohio; and No. 4 was Pittsburg slack, burned with forced blast at the Miami Soap and Oil-Works, Cincinnati, Ohio.

	No. 1.	No. 2.	No. 3.	No. 4.
Duration of test, hours	10·5	4	10	8
Average steam pressure, pounds	66·66	36	63·97	51·72
Average temperature of feed, degrees Fahr.	130	156	132	74
Water evaporated, pounds	34,800	14,428	112,663	51,221
Coal fired, pounds	3,360	1,344	12,000	7,365
Per cent of ash	7·50	7	4·82	12·288
Combustible, pounds	3,108	1,250	11,421	6,460
Grate surface, square feet	39·75	25	43·5	33·69
Coal consumed per square foot of grate per hour, pounds	6·261	13·44	27·5	21·861
Water evaporated per pound coal, under actual conditions, pounds	10·357	10·73	9·388	6·728
Water evaporated per pound combustible, actual conditions, pounds	11·196	11·55	9·882	7·875
Water evaporated per pound coal, from and at 212 degrees pounds	11·527	11·52	10·467	7·877
Water evaporated per pound combustible, from and at 212 degrees, pounds	12·460	12·38	10·997	8·981

The difference in the results obtained in tests No. 3 and 4 is just about the proportion that is generally found to exist between lump and slack coal from the same mine; they should be compared with each

* A paper read at the Harrisburg Meeting of the American Institute of Mining Engineers.

† No traces were found with the blow-pipe.

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other in proportion to the difference in the selling price of the two grades. The extra cost of running the blower in burning slack, if properly used, is more than compensated for by the increased economy which is obtained by supplying more nearly the theoretical amount of air necessary to form complete combustion, so that this expense need not be taken into account in the comparison.

PROGRESS IN SCIENCE AND THE ARTS.

The Faure Accumulator.—Speaking before a meeting of the shareholders of the Faure Electric Accumulator Company, in London, Professor Ayrton, in the course of an address, made the following statement as to the progress made in the construction of the Faure accumulator. The Faure accumulator, as originally made, had three defects: first, that, great as was the advance it constituted on the Planté cell, still its capacity for storing electric power was not so very large; secondly, the rate at which this power could be taken out of it was limited; and lastly, some kind of flannel or felt was employed to keep the red-lead in contact with the lead plates and prevent the plates touching one another. In all these three directions the cell has been immensely improved during the last twelve months, so that whereas we thought it an excellent result to find last December that a cell weighing, with the lead, red-lead, acid, and box, about 130 pounds, contained electric energy equivalent to one horse-power for three quarters of an hour, our recent tests of the Faure-Sellon-Volckmar cells show that in a gross weight of only about 75 pounds, consisting of lead, oxide, acid, and box, there is a store of one horse-power for one hour; further, that whereas, in December last, we regarded a steady discharge without polarization of a third of an ampère per pound gross weight a good result, we now can obtain as much as three quarters of an ampère per pound gross weight. Altogether, then, the electrical value of the accumulator of the end of this year is double that of a good accumulator at the end of last.

THE E. T. Barnum Wire and Iron-Works, of Detroit, Mich., have gradually developed during the sixteen years of their existence, until now a further addition to their facilities has become necessary, and new works are building. They will be quadrangular in form, and will have more than 130,000 square feet of floor surface. They will give employment to fully 600 men when completed.

GRINDING PHOSPHATES WITH THE LUCOP & COOK PULVERIZER.—We are informed that, at the Rumford Chemical Works, a Lucop & Cook pulverizer put 3800 pounds of phosphate per hour through a 30-mesh sieve, 3000 pounds being fine enough to be bolted through a 120-mesh sieve. This, it is said, is three times the product of the mill formerly used by the works.

The Wando Phosphate Company, of Charleston, has similar favorable experience with the same pulverizer. It succeeded in passing 2100 pounds per hour through a 50-mesh sieve, the bulk of the phosphate being fine enough to pass through 100-mesh.

FATAL ACCIDENTS IN 1882.—The Pittsburg *Commercial Gazette* has evidently been keeping account of all the disasters occurring in 1882. The result is given out editorially in a recent issue of that journal, and only requires comparative statistics from former years to possess more interest, if not value. The totals are:

Tornadoes	396	Floods	163
Boiler explosions	198	Mining explosions	132
Fires	128	Struck by lightning	26
Powder explosions	83	Snow slides	81
Falling buildings	72	Dynamite explosions	11
Fireworks explosions	43	Death on the rails	820
Deaths on lake	150		

Fatal calamities by reason of railroad disasters are thus seen to be the most numerous, yet feared by the general public probably considerably less than death by lightning, by flood, or by fire.

ANALYSIS OF THE LOISEAU FUEL.—Some time since, we gave the results of a series of tests made in this city with Loiseau fuel and chestnut anthracite. Completing the record, we now give analyses of the two fuels, since made:

	Loiseau fuel. Per cent.	Chestnut anthracite. Per cent.
Carbon	82·01	73·40
Hydrogen	2·56	3·09
Moisture	2·41	0·44
Ash	10·47	17·95
Nitrogen and oxygen, by difference	2·55	5·12
Theoretical calorific power, British thermal units	13,853·00	12,339·50
Equivalent to evaporation from and at 212 degrees, pounds water	14·33	12·76

Since our *résumé* of the tests, Professor Denton, of the Stevens Institute of Technology, has revised the data, and has reached the following figures for the total or absolute calorific power of one pound of fuel, less external radiation:

	B. T. U.	Average.
Loiseau fuel, natural draught	10,430·38	10,457·29
" " forced "	10,484·21	
Chestnut anthracite, natural draught	9,590·03	9,579·67
" " forced "	9,569·32	

In these figures, Mr. Denton includes an allowance for the evaporation of the moisture in the fuels, thus favoring the Loiseau coal. It is pointed out that probably the presence of this quantity of moisture is its normal condition, and that, as it always will have this amount of work to do, it should not be credited with it. He has similarly taken into account the moisture in the air supplied for combustion. Eliminating both of these, the two fuels compare as follows: after allowing for the excessive loss of heat in the waste gases: Loiseau, 8899·45 heat-units, and anthracite coal, 7829·46 heat-units, or an advantage of 13·66 per cent. Mr. Denton, in concluding his reports, says that "the Loiseau fuel burned with such freedom and intensity and entire absence of clinker, even without a powerful forced draught, as to conclusively show its superiority to chestnut anthracite as regards ease of firing and the rapid generation of heat."

THE PITTSBURG COAL RIVER MEN.—The Pittsburg River coal men are an absolutely unique class. There are, at least, a half-dozen of them whom no combination of misfortunes can discourage, and who are always ready with some plan to surmount a new difficulty. To send a ton of coal from that city to New Orleans, 2000 miles, without the loss of a lump out of the quarter million bushels, requires and develops these traits. Who but a Pittsburg and New Orleans coal man would bore a hole in the bottom of a leaky barge to let the water out into the river again? The thing is simple when you know how. Say there are six inches of water in the barge or boat. An auger-hole is bored through the planks into the river, while the craft is in motion. Through this hole is pushed a short section of 2-inch rubber hose, until its upper end is well below the surface of the water inside and its lower end projects into the river, say a foot. The passage of the boat through the water surrounding the lower end of the hose produces a downward suction therein, drawing the water out and draining the leaky barge completely. And when a loaded barge, moored at a landing, leaks, the Pittsburger does not fret and fume and unload that coal. He gets a long pole, a nail-keg, and some dry sawdust. The second he fastens to the end of the first, after packing the keg tightly with the third. The pole and keg are poked under the barge, and a few smart taps on the outer end of the pole loosen the sawdust, which ascends and meets the leaky bottom above. It is drawn into the leaky crevices, and there it swells and stops the mischief. The same is done with damp leaves when *en route* to New Orleans, and sawdust is not available or the cracks too wide for such filling. In scores of other ways, this fertility of resource is apparent in the class of men in question.

GENERAL MINING NEWS.

ARIZONA.

From the *Star* we take the following figures, showing the product of the mines for 1882:

SILVER AND GOLD OUTPUT OF 1882.

Silver King, silver bullion	$375,000.00
Silver King, silver concentrations	440,000.00
Tip Top, silver	243,081.03
Mack Morris	281,024.00
Pioneer	33,763.00
Arizona Central, gold (estimated)	425,000.00
Silver bullion shipped from Pima per Wells, Fargo & Co.	76,109.80
Gold bullion and dust shipped from Pima per Wells, Fargo & Co	75,208.20
Silver bullion shipped from Yuma per Wells, Fargo & Co	13,369.00
Gold bullion and dust shipped from Yuma per Wells, Fargo & Co.	14,472.00
Ore-shipments via Yuma	54,106.53
Ore-shipm'ts via Casa Grande	22,500.00
Total	$2,054,133.53

Tombstone District.

Contention	$1,680,542.13
Grand Central	1,358,820.35
Stonewall (eight months' run)	240,000.00
Boston mill (custom)	165,000.00
Girard mill and mine (and custom)	177,540.00
Tombstone	1,440,894.06
Head Center (eight months' run)	$125,079.81
Watervale mill (two months' run)	15,000.00
Total of Tombstone	$5,202,876.35

COPPER OUTPUT 1882.

	Pounds.
Copper Queen, Warren Dist	8,045,320
Arizona Copper Company, Longfellow, and Coronado, Clifton Dist.	4,325,000
Old Dominion, Globe Dist	1,940,000
Buffalo, Globe Dist	461,400
Pima Company, Silver Bell Dist	961,500
Columbia, the Bulldozer and other mines, Santa Rita Dist.	498,000
Russel and Peabody, Dragoon Mountain Dist	266,686
Detroit, operating in Clifton Dist. (estimated)	250,000
Long Island, Globe Dist	453,680
Total value of copper	$2,945,284.40

RECAPITULATION.

Total of Tombstone	$5,202,876.35
Total of outside districts	2,054,133.53
Value of crude copper bullion	2,945,284.40
Estimated output not reported	1,500,000.00
Grand total	$11,702,294.28

PIMA COUNTY.

YOUNG AMERICA COPPER MINING COMPANY.—Recent official reports are, that the company has received returns from its recent shipment of ore to New York. The ore yielded 28·3 per cent of copper, for which the company received an offer of 18 cents per pound, only 4 cents per pound less than the price of Baltimore ingot copper. Dr. C. H. Lord, the superintendent, reports that the miners believe they have struck the mother vein in this property, and are very jubilant over it. A large body of ore, averaging 18·37 per cent, has been found, as well as several deposits averaging 30 to 40 per cent. Arrangements have been made for a vigorous development of the several mines belonging to the company.

TOMBSTONE DISTRICT.

TOMBSTONE.—A dispatch just received from the assistant-superintendent says that ore has been struck in cross-cut third level west side; can not tell extent as yet, but very encouraging. Also found several good leads in new ground. Furnace doing as well as possible—in fact, could not run better. The restraining order of this company against the Way Up has been continued in force by the Supreme Court until February 28d.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

The year 1882 has not been so prosperous a one for this district, says the Bodie *Free Press*, as some of its predecessors; still, it has not been a bad one. On an average, about 750 men have been employed in the mills and mines, which number, since the closing of the Noondays and Red Cloud works, in the first part of December, has been reduced to about 500. One hundred and thirty-five stamps out of the 139 have been constantly employed until the closing down referred to, and 95 are at the present time in motion.

The following table shows the total bullion production of the Bodie District in 1882:

Standard Consolidated	$1,258,056.80
Bodie Consolidated	484,890.48
Noonday and North Noonday	231,000.00
Bodie Tunnel	129,216.53
Syndicate	75,458.29
Boston Consolidated	1,331.00
Wagner & Gillespie's tailings mill	$8,300.00
Scattering, placer, bullion, etc.	29,527.14
Total	$2,217,780.24

The following table shows the percentage of gold and silver in 1882:

	Gold.	Silver.		Gold.	Silver.
Standard Consolidated	89·8	10·2	Bodie Tunnel	93·4	6·6
Bodie Consolidated	54·8	45·2	Tailings mill	50·0	50·0
Noonday	60·0	40.0	Boston Consolidated	86·0	14·0
North Noonday	56·0	44.0	Scattering	95·0	5·0
Syndicate	91·4	8.6			

The production for 1881 was $3,172,749.71, showing a decrease of $954,969.47.

PLUMAS COUNTY.

TAYLOR-PLUMAS.—At a meeting of the stockholders held in New York recently, the following gentlemen were elected trustees for the ensuing year: O. D. Russell, M. B. Bransford, H. L. Underwood, J. G. Moody, and John C. Marion. At a subsequent meeting of the trustees, the old officers were re-elected as follows: O. D. Russell, President; M. B. Bransford, Vice-President and Superintendent; J. G. Moody, Secretary and Treasurer.

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CANADA.

NEW BRUNSWICK.

ALBERT.—At a stockholders' meeting, recently held at St. John's, the following directors were elected for the ensuing year: Henry Gilbert, John Byers, Bradford S. Gilbert, Alexander Duncan, and James S. Gilbert. Henry Gilbert was elected president, and S. Schofield, secretary.

COLORADO.

GUNNISON COUNTY.

MOFFATT SMELTER.—A dispatch to the Denver *Republican* says that the smelter, after several false starts, is now running successfully, and on January 4th turned out its first bar of bullion.

HINSDALE COUNTY.

Most of the figures given below are official, according to the Lake City *Silver World*. Those estimated will run under rather than over the actual amount. With the exception of the Ute & Ulé and Palmetto, the output is entirely from development-work—no stoping. The Palmetto represents but five months' output; and the silver product, $15,000, but about thirty days' run of the mill. The Crooke Works ran nearly the entire year upon second-class ores, and during the first four months and the last month of the year, the run was less than half-time or capacity—much of it, indeed, not one quarter, and in January and December not to exceed one tenth. The Belle of the West output is for the past two months.

PRODUCT OF SILVER.

Crooke's Works	$53,734
Palmetto Works	14,840
Total	$68,574

The production of the Ute & Ulé, Frank Hough, Palmetto, Belle of the East and West, Mountain Chief, Independence, Wyoming, Morning Star, Polar Star, and other mines, was 12,000 tons of a value of $325,000.

LAKE COUNTY.

Late Leadville exchanges contain the following:

AMIE.—About seventy-five tons of ore are shipped daily. The greater portion of the product of the mine is quite high grade in silver and lead, netting from one to two hundred dollars per ton. The shipments also include some iron ore, but no very great amount. The mine is worked on a lease.

CHRYSOLITE.—The incline driven by the management from the Colorado No. 2 shaft has attained quite a length, and is under the old workings about Vulture No. 2 shaft. A rise is to be begun in a few days, to connect the incline with these old workings and demonstrate the existence of two distinct layers of iron and ore in Fryer Hill.

HENRIETT.—The middle shaft has reached the top of the second body of mineral.

MIKE & STARR.—The shaft is sinking to a greater depth, with a view of reaching solid formation before drifting for the ore-body caught higher up last summer. The shaft is now 480 feet deep, and is beginning to show pyrites of the same character as those encountered before the ore-body was reached before.

WILLIAM WALLACE.—Work has been resumed. The pumps are working satisfactorily.

OURAY COUNTY.

BIG SAN JUAN.—The company is pushing development upon its several properties in Silver Basin, and will in a few days begin shipping ore from the Mohawk.

PUEBLO COUNTY.

COLORADO COAL AND IRON COMPANY.—The General Manager, Mr. W. G. Brown, reports the production of iron and steel for 1882 as follows:

IRON ORES.

	Tons.
South Arkansas mines	14,202
Hot Springs mines	29,190
Placer mines	8,378
Silver Cliff mines	854
Grape Creek mines	801
Total	53,425

IRON AND STEEL.

	Tons.	Pounds.
Merchant bar, mine, rail, etc	3,883 tons of	2000
Pig-iron	24,303 tons of	2000
Castings	2,752 tons of	2000
Muck bar, four months only	1,253 tons of	2240
Steel ingots, eight months only	20,919 tons of	2240
Steel blooms, eight months only	18,068 tons of	2240
Steel rails, eight months only	16,139 tons of	2240
Nails, four months only	16,158 kegs, each of	100
Spikes, six months only	5,022 kegs, each of	100

SAGUACHE COUNTY.

HORTENSE.—A recent dispatch says that a piece of tellurium taken from this mine gave assay returns of 2080 ounces in gold and 1139 ounces in silver. The shaft is down but ninety feet, and this tellurium streak is from three to four inches in thickness. This is now the third assay from this mine in the past two weeks, which gave in gold respectively 1017, 1055, and 2080 ounces, and the silver running away up in the hundreds.

PARAGON.—A large body of gray copper ore measuring eighteen inches in thickness was struck in this mine, situated on Round Mountain, which gave assays as high as 924 ounces in silver.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended December 31st Ore produced, 1050 tons. South header advanced 4 feet; total, 30 feet. North drift advanced 12 feet; total, 42 feet. No change to speak of in quality of ore. Started to sink a winze from the lower sill-floor last Thursday. The mill is crushing 150 tons every day.

FATHER DE SMET.—The superintendent reports for nine days ended January 1st: Ore extracted from first level, 1500 tons; second level, 1000 tons; third level, 500 tons. Ore milled, 3000 tons. South drift, tramway level, advanced 1 foot; 9 feet for the month; stopped. Widening third level header, 18 feet; 55 feet for month. At the end of south drift, tramway level, have struck a ledge 5 or 6 feet wide, which I will stope out 25 feet long to the surface and then work open cut.

GOLDEN SUMMIT.—The company has secured the Brady mill, and is engaged in moving it to the mine, and expects to begin the reduction of ore shortly.

GUSTIN.—The company expects to sink the west side of its properties, to reach the body of ore that is now worked by the Gustin and Minerva companies, which is said to be extensive and high grade.

HOMESTAKE.—The *Chronicle* has a report that this company intends to buy the Grand Junction mine, together with the Crofford ditch.

WASHINGTON CONSOLIDATED.—The Black Hills *Democrat* says that a patent has been taken out on this mine at Galena; and all claims on the ground have been settled. The Sitting Bull smelter, which is located on that company's land, has taken a ten years' lease.

IDAHO.

ATLANTA.—The Wood River *Times* says that the new 75 horse-power hoisting-works, which were recently started up, are running smoothly. They are of a capacity to sink 1200 feet, and are reported to have cost $15,000. A new strike was recently made on the 300-foot level of the Monarch mine, the property of this company, which promises to develop into a small bonanza. The ore is ruby silver. The extent of the body is not yet known. The two ten-stamp mills, the Greenback and Monarch, will be overhauled this winter and put in shape for a good run next summer and fall, when a large force of men will be at work extracting ore.

KETCHUM SMELTER.—The production of this smelter, the property of the Philadelphia Smelting Company, is reported by a correspondent of the Boise City *Statesman* to have been for the three months of its operation 1,575,257 pounds of lead and 165,879 ounces of silver. Of this amount, 510,165 pounds of lead and 47,298 ounces of silver were produced from ores from the company's mines.

MAINE.

DEER ISLE.—It is reported that Mr. Hanson has resigned his position as president, and that Mr. D. H. Bacon, of Portland, has been chosen to fill the vacancy.

STEWART.—The report of the superintendent shows that he has opened a vein on the property to the west of No. 2 shaft, which shows a large body of ore equal to any yet found in the district.

MICHIGAN.

The Marquette *Mining Journal* gives the following table, showing the product of the Lake Superior mines and furnaces in 1882, together with the value of the same in the market; the tables also show the product of each mine during the whole time it has been in operation, as well as the aggregate product and value of the output each and every year since 1853. It will be noticed that a goodly number of mines have been added to the shipping list, while only three or four of those reporting last year are missing. An analysis of the figures given for 1882 shows that of the total output the so-called Marquette range contributed 1,817,595 gross tons, and the so-called Menominee range 1,125,719 tons; of this last amount 276,017 tons came from the two mines in Wisconsin (Florence County) and 93,331 tons from mines located in Marquette County. Apportioned among the several counties, Marquette County would stand credited with a product of 1,886,907 tons; Menominee County, 756,371 tons; Florence (Wis.) County, 276,017 tons; and Baraga County, 24,019 tons.

Name of mine.	Gross tons.	Value in market.
Argyle	12,421	$117,999
Barnum	41,778	396,891
Bay State	1,236	7,416
Beaufort	5,532	30,426
Bessemer	27,494	164,964
Boston	18,245	178,327
Brier Hill	10,593	90,041
Cambria	47,545	285,270
Champion	159,009	1,590,090
Chapin	247,506	2,103,810
Cleveland	206,120	1,958,140
Commonwealth	115,862	752,503
Calumet	5,847	49,700
Crystal Falls	1,341	8,716
Curry	13,374	114,779
Cyclops	18,287	155,440
Columbia	12,066	102,539
Dalliba	44,836	246,598
Detroit	5,402	32,412
East Champion	4,002	38,019
Erie	2,731	21,848
Fairbank	8,045	44,247
Florence	160,155	960,930
Foster	11,648	60,186
Great Western	587	3,228
Goodrich	9,988	84,899
Hewitt	9,500	80,750
Humboldt	43,463	412,898
Indiana	4,280	36,380
Iron River	29,115	189,247
Jackson	96,830	919,885
Jim Pascoe	18,880	113,840
Keel Ridge	23,425	199,112
Lake Angeline	14,326	107,445
Lake Superior	296,509	2,834,835
Ludington	52,152	413,392
Mastodon	3,477	22,600
McComber	40,406	232,842
Metropolitan	23,854	154,251
Michigamme	43,712	415,164
Milwaukee	40,891	245,246
Mitchell	33,386	200,376
Nanaimo	2,480	16,120
National	23,366	222,077
Negaunee Consolidated Works	1,177	$11,118
New York	58,806	539,657
New York Hematite	2,105	12,630
New Burt	5,017	47,661
Norway	166,373	1,081,374
Quinnesec	44,240	331,800
Paint River	6,515	35,842
Pendill	4,178	22,979
Perkins	73,648	626,008
Pittsburg & Lake Superior	41,456	373,104
Republic	235,100	2,351,109
Rolling Mill	163	896
Saginaw	11,259	106,960
Salisbury	41,243	247,458
Section 12	3,287	17,078
Spurr	8,873	78,857
St. Lawrence	9,988	49,940
Swanzey	31,498	188,988
Sterling	8,006	76,057
Taylor	15,140	83,373
Titan	1,778	9,779
Union	15,948	103,662
Vulcan	94,042	799,357
Webster	4,443	24,436
West Republic	27,865	264,717
Wheat	9,554	76,432
Wetmore	1,777	9,773
Wick	196	1,078
Winthrop	23,005	128,030
Youngstown	6,198	37,188
Scattering	719	3,954
Total iron ore	2,943,314	$24,237,166
Quartz.		
Carp River Iron Co.	5,595	27,975
Powell Bros. & Co.	1,643	8,215
McVichie & Co	5,385	26,925
Total quartz	12,623	$63,115
Total ore and quartz	2,955,937	$24,300,281

The following is a statement in gross tons of the aggregate product of the mines and furnaces for each year since 1853, together with the value of same:

Year.	Ore.	Pig-iron.	Ore and pig.	Value.
1856, and previous	86,319	.....	86,319	$258,957
1857	25,646	.....	25,646	76,938
1858	22,876	1,629	24,505	133,788
1859	68,832	7,258	76,090	575,529
1860	114,401	5,660	120,061	736,496
1861	114,258	7,970	122,228	775,832
1862	124 169	8,590	132,759	984,977
1863	203,055	9,813	212,868	1,416.935
1864	247,059	13,620	260.679	1,867 215
1865	193,758	12,283	206,041	1,590,430
1866	296,713	18,437	315,150	2,405,960
1867	465,504	30,211	495,715	3,475,820
1868	510.522	38,246	548,768	3,902,413
1869	639,097	39,003	678,100	4,968,435
1870	859,507	49,298	908,805	6,300,170
1871	813,984	51,225	865,209	6,115.895
1872	948.553	61,195	1,009,748	9,138,055
1873	1,195,234	70,507	1,265,741	11.395,887
1874	935,488	86,494	1,021.982	7,592 811
1875	910.840	81,753	992,593	5,788,703
1876	993.311	61,911	1,055,222	5.397,785
1877	1,025,129	29,685	1,054,814	5,299,598
1878	1,125,093	17,404	1,142,497	9,888,412
1879	1,414,182	39,583	1,453,765	11,413.114
1880	1,987,598	48,523	2,036,121	19,457.427
1881	2,321.315	52,953	2,374,268	20,498,613
1882	2,943,314	72,962	3,016,276	26.243,620
Total	20,585,757	916,213	21,501,970	$164,325,895

MONTANA.

JEFFERSON COUNTY—CATARACT MINING DISTRICT.

The Butte *Miner* says that the predominating character of the ore in the district is galena, rich in silver. Several mines are expected to be worked next year and reduction-works erected by Eastern capitalists. Ore from the following five claims, the Atlantic, Butterfly, Boulder Chief, Rising Sun, and Pelgan, assayed from 53 up to 1944 ounces. The Boulder Chief, with a shaft only 16 feet in depth, has a 30-foot ledge of galena carrying strong silver. The Atlantic, with a 40-foot tunnel, has a 2½-foot ledge, with 14 inches of pay-streak, which samples 500 ounces. The Butterfly shows a fine prospect on top. The ledge is expected to be tapped by the tunnel at 65 feet, and is now in 32 feet. The Rising Sun is another good prospect. The vein has been tapped in several places along the croppings, and samples 35 ounces on

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the surface. The Peigan has also been tapped in several places along the vein, the deepest prospect being only ten feet, at which depth a vein was penetrated which samples 92 ounces.

LEWIS & CLARKE COUNTY.

UNITED STATES ASSAY-OFFICE AT HELENA.—The following statement shows the value of gold and silver bullion deposited during the year 1882, as compared with 1881;

	Gold.	Silver.	Total.
1882	$678.925	$91,013	$769,938
1881	570,536	98,714	669,250
Increase			$100,688

The slight falling off in the silver deposits is owing to the increase of shipments directly from contiguous mines to the East, being a saving to the companies in the item of freights. The bulk of the silver bullion produced in the Helena District is transported to market in its crude form, and of course does not appear in the assay-office figures.

NEVADA.

ALEXANDRIA.—This company has purchased a number of claims lying south of and adjoining its property, known as the Sterling series. The work of development upon the consolidated mines of this company will be pushed ahead as fast as possible, with plenty of money to back it. The hoisting-engine lately placed upon the Alexandria incline is in course of removal to the Diligent shaft, now down to a depth of 100 feet, and which will be carried down to a depth even with the level of the Eureka Tunnel, with which connection is to be made by a drift, about 600 feet in length. This give to three mines, the Alexandria, Eldorado Consolidated, and the Eureka Tunnel, a perfect system of ventilation, cheapening and facilitating the work of development in all.

DAY.—Work is pushed ahead vigorously. The 860-foot level has been reached, a station cut out, and a drift started in the direction of the ore-chamber, and the work of sinking to the 960 level is now going on.

TUSCARORA DISTRICT.

BELLE ISLE.—The north drift on the west vein, 300 level, has been extended 24 feet the past week. The formation continues favorable for making rapid progress.

INDEPENDENCE.—The south drift on the 400 level was extended nine feet the past week and is now in 241 feet. The west cross-cut, 300 level, was extended seven feet during the same period. Shaft No. 1 has been completed to the depth of 200 feet.

NAVAJO.—A dispatch states that the developments on the 450 level add a great value to the ore-reserves, and give assurance of important developments in Belle Isle adjoining.

NEW MEXICO.

The Albuquerque *Journal* reports that ground has been broken at Copper City for two new smelters. One is building by the New Mexico & Illinois Mining Manufacturing Company, and the other is the property of a private individual.

GALLINAS MINING AND SMELTING COMPANY.—This company has completed the assessment on the Deadwood, Over the Hill, First Chance, Red Cloud, and Muldoon. With the exception of the latter, ores in paying quantities, chiefly copper and galena, have been found on these claims. Development on a substantial scale will shortly be begun.

UTAH.

CARBONET.—Contract has been let for running a tunnel, which when completed will cut the vein at a depth of 400 feet. In the veins in the upper workings, some fine ore was taken out, but it was mixed too much to pay. The tunnel is expected to cut the vein in the solid formation.

SILVER SPRING.—The manager of this company has put a force of men to work. This property adjoins the Sampson on the east. Work will be pushed vigorously to tap the ore-body.

TINTIC.—The erection of the Mammoth furnaces is pushed with the utmost vigor, and will not stop till the maximum number of twenty-six is reached. The production of matte from the furnaces in operation is constant and large.

WELLS, FARGO & CO.'S STATEMENT OF THE MINERAL PRODUCT OF UTAH FOR 1882.

Base bullion.	Lbs. lead refined.	Lbs. lead unrefined.	Ozs. silver.	Ozs. gold.
Frisco Milling and Smelting Company		3,027,424	214,320	882
Germania Lead-Works	8,213,789	561,777	85,082	169
Hanauer		5,602,324	254,339	1,384
Horn-Silver Mining Company		32,003,775	1,620,357	...
Mingo Furnace Company		10,128,738	316,309	816
Other smelters		966,000	53,566	13
Total	8,213,789	52,290,038	2,543,973	3,264
Deduct base bullion purchased by Germania Lead Company		713,385	44,968	124
Net product base bullion	8,213,789	51,576,653	2,499,005	3,140
Lead, silver and gold in ores shipped		773,197	15,464	193
Matte containing copper (605,880 lbs.)			67,320	1,683
Total (605,880 lbs.)	8,213,789	52,349,850	2,581,789	5,016
Doré Bars.				
Germania Lead-Works			303,532	646
Ontario Silver Mining Company			1,852,664	....
Silver Reef District			621,879	....
Tintic Milling and Mining Company			59,814	447
Other mills and placers			15,766	2,930
Total doré bars			2,853,655	4,023
Recapitulation.				
605,880 pounds copper, at 12½ cents per pound				$75,735
8,213,798 pounds refined lead, at 5 cents per pound				410,690
52,349,850 pounds unrefined lead, at $52 per ton				1,361,096
5,435,444 ounces silver, at $1.12½ per ounce				6,114,874
9039 ounces gold, at $20 per ounce				180,780
Total export value				$8,143,175
Value of product of 1881				7,353,658
Showing an increase this year of				$789,517

Computing the gold and silver at its mint valuation and other metals at their value at the seaboard, it would increase the value of the product to $10,312,902.

COMPARATIVE BULLION STATEMENT.

Comparative statement showing the quantity of the silver and gold contained in base bullion produced in Utah:

	Total ounces of silver produced.	Total ounces of gold produced.	Ounces of silver in base bullion.	Ounces of gold in base bullion.
1877	4,359,703	17,325	2,102,098	11,035
1878	4,357,328	15,040	2,108,339	10,165
1879	3,835,047	15,932	1,797,589	5,693
1880	3,783,566	8,020	1,403,819	2,878
1881	5,400,191	7,958	2,643,899	2,622
1882	5,435,444	9,039	2,581,789	5,016
Total	27,171,279	73,314	12,637,533	37,409

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

Fifty-seven patents, as named below, will be promulgated by the General Land-Office during the week ended January 6th, showing a part of the work done in the Mineral Division, of which Mr. D. K. Sickels is chief, during the last half of December, which, it must be remembered, includes the holiday season. Under the circumstances, the showing is a very creditable one.

ARIZONA.

TUCSON DISTRICT.

W. S. Woods, trustee, upon the Oriental lode.

CALIFORNIA.

LOS ANGELES DISTRICT.

Placer claim of Henry C. Roberts.

SACRAMENTO DISTRICT.

J. W. Taylor, upon the Legal Tender quartz mine. Terence McSorley *et al.*, upon the Green Mountain placer.

STOCKTON DISTRICT.

Charles C. Miller *et al.*, upon the Miller & Holmes quartz mine and mill-site.

COLORADO.

CENTRAL CITY DISTRICT.

George E. Marsh, upon the Challenge lode. Benjamin C. Catren, upon the Washington and Crown Point lodes. The Miner's Smelting and Reduction Company, upon the Lucerne lode. W. H. Bush, upon the Bonanza lode. Walter P. Miller, upon the Resolute and Reliance lodes. Oscar Venettisch *et al.*, upon the Harlem lode. Henry M. Teller, upon the Symonds Forks lode. J. H. Nolan *et al.*, upon the Nolan-Gilmer lode. J. H. Gildersleeve *et al.*, upon the Steam Power lode. New Columbia Consolidated Gold and Silver Mining and Milling Company, upon the Columbia, President Hayes, and Castleton lodes. William Fullerton, upon the English-American lode. Justus E. Du Bois, upon the Alexander lode. Turner Tunnel Mining and Milling Company, upon the Louis lode. Henderson E. Eddy, upon the Mammoth lode. George M. Laird *et al.*, upon the Wyomed lode. Joseph M. Marshall *et al.*, upon the Rough and Ready lode.

DENVER DISTRICT.

North Park & Vandalia Mining and Smelting Company, upon the Constellation, Pennsylvania, Dolly Varden, Legal Tender, Fannie Crook, and Empire lodes, and the Edomite lode and mill-site.

DURANGO DISTRICT.

Frederick Linke, upon the Dallas lode.

LAKE CITY DISTRICT.

The Gunnison Silver Mining Company, upon the Lily and Cashier lodes, and the Gunnison lode and mill-site. Heirs of Jonathan Paxton, deceased, upon the Cortez lode. Charles H. Bent *et al.*, upon the Grand Central lode. Michael Breen *et al.*, upon the Green Mountain lode. Desire Friend *et al.*, placer claim.

LEADVILLE DISTRICT.

D. B. Webster *et al.*, upon the Jackson lode. The Mammoth Mining and Milling Company, upon the Mammoth lode. J. O. Hudnut, upon the Anita and Mass-O-Coltes lodes. Marquis S. Dimic, upon the Fugitive lode. Frederick A. Buse *et al.*, upon the Janes lode. G. M. Mitchell *et al.*, upon the Lady Alice lode. Sumner B. Hilliard *et al.*, upon the Huron lode. W. A. Morrison *et al.*, upon the Juniata lode. L. B. H. Brown, upon the Jacob's Wonder lode. Frank de Maivierville *et al.*, upon the Merry Monarch lode. John Devlin *et al.*, upon the Empire lode. Charles G. Arnold *et al.*, upon the Iron Rock lode. John J. Riethman *et al.*, upon their placers.

PUEBLO DISTRICT.

The Hawkeye Mining Company, upon the Sunset lode.

MONTANA.

HELENA DISTRICT.

S. T. Hauser, *et al.*, upon the Independence lode.

NEVADA.

EUREKA DISTRICT.

Manhattan Silver Mining Company, upon the Lander lode. Franklin Way *et al.*, upon the Antelope (North) lode.

UTAH.

SALT LAKE CITY DISTRICT.

George S. Smith, upon the Extension lode. Excelsior Silver Mining Company, upon the Excelsior lode and mill-site. William H. Hooper, placer claim.

WYOMING.

EVANSTON DISTRICT.

Coal claims of William Leach. Of Clarence D. Clark. Of Thomas A. Clark.

WASHINGTON.

OLYMPIA DISTRICT.

Coal claims of Frederick H. Saylor. Of Fayette H. Reed. Of Julius Galland. Of Charles W. Burrage.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Jan. 12.

The mining market has been more active this week than for months past, and the dealings have been more of a widespread and better character. This result is partly due to the Pipe-Line certificates, which, no doubt, have brought considerable new business to the New York Mining Exchange. Prices generally have been strong, and there is a better feeling for the future of the market. The Comstock shares come in for a small share of this buoyant feeling, but the depression in these stocks is strongly felt here. The Leadville stocks have been strong under a small business. The greatest strength shown by any of the stocks has been in the Tuscaroras. Reports from the mines are very favorable, and, consequently, the stocks have been in good demand at very strong prices. There are two or three low-priced stocks which have gained considerable strength this week, notably Elko Consolidated, Hortense, and Red Elephant. The market closed strong. Below will be found a summary. The sales of mining shares during the week at all the Exchanges aggregate 585,555, as against 419,070 last week.

The Comstock shares have been quiet at very irregular prices. California, with a large business, was strong, selling from 19@26@24c. Consolidated Virginia had quite an active business at very irregular prices; it sold from 48@56@48c., with transactions of 10,465 shares. Sierra Nevada was very quiet at $2.38@$3.60@$3.25. Union Consolidated sold to the extent of 235 shares at $3.25@$2.90. Mexican was quiet and a little weak at $3.20@$3. Ophir sold at $3, and Best & Belcher at $4. Sutro Tunnel had

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DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	SHARES. No. in 1000's	SHARES. Par Value.	ASSESSMENTS. Lev'd to date in 1000's.	ASSESSMENTS. Date and amount per share of last.		DIVIDENDS. Total paid to date in 1000's.	DIVIDENDS. Date and amount per share.		HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Jan. 6. H.	Jan. 6. L.	Jan. 8. H.	Jan. 8. L.	Jan. 9. H.	Jan. 9. L.	Jan. 10. H.	Jan. 10. L.	Jan. 11. H.	Jan. 11. L.	Jan. 12 H.	Jan. 12 L.
Alice, Mon.	400	25	*			400	De 81	10					1.95	1.90			1.95		2.00	
Amie Con., Co.	500	10				805	My 80	10	.22	.19	.21	.20	.21	.19	.19	.18	.19	.18	.20	.18
Atlantic, Mich.	40	25	280	Ap 75	1 00	140	Fe 82	2 00												
Argenta, Ne.	100	100	225	No 82	25	40	Fe 80	20												
Bay & Walker, Ut.	100	10	*			60	No 80	10												
Bassick, Co.	100	100	*			25	Fe 80	25												
Belle Isle, Ne.	100	100	95	My 82	10	300	De 79	25	.90	.75	1.60	1.20	1.45	1.35	1.40	1.35	1.25	1.20	1.25	1.20
Black Bear, Ca.	30	100	15	Se 79	50	869	Se 82	30												
Belcher, Ne.	104	100	2562	Se 82	25	16397	Ap 76	1 00												
Bodie Cons., Ca.	100	100	125	De 81	50	1295	No 82	20	2.00		1.90									
Bodie Cons., Ca.	200	10				310	Ja 83	05												
Bos'n & Mon, Mon.	200	25				2	Fe 80	1												
Breece, Co.	100	100				140	Ja 83	10	.95				.95		1.00		.95		.95	
Bulwer, Ca.	540	100	638	No 82	20	31320	De 79	50	.28		.19				.26	25c	.25		.24	.22
California, Ne.	100	25				22850	Ja 83	5 00												
Cal. & Hecla, Mich.	100	10	*			50	Mr 80	10												
Carbon Con., Co.	100	2				8	Oc 82	02												
Carolina Q'n, N.C.	100	1				24	Ja 83	03												
Castle Creek, Id.	300	10	*			210	De 82	10												
Catalpa, Co.	20	25	100	Se 61	6	1610	Fe 82	25												
Central, Mich.	100	100				78	De 80	10												
Christy, Utah.	200	50	*			1600	De 81	50	1.45	1.40	1.35	1.30	1.40	1.35	1.40	1.35	1.40		1.45	
Chrysolite, Co.	200	5	*			180	Au 80	30									.10		.10	.08
Climax, Co.	100	10	*			80	De 82	04												
Cons. G. Mg., Ga.	540	100	897	Au 82	30	42030	Au 80	50	.50	.44	.47	.45	.44	.43	.56	.44	.56	.53	.53	.45
Cons. Va., Ne.	250	50				2087	De 82	25												
Contention, Ariz.	250	10	*			850	Ja 83	50												
Copper Queen, Ar.	100	100	2673	Fe 82	25	11588	Ja 75	2 00												
Crown Point, Ne.	200	25	*			900	Ja 83	10												
D'dw'd-Terra, Dk	200	25	*			200	Ju 81	7½					9.50				10.50		9.50	
Dunkin, Co.	50	100	100	My 76	1 00	4817	Jy 82	35												
Eureka Cons., Ne.	50	10	*			1225	Oc 82	50												
Evening Star, Co.	100	100	800	Ja 82	1 00	875	Oc 80	25												
Excelsior, Ca.	100	100				580	De 82	20			5.00		4.75						5.00	
Fa. de Smet, Dk.	100	100	*			6	My 79	10									.07	.05	.08	
Findley, Ga.	200	25	*			50	My 80	25												
Freeland, Co.	250	20	*			25	My 81	10												
Glass-Pend., Co.	150	10	*			76	Jy 81	15	.06		.06		.07		.07		.08	.07	.08	
Gold Stripe, Ca.	108	100	3478	Se 82	50	3826	Oc 70	$10									.38		.36	.33
Gold & Curry, Ne.	100	100	420	No 82	25	450	Se 80	25			.40	.32	.50				.03		.04	.03
Grand Prize, Ne.	300	1	*			18	Jy 80	01			.45	.42	.40				.46	.45	.46	
Great Eastern, Dk	125	10	*			212	No 81	7½	.41											
Gr. Mountain, Ca.	112	100	4006	Se 82	50	1598	Ap 71	5 00							1.70				1.75	
Hale & Nor., Ne.	150	1				7	Ja	03	1.60											
Hall-And's'n, N.S.	30	50				387	No 82	50			.03		.03		.03		.03		.17	
Hecla Con., Mon.	200	25	*			180	Jy 81	40	.01											
Hibernia, Co.	200	1				14	Ja 83	03												
Holyoke, Id.	100	100	200	Ju 78	1 00	1812	Ja 83	50			18.00	17½	18.00							
Homestake, Dk.	400	25	*			1700	No 82	75	6.50		6.25				6.25		7.00	6.25	6.50	
Horn-Silver, Ut.	200	5	*			210	De 78	10	15	.14	.16		.17	.15	.19	.16	.25	.17	.29	.24
Hukill, Co.	100	100	185	Fe 82	15	225	Se 79	25	.75		.80		.80				.70		.67	.65
Indep., Ne.	125	2				365	No 82	02												
In. Queen, Ne.	100	5	*			45	Ap 82	05												
Inyo, Ca.	500	20	*			930	De 82	20							2.45		2.40			
Iron Silver, Co.	100	100				750	No 82	00												
Jocuistita, Mex.	30	100	342	No 81	30	335	Fe 70	5 00												
Kentuck, Nev.	200	10	*			610	Se 82	30												
La Plata, Co.	100	10	*			270	Ja 83	05	.65				.65		.65				.65	
Leadville C., Co.	400	10	*			78	Oc 78	15												
Leads, Ut.	100	100	87	Ju 82	50	700	Au 80	50	.39		.40	.38	.42	.40	.40		.41	.40		.64
Little Chief, Co.	200	50	*			1050	Mr 80	50					.65		.63	.62				
Little Pitts., Co.	200	100	*			19	Oc 82	25												
Marguerite, Cal.	25	20				9	Jy 79	30												
Marian White, Ne	100	100	950	Se 82	25	20	Jy 82	10									.03			
Mineral Nu'v's, Mex	100	3	*			550	Mr 76	25												
Moose, Co.	200	10	4			565	De 82	25												
Morning Star, Co.	100	10				100	De 82	25	8.75		9.38				9.50	9.38	9.25	9.00	9.25	
Navajo, Ne.	100	100	285	Mr 82	20	25	Jy 79	10												
N. Y. & Colo., Col.	50	20				2300	No 82	50	9.50				9.50						10.18	9.75
N'h'n Belle, Ne.	100	100				45	Se 82	15	.45		.75	.65	.76	.71	.77	.72	.80	.76	.75	.70
N. Belle Isle, Ne.	100	100	75	No 82	20	4922	Ja 82	50			35.50				35.50		35.00			
Ontario, Ut.	150	100				1595	Jy 82	1 00			3.00								1.90	
Ophir, Ne.	100	100	3495	De 82	1 00	735	De 82	1 00												
Osceola, Mich.	50	25	480	Ap 76	1 60	30	De 82	05												
Pleasant Val., Cal	100	100				151	Jy 79	8												
Plumas, Ca.	100	10	*			117	No 82	10												
Prussian, Colo.	150	10				664	Ju 82	6 00												
Quicks. Pref., Ca.	43	100				151	Ju 82	40												
" Com., Ca.	57	100				3330	Au 82	5 00												
Quincy, Mich.	40	25	200	De 62	6 00	52	My 81	7½	.07	0	.07	.06	.07		.07		.09	.07	.11	.10
Rising Sun, Ca.	150	5	*			9	De 82	03		6										
Robinson Bar, Id.	100	1	*			575	No 81	50	1.50	1.25	1.25	1.20	1.25	1.20	1.20		1.30	1.20	1.30	1.25
Robinson Con., Co.	200	50	*			100	De 82	10												
Robt. E. Lee, Co.	500	500				4460	Ju 69	3 00												
Savage, Ne.	112	100	2484	No 82	50	3	No 82	01												
Shoshone, Id.	150	1				300	Ja 83	25	2.55	2.00	2.40	2.30	2.40	2.20	2.40		2.35	2.50	3.10	2.80
SierraGrande, NM.						102	Ja 71	1 00	2.50	2.38	3.60	3.35					11.00		3.25	
Sierra Nev., Ne.	100	100	5150	De 82	1 00	1126	De 82	25												
Silver King, Ar.	100	100				50	Au 81	10												
Silver King, Co.	500	2				4	Mr 82	¾												
Socorro, N. Mex.	2.5	100				50	Fe 81	25							6.00		6.50			
Spr'g Valley, Ca.	200	1	*			4050	Ja 83	25			6.50	6.25								
Standard, Ca.	100	100				169	Ju 81	10												
Starr-Grove, Ne.	200	10	*			155	No 81	05												
Stormont, Ut.	200	1	*			390	De 82	20												
St. Joseph, Mo.	100	10	*			100	No 81	20												
Tip Top, Ar.	100	100	170	Mr 80	50	1250	Ap 82	10												
Tombstone, Ar.	500	25	*			140	Ap 82	10					1.00				1.00	.96	1.00	
Vizina, Ar.	200	25	*			2184	Au 71	2 50	.90											
Yellow Jacket.	120	100	5338	Fe 82	1 00															

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ 4817·5.

SALES.—Alice, 400; Amie Consolidated, 59,750; Belle Isle, 5900; Bodie Consolidated, 100; Bulwer, 600; California, 3300; Chrysolite, 5500; Climax, 800; Consolidated Virginia, 10,465; Eureka Consolidated, 140; Father de Smet, 400; Findley, 5400; Gold Stripe, 19,500; Grand Prize, 1300; Great Eastern, 6200; Green Mountain, 3575; Hall-Anderson, 2200; Hibernia, 1700; Homestake, 500; Horn-Silver, 950; Hukill, 9000; Independence, 2400; Iron Silver, 500; Leadville Consolidated, 900; Little Chief, 5300; Little Pittsburg, 1030; Moose, 100; Navajo, 1500; Northern Belle, 115; North Belle Isle, 8900; Ontario, 490; Ophir, 30; Rising Sun, 7400; Robinson Consolidated, 45,400; Sierra Grande, 32,400; Sierra Nevada, 280; Silver King, 25; Standard, 320; Virginia Consolidated, 600; Yellow Jacket, 400. Dividend shares sold, 236,700.

quite an active business at steady prices; it sold from 20@24@23c., the transactions being 14,450 shares.

The Leadville stocks were quiet and steady. Amie has been very active at strong prices, selling from 22@18@19c. Chrysolite has been rather quiet at steady prices, selling from $1.30@$1.45. Hibernia, new stock, sold at 17c.; the old stock sold at 4@8c. Iron Silver was quiet and steady at $2.45@$2.40. Leadville was quiet and steady, selling at 65c. Little Chief had a fair business at irregular prices; it sold from 39@42@40c. Little Pittsburg was quiet and steady, selling at 65@62@64c. Climax had a business of 800 shares, and sold from 10@8c. Big Pittsburg records a moderate business at strong prices, selling from 15@23@22c.

The Bodie stocks were quiet at about steady prices. Bodie was very quiet, selling at $2@$1.90. Standard with a small business, was steady at $6@$6.50. Bulwer sold at $1@95c., with a business of 600 shares. Bechtel sold at 20@25c.; Goodshaw, at 6@7c.; and Tioga, at 5c.

The Tuscarora stocks had a fair business at strong prices. Grand Prize was quiet and very irregular, selling from 32@50@33c. Tuscarora was quite active and very strong, selling from 10@20@15c., with a business of 13,900 shares. Navajo had a moderate business, but was very strong; it sold from $8.75@$9.50@$9.25. Belle Isle was also very strong, under a fair business, selling from 75c.@$1.60@$1.20. North Belle Isle was active and strong, selling from 45@80@75c. Independence was quiet and weak; it sold from 80@65@66c.

In the miscellaneous list, the Green Mountain stocks were active at strong prices. Gold Stripe was very active, selling from 6@8c. Green Mountain was strong at 40@46c. Rising Sun was strong at 6@11c.; and Cherokee sold at 7@10c. Great Eastern had a fair business at steady prices, selling from 2@4c. Hall-Anderson was quiet and strong, selling from $1.60@$1.75. Horn-Silver, under a moderate business, has been strong, selling from $6.25@$7@$6.50. Hukill has been quiet, but has developed considerable strength; it sold from 14@29@27c. Robinson Consolidated has been quite active at irregular prices; it sold from $1.20@$1.30@$1.25. Sierra Grande has also been quite active, and at one time was very weak, but has regained some of its strength; it sold from $2@$3.10; closing at the latter figure to-day.

Alta-Montana suffered a decline to-day to 22c. It has had a moderate business during the week at 26@24@27c. Barcelona continues to be very active on the American Board at steady prices; it sold at 21@25c. Bradshaw has been moderatively active at steady prices; it sold from 36@39@38c. Central Arizona developed some strength to-day, selling as high as 55c. It sold during the week at 37c. Decatur has been very active at steady prices, selling at 10@9c. Elko Consolidated records a very active business at very strong prices; it sold from 9@24@19. Hortense under a fair business, has been strong, selling from 14@20@17c. Oriental & Miller has been active and steady at 12@13c. Rappahannock has been active and strong, selling from 9@13@11c. Red Elephant has had a very active business, and has developed considerable strength; it sold from 5@11@10c. Silver Cliff has been quiet and irregular at 38@41@39c. South Pacific records a large business at steady prices, selling from 10@9c. The State Line stocks have had a fair business at steady prices. Nos. 1 and 4 sold from 2@4c., and Nos. 2 and 3 from 7@8c. Taylor-Plumas has been very active at steady prices, selling from 19@22c.

PIPE LINE CERTIFICATES.

The business in the Pipe Line Certificates at the New York Mining Exchange has been very large this week, and is constantly growing. The Board is now connected with the Oil City Exchange by special wire, and quotations are received directly from there and in advance of those sent out on the tape. In addition to this, the system of clearing adopted by the Board affords special advantages to those wishing to trade in oil. Below will be found the daily quotations and sales for the past week. The highest quotation for the week was 93½c. and the lowest 84⅛c.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Jan. 6....	86¾	89¾	86	88¼	79,000
" 8....	87¾	89½	84⅛	87¾	256,000
" 9 ..	89	90⅝	88¾	89¼	175,000
" 10....	89¼	93½	86	90	250,700
" 11....	89½	90⅝	87¼	90⅛	249,000
" 12....	90¼	90¾	89	89½	96,000
Total sales..					1,105,700

UNLISTED QUOTATIONS.

Mr. Alexander C. Lassen, No. 61 Broadway, under date of January 12th, three P.M., reports the current quotations of unlisted stocks as follows:

	Bid.	Asked.		Bid.	Asked.
Bodie Tunnel..	$0.25	$0.75	Hibernia Silver, (New)....	$0.19	$0.21
Buckeye Water.	.50	....	Hond. Rosario.	1.25	5.00
Bunker Hill....	.99	1.00	Little Rapids...	....	1.00
Borva Copper..	....	2.00	London Cons...	.90	1.35
Batopilas Pref..	9.00	24.00	Mack Morris...	....	.75
Berkshire.....	....	.35	Moulton.....	....	4.00
California Wat'r	.25	....	Santa Maria....	.40	1.10
Centennial.....	....	.20	Stormont, new..	.20	.30
Col. & Beaver..	.05	.09	Satemo.....	.50	.75
Contention.....	3.00	8.00	Sierra Apache..	.32	....
Dahlgren.....	.40	....	Sierra Bella. ...	.40	....
Empire Gold...	2.00	....	Sierra Madre...	.50	2.00
Eureka Tunnel.	.45	.90	Terrible.....	1.75	....
Grand Central..	1.50	....			

DIVIDENDS.

The Calumet & Hecla Mining Company, of Michigan, has declared a quarterly dividend of $5 per share, payable in Boston.

The Carbonate Hill Mining Company, of Colorado, has declared its first dividend of 5 cents per share, payable February 1st. Transfer-books close January 20th, and reopen February 2d.

The Deadwood-Terra Mining Company, of Dakota, has declared a dividend of $20,000 for the month of December, payable at the office of Lounsbery & Haggin, transfer-agents, No. 18 Wall street, on January 20th. Transfer-books close on January 15th.

The Homestake Mining Company, of Dakota, has declared a dividend (No. 53) of $50,000, payable at the office of Lounsbery & Haggin, transfer-agents, 18 Wall street, on January 25th.

The Leadville Consolidated Mining Company, of Colorado, has declared a dividend of $20,000, or 5

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NON-DIVIDEND PAYING MINES.

NAME AND LOCATION OF COMPANY.		NUMBER OF SHARES.	PAR.	ASSESSMENTS. Total levied to date.	ASSESSMENTS. Date and amount of last.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Jan. 6. H.	Jan. 6. L.	Jan. 8. H.	Jan. 8. L.	Jan. 9. H.	Jan. 9. L.	Jan. 10. H.	Jan. 10. L.	Jan. 11. H.	Jan. 11. L.	Jan. 12. H.	Jan. 12. L.
Advance	Nev.	150,000	100	397,500	Jun. 82	25	30c		30c							30c	
Albion, s. L.	Nev.								2 95								
Aliouez	Mich																
Alpha	Nev.			420,000	Mar. 82	50											
Alta	Nev.	100,800	100	1,356,890	Dec. 82	25											
Alta-Montana, G	Mon.	500 000	10				26c					25c		24c		27c	22c
Am. Flag, s	Colo	12b.000	10	300,000	Jun. 77	25										1c	6c
Barcelona, G	Nev	200,000	25	*			23c	21c	23c		24c		24c		25c	24c	25c	24c
Battle Creek																	
Bear Creek	Cal.	300.000	1														
Beauce																	
Bechtel Con., G	Cal.	100.000	100	175,000	Oct. 82	10								20c		25c	
Best & B'lcher, G. s	Nev.	100.800	100	1,345,790	No. 82	50			4.0c							4.0c	
Big Pittsburg, s. L	Colo	200,000	100	*			16c		17c	15c	15c		20c	20c	19c	23c	21c
Black Jack, G	Cal.	100,00	2½														
Bonanza Chief	Mon	1,000.000	1	*												3c	
Bondholder	Colo	200,000	2½														
Boston Con., G	Cal.	100,000	100	95,000	Oct. 82	25											
Boulder Con																1c	
Bradshaw, s	Ariz	225.000	10				36c				38c		37c	38c	37c	39c	36c
Buckeye	Colo	400.000	5	*			1c						2c	1c			
" pref.																	
Bull-Domingo, s L	Colo	200,000	50	*													
Bullion, G. s	Nev.	100.000	100	3,747,000	Oct. 82	50											
Bye and Bye	Ariz	100,000	10	*												3c	2c
Calaveras, G	Cal.	500,000	1	*			2c			2c				2c		2c	
C'lav'r's W. & M. Co	Cal.															7c	5c
Cal., S. H., G	Dak.	100,000	100	480,000	Au. 82	15											
Carbonate Hill, s L	Colo	200,000	10														
Catskill, s	Nev.	300,000	5														
Central Ariz'na, s	Ariz	100.000	100				37c							37c		55c	48c
Chapparal	Cal.																
Cherokee, G	Cal.	150.000	10						7c					7c		10c	9c
Chollar					Sep. 82	50											
Clarence	Can.																
Colorado Cent'l, s	Colo	300,000	10														
Col'mb'a Con., G. s	Nev.	100,000	50														
Cons. Imp'ri'l, G. s	Nev.	500,000	100	1,425,000	Jan. 82	10	2c									3c	
Con. Pacific, G	Cal.	60,000	100	141,000	Au. 82	25											
Crescent, s L	Colo	300,000	10	*													
Crowell, G	N. C.	50 .000	1							4c						5c	
Dahlonega, G	Ga.	250,000	1	*													
Dardanelles, G	Cal.	100,000	10														
Decatur							9c		10c	9c	10c	9c	10c	9c	9c	10c	9c
Dunderberg, s	Colo	150,000	10	*													
Durango, G	Dak.	500.000	1	*													
Eastern Oregon																	
Elko Cons									14c	9c	20c	15c	24c	19c	21c	19c	19c
Empire, s	Ut'h	100,000	100														
Enterprise	Colo						60c	57c	59c	55c	57c	52c	55c	50c	51c	48c	49c	48c
Exchequer	Nev	100,000	100	630,000	Jan. 82	25											
Fannie Barrett							2.05		2.05		2.05		2.05		2.10	2.05	2.10	
Globe Copper	Ariz.																
Gold Placer, G	Colo	200,000	25	*													
Goodshaw, G	Cal.	100,000	100	200,000	Oct. 82	10											
Granville, G	N. C.	300.000	1	*													
Harshaw, s	Ariz	100.000	100														
Head Center, s	Ariz	100.000	100	160,000	May 82	20											
Hortense, s	Colo	200,000	10										14c		17c	16c	20c	17c
Index	Cal.																
Julia, G s	Nev.	110,000	100	1,394,000	Jan. 82	20											
Kossuth, G s	Nev.	105,000	100	421,200	Aug. 77	15											
Lacrosse, G	Colo	100,000	10	*			14c				14c	10c					
Leviathan, s	Nev	100,000	100	880,000	Sep. 82	25											
Lucerne, s	Colo	500,000	10	*													
Mariposa Pref., G	Cal.	50,000	100	1,687,500	Dec. 81												
" Com., G	Cal.	100,000	100	1,950,000	Feb. 82												
May Belle, G	Cal.	100.000	100	84,000	Dec. 81	20											
Mayflower, s	Colo	100,000	100	*													
Mexican, G. s	Nev.	100,800	100	2,146,600	Oct. 82	$1							3.00			3.20	3.00
Michoacan Synd.	Mex.																
Miner Boy, G s L	Colo	500,000	10	*													
Miller	Nev.	200,000	25														
Mono, s	Cal.	50,000	100	525,000	Oct. 82	25											
Moose Silver, s	Colo	300,000	10														
Nevada Syndi																	
North Standard, G	Cal.	100,000	100	20,000	Nov. 81	10											
N. Horn-Silv'r, s L	Utah	400,000															
Noonday	Cal.	60,000	10	208,000	Dec. 82	$1											
Old Dominion, C	Ariz	200,000	100	*													
Oriental	Nev.	200,000	10														
Ori'nt'l & Miller, s	Nev.	400,000	25				13c	12c	13c	12c	13c	12c	13c	12c	13c	12c	13c	12c
Overman, G s	Nev.	115.200	25	3,604,700	May 82	25												
Potosi	Nev.	112,000	100	500,610	Nov 82	25												
Prussian																		
Quartz Creek			100															
Rappahannock, G	Va.	250,000		*							9c		10c	9c	12c	10c	13c	10c
Red Elephant, s	Colo	500,000	1	*					6c	5c	5c		8c	7c	10c	8c	11c	10c
Retort			10															
San Pedro, G s L	N. M	400.000																
Silver Cliff, s	Colo	200,000	25	*			40c	38c	39c						41c		41c	37c
Silver Islet	Can.		60															
Sonora Con	Mex.																	
South Bodie, G	Cal.	100.000		100,000	Mar. 82	15												
South Bulwer, G	Cal.	100.000	100	195,000	May 81	25												
South Hite	Utah	100,000	100		May 82	10									20c		20c	
South Pacific	Cal.		5				10c	9c	10c	9c	9c		10c	9c	9c		9c	
State Line No. 1, s	Nev.	200,000	1															
" No. 2, s	Nev.	200,000	25															
" No. 3, s	Nev.	200,000	25															
" No. 4, s	Nev.	200,000	25															
" Nos. 1 & 4, s	Nev.						3c	2c	3c		3c		3c		3c		4c	
" Nos. 2 & 3, s	Nev.						7c		7c				7c		7c		8c	
Sutro Tunnel	Nev.	2,000,000		*			22c	21c	22c	21c	22c	21c	22c	20c	22c	20c	24c	21c
Taylor-Plumas			10				19c		20c		20c		21c	20c	22c		22c	21c
Tioga, G	CC.	100,000		285,000	Oct. 82	10					5c							
Tuscarora, s	Nev	100,000	100	110,000	Oct. 81	15			18c	10c	16c	15c	20c	15c	15c			
Unadilla, s	Ariz	500,000	100	*											4c		4c	
Union Cons, G. s	Nev.	100,000	1	1,460,000	Oct. 82	$1			3.25	3.00	3.25				2 90			
Utah		20,000	100	1,360,000	Dec. 82	$1												
Vandewater	Nev.	200,000	100	*			32c		32c		32c				32c		32c	
Washington	Ariz.	200,000	10														10c	
Whalen Copper	Nev.	100,000	25															
Wide West																		
Wiltshire	Cal.	50,000	5	*														

SALES.—Advance, 200; Albion, 100; Alta-Montana, 1200; American Flag, 4900; Barcelona, 11,800; Bechtel Consolidated, 900; Best & Belcher, 30; Big Pittsburg, 6800; Bonanza Chief, 7500; Boulder Consolidated, 1000; Bradshaw, 7500; Buckeye, 5100; Bye-and-Bye, 1200; Calaveras, 4000; Calaveras W. & M. Co., 500; Central Arizona, 2100; Cherokee, 8600; Consolidated Imperial, 2000; Crowell, 2100; Decatur, 25,400; Elko Consolidated, 53,300; Enterprise, 9000; Fannie Barrett, 3400; Goodshaw, 1200; Hortense, 6000; Lacrosse, 400; Mexican, 140; Oriental & Miller, 18,600; Pappahannock, 8600; Red Elephant, 20,200; Silver Cliff, 2600; South Hite, new, 400; South Pacific, 24,300; State Line, Nos. 1 & 4, 6200; State Line, Nos. 2 & 3, 5300; Sutro Tunnel, 14,450; Taylor-Plumas, 59,500; Tioga, 300; Tuscarora, 13,900; Unadilla, 3000; Union Consol'dated, 23; Vandewater, 4300; Washington, 600. Non-dividend shares sold, 348,855. Total shares sold at all the Exchanges, 585,555.

cents a share on the capital stock, payable January 25th. Transfer-books close on the 18th, and reopen on the 29th.

MEETINGS.

Gold Stripe Mining Company, No. 18 Wall street. Annual meeting of stockholders and election of trustees, January 16th, between ten A.M. and twelve M.

Inez Gold Mining Company, No. 145 Broadway. Annual meeting of stockholders and election of trustees, January 16th, at twelve M.

Princeton Mining Company, No. 67 Wall street, Room 8. Annual meeting of stockholders, January 17th, at eleven A.M.

Wide West Mining Company, No. 39 Broadway. Annual meeting of stockholders and election of trustees, January 20th, between twelve M. and two P.M.

Silver Queen Mining Company, No. 52 Broadway, Room 57. Annual meeting of Stockholders, January 23d, at two P.M.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market continues dull. The market for the Comstocks is flat, and there is no news of importance from the mines. The Tuscarora stocks have been the attraction in the market at very strong prices, Navajo taking the lead. Telegraphic dispatches from this mine state that developments on the 450 level add $1,000,000 value to the ore-reserves, and give assurance of important developments in Belle Isle adjoining. The Mining Boards, at their annual meeting, re-elected the old officers. It is said that in consequence of the decline in the mining stock business, the Pacific Exchange has decided to dispose of its property on Montgomery street. Scorpion has levied an assessment of ten cents per share.

The following statement shows the financial condition of the companies named on January 1st:

	Cr.	Dr.
Consolidated Virginia	$104,000.00	
Chollar	29,278.06	
Gould & Curry	17,642.40	
Hale & Norcross	19,479.19	
Mexican	45,064.92	
Ophir*	17,080 91	
Occidental	6,983.09	
Potosi	23,255.50	
Savage	29,872.29	
Sierra Nevada		$7,485.70

* Unsold bullion, $15,744.10.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Jan. 5.	Jan. 6.	Jan. 8.	Jan. 9.	Jan. 10.	Jan. 11.
Albion	2⅞	2¾	2⅝	2⅝	.....	1¾
Alpha	1	13-16				
Alta	5-32	3-16	5-32	5-32	3-16	3-16
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	¾	11-16	¾	¾	29-32	¾
Best & Belcher	3⅞	3¾	3¾	4	4	3¾
Bodie	2	.....	2	1⅞	2	1⅞
Bullion	15-16	1	1	13-16	1¼	29-32
Bulwer	.....	.....	.....	.....	.....	.....
California	3-16	3-16	¼	¼	.....	.....
Chollar	1⅛	1⅛	1⅛	1⅛	1⅛	1¼
Con. Virginia	7-16	7-16	⅛	9-16	½	½
Crown Point	¾	.....	¾	.....	29-32	.....
Eureka Con	.....	.....	.....	10	.....	.....
Exchequer	3-16	.....	3-16	3-16	¼	.....
Gould & Curry	1¾	1¾	1⅝	1¾	1⅝	1⅝
Grand Prize	.....	11-32	19 32	½	11-32	11-32
Hale & Norcross	1	1	1⅛	1¼	1¼	1⅛
Manhattan	.....	.....	.....	.....	.....	.....
Martin White	2⅞	2⅞	2¾	2¾	2¾	2¾
Mexican	3	3	2⅞	3	3	2⅞
Mono	.....	.....	1-16	.....	.....	3-32
Mount Diablo	.....	¼	3¾	3¾	3¾	3¾
Navajo	8⅝	9¼	9¼	9⅝	.....	9¼
Northern Belle	9⅛	9⅜	9¾	10	10	10
Noonday	.....	.....	.....	.....	.....	.....
Ophir	1¾	1¾	1¾	1¾	1¾	1⅝
Oro	.....	.....	.....	.....	.....	.....
Overman	.....	.....	.....	.....	.....	.....
Potosi	1⅛	1⅛	1⅛	1⅛	1¼	1¼
Savage	¾	¾	¾	29-32	15-16	13-16
Scorpion	9-16	9-16	9-16	.....	9-16	.....
Sierra Nev	2⅛	2⅜	3⅛	3¼	3¼	3
Silver King	10	.....	10	10	10½	10½
Tip Top	.....	.....	.....	.....	.....	.....
Union Con	3⅛	3	3	2⅞	3	2⅞
Wales Con	3-16	3-16	.....	.....	3-16	3-16
Yellow Jacket	1	1	1	1	1⅛	1⅛

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Jan. 11.

The market for mining stocks the past week has not shown that degree of activity which we hoped would result from the opening of the new year; still there are signs of encouragement that more activity and better prices for the really good mines is not far in the future. The Lake Superior copper stocks are held very firmly, and higher prices are confidently predicted for those who make regular returns to their stockholders. The speculative list is almost wholly neglected, the public not being in the mood for fliers as yet; before the year closes, however, this may be changed, as has been the case in years past, when almost every body was ready to make a quick turn in copper stocks, which may be called a Boston notion. Among the coppers, Calumet & Hecla is firm and in good demand at $252@$253; the usual quarterly dividend of $5 has been declined. Franklin is strong, and although a lot of 500 shares was on the market, it was quickly absorbed at $15½, and later 300 shares were taken at $15¾, with none offered now at less than $16. Pewabic advanced from $10@$10¾, but receded again to $10, which was the bidding price to-day. Quincy has ruled steady at $63@$63½, with sales at $64, buyer 60 days. Osceola sold as before at $33; Atlantic at $17; Huron at $2; and National at $1⅞.

In silver stocks, Bonanza was very dull at $2¼@$2⅜. Catalpa declined to 75c. Crescent sold at 30c. Harshaw at 50c. San Pedro declined to 35c.; and Sullivan to $⅞. Silver Islet advanced from $5¼@$7½ on sale of 100 shares only. Napa Quicksilver sold at $3⅛.

At the Boston Mining Exchange, there has been a fair amount of business transacted, and prices in some instances show an advance over ruling quotations of last week. Empire advanced from 30@34c. Massachusetts & New Mexico, from 18@20c. Deer Isle from 10@20c., but later fell off

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BOSTON MINING STOCKS.

	Jan. 5.		Jan. 6.		Jan. 8.		Jan. 9.		Jan. 10.		Jan. 11.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez									2.62½				50
Atlantic	17.00												50
Aztec													
Best & Bel			2.20										
Bodie Con			2.37½	2.25	2.37½				2.35				100
Bonanza D	15.00	14.25											350
Bruns. Ant													60
Bulwer													
California													
Cal. & Hec					253		253				253	252	21
Carbon. Hill													
Catalpa	.77½		.80	.75	.80	.75	.77½	.75	.75		.75		1,610
Central Ariz													
Cherryfield					.25								800
Chrysolite													
Con. V'giula							.45	.42					300
Copp'r Falls													
Crescent	.33				.32½	.27½					.30		700
Cumber'd													
Deer Isle	.12	.10	.10		.12	.11	.17	.15	.20	.18			12,600
Denver City													
Douglas					.95								100
Duncan													
Duskin													
Empire	.30				.32		.32		.24	.32			6,700
Eureka Con.													
Franklin							15.50		15.75	15.50			880
Gila County	.23	.20	.23		.23		.24		.24				3,500
Hancock G.													
Harshaw									.50		.50		450
Horn-Silver													
Huron	2.00		2.00		2.00								400
Independ'ce													
Indian Q'n													
Little Pitts													
Madison													
Mammoth					.02		.03	.02	.02				7,050
Mass. & N.M.	.19						.20	.19	.20				4,750
Milton													
Napa	3.12½										3.25		300
National							1.87½						580
North. Belle													
Osceola			33.00		33.00		33.00						97
Penn-Breck													
Pewabic	10.37		10.37	10.25	10.25				10.25	10.12	10.00		530
Pine Tree			.15										500
Plymouth	.27	.25	.27		.27				.28				2,900
Quincy	64.00		63.5		63.50		63.50		63.50		63.50	63.00	313
Ridge													
Robinson													
San Pedro	.40		.40		.40	.35			.40		.40		700
Sta Nevada							3.30						20
Silver Islet											7.50		100
Silver King													
So. Pacific							.08						500
Standard													
State Line													
Nos. 2 & 3													
Sullivan					1.00		1.00		.87½				280
Sutro Tun	.21				.21		.12						1,600
Sycamore													
Twin Lead	.36		.35	.31	.31		.30						3,300
Vizina													

PHILADELPHIA MINING STOCKS.

	Jan. 5.		Jan. 6.		Jan. 8.		Jan. 9.		Jan. 10.		Jan. 11.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American	.13		.12		.12		.19	.15	.18	.17	.20	.17	*
Argent													
Arizona So.													
Aztec									.02				5,000
Battle Mt.													
Black Sul.													
Bodie													
Buena													
California													
Calista													
Cincinnati			.11		.11								300
Comprom'e	.35	.32½	.32½	.30	.30								8,3 0
Dauntless									.02				1,000
Del Monte									.05	.05	.05		6,000
Denver City	.21		.21	.20	.20		.20	.19	.19	.17	.18		11,150
Fairview													
Eureka													
Girard	.16		.17	.16	.16		.17		.16				9,400
Golconda													
Golden Age													
Governor	.04		.05		.04		.04						8,700
Grand Uni'n	.10		.10				.09		.10	.09			5,500
Gunnison									.50				1,000
Hancock													
Intervener													
Iowa Gulch	.08		.08		.08	.07	.09	.08	.09		.09		35,600
King Bul'on													
Little Cla'd													
Little Maud	.05										.05		8,000
L'g & D'y Hl													
McCullough													
Magnolia													
Montana									.05		.04		250
Mt. Lincoln					.01								1,000
Mt. Sheridan	.03												3,000
National													
Orion			.10		.10				.05		.09		1,600
Palmetto E.													
Pembina											.16		600
Penn-Breck	.12		.12		.12		.12		.12		.18	.12	11,200
Permanent													
Pizarro													
Pizarro Ex													
Potosi													
Rara Avis	.40								.40		.40		3,800
Rara Avis E.													
Record													
Rico Pion'r													
San Pedro													
Sierra G'nde	3.10	2.60	2.55	2.40	2.55	2.20	2.45	2.30	2.50	2.45	2.80	2.60	16,275
Silver Cord	1.10		1.32½	1.30									2,700
Silv'r Plume													
Silver Rock													
Sovereign													
Standard													
Sultana	.05		.05		.05		.05		.05		.05		21,200
Sutro Tun'l													
Tombst'ne	.87½		.87½	.35	.85		.85		.85	.82½	.85	.82½	12,020
Tranquilli'y													
Tyrone													
Victor													
Yale Mt									.23	.19	.19		1,300

* 120,850.

again to 13c St. James Manganese advanced to $1.15, but we should not advise buying it at any such price. Twin Lead declined to 23c. Pipe line certificates have been dealt in somewhat at New York prices.

3 P.M.—At the afternoon Boards, but little was doing, dullness being the prevailing characteristic. Calumet & Hecla sold at $252; Quincy, at $63½; Catalpa, 75c.; San Pedro, 40c.; Napa, $3¼. Closing prices: Allouez, $2½@$3; Atlantic, $15@$17; Antimony, $14 bid; Bonanza, $2⅛; Franklin, $15¼@$15¾; Huron, $1⅞@$2; National, $1½@$2; Osceola, $32@$33; Pewabic, $10@$10¼; Quincy, $63@$63½; Silver Islet, $5@$6⅛; Sullivan, $¾@$1; Napa, $3⅛@$3¼.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 12.

The following figures for the imports of iron and steel into the port of New York for the years 1881 and 1882 will be perused with interest:

Imports.	1881.		1882.	
Pig-iron	184,689	tons.	282,498	tons.
Spiegeleisen	87,926	"	65,950	"
Old rails	34,468	"	39,516	"
Iron rails	27,629	"	9,392	"
Scrap iron	21,429	"	38,918	"
Scrap steel	28,087	"	15,917	"
Iron ore	218,673	"	148,332	"
Swedish iron	....		23,970	"
Iron wire rods	....		11,020	"
Steel " "	....		79,653	"
Hoop-iron	....		3,392	"
Sheet-iron	....		6,843	"
Russia sheet	1,249	tons.	1,392	"
Iron beams and channels	....		5,519	"
Iron bars and bundles	....		5,464	"
Iron cotton ties	....		51,710	"
Steel tires and forgings	....		3,053	"
Steel bars, etc	....		8,097	"
Steel rails	55,029	tons.	59,757	"

American Pig.—The market continues unsettled and weak so far as less well-known brands are concerned. The makers of standard brands still maintain a firm position, due principally to the fact that they have small stocks only. There is evidence that stocks are accumulating a little on the hands of producers, and weaker concerns are, therefore, found to press sales somewhat by offering at concessions. We have no business of any magnitude to report, and quote as follows, with the market in favor of buyers' interest: We quote at tide-water, standard to choice brands, $24.50@$26 for No. 1 Foundry; $22.50@23 for No. 2; and $20.50@$21 for Gray Forge. Bessemer pig is quiet and dull at $22@$22.25, the latter figures being the lowest mentioned by sellers. Spiegeleisen is dull and quiet, with 10@12 per cent. at $27.50@$28, and 20 per cent at $33@$34.

Scotch Pig.—The situation has not changed, except that the market is a trifle weaker. Arrivals are not heavy, and partially go into store. The foreign market is showing a small decline, and freights are still cabled low, 5s. from Glasgow. During the week, sales have aggregated about 1000 tons at private terms. Desirable buyers could probably obtain concessions from the following quotations: Coltness, $25.50@$26; Summerlee, $23.50; Glengarnock, $22.75@$23; and Eglinton, $21@$21.50. At the Wall Street Exchange, the cables to-day are: Carnbroe, 55s. 6d.; Gartsherrie, 63s. 6d.; Summerlee, 62s. 6d.; Coltness, 67s.; Langloan, 67s.; Glengarnock, 55s.; and Eglinton, 50s. 6d. Warrants are 48s. 2d., a decline of 10d.

Steel Rails.—Some of the mills are not taking orders for earlier than July delivery. There have been sales of small lots at $40 at mill, which is firmly adhered to, and which we quote. England is lower, £4 17s. 6d.@£5 2s. 6d.

Old Rails.—The market is dull and weaker. We hear that American Ts are offered at $23. Nothing has been done in Double Heads.

Scrap.—We hear of no transactions; $27@$28 is asked ex yard.

Philadelphia. Jan. 12.

The only unsettling influence in the Pennsylvania iron trade, and which holds in check a rising demand for iron, is the pending reduction in the tariff duties on iron and steel. Consumers are keeping stocks low, intending to buy largely when bottom is reached; but this very necessity will tend to react on prices, and the probability is discounted by a few careful sellers and buyers. The general situation is good. Large quantities of iron will be wanted. The railroad companies are still holding back, and will not come into market while matters are so unsettled. Railroad work is vigorously prosecuted in nearly all parts of the country, and surveys are running for a thousand miles or more of road. The present lull is more from the exercise of prudence than through lack of demand.

Pig-Iron is barely holding its own. The standard brands are firm, while the inferior makes are going for the best prices to be had. Foundry, in fifty-ton lots, has sold at $24.75@$25@$25.50; No. 2, $23. Gray Forge iron sold at $20.50. Inquiry is less active. Both sides are waiting for developments.

Bessemer Pig.—Very little has been done. Buyers offer under rates. Quotations are: $22@$22.50, tide-water. Negotiations are hanging fire. Foreign Bessemer is weak. Offers for future shipments, large lots, are under consideration.

Muck Bars.—Prices have weakened $1 per ton, and business has been done at $38; offers are in hand at $37.

Blooms.—Charcoal Blooms are weak. Actual selling prices are below quoted rates—$65@$67; Anthracite, $55@$56. New business is scarce.

Merchant Bar.—Small lots are selling at and above 2·40c. rates at store. Mill prices gravitate between 2·30@2·40c., common iron a little less. Consumers want iron, but are holding off, and possibly may wait too long. Should all who are waiting conclude to present their requirements at once, in February or March, as circumstances might seem to require, there would be an improvement in spite of the apparent weakness. Mills have small stocks on hand, and consumers are running from hand to mouth.

Nails.—Factories have quoted this week $3.30@$3.40, in response to inquiries. Should the combination stick together, firmer prices will be had in the spring.

Shapes.—To-day's quotations are: Angles, 2·5c.; Tees, 3½c.; Beams and Channels, 4@4·2c.; but desirable orders can be had under these quotations, though manufacturers are not short of work. Plates are quoted 2½@2·6c., all mill figures.

Plate and Tank.—Very little fresh business has come along, and buyers are living in hopes that they can place large orders at lower than current rates. Tank, 2·50@2·60c.; Shell, 3·50c.; Flange, 4·50c.

Steel.—Steel for tools, machine-shops, etc., is in moderate request. Prices have weakened during the past thirty days, and orders have been accepted at 10 per cent off card rates.

Steel Rails.—Several inquiries are in hand, and a moderate amount of business has been done in large and small lots at $39@$41 quoted.

Old Rails.—Sales of small lots have been made at $26; offers are made for shipment at $25 tide.

Scrap.—$26@$28 covers the few transactions that have been heard of.

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METALS.

NEW YORK, Friday Evening, Jan. 12.

Copper.—During the week, it transpired that the lake companies had contracted to deliver between 10 and 11 millions of pounds of copper, to manufacturers chiefly, at 18c. We have had this news confirmed by the best of authority. The market is firmer for Lake, and a number of small parcels have changed hands at 18c. each, with some holders at the close ask-18⅛c. We record also sales of several hundred thousand pounds of Baltimore at private terms. Baltimore is now held at 17@17⅛c. London cables at the close £66 15s.@£67 for Chili Bars, a slight increase, and £72@£72 5s., for Best Selected, unchanged.

Tin.—The market has been fairly active, with the prices tolerably well maintained at the closing figures of last week, 21¼@21⅝c. asked for spot Straits, and 21¼c. freely paid. London, which went as high as £94 15s. during the week, had reacted £90 5s. at the close. The imports of tin into New York were 10,640 tons in 1882, against 9758 in 1881.

Lead.—The market has been more active here, and we note sales of 400 tons Refined at 4·75c., and 200 tons Pueblo refused at 4·70c., with additional transactions closed in the West. The bulk of these sales, both East and West, appears to be for future delivery, consumers, it seems, being desirous to secure a part of their supplies in any emergency. We quote: Common, 4·70c.; and Refined, 4·75c. London cables £13 15s.@£14 for English Common.

White lead manufacturers from all parts of the country have held a three days' meeting in this city, with a view to agreeing to some arrangement to place prices on a remunerative basis. The attendance was full and the feeling in favor of an agreement which will probably be entered upon, should the absentees be induced to give it their support. It does not seem that this is to be combined with any effort to restrict production, and it may possibly, therefore, lead to a general crowding of the beds and a temporary increase of the demand from that quarter.

It is understood that the stock of 7000 or 8000 tons of the Richmond Company is held at 4·90c., and that the largest holder in Chicago insists on 4·70c.

Preliminary estimates of the production of lead in the United States, compiled from the returns obtained from all the important desilverizing establishments in the country, and after a careful estimate of Missouri and Illinois, enable us to s ate that the output was at least 136,000 net tons during the year. A few outstanding returns may possibly increase this figure to 139,000 tons. The smaller figure is a minimum.

From St. Louis, Messrs. John Wahl & Co. wire us to-day as follows:

Our market has shown remarkable activity since our last advices. Sales for the week sum up over 400 tons of Refined at 4·30c., and 300 tons of Hard Lead at 4·25c.

Spelter.—There is nothing new, and the market remains dull and lifeless. We quote 4·50@4·65c. for Common. England cables £16 5s.@£16 10s. for Ordinary. It may be of interest to note that the imports into the port of New York during 1882 were 11,176 tons, against 2636 tons in 1881.

Antimony.—The market is weak, and it is stated that Cookson's is now selling at less than the cost of importation. We quote Cookson's 11¼@11⅝c., and Hallett's, which is scarce, at 10⅝c.

Quicksilver.—Spot market quiet at 35½c.; some holders ask 36⅜c., preferring to ship upon owners' account rather than to sell at this low rate.—*San Francisco Commercial Herald.*

BULLION MARKET.

NEW YORK, Friday Evening, Jan. 12.

But for an advance here in sterling exchange, the past week, silver would show a considerable decline since our last issue. The London rate to-day is about as low as it has marked on the recent decline.

DATE.	London	N. Y.	DATE.	London	N. Y.
	Pence.	Cents.		Pence.	Cents.
Jan. 6 ...	50 7-16	109¼	Jan. 10.....	50⅜	109⅛
Jan. 8....	50⅜	109⅛	Jan. 11.....	50¼	109
Jan. 9. ..	50⅜	109⅛	Jan. 12.....	50⅛	108⅞

Foreign Bank Statement.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank gained £264,000 bullion, and the proportion of its reserve to its liabilities made an extraordinary gain—from 29⅞ to 37 11-16 per cent, against 34⅜ per cent at this date last year. To-day, the bank gained £77,000 bullion on balance. The weekly statement of the Bank of France shows losses of 7,425,000 francs gold and 320,000 francs silver.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended January 12th, as compiled from various sources, amounted to $374,877, as against $496,579.80 reported for the previous week. The receipts from January 1st, 1883, to date, are $871,456.87.

United States Mint.—The coinage executed at the mints of the United States during the year 1882 amounted to 88,805,831 pieces, of the value of $94,820,120.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended January 6th.....	$266,713
Corresponding week last year...	228,239
Since January 1st, 1883.....	266,713
Corresponding period last year.....	228,239

Imports.

Week ended January 6th.....	$71,007
Corresponding week last year.....	109,157
Since January 1st, 1883.....	71,007
Corresponding period last year.....	109,157

BULLION PRODUCTION FOR 1882.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1882.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13⅓ per cent to arrive at actual value.

MINES	States.	For the week.	Month of December.	Year from Jan. 1st, 1882.
*Alice, G. S....	Mont...	.....	.....	$789,591
*Alta-Montana, S. L....	" ...	.....	.....	343,290
Barbee & Walker, S..	Utah..	.....	.....	84,262
*Belmont.....	Mont...	.....	.....	26,916
Betty O'Neal, S.....	Nev....	.....	.....	59,159
*Black Bear, G.....	Cal....	.....	.....	69,015
Bodie, G. S.....	"	.....	$31,225	485,890
Bodie Tunnel, G.....	Cal....	.....	.....	120,217
*Boston & Montana, G.	Mont...	.....	.....	265,615
*Caledonia, G	Dak ...	.....	.....	76,655
*Caribou, S	Colo....	.....	.....	126,918
*Central Arizona, S...	Ariz...	.....	.....	180,858
*Christy, S.....	Utah...	.....	.....	334,114
*Chrysolite, S. L	Colo...	.....	.....	289,578
Cons. Bobtail, G..	" ..	.....	.....	99,784
*Contention, S.....	Ariz ...	.....	.....	1,692,604
Crismon-Mammoth, G.	Utah...	.....	.....	63,579
*Custer, G. S...	Idaho...	.....	.....	682,331
*Deadwood-Terra, G...	Dak....	.....	.....	551,052
*Derbec Blue Grav., G.	Cal	.....	.....	183,781
*Eureka Con., G. S. L..	Nev....	.....	.....	903,538
Evening Star, S. L....	Colo...	.....	.....	862,520
*Father de Smet, G...	Dak....	.....	21,288	391,269
*Frisco M. & S.Co., S. L	Utah...	.....	22,061	370,635
Girard, S.....	Ariz...	.....	.....	177,540
Grand Central, S.....	" ...	.....	.....	1,358,820
*Hall-Anderson, G....	N. S...	.....	.....	13,050
*Head Center, S.....	Ariz...	.....	.....	145,636
*Hecla, G. S, L.....	Mont..	.....	.....	77,945
*Homestake, G.....	Dak....	.. ....	.....	1,114,568
Horn-Silver, S. L.....	Utah...	.....	294,500	3,539,516
*Hope, S.....	Mont...	.....	25,685	329,752
Idaho, G.....	Cal	.....	.....	395,540
*Independence, S....	Nev....	.....	.....	152,527
*Indian Queen, S	"	.....	.....	183,650
*Inyo Cons., G.....	Cal	.....	.....	59,421
Ingersoll, S.....	Ariz...	.....	.....	90,000
Iron Silver, S	Colo...	.....	.....	865,436
*Jocuistita, S.....	Mex....	.....	.....	700,585
*Kentuck.....	Nev....	.....	.....	8,526
†Leeds, S.....	Utah...	.....	.....	11,988
Lexington, S.....	Mont...	.....	.....	88,508
*Little Pittsburg, S. L.	Colo...	.....	.....	134,538
Manhattan, S.....	Nev....	.....	.....	64,300
Mack Morris, S.....	Ariz...	.....	.....	281,024
*Marguérite, G.....	Cal ...	.....	15,800	15,800
Morning Star, S. L....	Colo....	.....	.....	478,676
Mount Diablo, S.....	Nev....	.....	.....	294,307
*Navajo, G. S,...	"	.....	.....	384,193
New York Hill, G.....	Cal	.....	.....	105,136
Noonday & North Noonday, G.	"	.....	.....	231,000
Northern Belle, S.....	Nev....	.....	.....	740,012
†Ontario, S. L.....	Utah...	.....	.....	2,221,303
Ophir, G. S.....	Nev. ..	.....	.....	39,472
*Oxford, G.....	N. S....	.....	.....	15,564
Pascoe, S.....	Utah...	.....	.....	4,575
*Pleasant Valley, G. S.	Cal	.....	.....	46,360
Robert E. Lee, S.....	Colo....	.....	.....	292,550
Russell, C. S.....	Ariz...	.....	.....	266,686
*Satemo, G.....	N. S....	.....	.....	11,095
Savage, S.....	Nev....	.....	.....	33,281
*Silver Bow, G. S....	Mont...	.....	.....	330,182
Silver King, S	Ariz....	.....	.....	815,000
*Spring Valley, G....	Cal	.....	.....	152,000
Standard, G.....	"	.....	92,023	1,258,057
Star, S..... ..	Nev....	.....	4,515	61,716
Stonewall, S..... ..	Ariz...	.....	.....	240,000
Stormont, S.....	Utah...	.....	19,690	283,934
*Sullivan, S.....	Maine..	.....	.....	4,536
Syndicate, G.....	Cal	.....	.....	75,458
Tintic M. & M. Co....	Utah...	.....	10,576	76,231
*Tip Top, S.....	Ariz....	.....	33,653	243,081
*Tombstone, G. S.....	"	.....	550,988	1,440,894
*Union Con., S.....	Nev....	.....	.....	318,291
*Vizina, S.....	Ariz...	.....	.....	107,339
Total amount of shipments to date.....				$29,280,811

* Official. † Net. ‡ Assay value. *G Gold. S, Silver. L. Lead.*

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 12.

Anthracite.

Buyers of anthracite coal enter the market only to cover pressing wants, and the market therefore continues to rule dull. The week has been one of expectancy. While the production has been light in consequence of bad weather, which has affected the working of the collieries much more than is generally believed, it is nevertheless true that it appears to be greater than the wants of the market. It is understood quite generally that a conference will be held to-morrow, to decide whether it will be necessary to resort to the policy of restriction, and if so, to what extent. The feeling in the trade seems to be in favor of it. Prices are not better nor are they worse than they have been. The majority of the companies are not pressed for orders, and maintain an attitude of indifference.

The production of anthracite for the week ended January 6th was 430,784 tons, as compared with 453,882 tons the previous week, and 371,298 tons for the corresponding week of 1882. The total product from January 1st to January 6th was 430,784 tons, as against 371,298 tons for the like period of last year, showing an increase this year of 59,436 tons.

Bituminous.

A larger supply of cars to Clearfield shippers, who have ceased buying Cumberland coal, and considerably easier freights from Baltimore, have swelled the quantity of available coal in the hands of some shippers, and with an unchanged demand have produced some weakness. On the other hand, vessels are so scarce at Philadelphia that the shipments from that point have been considerably lessened, so that the supply here of certain of the best grades of Cumberland is small.

We quote alongside Clearfield at $4.60@$4.75, and Cumberland, $4.65@$4.80.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended January 6th and year from January 1st:

TONS OF 2240 LBS.	1883.		1882.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co..	57,731	....	49,331	.....
D. L. & W. RR. Co.	80,045	.....	70,500	.....
Penna. Coal Co.....	22,109	... .	19,387	.....
L. V. RR. Co.....	16,949	.....	18,462	.....
P. & N. Y. RR. Co..	3,102	.....	2,797	.....
C. RR. of N. J.....	27,406	... .	19,897	....
	207,342	.....	180,374	.....
Lehigh Region.				
L. V. RR. Co.....	82,848	.....	69,547	....
C. RR. of N. J	24,515	.....	19,990	....
S. H. & W. B. RR..	.....	.....	.....	... .
	107,363	.....	89,537	.....
Schuylkill Region.				
P. & R. RR. Co.....	89,317	.....	85,593	....
Shamokin & Lykens Val.....	25,788	.....	14,893	....
	115,105	.....	100,486	.....
Sullivan Region.				
St Line & Sul. RR. Co.	924	....	901	....
Total	430,734	....	371,298	.....
Increase	59,436	... .	.....	... .
Decrease	.....	....	.....	....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878 ... .499,868 tons.
" " " " 1879.....352,289 "
" " " " 1880.....436,978 "
" " " " 1881.....305,298 "

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 6,256 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended January 6th:

	Week.	Year. 1883.	Year 1882.
Coal for shipment at Coal Port (Trenton)	125	125	... .
Coal for shipment at South Amboy.....	14,933	14,933	14,301
Coal for distribution.....	14,022	14,022	11,540
Coal for company's use	2,711	2,711	1,691
Total	31,791	31,791	27,532
Increase...	.....	4,259	.....
Decrease.....	.....	.....	.....

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1485, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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ANOTHER one of the great blasts for which the limestone quarries of the Glendon Iron Company are famous was fired on the 11th. A total charge of 29,000 tons of Judson powder, distributed in six chambers, was fired by Mr. FRANK FIRMSTONE, the quantity of rock displaced being estimated at considerably above 100,000 tons.

THE preliminary work connected with the forthcoming National Exposition of Railway Appliances seems to be progressing favorably. Mr. FRENCH, Acting Secretary of the Treasury, has issued a circular permitting the bonding of the exhibition building and providing for the necessary regulations to allow the entry of foreign goods. From what we can learn, the prospects of the exhibition are very encouraging.

IT seems likely now that the Senate Finance Committee will, by an amendment, alter some of the provisions of its bill relating to iron and steel. They have heard Mr. H. N. OLIVER, who has impressed them with the necessity of discriminating a little more than they have done between the various grades of that very elastic metal, "steel." It is the intention to draw the line somewhere between the ordinary Bessemer ingots at one end of the scale and open-hearth steel made from the best Swedish charcoal-iron at the other end. The pig-iron men have also been active, and have succeeded in convincing the Finance Committee that a reduction of the duty to $6 per ton means utter ruin to large numbers of blast-furnaces, and it is probable that 72 cents will be added to prevent that calamity.

THE annual meeting of the American Society of Civil Engineers was held in this city this week, there being a full attendance. Professionally, the principal interest centered in the discussion of Mr. W. P. SHINN'S remarkable paper on the Increased Efficiency of Railroads for the Transportation of Freight, formal contributions to the subject being made by Messrs. JOHN B. JERVIS and CHARLES PAINE, the newly-elected president, while a number of prominent railroad engineers made short addresses. It is understood that the discussion will again be taken up, and that efforts will be made to bring out the views of a still greater number of specialists. The second day of the meeting was devoted to a visit to a number of points of interest in this city, and the meeting ended with a reception at the rooms of the society.

THE Western sheet-iron roofing manufacturers have addressed a protest to Congress against the unjust discrimination of duties upon sheet-iron in favor of tin plate, the papers bearing the signatures of such firms as SCOTT & Co., W. G. HYNDMAN & Co., the PORTER IRON ROOFING COMPANY, the EUREKA IRON ROOFING COMPANY, all of Cincinnati; O. S. KEELEY & Co., of Indianapolis; and a number of leading manufacturers. They call attention to the fact that the present duty on tin plates, 1·1 cents per pound, is only 20 per cent *ad valorem*, and that, if it were advanced, as proposed, to 2·1 cents per pound, it would be only 40 per cent *ad valorem*. Any decrease in the duty would lead to increased importations of tin plates, and would make further inroads into the market of the home sheet-iron roofing industry, which has been gradually developed, particularly in the West, under heavy disadvantages.

ANNUAL REVIEW OF THE METAL MARKETS FOR 1882.

The year 1882 has on the whole been one devoid of excitement for the metal trade. In all the prominent metals in which Americans are interested as large producers, prices have generally ruled in buyers' favor, and a steady decline in values has taken place, as is proved by a glance at the accompanying summary of prices, quoted, whenever possible, on the basis of actual transactions in large lines. It may be said that this decline is almost wholly due to increased supplies, the growth in production, as we shall show in detail farther on, having been remarkable. Consumers were fairly active, and more than maintained the good record of the previous year. But as the exceptional prosperity of 1880 and 1881 had led to important additions to manufacturing capacity, and the rate of progress of those years was not kept up, there was probably more complaint of dullness than the volume of business really warranted. A manufacturer who turned over a product of 5000 tons of lead a year before 1879 may be ready run to do 9000 tons, and complains of dullness when his business does not foot up to figures which a few years ago would have taxed his capacity.

Except in tin and, at one period, in lead, the speculative element has been almost entirely absent during the year.

The tariff agitation has done considerable havoc to business for the time being. We have so fully expressed our opinions on that subject from week to week that we need add nothing now. Suffice it to say, that at present the prospects are discouraging. Business men throughout the country freely express their willingness to accept reasonable reductions, provided the injurious agitation of the question is brought to a close as speedily as possible. We regret to say that now an early settlement does not seem probable, and many months may pass by before the producing and manufacturing interests of the country know just where they stand. This is very unfortunate, because it will hamper any free movement for a long time, so that the prospects of reasonable activity in business are not good.

The magnitude of the consumption of the leading metals in this country, and of the interests involved, may be approximately presented by the following figures:

Metal.	Consumption.	Average price.	Total value.
Copper	45,000 tons	18c.	$16,200,000
Lead	140,000 "	4½c.	12,600,000
Tin	11,000 "	22c.	4,800,000
Spelter	42,000 "	5c.	4,200,000
Quicksilver	50,000 bottles	36·5c.	1,300,000
			$39,100,000

Antimony and nickel will swell this to a minimum of forty millions of dollars.

Copper.—Last year, we recorded the heavy increase in the production of copper in the West, submitting figures based on careful estimates of the production by gentlemen closely connected with the trade. The many evidences of a very notable increase during the present year induced us to make special efforts to gather statistics of the production in 1882. We take this opportunity to thank the gentlemen in many parts of the country who have cordially assisted us with their aid and advice, and we believe that the result of our work will be a surprise to them as it was to us. We could not, nor did we, attempt to present absolutely accurate data. Many of the mines had not received December returns, others reported only "mineral" or "black copper," others were obtained through reports of refiners, which were hard to be estimated from occasional or scattered figures printed in local newspapers. Information was directly derived only in a few cases. As the figures submitted by refiners represent only actual sales of ingot copper, while those of many mining companies include estimated yield of impure coppers in transit, our data

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are approximations only. As they stand, however, they are as closely accurate as it is possible to make them at so early a date. We have been particularly careful to avoid duplications, which, for instance, easily occur, because the same copper produced in Montana or Utah may reappear as blister copper or matte in the figures of Colorado works and in the statements of Eastern refiners. Whenever possible, we have referred the amounts to the original source. Another difficulty besetting the statistician in collecting figures for the production of copper is, that a part of the amount, mattes, etc., is converted into blue vitriol, and does not appear upon the market as ingot metal.

We have grouped the returns by States, many of the data submitted being confidential:

PRODUCTION OF COPPER IN 1882.

Michigan.

	1882.	1881.
Calumet & Hecla	32,000,000	31,360,731
Quincy	6,500,000	5,506,848
Osceola	4,175,000	4,179,976
Franklin	3,334,000	2,677,932
Atlantic	2,620,000	2,528,009
Allouez	1,675,000	1,421,433
Pewabic	1,650,000	1,876,244
Central	1,350,000	1,418,465
Conglomerate	766,500	386,091
Grand Portage	675,000	528,866
Copper Falls	601,570	669,121
Hancock	540,575	571,897
Huron	392,000	254,515
Ridge	129,410	235,606
National	20,000	.....
	56,449,055	53,615,784
Other mines assumed equal both years	958,728	958,728
Total	57,407,783	54,574,512

The product of the Calumet & Hecla was 19,946·71 tons of mineral in 1882, against 19,542·03 in 1881. We have assumed that the yield of ingot copper would be the same, that is, 77 per cent, which is lower than it was the fiscal year in 1880, when it was 77·86 per cent. We feel justified, therefore, in putting down the Lake mines at 57½ millions of ingot copper. We have therefore:

Michigan	57,500,000
Arizona	15,560,000
Montana	10,000,000
California	1,000,000
Colorado and Utah	1,000,000
Vermont	1,265,000
New Mexico	870,000
Imported pyrites	1,000,000
Nevada	400,000
Missouri	295,000
Eastern and Southern States	750,000
Miscellaneous, desilverizers, etc.	500,000
Total	90,140,000

In the above figures, Arizona includes the Copper Queen, the Longfellow, Old Dominion, Pima, Columbia, Russell, Buffalo, Neptune, Long Island, and Detroit. The Montana production is an estimate from refiners' returns, as most of the copper goes through their hands, to which estimated exports have been added. In California, the principal copper producer is the San Francisco, at Spenceville. Colorado includes the product of the Mammoth in Utah, but does not include the figures of the Colorado & Montana Smelting Company and the Bell Company, both of Butte City, Montana, whose shipments are included in those of the Boston & Colorado works at Argo, Colo. Vermont includes returns of the Ely and Elizabeth mines, the former sending the product to Ansonia, Connecticut. The copper from imported pyrites is obtained chiefly from Canadian ore, and the bulk is probably re-exported in the form of matte. The Nevada product is almost entirely a poor grade of mineral copper, which we believe has not yet been refined. Missouri appears for the first time as a producer of refined copper, the quantity given being almost exclusively that of the company working at Genevieve. The estimates given for Eastern and Southern States include Maine, New Hampshire, Pennsylvania, Maryland, Georgia, Tennessee, and Alabama, It may be assumed from these figures, which have been largely checked by refiners' returns, that the total product of the country was not less than 90 millions of copper.

Of this quantity, 2,400,000 pounds of Lake, 2,000,000 pounds of Montana matte copper, 1,000,000 of pyrites mattes and 500,000 pounds of miscellaneous coppers, as cement, etc., were exported, or roughly, six millions of copper, leaving the approximate consumption at about 84 millions of pounds of ingot copper. This, it will be conceded, is unprecedented, and is eloquent proof of the great expansion in the demand. The principal increase has been in the requirements of the electric lighting companies for wire and in the use of brass for ornamental and machinery purposes. We have a report from one of the great electric lighting companies, stating that its consumption during the last year had been 6,000,000 pounds, and was likely to be larger this year.

As for the prospects of production during the present year, it is necessary to note that, besides the large mines in the Lake district, which in general show an increase due to reduction of cost by improvements in mining, the use of rock-drills, etc., and greater facilities in handling larger masses of rock in the stamp-mills, there are coming up new promising concerns. Among these is the Conglomerate, whose product this year was entirely from prospecting; the Peninsula, Wolverine, and others, all getting ready for work on a large scale. In Arizona, the larger mines, like the Copper Queen, Longfellow, and Old Dominion, are now producing at a considerably greater rate than their average during the year, and all of them will probably increase their record for 1883 considerably. A number of the others are now, and probably will be, hampered by lack of metallurgical talent, or the absence of sufficient capital. With coke ranging from $60 to $70 per ton, and high labor and freight, none but very high-grade ores will pay, and they only in well-arranged and carefully conducted plants, backed by ample capital. We shall probably hear during the year of the beginning of operations of a number of works now building, and of resumption of others now idle; but we do not expect that, after all, the aggregate of the smaller works will be much heavier than it was this year, say at the utmost five or six millions. This is largely the case too with New Mexico concerns. Utah and Colorado will probably do better, and a very considerable increase may be expected from Montana. Taking the whole, we look forward to a material addition to our copper product during the year 1883.

During the year, the Lake companies have continued to pursue the policy of marketing their copper in large blocks, dealing directly with consumers. As the quantities taken by dealers or speculators were small, outside transactions were limited, and the quotations of Lake copper were therefore frequently nominal. We have, therefore, added to our list a column showing the variations in the price of Baltimore, as furnishing a better indication of the weekly fluctuations of the market. Here the transactions are frequently made on private terms, and our quotations probably, on an average, represent holders' views. Considerable outside Western copper does not reach the open market, going directly from the hands of a large firm, manufacturing refiners and dealers, into their own mills and to their own trade. It will be understood, therefore, that it is a difficult matter to follow closely the variations in the metal.

The year opened with a quiet market, showing occasional signs of weakness, as manufacturers were well supplied, and there was little inquiry. Speculators were induced to take hold at lower prices, but unfavorable advices from abroad had a depressing influence. February opened with buyers in an expectant attitude, but firmly declining to pay current figures, which gradually gave way, until, at the close of the month, there were somewhat more liberal purchases at 19@19¼ cents for Lake. Stocks began to get to a low ebb; but the unbroken front presented by consumers caused a further decline, so that April opened at 18½ cents, and a week later the market stood at 18¼ cents. In the middle of April, the companies gave way, selling twenty millions of pounds of Lake at 18 cents. Meanwhile, offerings of outside brands became more liberal, and a considerable quantity was cleared away at rising prices. June, July, and August passed quietly, with values well sustained, but a limited business, until, in the beginning of September, the Lake companies sold between 10 and 11 millions of copper at the reported price of 18 cents, followed by sales of round lots of Baltimore at 17½ cents, and, toward the close of the month, of a million of Arizona copper at 17⅜ cents, and lots of other kinds at low figures. The market was somewhat relieved of the pressure of these brands of copper by exports of mattes, but did not recover sufficiently to hold prices, which gradually but steadily declined untill the close of the year.

The following statistics by Messrs. James & Shakspeare, of London, show the position of the metal at the close of the year in England and France:

		Jan. 1 to Dec. 31. 1882.	1881.	1880.
Imports.	Chili	42,306	40,589	45,499
	Other foreign	35,571	35,888	33,865
Tons		77,877	76,477	79,364
Deliveries.	Chili	43,502	50,890	43,328
	Other foreign	37,991	34,836	31,839
Tons		81,493	85,726	75,167
		Dec. 31, 1881.		Dec. 31, 1882.
Stocks.	England	35,306		32,623
	France	3,437		2,504
Total stocks		38,743		35,127
Afloat		11,120		11,460
Tons		49,863		46,587

Tin.—This metal has become the favorite foot-ball of speculative cliques on both sides of the Atlantic. With the principal mines of supply at a distance, where it is difficult to watch the development of production, which is extremely variable, from the nature of the deposits, and is subject to droughts, etc., it is natural that rapid variations in values should take place. Besides this, past experience in the tricks resorted to to "fix" statistics has rendered the latter unreliable. The history of the metal is therefore little more than a record of the achievements of bulls and bears. The bulls had it their own way in the beginning of the year, but were somewhat frightened in January by the French panic. In February, they again obtained the ascendency, but lost their hold during the close of March, when London went down to £88, our own market following. London recovered and fluctuated for a while without affecting prices here much. The market was quiet and dull during May and June; but the Egyptian troubles and the temporary closing of the Suez Canal again rushed prices upward; but toward the end of the month, a more favorable turn of affairs in Egypt caused a reaction in London, to which our market partly responded. The metal had meanwhile got into firm hands here, and maintained its position fairly well; but the apathy of consumers caused a steady decline during October, November, and December. Since the beginning of the year, the 10 per cent differential duty discriminating against tin not imported directly from beyond the Cape of Good Hope has been abolished, and now New York will probably, more closely than ever, follow the movements of the London market.

Lead.—The most important feature affecting the business during the year 1882 has been the great increase in the production. We have made special efforts this year to obtain data upon which to base an estimate of the output, and we are pleased to state that we have been furnished with figures in the most liberal manner by all the leading desilverizing works in the country. We are not at liberty to give the items in detail; but we may state that returns from the Richmond works at Eureka, Nevada; the Germania works, Salt Lake City, Utah; the Pueblo, Colorado; the Omaha, Neb.; the Kansas City, St. Louis; the Horn-Silver, Chicago, the Pittsburg, and Balbach & Sons', Newark, N. J., works aggregate 99,700 net tons of refined lead. In the absence of returns, we estimate the Selby works at San Francisco, the Delaware works, Philadelphia, and the Manhattan works in this city, together, at minimum of 6300 tons, which would make the total of desilverized lead 106,000 tons. To this must be added the product of Missouri and Kansas, which is so much scattered that we have not been able to obtain direct returns in sufficient number to warrant an estimate. We place, however, on very good authority—that of Messrs. John Wahl & Co., of St. Louis—the output at 631,721 pigs, at 80 pounds, or 25,268 tons. Assuming the entire product of Missouri, Kansas, and Illinois at 30,000 tons, we reach a total of 136,000 tons. To this it is necessary to add 2000 tons, being the product of such works as the Castle Dome Company, of California, which cupels rich silver-lead, and the make of small quantities in Virginia and elsewhere. We believe, therefore, that we are as close to the actual production as preliminary estimates at s

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early a date can make it, when we say that the total make of lead is 138,000 net tons. This will probably closely represent the amount which was marketed. Assuming that the stocks are now slightly greater than they were a year ago, it must be remembered that the Richmond Company, of Eureka, brought upon the market several thousand tons of lead more than it produced, thus diminishing its stock, which is now between 7000 and 8000 tons of lead. That such an enormous quantity of metal should have passed out of the hands of producers into that of consumers, without seriously disturbing the price, is one of the most encouraging signs for the future. There can be no doubt that consumption was very heavy. The lead business is so closely dependent upon the prosperity of the building trades that any unusual activity in the latter aids the former. Statistics, published at the close of last year have shown that 1882 has fairly kept up the extraordinary record of 1881 in this city, Brooklyn, and Philadelphia. The demand in the East has been fully up to that of the preceding year. In the West, the increase has been very noteworthy, particularly so far as the manufacture of white-lead is concerned; but it is probable that a part of this increase is due to a transfer of business from Eastern to Western corroders. It is a noteworthy fact that the greatest increase in the manufacture of lead is taking place nearer the sources of supply, a very natural result of the circumstance that the greatest expansion of the population is going on nearer to them.

We have not attempted, however interesting such an inquiry would be, to trace the source of the lead now in course of production. We know from local statistics, gathered, evidently, with much care, and therefore trustworthy, the output of such districts as the Leadville and the Utah region. But there are, scattered in so many mining camps in Colorado, Montana, Utah, Nevada, New Mexico, and Idaho, so many small smelters, working by fits and starts, and frequently changing owners, that it would be impossible to gather the facts, except after many months' tedious correspondence. Suffice it to say, that Colorado, Utah, and Nevada lead in the Rocky Mountains. Leadville, with the smelters of which it is the main source of supply, both in the district and at a distance from it, has kept up its remarkable record, and, from all we can learn now, is likely to do as well this year. It has made tributary to it many smaller camps, which are turning out growing quantities of ore. The smelting business proper is not in a very satisfactory condition; but the sharp competition among the works aids development and fosters production.

In Utah, the Horn-Silver stands pre-eminent, with a record of 16,101 tons of refined lead, and the question whether the present rate can be kept up is an important factor in the market. From all that we can learn, the prospects are still favorable for the coming year.

In the Eureka District, the Richmond has been falling behind materially; but it is likely that the output of the Eureka and Albion mines will fully make up for the deficiency and carry the product to higher figures, even if the developments in the Richmond should be unsatisfactory during the year.

The most important increase in the production during the coming year will come from Idaho. It is now proved beyond a doubt that there are a number of mines capable of a large production in the Wood River and other districts, however overrated some individual properties may be. The ores are mostly galenas, which tell heavily when smelting operations have once been started and better transportation facilities are afforded.

Montana, from the accounts which reach us concerning the principal lead-silver mines, will make a fair record, and New Mexico is also likely to come to the front as a producer.

Throughout the year, quite a number of smelting plants have been erected in various sections of the Rocky Mountains; but it is within our knowledge that some of them have languished from some fatal defect of location or management, while others are not likely ever to figure prominently in the returns. Still, the capacity has been largely increased, and the numerous additions to the railroad mileage of many sections has rendered the receipt of raw materials and the shipment of product easier. We do not therefore see any prospect of a decline in the production this year.

Nearly all of the Western desilverizing works, from Pueblo to Pittsburg, have done full work and have been crowded. Their number has been increased by two during the year, one of which, the works at Aurora, Ill., is now beginning operations. The second, built by the Chicago Smelting and Refining Company, at Chicago, was reported to be a model plant, with many improvements, notably as regards the reduction in the consumption of fuel by the use of gas firing. Unfortunately, these works were destroyed by fire this week. It may be of interest to state here, as showing the very large business done by desilverizers, that returns received from five works, producing in the aggregate 49,300 tons of refined lead, turned out $9,022,000 of silver and $694,000 of gold, not counting the silver and gold produced from jewelry sweeps or by parting doré bars delivered directly. It seems probable, therefore, that the eleven works operating during the year have turned out nearly twenty millions of gold and silver, besides producing 111,500 tons of lead, valued at an average price of 4·50 cents per pound, or ten millions of dollars. The total value of the product of the desilverizing works in the country is therefore above thirty millions of dollars, exclusive of outside parting and sweep-smelting business.

In January, the market opened with growing signs of weakness, in spite of light spot stocks, the pressure coming chiefly from the West, and transactions were limited until, in the beginning of February, 2000 tons of Richmond lead were sold in one block, at 5 cents, for delivery in February, March, and April, followed by heavier business at better figures. The market weakened, however, during the following weeks, and, by the middle of March, had gone below 5 cents, chiefly, it seems, in consequence of rumors that foreign lead could be laid down here at current quotations. A week later, it was learned that the Richmond Company, of Nevada, had succeeded in making arrangements for shipping lead via New Orleans; and the uncertainty as to the extent of this movement brought the market to a stand-still, by creating the impression among buyers that heavy reductions would be granted. The Richmond Company, during the first week in April, again sold 3000 tons at 4·85 cents, which was promptly followed by sales of 600 tons at 5@5·05 cents. The market dragged along during the month of May, a steady decline alone inducing buyers to take hold from time to time. With a sale of 3000 tons more of Richmond lead hanging

WEEKLY PRICES OF METALS FOR 1882, WITH HIGHEST AND LOWEST PRICES FOR SIX MONTHS (THE HIGHEST AND LOWEST PRICES IN THE PERIOD OF SIX MONTHS ARE INDICATED BY HEAVIER-FACED FIGURES. ALL THESE ARE CENTS PER POUND).

Week ended.	Copper. Baltimore.	Copper. Lake.	Tin. Straits.	Pig-lead. Common domestic.	Spelter.	Antimony. Cookson's.
January 6th	**20·25**	20·25	24·25	5·12	5·62	.....
" 13th..	20·25	20·25	24·75	5·05	5·62	14·50
" 20th..	20·25	**20·50**	**25·25**	4·90	**5.87**	14·25
" 27th..	20·00	19·75	25·25	5·05	5·87	15·00
February 3d..	19·75	19·50	25·00	5·00	5·75	15·00
" 10th..	19·25	20·00	25·12	5·15	5·75	15·00
" 17th..	19·12	19·12	25·12	5·15	5·87	14·50
" 24th..	19·00	19·00	25·00	**5·20**	5·87	14 75
March 3d..	19·12	19·12	25·12	5·15	5·87	**15·25**
" 10th..	19·00	19·25	24·75	5·00	5·87	15·00
" 17th..	19·25	19·25	24·87	5·00	5·87	14·75
" 24th..	19·50	19 25	24·87	4·87	5·87	15·00
" 31st..	18·50	18·50	24·87	4·90	5·62	15·00
April 7th..	18·50	18·50	24·50	5·00	5·62	14·62
" 14th..	18·00	18·25	23·50	4·95	5·62	14·62
" 21st..	18·00	18·12	22·00	4·95	5·50	14·62
" 28th..	18·00	**18·00**	22·37	4·90	5·50	14·50
May 5th..	18 12	18·12	22·00	4.80	5·50	14·12
" 12th..	18·00	18·12	22·00	4.80	5·50	14·12
" 19th..	**17·50**	18·00	21·87	4.65	5·50	14·25
" 26th..	17·75	18·25	21·50	4.60	5·62	14·00
June 2d..	17·75	18·25	**20·25**	**4·55**	5·62	14·00
" 9th..	17·75	18·12	21·50	4·60	5·50	13·87
" 16th..	17·75	18·25	20·75	4·70	**5·37**	**13·50**
" 23d..	17·75	18·25	21·75	4·85	5·40	13·50
" 30th..	17·87	18·25	22·50	4·90	5·37	13·50

Week ended.	Copper. Baltimore.	Copper. Lake.	Tin. Straits.	Pig-lead. Common domestic.	Spelter.	Antimony. Cookson's.
July 7th..	**17·75**	**18·25**	24·00	4·90	**5·40**	**13·50**
" 14th..	17·62	18·12	25·25	5·10	5·37	13·25
" 21st..	17·75	18·12	25·00	5·10	5·25	13·50
" 28th..	17·62	18·12	25·00	5·10	5·37½	13·12
August 4th..	17·75	18·12	25·00	5·10	5·25	13·12
" 11th..	17.75	18·25	24·95	5·10	5·35	13·00
" 18th..	17·75	18·12	25.12	4·95	5·25	13·00
" 25th..	17·75	18·12	24.75	4·95	5·25	13·00
September 1st.	17·75	18·25	25·00	4·95	5·37	12·00
" 8th..	17·75	18·12	25·00	5·00	5·37	13·00
" 15th..	17·67	18·12	25.50	5·10	5·37	13·00
" 22d..	17·37	18·12	**25·75**	5·12	5·30	13·00
" 29th..	17.37	18·00	25.37	**5·12½**	5·27	13·00
October 6th..	17·37	18·12	24·87	5·10	5·37	13·00
" 13th..	17·50	18·12	24·50	5·05	5·30	13·00
" 20th..	17.50	18·00	23·50	5·00	5·30	12·87
" 27th..	17·50	18·12	23·37	4·87	5·15	12·87
November 3d..	17·50	18·00	23·50	4·80	5·25	12·75
" 10th..	17·50	18·12	22·75	4·90	5·12	12·75
" 17th..	17·37	18·25	22·50	4·80	5·10	12·75
" 24th..	17·50	18·00	22·50	4·62	4·87	12·62
December 1st..	17·37	18·00	22·25	**4·50**	4·75	12·50
" 8th..	17·37	18·00	21.87	4·55	4·75	12·25
" 15th..	**17·25**	**17·87**	**21·00**	4·65	4·75	11·75
" 22d..	17·37	18·00	21.00	4·70	4·75	**11·62**
" 29th..	17·25	18·00	21·25	4.75	**4·62**	11·62

HIGHEST AND LOWEST PRICES FOR EACH SIX MONTHS.

	Jan. to June. H.	Jan. to June. L.	July to Dec. H.	July to Dec. L.
Copper, Baltimore	20·25	17·50	17·75	17·25
Copper, Lake	20·50	18.00	18·25	17·87
Tin, Straits	25·25	20·25	25·75	21·00
Pig-Lead, common domestic	5·20	4·55	5·12½	4·50
Spelter	5·87	5·33	5·40	4·62
Antimony, Cookson's	15 25	13·50	13·50	11·62

over the market, prices receded to 4·55 cents in the beginning of June. It reacted slightly, owing to a better feeling in the West, and developed further strength during the month. In the first week of July, the Richmond Company disposed of 5000 tons at 4·92½ cents, chiefly taken on speculative account, the understanding being that the company would not sell any more lead during the year. Simultaneously, about 2000 tons of other brands of lead were taken at about the same figure, consumers supplying themselves for any future emergency. The available stock was, therefore, practically concentrated in the hands of one party, who promptly advanced jobbing lots to 5·10@5·15 cents. The market dragged along during July and August, showing symptoms of weakness at the close. The feeling was a little better during September, the party holding the bulk of the spot supply taking up any stray lots. Buyers in October began more and more to display a determination to take nothing beyond immediate and pressing wants, and by the beginning of November, free offerings of outside lead, particularly refined, carried the price down to 4·80 cents. In the third week in November, the market fairly gave way under sales of 2000 tons, declining to 4⅝ cents, and a week later had reached 4½ cents. In December, the metal slowly rallied, partly under the influence of favorable reports from Washington, the year closing with a very quiet market and quotations at 4·75 cents for Common, and the same nominally for Refined.

We give below the average price for common domestic lead for a series of years:

	1878.	1879.	1880.	1881.	1882.
January	4⅛	4¼	6	5	5⅛
February	3⅝	4⅝	6	4⅞	5¼
March	3¾	4	5½	4⅞	5
April	3¾	3	5⅝	4⅞	5
May	3½	3	4¾	4⅝	4⅝
June	3⅛	3¾	4⅝	4⅜	4⅞
July	3⅛	4	4⅞	5	5
August	3⅜	4⅛	4¾	5	5
September	3⅜	4	4⅞	5¼	5⅛
October	3½	5¼	4⅝	5⅜	5
November	3⅜	5½	5¼	5	4¼
December	4	5¾	5⅜	5⅛	4⅜

Spelter.—The year under review has been a particularly severe one to the zinc industries of this country. Low prices abroad and the comparatively high price in this country, with a large prospective demand, caused foreign makers to ship heavily to this market, a movement which was intensified by speculative importations and by a desire on the part of for-

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eign makers to hold lower prices by selling their surplus here even at unremunerative figures. Imports which for years had not been more on an average than 2500 tons rushed up to a monthly rate of 1000 tons, and at the end of the first nine months had reached 10,660 tons, so that they will not fall short of 11,500 tons for the year. Meanwhile, the center of production in our own country was moving Westward, and great activity was displayed in building in Southwest Missouri and Kansas. The importance of this district may be gathered from the following estimates of capacity sent to us by one of the makers of the district:

	Tons.
Southwest Lead and Zinc Company, Rich Hill, Mo	2,000
Joplin Zinc Company, Joplin, Mo	2,000
R. Lanyon & Co., Pittsburg, Kansas	3,500
S. H. Lanyon & Brother, Pittsburg, Kansas	1,750
W. & J. Lanyon, " "	900
Granby M. and S. Company," "	1,750
J. H. C. Gross, Weir City, Kansas	3,500
Total Southwest Missouri and Kansas	15,400

We estimate the output this year at 9000 tons, and the rest of the West at 17,000 tons, of which a very large proportion is converted into sheet. The East and South are placed by good authorities at nearly 4000 tons, so that a total of 30,000 net tons is reached. These figures will, we believe, fully explain the steady downward course during the year, and the fact that prices have receded even after foreign metal was practically excluded is ample proof that there are stocks still pressing on the market. It is not believed that prices for the metal, which is now in the extraordinary position of being as cheap as lead, can go lower, because the prices of ore are at their bottom figure. The royalty demanded and received by owners of the fee, and the increased depth of workings enhancing the cost, render any reductions impossible. Already a considerable proportion of the capacity is idle. The consumption is largely dependent upon a continuance of the demand for galvanizing and for sheet. The present low prices, of course, will stimulate the demand; but the producing interests will maintain a very conservative position so long as there is any uncertainty as to tariff legislation. Any reduction in the duty would promptly deliver the Eastern markets over to foreign producers, and our home works, limited to a narrow field, would be decimated until the production had adapted itself to the requirements of the smaller outlet.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

Suggestions to Young Assayers.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The first step in the business life of many of the graduates of our schools of metallurgy is an appointment as assayer to some smelting or ore-sampling works. It is the natural stepping-stone to higher positions in the future, and should be eagerly sought for by any young man who, after having completed his scientific studies, desires thoroughly to fit himself for the position of superintendent or manager, as it enables him to acquire an intimate knowledge of the business, and gives him an opportunity to see carried out in practice the various processes which he has studied in the lecture-room or laboratory. But the incapacity of many—I fear even I must say most—of the graduates of our best metallurgical schools to fill the position of assayer to the satisfaction of their employer, is a matter of astonishment and disappointment to myself in common with many brother superintendents. It is not that they are lacking in theoretical knowledge; nearly all are thoroughly drilled in all that can be learned from books pertaining to their especial branch; but it is in the faculty rapidly and systematically to turn off a large amount of accurate work, and to realize the immense importance of the results of their labors, that they are wanting. But unless they are told what their future work is likely to be, and have had shown them the particular branches in which it is necessary to perfect themselves, they can hardly be held responsible for some shortcomings in this particular. For many reasons, it would be well if every professor of metallurgy or instructor in chemistry could have served a term as assayer, and subsequently as superintendent, of some active metallurgical establishment, where he could fully realize the difficulties and annoyances that are sure to beset the novice, and learn what branches of his science should receive an extra share of study and practice, and what could be somewhat slighted without serious disadvantage.

The object of this article is to point out, with all due respect to both instructors and students, and from a superintendent's stand-point, the branches which ought to receive more attention, my opinion being formed from my own experience in employing, and seeing employed, some dozen or fifteen young men, all graduates of good mining schools, either American or foreign. I assume, of course, that the student can make an accurate gold and silver assay, as this process nearly always receives much attention, and is so striking and accurate that it is universally practiced with much pleasure and satisfaction. But I have nearly always found that the student is far too slow in his work, having been accustomed in many college laboratories to work with a small muffle, have an assistant to regulate the firing, and being in the habit of making only a few scorifications at any one time. It would save the young assayer much mortification and hard work in his first introduction in practical life, if he had been trained to test and regulate his own balance, do his own firing, and, working with a muffle holding say from twenty to thirty scorifiers, to weigh out, scorify, and cupel some sixty assays before dinner, reserving the afternoon to weigh his buttons, do his parting, and fill out his certificates. I dare say this may be the practice in some of our schools. I am only writing for those where it is customary to only require two or three scorifications from the student as a morning's work, and where the supervision is made easy for the professor, by having a skilled assistant to attend to the balances, firing, etc.

Another assay, which was not taught during my school years (at Freiberg), and which is one of the most useful and accurate that we have, is the crucible assay with litharge and soda, for gold and silver ores containing little sulphur and base metals—"dry ores." It takes the place of several scorification assays, as so large a quantity can be used at one time; and for surface quartz or mill tailings, containing small quantities of gold, is almost the only practicable method quickly and cheaply to arrive at reliable results. Few balances that may be found in the laboratories of ordinary smelting-works are delicate enough to give accurate results in gold assaying, and the student should be fully capable of determining this point, and should at once relieve himself of responsibility by reporting this fact to the superintendent.

He should also be able to granulate his own assay lead, and manufacture his own cupels. Possessing this knowledge, he can easily break in his assistant to the work, as well as to the management of the furnace.

Regarding lead assaying, I have little to say. The method itself is simple enough, but it requires much practice to obtain uniform results.

Copper, on the contrary, is a much more difficult metal to deal with. Without going into a discussion of the merits of the numerous methods in use, I will merely say that perfectly satisfactory results may be obtained by the two following methods:

1. Decolorization of the ammoniacal solution by a standard solution of cyanide of potassium.

2. Precipitation on platinum by the battery.

The first method has fallen somewhat into disrepute by careless working, and by employing it under improper conditions. In the absence of zinc, or large amounts of arsenic, antimony, nickel, or cobalt, and by observing proper precautions—titrating in the cold, and using measured amounts of acid and ammonia—the cyanide assay is quite accurate enough for ordinary working assays; that is, determination of the copper in slags, mattes, etc., for the guidance of the metallurgist, and may be made still more satisfactory by decanting the filtrate from the heavy red precipitate, when there is much iron present, and washing two or three times with hot water.

For quick work especially, such as determining the amount of sulphate and oxide of copper during matte or ore-calcination, this method is simply indispensable, and yet in almost every instance I have been obliged to teach each new chemist in my employ how to carry it out, and have been regarded at first as a most unreasonable task-master, when I have brought in a dozen samples from the furnaces in the morning, and told my new assistant that I expected results by the middle of the afternoon.

This assay should be practiced by all would-be assayers until they arrive at great accuracy and speed in its execution. The second method by the battery is always taught at colleges, I suppose, and should be used in duplicate in assaying commercial samples, or wherever great accuracy is desired without so much regard to speed.

The quantitative determination of sulphur is constantly required at smelting-works, and yet I have found few students who could do it accurately in an hour or two. There is only one method, so far as I know, that need ever be employed in metallurgical works. Dissolve the finely-powdered material in fuming nitric acid at a very low heat, until all sulphur is oxidized; evaporate, dissolve in hydrochloric acid, dilute, and titrate at a boiling temperature with a standard solution of chloride of barium. The fact that so few of my assistants have been familiar with this quick and excellent method, is my excuse for stating it here, however familiar it may be to some of my readers.

If, to the above list, I add the ability to make an accurate and speedy determination of silica and lime, and to determine the specific gravity of bodies both heavier and lighter than water, I shall have enumerated the principal qualifications essential to such an assayer as would suit my purposes, at least.

I am well aware that I am saying nothing new or original; but I am also aware that there is a lamentable deficiency on the part of students in this direction, and I have already stated that, during some twelve years or more of active metallurgical work, I have not found a single recent graduate, myself included, who could perform all the operations just indicated in a manner satisfactory to his superintendent.

I think I need hardly explain that I have not intended the above remarks as a description of the way in which the methods mentioned should be carried out, but merely as a catalogue of the processes in which the student should perfect himself before applying for the position of assayer. With this apology for the space that I have taken, I remain, yours very truly,

E. D. PETERS, JR.,
Assistant Manager Orford Nickel and Copper Co., former Territorial Assayer of Colorado, etc., etc.

NEW YORK, Jan. 15, 1883.

Green Mountain Matters.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of November 11th, 1882, you referred to a "confidential" circular and other matters concerning the Green Mountain Gold Mining Company, of California. A report by Mr. Patten, of Comstock fame, is alluded to. It may not be amiss to state, for the benefit of the stockholders, some of the circumstances attending the origin of this report, as I feel sure that many of them regard your reference to Patten, as the maker of it, as an error, meaning to refer to Professor Blake's report. Prof. William P. Blake had been the consulting engineer employed by the company from its origin, and furnished his last report on the condition of the mine under date of November 3d, 1882, a copy of which I inclose you. This report was printed and mailed to the stockholders. It does not take a very gloomy view of the company's prospects; on the contrary, it may be considered fairly encouraging; but it does clearly show that his recommendations had not been acted upon, and in language moderate yet unmistakable places the responsibility on the management. His report, as a consequence, did not suit them, as is evidenced by the fact that the services of Mr. Patten were called in to make the report to which you referred. The necessity for this second report, in the face of Professor Blake's usual report and contemporaneous therewith, is not very apparent to the average outside stockholder, and suspicion has been aroused in the minds of those who have called at the office of the company, and have become aware of its contents.

Now, as to the condition of the mine, and what has brought it about, a few circumstances are worthy of notice. According to reports of the management during April, May, June, and July, the mine and mill produced net profits. July was fully up to the average, producing about $7000 net. Mr. Vernan, vice-president of the company, arrived at the mine on or about the 29th of July. August showed a deficit of $3500. September showed a deficit, as did also October, November, and the first

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half of December. About the middle of December, Mr. Vernan left the mine, and singularly enough, the latter half of December showed a net profit of about $2350.

These are what the management call facts. I make no comments, but simply quote from a letter of late date received from a perfectly reliable gentleman, who resides in the vicinity of the mine and is conversant with every part of the property, having peculiar facilities for acquiring his information: "Soon after Mr. Vernan came here, ore ceased to be taken from the lower levels of the mine, where the best was always found. The men were moved to old workings near the summit of the mountain, where the ore was always poor, and this is what is now being milled and has been for months past. There is a ledge of as good rock as any ever milled there, that is at least twelve feet wide, and an immense amount of it in sight. Said one of the miner's to-day, 'I wish I had two dollars for every ton in sight; I would be a millionaire.' There is not a man employed about or who knows the mine who would not make oath that every one of the ninety-two stamps can to-morrow be fully supplied with good paying ore, and kept supplied for an indefinite time. Some of the statements contained in the circulars (confidential) you sent me are grossly false." These are facts from another source.

I also call your attention to the editorial and the mining notice in the Greenville *Bulletin* of January 3d, 1883, which I hope you will reprint for the benefit of innocent stockholders, quite a number of whom are women, as the stock-book shows, who possibly are dependent on the income derived from this investment.

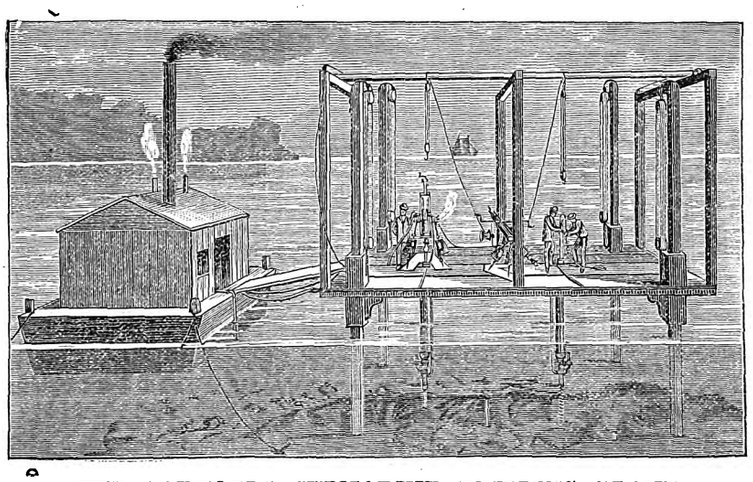
At the annual meeting to be held next week, the stockholders will do well to inquire into these matters. Very respectfully,

L. B. 51, W. F. H.

CARLISLE, PA., Jan. 16.

RECENT IMPROVEMENTS IN SUBMARINE DRILLING.

Submarine rock excavation has been a costly and laborious work, particularly so when the submerged reefs were covered with strata of sand, gravel, or silt. With the object of relieving the drill of the friction occasioned by the pressure of the superposed loose material, and to remove the *débris* and cuttings from the bottom of the holes as rapidly as possible, Mr. William L. Saunders, an engineer who has had considerable experience in this class of work, designed and patented an apparatus embracing some novel and valuable features. Mr. Saunders surrounds his drill with a tube, the lower section of which is provided with a tapering extension, to which a tube is connected pointing upward and having an internal diameter slightly greater than that of the hole to be drilled. A small pipe is carried down to near the bottom of the hole, parallel with the steel drilling-rod, while a second larger pipe enters the extension already spoken of, ending in a nozzle within it, also pointing upward. This part of the apparatus, Mr. Saunders calls the ejector. Its function is to provide for the discharge of the *débris* from the hole. This is attained by blowing steam or forcing water through the pipe and the nozzle spoken of. The small pipe which is parallel with the drill-rod and which enters the hole with it, serves the purpose of conveying the *débris* out of the hole and bringing them within the range of the injector.



THE SAUNDERS SUBMARINE DRILLING PLANT.

When a hole is to be drilled into rock covered by alluvial layers, the casing is lowered and water is forced through the small pipe. The casing sinks in by its own weight until it reaches bed-rock. The drill-rod is then introduced and drilling proceeds in the ordinary way, except that Mr. Saunders has so modified the plan that the drill-rod can be extended without drawing it from the hole. The constant scouring of the hole naturally considerably aids progress, and we shall farther on quote some figures from actual practice, to show what has been done. Another advantage is obtained by the use of the casing in charging the holes. As it is ordinarily done, a driver plugs up every hole after it is drilled, in order to keep it free from sand, etc. This is rarely thoroughly done, nor is the hole well cleared before charging. The result is, that the depth of effective hole is considerably impaired. Mr. Saunders introduces his charge through the tube immediately after the tube has been thoroughly secured, and by simple arrangements the person in charge can readily note whether the charge is really at the bottom of the hole. The services of a driver are thus dispensed with in most cases.

Mr. Saunders has, in addition to this, simplified the plant by providing a drill stage, the principal features of which are shown in the accompanying engraving which also shows two of his ejectors. By a small wrench, the stage, after being floated into place, is hoisted above the water, so that it is not affected by changes of tide. A six-inch pipe rolling along the top of the gallows-frames affords facilities for handling the drills, which are of the well-known Ingersoll pattern, and which are provided with a special bed-plate. The boiler and pump are placed on a separate scow. As most of the holes are drilled at an angle, it is generally only necessary to raise the ejector a short distance above the surface of the rock to let it swing entirely out of the range of the shot. We are informed by Mr. Saunders that the Ingersoll Rock Drill Company of this city is the manufacturer of this plant, and that it undertakes submarine excavation work.

We have before us a very interesting report of the operations on Black Tom Reef, New York Harbor, from the beginning of work, May 2d, 1881, to August 21st, 1882. In 283 net working days 17,658 lineal feet of hole were drilled, 16,567 feet being effective drilling. Out of 1736 holes and 1629 charged, 1542 were blasted. The average depth of the holes was 10·17 feet, and the distance between them four feet. The area drilled over was 32,100 square feet, and 5136 cubic feet of rock were removed with three drills, using 20,461½ pounds of dynamite, 200·19 tons of coal, 394·48 pounds of steel, 77·25 pounds of connecting wire, and 7 rolls of rubber tape for covering connections. The total cost of plant was about $15,500.

The largest diameter of bit was 3·75 inches, and the smallest 2·5 inches, the average loss of gauge per lineal foot of hole drilled being 0·03 inch. The cost of labor, repairs, and supplies is very low, the total being far below the figures usually accepted for such work. Holes have been drilled, charged, and blasted with the Saunders injector through six feet of gravel overlying the rock.

SULPHUR DEPOSITS IN UTAH AND NEVADA.*

By Israel C. Russell.

Sulphur deposits of sufficient extent to attract attention from their economic importance have been visited by the writer at three localities in the Great Basin. These are located at Cove Creek, Millard County, Utah; near Humboldt House, Humboldt County, Nevada; and at Rabbit-Hole, on the eastern edge of the Black Rock desert, in Northwestern Nevada.

SULPHUR DEPOSITS AT COVE CREEK.

Of these deposits, the most interesting to the geologist are those occurring at Cove Creek, in Southern Utah. This locality is on the eastern border of the Great Basin and at the western edge of the region of the high plateaus recently described by Captain Dutton. Eastward is a high range of trachytic mountains, that sweep around to the northwest and southeast, forming a crescent-shaped alcove in the western face of the range, the points of which are about ten miles apart. Between the horns of this crescent, and three or four miles southwest of the Ranch Fort, at Cove Creek, is a conical mountain of basalt, having the ruins of a cinder cone at the summit; for convenience, we shall call this old volcano the Cove Creek crater. From the perfection of its outlines, this crater seems to be of a very recent date, but is clothed with a scattered growth of cedars. Judging from its general appearance and the amount of weathering it has suffered, it is probably older than the post-Bonneville craters near Fillmore, Utah. The Cove Creek crater is now in the condition of a nearly extinct fumerole, as hot air and gases are said to escape from cracks and fissures near the summit of the mountain. The area between the base of the crater and the mountains to the eastward of Cove Creek is occupied by subaërial gravels, except along the immediate base of the eastern range, where volcanic tufas appear at an umber of localities. Along the line where the alluvium slopes upward to meet the tufas and volcanic rocks, is where most of the sulphur mines have been opened.

Prospecting for sulphur was begun at Cove Creek, about ten years since, by Mr. C. A. Semler, and has been carried forward by him with much energy ever since. At the present time, fifteen mines have been located, a few of which have been developed to a slight extent, and a large number of prospects opened. The mines, however, have not yet been worked sufficiently to make the sulphur from this locality an article of commerce. From the hasty examination that I was enabled to make, I find that the deposits at Cove Creek arrange themselves in three convenient groups, the divisions depending, however, more on the nature of the cavities that have received the sulphur than on any difference in the manner in which it has been introduced. In one instance, the sulphur occupies a nearly extinct solfatara; again we find it impregnating and cementing beds of volcanic tufa; at other times, the sides of fissures are sheathed with a brilliant drusy lining of sulphur crystals. In all of these instances, it is evident that the sulphur has been derived from deeply-seated sources, having been expelled in a gaseous form and condensed and crystallized in the cavities and fissures in the cooler rocks above.

In the mine named the Cleveland by Mr. Semler, situated about two miles southward of the fort at Cove Creek, the sulphur occurs in quantity, filling the crater of a solfatara. The bottom of the little valley in which the Cleveland is situated, is nearly circular, with a diameter of about 1200 feet, and is totally destitute of vegetation. Over the level surface of the strange little desert, the sulphur outcrops in many places, forming ledges of sulphur; and a number of prospects show an abundance of quite pure material. A shaft was sunk in the center of this deposit, to the depth of twenty-five feet, all in pure sulphur, as I was informed by Mr. Semler. The material taken from this shaft has been returned to it, in order to guard against the burning of the mine, and the broken fragments are now cemented into a solid mass by the sulphur that has been deposited in the interstices between the broken masses. The deposition of sulphur is still in progress, the prospecting-holes becoming lined in a few days with most beautiful plumb-like crystals of pure sulphur. The temperature in all the openings in this sulphur-bed is high. At the surface of one of the prospecting-holes which had been refilled with broken fragments, the thermometer read 104° Fahr.; and through all the openings vapor and heated gases are constantly escaping. In cold weather, the clouds of vapor forming above this mine may be

* A paper read before the New York Academy of Sciences.

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observed from a distance of a mile or two. The drops of moisture that condense on any cold object held for a moment in the excavations are intensely acid, and from their taste seem to contain a large proportion of sulphuric acid. No chemical examinations of these acid drops or of the gases that are constantly escaping from the openings could be made. It is noticeable, however, that no odor of sulphureted hydrogen can be detected about the mines; but from a few simple tests, and from the presence of dead animals in a large number of the openings, it seems evident that carbonic acid is exhaled in large quantities. The sulphur at this locality covers a circular area of about 1000 feet in diameter, and from the prospects that have been reported, can not be less than twenty-five feet thick. This is not pure sulphur, however, but certainly carries a large percentage of earthy matter. The conclusion arrived at, from a hurried inspection of this interesting locality, is, that the sulphur fills a nearly extinct solfatara, into which it has been conducted from below, seemingly by direct sublimation, or, what is perhaps more probable, by the decomposition of sulphurous gases, and the deposition of the liberated sulphur. A careful examination of the fumes that are exhaled from these openings would certainly be of much value in determining the chemical history of sulphur deposits.

Of the second class of mines—those in which the sulphur impregnates beds of volcanic tufa—we have examples in the Mariposa and the Prince Albert, situated at the base of the mountains, two miles east of the fort at Cove Creek. At these localities, the tufa is stratified, and contains scattered pebbles of quartzite and limestone, and is impregnated over a large area with sulphur, which fills all the interstices of the rock. Judging by the eye alone, much of the tufa contains from ten to forty per cent of sulphur, while in localities the rock is far richer than this. Overplacing the tufa are alluvial cones of gravel, that are in some places cemented by sulphur in the same manner as the strata of tufa beneath, thus showing that the beds now carrying the sulphur have acted simply as condensers for the sulphur, which in every case has been derived from a deeper source.

The third class of sulphur deposits—those in which the sulphur forms a lining of crystals on the sides of fissures—are illustrated by the Philadelphia and Mammoth mines. At the first of these, situated one mile north of Cove Creek, the sulphur occurs in drusy crystals covering the sides of small intersecting fissures in trachyte. The rock has here been much broken along a line of faulting, which may be traced southward to the top of the Cove Creek crater. The Mammoth mine is of a similar character, but found in dark carboniferous limestone. This mine is located on the top of the divide between Cove Creek and Dog Valley to the northward. While standing on this pass, the line of faulting on which the Mammoth mine is situated may easily be traced southward to the valley of Cove Creek; and across the valley, it is again seen as a bold fault-scarp, with a throw to the westward, ascending the side of the volcanic crater that we have already mentioned several times. The fault crosses this cone just to the east of the summit, and has given the eastern slope of the mountain a steeper inclination than is shown by the western side. Northward from the Mammoth mine, the same line of faulting is continued for many miles, and shows a recent scarp all along the eastern border of Dog Valley. The fault-scarp that ascends the side of the volcanic cone, and also the recent scarp in Dog Valley, are the results of slight and very recent movements along an ancient line of profound displacement. The volcanic mountain southwest of Cove Creek has been built over this old line of fracture. The sulphur in the Mammoth mine has been deposited in the fissures made by the faulting of the strata, and in the seams and openings between the layers of limestone. The rock on the borders of these fissures, beneath the thin lining of sulphur, has been altered to a brown earthy mass, to the depth of about half an inch. The mines, like the Philadelphia and the Mammoth, that have been opened on lines of fracture in solid rock, show but little sulphur, and on the whole can not be considered as giving promise of any large deposit below the surface. In these mines also, the temperature is high, but not so great as at the Cleveland.

The beds of volcanic tufa in which the sulphur has been deposited probably rest on harder rock that has been fissured, thus allowing the sulphur-bearing vapors to escape upward, as in the case of the Philadelphia mine; but no section showing the tufa-beds above such fissures has been exposed. As these beds of tufa occur for many miles along the base of the mountains, we may hope that the conditions for charging them with sulphur have been many times repeated. Next to the Cleveland mine, we should certainly look to the beds of tufa, along the base of the mountains eastward of Cove Creek, for the principal supply of sulphur for economic purposes from this region. Owing to the exhalation of noxious gases in nearly all the prospects that have been opened, we find in the bottoms of the excavations large numbers of dead insects, together with the remains of mice, bats, rabbits, etc., that have been smothered by the escaping gases. In many of the openings, a choking sensation is felt, and the amount of gas, which seems to be largely carbonic acid, is so great that a person can remain in them but a few seconds. Even in shallow prospects, the workmen have to fan each other, in order to remain in the openings long enough to do their work. These mines can only be opened from the surface, and even by this method they can not be worked to any considerable depth, owing to the high temperature of some of the prospects and the constant escape of noxious gases.

Associated with the deposits of sulphur are beds of gypsum, and also irregular deposits of "alum." Just what the nature of this "alum" may be has not been determined by analysis. These beds usually overlie the sulphur deposits, the alum being sometimes two feet thick, and the gypsum as much as eight feet. Hot springs occur in the same field, which, together with the feeble fumerole at the top of the old crater, bear evidence of the expiring volcanic energy of the region.

SULPHUR DEPOSITS AT HUMBOLDT HOUSE, NEVADA.

The sulphur at this locality has been reported as occurring in nearly vertical fissures that are associated with recent basaltic buttes. Careful search was made by the writer, however, for fissures answering these conditions, while examining the surface geology of the Humboldt Valley, without successful results. The only sulphur deposits that could be found in the vicinity, and the only ones known to the people living at Humboldt House, occur in the craters of extinct hot springs. These craters are situated about half a mile southward of Humboldt House, on the open sage-brush desert, and rise to the hight of from twenty to fifty feet, as nearly as could be estimated. Nearly all of the cones are weathered and broken down, and all are extinct, the water now rising to the surface for miles around. The outer surface of the cones is composed of calcareous tufa and siliceous sinter, forming irregular imbricated sheets that slope away at a low angle from the orifice at the top. The interiors of these structures are filled with crystalline gypsum, that in at least two instances is impregnated with sulphur. One of the cones has been opened by a cut from the side in such a manner as to expose a good section of the material filling the interior, and a few tons of the sulphur and gypsum removed. The percentage of sulphur is small, and the economic importance of the deposit, as shown by the excavation already made, will not warrant the further expenditure of capital. The cone that has been opened is surrounded on all sides by a large deposit of calcareous and siliceous material, thus forming a low dome or crater, with a base many times as great in diameter as the hight of the deposit. These cones correspond in all their essential features with the structures that surround hot springs that are still active in various parts of the Great Basin, thus leaving no question as to their origin. They are situated within the basin of Lake Lahontan, and must have been formed and become extinct since the old lake evaporated away.

Sulphur is reported as occurring in the chemically formed deposits that surround Steamboat Springs, situated midway between Carson and Reno, Nevada. The conditions at these springs must be very similar to those that existed near Humboldt House, at the time the cones containing the sulphur were formed. Sulphur is also said to occur in the Sweetwater Mountains, situated on the boundary between California and Nevada, in latitude 38° 30′. The extent and geological relations of these deposits are unknown.

THE RABBIT-HOLE SULPHUR MINES.

These mines are located in Northwestern Nevada, on the eastern border of the Black Rock Desert, and derive their name from the Rabbit-Hole Springs, a few miles to the southward. The hills bordering the Black Rock Desert on the east are mainly of rhyolite, with a narrow band of volcanic tufa along the immediate edge of the desert. These beds of tufa are stratified and evidently water-lain, and are identical with tufa deposits that occur over an immense area in Oregon and Nevada. At the sulphur mines, the tufas contain angular fragments of volcanic rock and have been cemented by opal and other siliceous infiltrations since their deposition, so that they now form brittle siliceous rocks with pebbles and fragments of older rocks scattered through the mass. In many places, these porous tufas and breccias are richly charged with sulphur, which fills all the interstices of the rock and sometimes lines large cavities with layers of crystals five or six feet in thickness. In the Rabbit-Hole District, sulphur has been found in paying quantities for a distance of several miles along the border of the desert; but the distribution is irregular and uncertain, and is always superficial, so far as can be judged by the present openings. As in the Cove Creek mines, the sulphur at Rabbit-Hole has been derived from a deeply-seated source, and deposited from a vaporous condition in the cooler and higher rocks in which it is now found. Judging from the siliceous material that cements the tufas, it is evident that the porous rocks, in which the sulphur is now found, were penetrated by heated waters bearing silica in solution, previous to the deposition of the sulphur. These mines occur in a narrow north and south belt, along a line of ancient faulting which is one of the great structural features of the region. The association of faults with sulphur-bearing strata of tufa is here essentially the same as at the Cove Creek mines. At the Rabbit-Hole mines, however, no very recent movement of the ancient fault could be determined. This absence of a recent fault-scarp, together with the fact that the mines are now cold and do not give off exhalations of gas or vapor, shows that the solfataric action at this locality has long been extinct.

At all the localities visited, the sulphur has been derived from sources far beneath the surface, from which it has been expelled by heat and escaped upward through fissures that were formed along lines of faulting, and has been condensed on the sides of fissures and in the interspaces of the cooler rocks near the surface. Whether the deposition of sulphur took place by direct sublimation or by the decomposition of sulphureted hydrogen, has not been determined. The date at which the sulphur was introduced into the rocks where we now find it is in all cases very recent, and at the Cove Creek mines the action is still in progress.

Work at the Rabbit-Hole mines is now carried forward by a day-shift of seventeen men, the production of sulphur being about six tons per day. The value of the sulphur produced is about forty-five dollars per ton in San Francisco. The sulphur, after being mined and assorted, is placed in upright cast-iron retorts, having a general resemblance to the common form of blast-furnace, with a capacity of about two and a half tons. When the retorts are charged, the opening at the top through which the sulphur-bearing rock is introduced is closed, and superheated steam admitted at the side. The steam pressure is at first about seventy pounds to the square inch; but as the sulphur begins to melt, the pressure is allowed to subside to sixty or perhaps fifty pounds. When the sulphur melts, it passes through a grate and is collected in a kettle beneath the retort, from which it is allowed to flow, in a very liquid brown stream, into a receiving-pan with a capacity of about twelve thousand pounds, where impurities that were previously held in suspension are allowed to settle to the bottom. From the receiving-pan, the sulphur is run into molds shaped like the frustum of a cone, each of which has a capacity of from two hundred to two hundred and fifty pounds. When allowed to stand a few days after cooling, these cylindrical masses break into irregular lumps, in which condition the sulphur is delivered to the refinery at San Francisco.

MINING ACCIDENTS IN THE UNITED STATES.—An analysis of the mining accidents which occurred during 1881 in ten of the Western United States, shows, according to the London *Mining Journal*, that they were thus distributed: California, 116; Nevada, 62; Arizona, 12; Colorado, 7; Montana, 6; Idaho, 4; Dakota, 3; Oregon, 2; Utah, 2; Washington Territory, 1=225. These accidents resulted in the death (d.) of 176 persons; the serious injury (s.) of 68 others; and the slight injury (i.) of 75 persons. The distribution was: California, d. 72; s. 31; i. 32=135;

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Nevada, d. 35; s. 28; i. 23=86; Arizona, d. 16; s. 7; i. 5=28; Colorado, d. 9; i. 4=18; Oregon, d. 5; i. 1=6; Montana, d. 8; s. 2=10; Dakota, d. 9; i. 8=17; Utah, d. 13; i. 1=14; Idaho, d. 8; i. 1=9; and Washington Territory, d. 1; giving the totals as above. These figures are given, and the various kinds of accidents have been placed in twenty-six classes by a gentleman in the office of Mr. del Mar, of San Francisco, and the compiler is certainly entitled to great credit for the elaborate way in which he has performed his somewhat laborious task. The cause of accident and the effect are thus distributed: Explosions and blasts, d. 28; s. 18; i. 23=69; falls (except 14 below), d. 30; s. 11; i. 12=53; cave in mine, d. 33; s. 13; i. 11=57; prostration by heat, and suffocation by heat, smoke, etc., d. 13; fire, d. 6; s. 2; i. 3=11; asphyxiated, d. 3; scalded by hot water, d. 1; s. 1; i. 1=3; poisonous water and air, d. 4; caught in or struck by machinery, d. 8; s. 5; i. 12=25; struck by cage or bucket. d. 1; s. 7=8; fall of cage or bucket (14), d. 1; struck by falling rock, tools, logs, etc., or pieces of quartz while working (4 classes), d. 12; s. 4; i. 6 =22; crushed by rolling boulders, between cars and side of shaft, or by rolling logs (4 classes), d. 7; s. 4; i. 1=12; run over by car d. 1; s. 1=2; washed through flume, d. 4; i. 2=6; land and snow-slides, d. 20; i. 3 =23, and reason of accident unknown, d. 4; s. 2; i. 1=7; total, d. 176; s. 68; i. 75; as stated above. It will be seen that caves in the mine produce the worst results, then falls, next explosions, and after these land and snow-slides. The author observes that, although the number of accidents chronicled here may seem very large, yet he does not think that more than one half of those which occurred in California and Nevada ever reach other than local papers, and that not more than two thirds reach even the local papers. As to the other States and territories which are referred to, it is only when any very exceptionally dangerous or curious accident has occurred that it is ever heard of so far away as San Francisco. This year, the papers have paid more attention to the item of mining accidents, but there is still great room for improvement.

GENERAL MINING NEWS.

ALASKA.

A dispatch states that a prospecting party, which started for the upper waters of the Yukon River some months ago, has discovered, 1500 miles up the Yukon, at the confluence of the Tananah River, rich and extensive gravel deposits, averaging $1.50 to the pan. The country is difficult of access, the Yukon being closed by ice until about June, while the trip overland from Sitka is as bad as a Siberian journey.

ARIZONA.

GILA COUNTY.

EXCURSION.—The company's mill on the east fork of the Verde River has stopped working. The reason is not given, but the stoppage is doubtless due to the difficulty of saving the gold.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—During the week ended January 9th, 202 car-loads of ore were hoisted, 17 of which were from the 740-foot level of the shaft, and the remaining 185 loads from the workings below the 640-foot level. There were 113·9 tons of ore sent to the mill, and 127·733 tons were crushed. The average assay value of the pulp was $49.44 per ton, that of the sacked ore being $156.28, and the tailings averaged $6.24 per ton in value. The stopes on the rich vein show no important change, and the average value of the ore from the general stopes is somewhat higher for the past week. The north drift at the 800-foot level of the shaft was driven 10 feet, and is 233 feet in length.

STANDARD CONSOLIDATED.—During the past week, there were extracted and shipped to the mills 1419 tons of ore. The south drift from the east cross-cut, 700-foot level, is in 335 feet; progress, 13 feet, showing the vein to be 3 feet wide. The north drift from the west cross-cut has been driven 20 feet; total length, 264 feet, in a favorable formation. South drift No. 1, 500-foot level, is in 337 feet; progress, 17 feet. The vein at this point is 12 feet wide. The uprise from this drift has reached a hight of 218 feet. The vein is 10 feet wide. The north uprise has been advanced 12 feet; total length, 221 feet, where the vein shows an average width of 8 feet. South drift No. 1, 385-foot level, is in 429 feet; progress, 20 feet. The vein at this point is 14 feet wide. The winze in south drift No. 2 has reached a depth of 175 feet. The vein is 6 feet wide. The stopes show no change.

PLUMAS COUNTY—GREENVILLE DISTRICT.

The *Bulletin*, in speaking of the mines, says that there is not much to report. At the Cherokee, there have been several sales under attachments for labor and supplies furnished. The future of this mine and of the Gold Stripe is still uncertain; reports have been current several times of some one coming from New York, fully authorized by the directors to settle up the affairs of the mines with a view to resume operations, but no such person has yet appeared.

GREEN MOUNTAIN.—Both mills are running steadily, and the prospects at the mines are reported to be favorable.

MONITOR.—In the main tunnel, the character of the ore has improved lately; the ground is also considerably better for working.

PLUMAS CONSOLIDATED.—The work of opening up the mine continues.

TAYLOR-PLUMAS.—The mill is nearly completed. The ground in the lower tunnel of the mine is constantly improving.

SAN BERNARDINO COUNTY—PROVIDENCE MINING DISTRICT.

BONANZA KING.—The water troubles of this company at Providence have been settled by the purchase of the Water Jacket spring, and the company's ten-stamp mill (dry crusher) began steady work on January 1st.

ORIENTAL.—Work has been begun on a ten-stamp mill for this company at Calico.

COLORADO.

CLEAR CREEK COUNTY.

DIAMOND TUNNEL.—The rise on No. 8 has opened up a fine 12-inch vein of solid mineral, showing some gray copper. A drift has been started from the top of the rise. No. 5 is also showing good mineral in both the tunnel level and V level. 100 feet above.

SUMMIT TUNNEL AND MINING COMPANY.—The second annual meeting was held at the office of the company, in Idaho Springs, January 10th, 1883. The following directors were elected: George W. Chipman of Boston; Mons Anderson and B. B. Healy of Lacrosse, Wis.; A. M. Noxon, H. H. Newton, Peter Theobald, and C. L. Moe, of Idaho Springs, Colorado. The officers elected were: A. M. Noxon, President; B. B. Healy, Vice-President; C. L. Moe, Treasurer; George E. McClelland, Secretary; A. M. Noxon, Managing Director. It was voted to establish a branch office of the company at Lacrosse, Wisconsin.

GILPIN COUNTY.

HATTIE ANNIE.—At a recent meeting of this company, held in Central City, the following directors were elected for the ensuing year: Edward Ferris, Paul Beckwith, E. T. Ensign, S. N. Nye, A. Allen, R. C. Bristol, and Warren Libby. Out of this board of directors the following officers were chosen: Edward Ferris, President; S. N. Nye, Vice President; E. T. Ensign, Secretary; and Alfred Allen, Treasurer.

PALMS.—This company has let a contract for the driving of a cross-cut south from the working-shaft of the Galena mine, on Central City Hill, 30 feet. This cross-cut, it is thought, will strike a new vein, which was discovered in grading off for an office building for the company, south and adjoining the main building over the mine. Another contract has also been let for driving a drift east from the working-shaft on the Bugher mine. The latter lies north of the Galena, and is considered a parallel vein.

LAKE COUNTY.

Late Leadville exchanges contain the following:

AMIE.—The lessees of this mine are crowding on all the miners they can advantageously work in the new and rich ore-stopes opened by them. Two and a half months yet remain in which to extract ore under the present contract.

BIG CHIEF.—Work will be resumed in a week or ten days. As soon as the Clontarf and Brookland get to work pumping water, this mine will be enabled to work advantageously its large ore-bodies on the lower levels.

BUCKEYE.—Active preparations are in progress for the resumption of work on this lode, on the north side of Fryer Hill. A new shaft-house of commodious dimensions has been erected, and machinery is getting into position.

CHRYSOLITE.—The concentrating mill of this company has been closed down. A large mill will probably be erected early in the spring. The mill just closed down was only an experimental establishment, and too small to admit of running at a profit.

HIBERNIA.—These mines were sold January 12th, by the sheriff of Lake County, and were knocked down to the judgment creditor, Mr. Hiram S. Holly, of Denver. The property is purchased by Mr. Holly subject to the sheriff's certificate of purchase made last March, and which had never been redeemed by the old company. This sale places the Hibernia properties in the possession of Mr. Holly, without redemption or further recourse for other creditors or the new Hibernia Silver Mining Company, which was organized some months ago, to redeem the property of the Hibernia Consolidated Company.

IRON HILL CONSOLIDATED.—The new hoisting machinery is in running order, and shipments of ore will begin shortly. The extraction of ore has already begun. A contract for sinking a new shaft has also been let.

LONG & DERRY.—Work is pushed on a drift running into the hill from the foot of No. 5 shaft, which shows a fine breast of ore, running two hundred ounces to the ton. The most of the development-work done on these properties by the former owners was restricted to pits and open cuts near the surface. The rich deposits of ore in the limestone near the surface are, however, indicative of large bonanzas, at greater depth. Mr. Langhorne is at present engaged in sinking a new shaft, designated as No. 12 shaft, which has attained a depth of 140 feet. It is located near the western limits of the consolidation, and apparently has struck in the line of the break. So far, boulders of lime, iron, and galena have been encountered in this shaft, with increasing prospects as depth is attained.

MORNING STAR.—A hoisting-engine in the Waterloo incline, to facilitate the sinking of an underground shaft or winze, has been put up.

OURAY COUNTY.

The placer mines down the river at the mouth of the Dallas are busily engaged in making preparations for an active season's work. Operations will begin as early as the season will admit.

SUMMIT COUNTY.

The output of this county, from the sources named, appears to have been as follows for the year 1882:

Robinson ore	$315,000
Kokomo ore	470,400
Kokomo bullion	237,952
Northeast end county, silver ore and bullion	459,550
Northeast end county, gold	50,800
Red Cliff ore	312,139
Red Cliff bullion	45,450
Gold Park bullion	70,000
Taylor Hill bullion	50,000
Total for Summit County	$2,011,291

DAKOTA.

FATHER DE SMET.—The superintendent reports, under date of January 4th, as follows: Herewith express company's receipt for bar No. 150, containing 1589.85 ounces gold, the result of run of mill for last half of December. As any drafts for December expenses will be about as they were last month, we shall make a very fine showing for the month, with a prospect of a continuance for a number of months at least. The mine is producing good ore at all points. The mill is doing first-rate work. Water, wood, and ore in abundance. We close the year without owing a dollar to any party for labor, supplies, etc., except current bills for the month of December, which are light.

IDAHO.

SAWTOOTH DISTRICT.

A correspondent of the Salt Lake *Tribune* reports on some of the mines of this district as follows:

NELLIE.—Of this group of mines, the Nellie is the best developed. In the lower tunnel, 300 feet from the apex of the ledge, the vein is five feet in width, and carries a great deal of ruby and wire silver. The owners of the Nellie group intend to build a ten-stamp mill next season.

SILVER KING.—This mine is situated on Beaver Creek, near the Pilgrim mine. The ledge is twelve feet or over in width, and has been stripped sixty feet and worked to a depth of twenty-eight feet. The quartz is said to be the richest for the size of the vein yet found in the Sawtooth District, and is so soft that no powder is needed to break it. The first class ore assays over $4000; second class, from $750 to $800; third class, from $90 to $120.

SOLACE.—The original Solace vein is over four feet in width, nearly half of which is extremely high grade. In running a tunnel to strike the main ledge last winter, a new vein, about 100 feet north of the Solace, was struck at a depth of 120 feet, with one or two feet of ore containing from $450 to $800 in silver. This company owns a number of ledges in Smiley Basin, and when they are sufficiently developed, a ten-stamp mill is to be erected.

VIENNA.—This is a consolidation of the Vienna and Mountain King mining companies, incorporated last winter at La Crosse, Wis. This summer, the company shipped from Chicago the machinery for a 20-stamp silver mill, built by Fraser & Chalmers. The building is completed and the machinery in place, and crushing will begin early in the spring. The snows and rains of September and October prevented the arrival of sufficient supplies of salt, quicksilver, etc., otherwise the mill could have started up by the 1st of January. The Mountain King mine is from twelve to twenty feet in width, and averages about $100 per ton. The vein is opened for a distance of 500 feet, and is over 200 feet from the surface at the deepest point in the main tunnel. The ore is ruby, sulphurets, and antimonial silver, carrying with the silver from half an ounce to an ounce of gold per ton. The Vienna mine is worked to a depth of 300 feet, and the different stopes and levels show abundantly of good ore. The vein is from two to five feet in width, and has been traced a distance of 1500 feet, showing the same character of ore the whole of that distance. The quartz is generally good, the first-class sampling all the way from $250 to $3000 per ton, and the whole of the vein averages well. The Alturas, Justice, Oregon, and other mines of the company (about one dozen, in all) contain fine ore and much of it.

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MICHIGAN.

The Houghton *Mining Gazette*, in a review of the mines of Lake Superior Mining District, says that the business career of the prominent copper mines of the district for the past twelve months has been exceedingly satisfactory, and that the outlook for 1883 promises to be even more gratifying in material results when the record of the year is brought to a close.

CALUMET & HECLA.—During the past year, this company purchased the very valuable property, carrying the dip of its conglomerate belt at a point on the south end of the mine, known as the Frue-Loring tracts. This addition to the already apparently inexhaustible metalliferous territory within the limits of the boundaries of the corporation's possessions indicates the capabilities of the Calumet & Hecla as furnisher of copper, if put to the test. During the past year, a vast amount of work has been done in connection with the hoisting machinery, etc., on the mine, and the stamp-mills at Torch Lake. At the latter place, pumping machinery, elaborate and durable in character, has been erected with a capacity for supplying every twenty-four hours the enormous quantity of 40,000,000 gallons of water, an amount ample to meet all demands in the future in connection with the operation of dressing mineral. Other important improvements in the direction of economy and efficiency in union with the mine works and stamp-mills will be completed during the coming year.

QUINCY.—During the past year, many necessary improvements and additions were made to the surface plant of the mine. The production for 1882 was 3471 tons, the largest ever afforded by the mines.

OSCEOLA.—The transfer during the year of hoisting machinery, etc., from the old or Conglomerate mine to the new mine on the Osceola lode, interfered to some extent with the production of the industry. The surface department, including dressing-mill, is in excellent shape, and will require but few expenditures outside of necessary repairs, for some time to come. The underground part of the works is abreast with the other portion of the mine.

FRANKLIN.—The mine starts out on its new business year well equipped, both underground and on the surface.

TAMARACK.—The vertical shaft on this mine is down several hundred feet, and has already cut one copper deposit of promise, and within the next four months it is expected the Allouez conglomerate will be encountered. The permanent hoisting, pumping, and general surface working plant of the Tamarack is now in place.

NEVADA.

ARGENTA.—At the annual meeting, held at San Francisco January 8th, the following directors were elected: J. L. Browne, President; Thomas Cole, Vice-President; George Congdon, W. H. King, E. M. Hall. E. M. Hall was elected Secretary, John E. Dixon, Superintendent Bank of California, Treasurer. The secretary reported receipts from assessments, $75,000; other sources, $1582.58; total receipts, $76,582.58. The disbursements amounted to $76,288.57, leaving a cash balance on hand of $294.01. The superintendent says that, in order to develop the Argenta mine at the least expense, it is necessary to work the 600, 700, and lower levels through the Grand Prize shaft, which can be done by paying half the cost of running it; and as there are good indications of a body of ore below the 600 level, the Argenta will take advantage of this proposition. The Argenta hoisting-works are valued at $18.600.

NEW MEXICO.

The Albuquerque *Journal* says that a miner's union has been organized in the Black Range. Members of it are requested to sign the following pledge: "That we, the miners of the Black Range, pledge ourselves to work underground for a no less compensation than four dollars per day." Miners of the Apache, Cuchillo Negro, and Limestone districts are invited to join.

BRADLEY & DORSEY GROUP.—The superintendent reports that a large body of free-milling ore, carrying horn-silver in good quantities, has been struck.

MOUNTAINEER.—A half-interest of this entirely undeveloped mine was recently sold at Albuquerque for $1000.

NORDHAUSEN.—Assessment-work has been commenced on this claim, and, at a foot or two from the surface, chunks of lead and antimony-bearing silver began to appear, imbedded in the quartz and soft gouge matter which occupied the whole width of the shaft. Most of the mineral has the form of hard carbonates. Assays have not yet been made.

UTAH.

SAMPSON.—The manager of this property, Mr. Van Praag, sunk a shaft to the depth of 200 feet, when a four-foot vein was struck. Ore is scattered through this vein, there being several small streaks, aggregating about six inches of rich ore. At a point 600 feet east of this shaft, an incline was run in and steam hoisting-works placed over the mouth of the incline. In this incline, the vein was cut a few days ago, and drifting has been done to the amount of about twenty-five feet.

WYOMING.

The new mill at Cummins City is all ready to fire up—all the machinery in place, and the building complete. It will run ten stamps, and will be put to work.

Messrs. Burnham & Hudson are making preparations for increasing the power of their five-stamp mill to twenty stamps.

TIE SIDING.—Mr. Le Roy Grant has sold his half-interest in this copper mine to a Welsh company, which proposes to develop it. It has already commenced work at the shaft.

ANNUAL FINANCIAL STATEMENTS.

Annual statements of the financial condition of different mining companies incorporated in this State are now published according to law, and we glean from them the following figures, which may prove valuable and interesting reading. The statements are generally so framed that the amounts given as indebtedness are estimated to be the maximum. They do not profess to be, in most cases, an accurate summary of outstanding debts:

	Indebtedness.	Reporting Officer.
Arizona Queen Gold Mining Company...	$6,703.00....	Robert B. Gilman, President.
Auraria Gold Mining Company.....	6,386.84....	J. H. George, Secretary.
Bye-and-Bye Gold Mining Company.....	5,000.00....	Peter Bodine, Secretary.
Central Arizona Mining Company	50,000.00....	J. M. Seymour, President.
Consolidated Bobtail Gold Mining Company	11,000.00....	John Stanton, Secretary.
Crooke Mining and Smelting Company....	500,000.00....	Lewis Crooke, Secretary.
El Oro Mining Company.....	400,000.00....	Benjamin F. Guyton, Sec'y.
Hall-Anderson Gold Mining Company.....	2,277.58....	H. R. Kretschmar, Secretary.
Mineral Point Tunnel Company.....	100,000.00....	E. Salomon, Secretary.
New York & San Jorje Hydraulic Gold Mining Company.....	63,843.00....	A. F. Pruyn, President.
North Star Mining and Smelting Company.	5,000.00....	Lewis Crooke, Secretary.
Pierce Gold Mining Company.....	15,000.00....	Benjamin F. Guyton, Sec'y.
Southern Eureka Mining Company.....	10,000.00....	Peter Bodine, Secretary.
South Horn-Silver Mining Company.....	5,000.00....	Henry Bradstreet, Secretary.
South Pacific Mining Company.....	15,000.00....	James F. Oliver, President.
Utah Consolidated Silver and Gold Mining Company.....	275.00....	M. P. O'Hern, President.
Willshire Hydraulic Gold Mining Company.	6,000.00....	M. J. Waters, Secretary.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Jan. 19.

The better feeling at the Mining Exchanges recorded last week has continued and a very active business has been done at good prices. There is nothing of special interest to report, as the market is fully covered by the summary below. The Comstock shares have been weak and quiet, while the Leadville stocks record an active business at strong prices. The Tuscaroras continue strong, but have been rather quiet. There are several low-priced stocks which have been very active and quite strong. The sales of mining shares at all the Exchanges aggregate 606,100 shares, against 585,555 last week.

The Comstock shares have been very quiet at about steady prices. California was quiet and steady, selling from 24@20@21c. Consolidated Virginia records a very moderate business at irregular prices; it sold from 45@53@46c. Union Consolidated sold at $2.75 and Mexican at $2.50. Ophir was dealt in to the extent of 235 shares at $2.90@$2 35. Consolidated Imperial was quiet and steady at 3@2c. Hale & Norcross sold at $1. Savage sold from 70@75c. with a business of 200 shares. Yellow Jacket was very quiet at $1⅛. Best & Belcher sold at $3¾. Sutro Tunnel had an active business and was steady, selling from 21@25@23c.

The Leadville stocks were moderately active and were strong. Amie records an active business at strong prices, selling from 18@24@19c. Chrysolite was also strong, under moderate transactions, selling from $1.35@$1.55@$1.50. Hibernia was quiet and strong at 2@9@6c. Iron Silver records a moderate business at strong prices; it sold from $2.45@$2.55. Leadville was very quiet, and was held firmly at 65@70@68c. Little Chief records a very active business at strong prices; it sold from 39@45c. Little Pittsburg had a moderate business, and was also strong, selling from 63@77@72c. Big Pittsburg has declined from its recent strong prices, and has sold this week from 29@19c. with a very active business. Climax had a fair business at steady prices, selling at 8@10c.

The Bodie stocks were very quiet at steady prices. Bodie Consolidated sold from $1.88@$2.25. Standard records but two small transactions at $6½. Bulwer has been quiet and a little weak, selling from 93@90c. Goodshaw sold from 6@8c.

The Tuscarora stocks had a moderate business at strong prices, Grand Prize sold from 28@50c., with a moderate business. Tuscarora was quiet and strong, selling from 14@28c. Belle Isle records a fair business at strong prices; it sold from 90c@$1.10@95c. Navajo was strong at $9⅝@$9½@$8¾@$9. Independence was very quiet at strong prices, selling from 65@70c. North Belle Isle records a business of 1000 shares at 60@72c.

In the miscellaneous list, Alice has had a fair business at strong prices; it sold from $2.05@$2.45@$2.40. Eureka Consolidated has been strong, selling from $10.75@$11.25. Findley has had a fair business at irregular prices, selling from 9@6@8c. The Green Mountain stocks have been very quiet at weak prices. Gold Stripe sold at 9@7c.; Green Mountain, at 50@49c.; Rising Sun, at 10@7c.; and Cherokee, at 11@6c. Hall-Anderson has been a little weak, under a moderate business, and sold from $1.85@$1.70. Horn-Silver records a moderate business at strong prices; it sold from $6¼@$7½. Hukill has been very active but somewhat weak; it sold from 27@16c. Robinson Consolidated records a very active business at irregular prices, selling at $1.30@$1.20@$1.25. Sierra Grande continues to be very active, but has been very irregular; it sold from $3@$2.40@$2.45.

Albion has been quiet and weak, selling from $1.75@$1.25. Alta-Montana has suffered a decline this week, under a small business, and has sold from 22@18c. Barcelona has been active and steady at 23@24c. Bradshaw has been quiet and steady, selling from 39@37c. Decatur continues to do a very large business at steady prices, selling from 8@9c. Fannie Barret has had a moderate business on the American Board at strong prices, selling from $2.10@$2.25@$2.20. Oriental & Miller has been very active at irregular prices; it sold from 12@20@15c. Silver Cliff has been quiet and irregular, selling from 36@41@39c. South Pacific has been active and steady at 8@9c. The State Line stocks record a fair business at steady prices; Nos. 1 and 4 sold from 4@3c., and Nos. 2 and 3 at 7@8c. Taylor-Plumas has been very active on the American Board at about steady prices; it sold from 22@18@20c.

PIPE LINE CERTIFICATES.

Below will be found the daily quotations and sales for the past week at the New York Mining Stock Exchange. The highest quotation for the week was 92⅛c., and the lowest 88½c. The market has been very quiet:

	Highest.	Lowest.	Sales.
Jan. 13.....	89⅝	85⅝	44,000
" 15.....	91⅞	89⅞	190,600
" 16.....	92⅛	91¼	118,000
" 17.....	91⅞	91	67,000
" 18.....	91⅝	89¾	61,000
" 19.....	89½	88½	79,000
Total sales.....			559,600

The property of the old Silver Nugget Company has been sold to the Consolidated Silver Nugget Mill and Mining Company, which starts entirely free from debt and with ample working capital. It also controls, by lease at $500 per month, a mill. Stockholders in the old company have the privilege of turning into the new company's office (Room 62, Drexel Building) their stock, and by the payment of 25 cents per share secure stock in the new company.

DIVIDENDS.

The Contention Consolidated Mining Company, of Arizona, has declared its regular monthly dividend (No. 12) of 25 cents per share, payable January 29th, at the office of the Farmers' Loan and Trust Company, on all stock registered in New York. Transfer-books close on January 18th.

The Father de Smet Consolidated Gold Mining Company, of Dakota, has declared a dividend (No. 25) of 20 cents per share, payable at the office of Laidlaw & Co., No. 14 Wall street, on January 31st. Transfer-books will close on January 20th.

The Horn-Silver Mining Company, of Utah, has declared a quarterly dividend (No. 8) of $300,000, being three per cent on the capital stock, payable February 15th. Transfer-books close on February 7th, and reopen February 16th.

The Kentuck Mining Company, of Nevada, has declared a dividend of ten cents per share.

The Northern Belle Mining Company, of Nevada, has declared a dividend of fifty cents per share.

The Paradise Valley Mining Company has declared a dividend of five cents per share, payable at San Francisco.

MEETINGS.

New England Gold and Silver Mining Company, No. 546 Broadway, New York. Annual meeting of

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DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	SHARES. No. in 1000's	SHARES. Par Value.	ASSESSMENTS. Lev'd to date in 1000's.	ASSESSMENTS. Date and amount per share of last.	DIVIDENDS. Total paid to date in 1000's.	DIVIDENDS. Date and amount per share.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Jan. 13. H.	Jan. 13. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 18. H.	Jan. 18. L.	Jan. 19. H.	Jan. 19. L.
Alice, Mon.	400	25	*		400	De 81 10			2.05		2.30	2.15	2.35	2.20	2.45	2.35	2.40	
Amie Con., Co.	500	10	*		805	My 80 10	.19	.18	.20	.18	.21	.18	.24	.20	.20	.19	1.9	.18
Atlantic, Mich.	40	25	280	Ap 75 1 00	140	Fe 82 2 00												
Argenta, Ne.	100	100	225	No 92 25	40	Fe 80 20												
Bar & Walker, Ut.	100	10	*		60	No 80 10												
Bassick, Co.	100	100	*		25	Fe 80 25												
Belle Isle, Ne.	100	100	65	My 82 10	300	De 79 25	1.00	.90	1.00		1.05		1.10	1.00			1.05	.95
Black Bear, Ca.	90	100	15	Se 79 50	889	Se 82 30												
Belcher, Ne.	104	100	2562	Se 82 25	15397	Ap 76 1 00					2.00		1.88				2.25	
Bodie Cons., Ca.	100	100	125	De 81 50	1295	No 82 20												
Bos'n & Mon., Mon.	200	10			310	Ja 83 05												
Breece, Co.	200	25	*		2	Fe 80 1												
Bulwer, Ca.	100	100	80	De 77 50	140	Ja 83 10			.93	.90	.92	.90	.92	.90	.92	.90		
California, Ne.	540	100	638	No 82 20	31320	De 79 50	.24				.23	.22	.23	22c	.23		.22	.20
Cal. & Hecla, Mich.	100	25			22850	Ja 83 5 00												
Cariboo Con., Co.	100	10	*		50	Mr 80 10												
Carolina Q'n, N.C.	100	2			8	Oc 82 02												
Castle Creek, Id.	100	1			24	Ja 83 03												
Catalpa, Co.	300	10	*		210	De 82 10												
Central, Mich.	20	25	100	Se 61 6	1610	Fe 82 25												
Christy, Utah.	60	100			78	De 82 10												
Chrysolite, Co.	200	50	*		1600	De 81 50	1.85		1.50	1.40	1.50	1.45	1.55	1.50	1.50		1.50	
Climax, Co.	200	10	*		180	Au 80 30	.10		.10		.10		.8		.10	.09	.10	
Cons. G. Mg., Ga.	100	5	*		80	De 82 04					.49		.53	.48	.51	.49	.46	
Cons. Va., Ne.	540	100	897	Au 82 30	42030	Au 80 50	.47	.45										
Contention, Ariz.	250	50			2087	De 82 25												
Copper Queen, Ar.	250	10	*		850	Ja 83 50												
Crown Point, Ne.	100	100	2673	Fe 82 25	11588	Ja 76 2 00												
D'dw'd Terra, Dk	200	25	*		900	Ja 83 10												
Dunkin, Co.	200	25	*		200	Ju 81 7½			10⅛	10.75					11.25	10.75	11.25	
Eureka Cons., Ne.	50	100	100	My 76 1 00	4817	Jy 82 25												
Evening Star, Co.	50	10	*		1325	Oc 82 50											5¼	
Excelsior, Ca.	100	100	300	Ja 82 1 00	875	Oc 80 25												
Fa. de Smet, Dk.	100	100			590	De 82 20							.09		.08	.07	.08	.06
Findley, Ga.	200	1	*		6	My 79 14	.08											
Freeland, Co.	200	25	*		50	My 80 25												
Glass-Pend., Co.	250	20	*		25	My 81 10												
Gold Stripe, Ca.	150	10	*		76	Jy 81 15	.09		.08		.08		.08	.07	.08		.07	
G'ld & Curry, Ne.	108	100	3476	Se 82 50	3826	Oc 70 $11												
Grand Prize, Ne.	100	100	420	No 82 25	450	Se 80 25	.50	.28			.28		.40				.50	
Great Eastern, Dk	300	1	*		16	Jy 80 01	.04		.04	.03	.04		.04		.04		.04	
Gr. Mountain, Ca.	125	10	*		212	No 81 7½	.50						.49					
Hale & Nor., Ne.	112	100	4006	Se 82 50	1598	Ap 71 5 00									1.00			
Hall-And's'n, N.S.	150	1			7	Ja 82 05	1.85				1.70		1.75		1.70			
Hecla Con., Mon.	30	50			887	No 82 50			.03	.02	.03		.03		.09	.03	.06	
Hibernia, Co.	300	25	*		180	Jy 81 40												
Holyoke, Id.	200	1			14	Ja 83 03											19.00	
Homestake, Dk.	100	100	200	Ju 78 1 00	1812	Ja 83 50			17.50		6.50	6¾	7.25		7.25	7.00	7.50	7.00
Horn-Silver, Ut.	400	25	*		1700	No 82 75	6.50	6.25	6.50						.20	.17	.18	.16
Hukill, Co.	200	5	*		210	De 78 10	.27	.22	.22		.21	.20	.20	.18	.70			
Indep., Ne.	100	100	185	Fe 82 15	225	Se 79 25			.65		.67							
In. Queen, Ne.	125	2			385	No 82 02												
Inyo, Ca.	100	5	*		45	Ap 82 06												
Iron Silver, Co.	500	20	*		900	De 82 20	2.45		2.45		2.50		2.55	2.50	2.55		2.55	
Jocuistita, Mex.	100	100			750	No 82 1 00												
Kentuck, Nev.	30	100	342	No 81 30	955	Fe 70 5 00												
La Plata, Co.	200	10	*		610	Se 82 30							.67	66	.70	.68		
Leadville C., Co.	200	10	*		270	Ja 83 05	.65											
Leeds, Ut.	60	100	87	Ju 82 50	78	Oc 78 15												
Little Chief, Co.	200	50	*		700	Au 80 50	.40	.39	.40		.45	.39	.44	.41	.45	.42	.45	
Little Pitts., Co.	200	100	*		1050	Mr 80 50					.64	.63	.67	.65	.75	.66	.77	.72
Marguerite, Cal.	25	20			19	Oc 82 25												
Martin White, Ne	100	100	950	Se 82 25	90	Jy 79 30												
Min.s Nu'v's, Mex	100	3	*		20	Jy 82 10												
Moose, Co.	200	10	4		550	Mr 78 25			.03									
Morning Star, Co.	100	10			565	De 82 25												
Navajo, Ne.	100	100	285	Mr 82 20	100	De 2 25	9⅜		9.50	9⅜			9¾	9.00	9.50	9¼	9.00	8.75
N. Y. & Colo., Col.	50	20			25	Jy 79 10									9⅝		.72	
N'h'n Belle, Ne.	50	100			2300	No 82 50	10.13											
N. Belle Isle, Ne.	150	100	75	No 82 20	45	Se 82 15	.60		.65									
Ontario, Ut.	100	100	3495	De 82 1 00	4925	Ja 82 50									2.90	2.80	2.35	
Ophir, Ne.	50	25	480	Ap 76 1 60	1595	Jy 82 1 00	1.50											
Osceola, Mich.	100	100			785	De 82 1 00												
Pleasant Val, Cal	100	10	*		30	De 82 05												
Plumas, Ca.	100	10			151	Jy 79 3												
Prussian, Colo.	150	10			117	No 82 10									30.00			
Quicks. Pref., Ca.	43	100			654	Ju 82 6 00												
" Com., Ca.	67	100			151	Ju 82 40												
Quincy, Mich.	40	25	200	De 62 5 00	3330	Au 82 5 00												
Rising Sun, Ca.	150	5	*		52	My 81 7½	.10		.09		.08	.07	.08	.07				
Robinson Bar, Id.	150	1	*		9	De 82 03									1.25	1.20	1.25	1.20
Robinson C., Co.	200	50	*		575	No 81 50	1.25		1.30	1.20	1.20		1.25	1.20				
Robt. E. Lee, Co.	500	500			100	De 82 10									.70		.75	
Savage, Ne.	112	100	5484	No 82 50	4460	Ju 69 3 00												
Shoshone, Id.	150	1			3	No 82 01												
SierraGrande, NM					300	Ja 83 25	3.00	2.50	2.80	2.70	2.60	2.40	2.60	2.40	2.55	2.45	2.50	2.40
Sierra Nev., Ne.	100	100	5150	De 82 1 00	102	Ja 71 1 00												
Silver King, Ar.	100	100			1125	De 82 25												
Silver King, Co.	500	2			50	Au 81 10												
Socorro, N. Mex.	2.5	100			4	Mr 82 24												
Spr'g Valley, Ca.	200	1	*		50	Ja 81 25											6.50	
Standard, Ca.	100	100			4050	Ja 83 25					6.50							
Starr-Grove, Ne.	200	10	*		160	Ju 81 10							20.00					
Stormont, Ut.	200	1	*		155	No 81 05												
St. Joseph, Mo.	100	10	*		390	De 82 20												
Tip Top, Ar.	100	100	170	Mr 80 50	100	No 81 20												
Tombstone, Ar.	500	25	*		1250	Ap 82 10									1.00		.98	
Vizina, Ar.	200	25	*		140	Ap 82 10									1.13			
Yellow Jacket	120	100	5338	Fe 82 1 00	2184	Au 71 2 50												

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ 4817·5.

SALES.—Alice, 3800; Amie Consolidated, 32,200; Belle Isle, 3200; Bodie Consolidated, 160; Bulwer, 1950; California, 4700; Chrysolite, 5900; Climax, 6800; Consolidated Virginia, 4400; Eureka Consolidated, 405; Father de Smet, 100; Findley, 4300; Gold Stripe, 5800; Grand Prize, 2625; Great Eastern, 17,600; Green Mountain, 200; Hale & Norcross, 100; Hall-Anderson, 2300; Hibernia, 6800; Homestake, 120; Horn-Silver, 2275; Hukill, 20,300; Independence, 300; Iron Silver, 4500; Leadville Consolidated, 1000; Little Chief, 14,130; Little Pittsburg, 2320; Moose, 100; Navajo, 1900; Northern Belle, 135; North Belle Isle, 1000; Ophir, 235; Quicksilver, preferred, 100; Rising Sun, 2200; Robinson Consolidated, 38,300; Savage, 200; Sierra Grande, 17,525; Standard, 35; Stormont, 100; Virginia Consolidated, 300; Yellow Jacket, 100. Dividend shares sold, 210,115.

stockholders and election of trustees, January 30th, at eleven o'clock A.M.

Ohio Consolidated Mining Company, No. 115 Broadway, Room 62. Annual meeting of stockholders and election of trustees, February 12th, from two to four o'clock P.M.

Consolidated Bobtail Gold Mining Company, No. 76 Wall Street, New York. Annual meeting of stockholders, January 25th, at twelve o'clock M.

Decatur Coal Company, No. 234 South Fourth street, Philadelphia. Annual meeting of stockholders and election of trustees, January 23d, at two o'clock P.M.

Green Mountain Gold Mining Company, No. 61 Broadway, New York, Room 41. Annual meeting of stockholders, January 23d, at twelve o'clock M.

Pautano Gold and Silver Mining Company, No. 150 Broadway, New York. Annual meeting of stockholders and election of trustees, January 27th, from two o'clock P.M. to four o'clock P.M.

Silver Queen Mining Company, No. 52 Broadway, New York, Room 57. Annual meeting of stockholders, January 23d, at two o'clock P.M.

Spring Valley Hydraulic Gold Company, No. 61 Broadway, New York. Annual meeting of stockholders, February 6th, from twelve o'clock M. to two o'clock P.M.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been more active this week than usual. The Comstock shares have had a good share of the business, but at lower prices. News from the mines states that there is a marked decrease of water in the North End mines, and that the 2700-foot level is nearly dry. The Tuscarora stocks continue strong under a small business. It is stated that the shaft at Navajo is sinking below the 450-foot level, and that the drifts at the lower level show good quality of ore. Telegraphic dispatches state that considerable excitement in the mining market has been caused by the disappearance of D. B. Chisholm, Secretary of the Albion and several other mining companies, and it is said that large operations in Albion and an over-issue of stock have been the cause of his flight. Under these reports, Albion was quite active at weak prices.

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Jan. 12.	Jan. 13.	Jan. 15.	Jan. 16.	Jan. 17.	Jan. 18.
Albion	1¾	1⅛	1¼	1¼	1	1
Alpha		1				
Alta			5-32	5-32	5-32	3-16
Bechtel			3-32	3-32		
Belcher	11-16	13-16	¾			¾
Best & Belcher	3⅞	3¾	3⅞	3⅝	3⅜	3⅝
Bodie		1⅛	1⅛	1⅛	1⅛	1⅛
Bullion	1	29-32	29-32	15-16	15-16	29-32
Bulwer						
California	¼		¼			3-16
Chollar	1⅝	1½	1½	1⅜	1⅛	1¼
Con. Virginia	7-16	½	½	7-16	½	7-16
Crown Point	29-32	15-16		1	1	1
Eureka Con.	10				10¼	10½
Exchequer	3-16	3-16		¼	3-16	3-16
Gould & Curry	1⅝	1⅝	1⅝	1⅛	1⅛	1⅛
Grand Prize	11-32	13-32	11-32	13-32	7-16	19-32
Hale & Norcross	1⅛	1¼	1¼	1⅛	1⅛	1
Manhattan						
Martin White		2¾	3	3	3	3
Mexican	2⅞	2⅞	3	2¾	2⅝	2¼
Mono				3-32	3-32	
Mount Diablo	3¼					
Navajo	1⅝	9⅛	9¼	9¼	9¼	9⅛
Northern Belle	10	9⅝	9		9⅛	9
Noonday						
Ophir	1½	1½	1⅝	1½	1⅝	1⅛
Oro						
Overman		3-16	3-16	5-32		5-32
Potosi	1⅝	1⅝	1⅜	1¼	1⅛	1¼
Savage	27-32		27-32	¾	¼	11-16
Scorpion	½		9-16	½	½	7-16
Sierra Nev.	3⅛	3⅛	3¼	3⅛	3⅛	2⅞
Silver King	10⅝	10⅞	10½	10⅝		10½
Tip Top						
Union Con.	2⅞	2⅞	2¾	2⅛	2⅛	2¼
Wales Con.	3-16			3-16	3-16	3-16
Yellow Jacket	1⅛	1⅛	1¼	1¼	1¼	1¼

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Jan. 18.

The market for copper stocks the past week has been fairly active at generally lower prices, especially in Quincy, which has declined from $63@$59 on sales of small lots. We hear no special reason assigned for the decline, unless it be found in the fact that as yet no dividend has been declared, as expected, and a slight falling off in the product for the past year. Calumet & Hecla sold ex-dividend at $245, a decline of $1 from last week's sales. There is, however, but little stock offered, and ready purchasers are at hand for the lots as they come on the market. Franklin also declined from $15¾@$15. Pewabic sold as before at $10. Osceola has been more active, but lower and declined from $33@$31½. Huron sold at $2, but later declined to $1¾. National sold also at $1¾, against $1⅞ last week. Brunswick Antimony declined from $15@$14⅜.

In silver stocks, Catalpa and Crescent have been most active. The former, on the good showing from the mine, advanced from 75c.@$1.10, with sales of several thousand shares; and the latter, in sympathy with its companion, also advanced from 30@42½c.; both stocks, however, later declined, the former to $1 and the latter to 40c. Bonanza was steady at $2⅜, but dull. Silver Islet declined from $7⅛@$7. Sullivan advanced to $1⅛ on sale of 500 shares in one lot, but later declined to $1. San Pedro advanced from 35@42½c.

At the Mining Exchange, Empire steady at 30c.; Deer Isle, 12@14c. Massachusetts & New Mexico advanced to 24c., and in good demand. Quite a business has been transacted in Pipe Line certificates, at 90@92½c.; Twin Lead at 25@28c. The Water Meter stocks are steady at about 50@60c. for New England, and 60@65c. for Standard.

3 P.M.—The market this afternoon was active, with sales of Bonanza at $2 7-16@$2¼; Calumet & Hecla, at $245½, Catalpa, 95c. Pewabic sold at $9, which was also bid for it at close; Quincy at $61, closing $60½ bid. Huron sold at $1 13-16. Osceola offered at $32. Atlantic, $16 bid, $17 asked. Allouez, $2½@$3. Franklin, $15½ asked. Silver Islet, $5½@$7. Pedro sold at 42½@40c., and offered at the latter price. Napa Quicksilver, $3¼ sales and bid. Brunswick Antimony, $14 bid.

BULLION MARKET.

NEW YORK, Friday Evening, Jan. 19.

The market has been more steady the past week than since the recent decline began, and may be considered firm at the rates of the accompanying table.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Jan. 13	50⅛	109	Jan. 17	50⅛	109⅛
Jan. 15	50⅛	*	Jan. 18	50⅛	109¼
Jan. 16	50⅛	109	Jan. 19	†	109⅜

* 108⅞@109. † 50 3-16

If the government should limit the coinage of the

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standard dollar, as proposed by the Coinage Committee of the House, there would be, doubtless, a decline of five or ten cents an ounce in silver.

BULLION PRODUCTION FOR 1882.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1882.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13½ per cent, to arrive at actual value.

MINES.	States.	For the week.	Month of December.	Year from Jan. 1st, 1882.
*Alice, G. S.	Mont.			$789,591
*Alta-Montana, S. L.	"			343,290
Barbee & Walker, S.	Utah			84,262
*Belmont	Mont.			26,916
Betty O'Neal, S.	Nev.			59,159
*Black Bear, G.	Cal			69,015
Bodie, G. S.	"		$31,225	485,890
Bodie Tunnel, G.	Cal			129,217
*Boston & Montana, G.	Mont.		20,283	285,898
*Caledonia, G.	Dak.			76,655
*Caribou, S.	Colo.			126,918
*Central Arizona, S.	Ariz.			180,858
*Christy, S.	Utah			334,114
*Chrysolite, S. L.	Colo.			289,578
Cons. Bobtail, G.	"			99,784
*Contention, S.	Ariz.		122,039	1,814,643
Crismon-Mammoth, G.	Utah			63,579
*Custer, G. S.	Idaho			682,331
*Deadwood-Terra, G.	Dak.			551,052
*Derbec Blue Grav., G.	Cal			133,781
*Eureka Con., G. S. L.	Nev.		79,446	982,984
Evening Star, S. L.	Colo.			862,520
*Father de Smet, G.	Dak.		47,892	417,873
*Frisco M. & S.Co., S. L	Utah		22,061	370,635
Girard, S.	Ariz.			177,540
Grand Central, S.	"			1,358,820
*Hall-Anderson, G.	N. S.			13,050
*Head Center, S.	Ariz.			145,636
*Hecla, G. S. L.	Mont.			77,945
*Homestake, G.	Dak.			1,114,568
Horn-Silver, S. L.	Utah		204,500	3,539,516
*Hope, S.	Mont.		25,685	329,752
Idaho, G.	Cal			395,540
*Independence, S.	Nev.			152,527
*Indian Queen, S.	"			183,650
*Inyo Cons., G.	Cal			59,421
Ingersoll, S.	Ariz.			90,000
Iron Silver, S.	Colo.			865,436
*Jocuistita, S.	Mex.			700,585
*Kentuck	Nev.			8,526
*†Leeds, S.	Utah			11,988
Lexington, S.	Mont.		92,346	279,822
*Little Pittsburg, S. L.	Colo.			134,538
Manhattan, S.	Nev.			64,300
Mack Morris, S.	Ariz.			281,024
*Marguerite, G.	Cal		15,800	95,490
Morning Star, S. L.	Colo.			478,676
Mount Diablo, S.	Nev.			294,307
*Navajo, G. S.	"			364,193
New York Hill, G.	Cal			105,136
Noonday & North Noonday, G.	"			231,000
Northern Belle, S.	Nev.			740,012
*†Ontario, S. L.	Utah		174,000	2,395,000
Ophir, G. S.	Nev.			39,472
*Oxford, G.	N. S.			15,564
Pascoe, S.	Utah			4,575
*Pleasant Valley, G. S.	Cal			46,360
Robert E. Lee, S.	Colo.			292,550
Russell, C. S.	Ariz.			266,686
*Satemo, G.	N. S.			11,095
Savage, S.	Nev.			33,281
Sierra Grande, S.	N. Mex.			735,260
*Silver Bow, G. S.	Mont.			330,182
Silver King, S.	Ariz.			815,000
*Spring Valley, G.	Cal			152,000
Standard, G.	"		92,023	1,258,057
Star, S.	Nev.		4,515	61,716
Stonewall, S.	Ariz.			240,000
Stormont, S.	Utah		19,690	283,934
*Sullivan, S.	Maine			4,536
Syndicate, G.	Cal			75,458
Tintic M. & M. Co.	Utah		10,576	76,231
*Tip Top, S.	Ariz.		33,653	243,081
*Tombstone, G. S.	"		550,988	1,440,894
*Union Con., S.	Nev.			318,291
*Vizina, S.	Ariz.			107,339
Total amount of shipments to date				$30,709,448

* Official. † Net. ‡ Assay value. *G. Gold. S. Silver. L. Lead.*

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended January 12th	$266,106
Corresponding week last year	109,300
Since January 1st, 1883	532,819
Corresponding period last year	337,539

Imports.

Week ended January 12th	$34,630
Corresponding week last year	155,190
Since January 1st, 1883	105,637
Corresponding period last year	264,347

NON-DIVIDEND PAYING MINES.

NAME AND LOCATION OF COMPANY.		NUMBER OF SHARES.	Par.	ASSESSMENTS. Total levied to date.	ASSESSMENTS. Date and amount of last.		HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Jan. 13. H.	Jan. 13. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 18. H.	Jan. 18. L.	Jan. 19. H.	Jan. 19. L.
Advance																		
Albion, S. L.	Nev.	150,000	100	397,500	Jun. 82	25	1.75		1.50						1.25		1.25	
Allouez	Mich																	
Alpha	Nev.			420,000	Mar. 82	50												
Alta	Nev.	100,800	100	1,892,000	Jan. 83	25												
Alta-Montana, G.	Mon.	500 000	10	*			22c				23c		22c		21c	18c	20c	18c
Am. Flag, S	Colo	125,000	10	300,000	Jun. 77	25	5c				7c		8c					
Barcelona, G.	Nev	200,000	25	*			24c		24c		24c		23c		23c		24c	23c
Battle Creek																		
Bear Creek	Cal.	300,000	1															
Beaunce																		
Bechtel Con., G.	Cal.	100,000	100	185,000	Jan. 83	10												
Best & B'cher, G. S	Nev.	100,800	100	1,345,790	No. 82	50											3 75	
Big Pittsburg, S. L	Colo	200,000	100	*			29c	25c	27c	24c	25c	24c	24c		19c		19c	
Black Jack, G.	Cal.	100,000	2½															
Bonanza Chief	Mon	1,000.000	1	*			4c		3c	2c	3c		3c	2c	3c			
Bondholder	Colo	200,000	2½															
Boston Con., G.	Cal.	100,000	100	95,000	Oct. 82	25												
Boulder Con							2c	1c	2c									
Bradshaw, S.	Ariz	225,000	10				37c				38c		38c	37c	39c	37c	37c	
Buckeye	Colo	100,000	5	*			2c		2c		2c		3c		2c			
" pref.																		
Bull-Domingo, S L	Colo	200,000	50	*					5c		5c							
Bullion, G. S.	Nev.	100,000	100	3,747,000	Oct. 82	50												
Bye and Bye	Ariz	100,000	10	*					4c	3c	3c		3c		4c		4c	
Calaveras, G	Cal.	500,000	1	*			3c		3c		3c	2c	2c		2c		2c	
C'lav'r's W.&M.Co	Cal.																	
Cal., B. H., G.	Dak.	100,000	100	480,000	Au. 82	15												
Carbonate Hill, S L	Colo	200,000	10															
Catskill, S.	Nev.	300,000	5															
Central Ariz'na, S	Ariz	100.000	100				50c				50c		50c					
Chapparal	Cal.																	
Cherokee, G.	Cal.	150,000	10				11c	10c	9c		7c	6c	8c	6c			6c	
Chollar					Sep. 82	50												
Clarence	Can.																	
Colorado Cent'l, S	Colo	300,000	10															
Col'mb'a Con., G. S	Nev.	100,000	50															
Cons. Imp'r'l, G. S	Nev.	500,000	100	1,425,000	Jan. 82	10	3c		3c		3c				2c		2c	
Con. Pacific, G.	Cal.	60,000	100	141,000	Au 82	25												
Crescent, S L	Colo	300,000	10	*														
Crowell, G.	N. C.	500,000	1				5c											
Dahlonega, G.	Ga.	250,000	1	*														
Dardanelles, G.	Cal.	100,000	10															
Decatur							9c	8c	9c		9c	8c	9c	8c	9c	8c	9c	8c
Dunderberg, S.	Colo	150,000	10	*														
Durango, G.	Dak.	500,000	1	*			9c											
Eastern Oregon																		
Elko Cons.							18c	16c	20c	19c	24c	20c	24c	23c	24c	19c	27c	24c
Empire, S.	Ut'h	100,000	100															
Enterprise	Colo						45c		46c	45c	48c	46c	49c	48c	50c	48c	52c	50c
Exchequer	Nev	100,000	100	630,000	Jan. 82	25			2.10		2.20		2.10		2.25	2.15	2.20	2.15
Fannie Barret																		
Globe Copper	Ariz.																	
Gold Placer, G.	Colo	200,000	25															
Goodshaw, G.	Cal.	100,000	100	200,000	Oct. 82	10	6c				6c						8c	7c
Granville, G.	N. C.	800,000	1	*														
Harshaw, S.	Ariz	100,000	100															
Head Center, S	Ariz	100.000	100	160,000	May 82	20												
Hortense, S.	Colo	200,000	10				16c	14c	15c				16c	15c				
Index	Cal.																	
Julia, G S	Nev.	110,000	100	1,394,000	Jan. 82	20												
Kossuth, G S	Nev.	108,000	100	421,200	Aug. 77	15												
Lacrosse, G.	Colo	100,000	10	*									14c				14c	
Leviathan, S.	Nev	100,000	100	380,000	Sep. 82	25												
Lucerne, S.	Colo	500,000	10	*														
Mariposa Pref., G	Cal.	50,000	100	1,687,500	Dec. 81													
" Com., G.	Cal.	100,000	100	1,950,000	Feb. 82													
May Belle, G	Cal.	100,000	100	84,000	Dec. 81	20												
Mayflower, S	Colo	100,000	100	*														
Mexican, G. S.	Nev.	100.800	100	2,146,600	Oct. 82	$1							2.50					
Michoacan Synd.	Mex.																	
Miner Boy, G S L	Colo	500,000	10	*														
Miller	Nev.	200,000	25															
Mono, G.	Cal.	50,000	100	535,000	Jan. 83	20												
Moose Silver, S.	Colo	300.000	10															
Nevada Syndi																		
North Standard, G	Cal.	100,000	100	20,000	Nov. 81	10												
N. Horn-Silv'r, S L	Utah	400,000																
Noonday	Cal.	60,000	10	208,000	Dec. 82	$1												
Old Dominion, G	Ariz	200,000	100	*														
Oriental	Nev.	200,000	10															
Ori'nt'l & Miller, S	Nev.	400,000	25				14c	12c	14c	13c	20c	14c	16c	15c	15c	14c	15c	14c
Overman, G S	Nev.	115,200	25	3,604,700	May 82	25												
Potosi	Nev.	112,000	100	500,640	Nov 82	25							3c		2c		3c	
Quartz Creek			100															
Rappahannock, G	Va.	250,000		*			10c											
Red Elephant, S.	Colo	500,000	1	*			10c	9c	10c	9c	9c							
Retort			10															
San Pedro, G S L	N. M	400,000																
Silver Cliff, S	Colo	200.000	25	*			40c		40c	38c	40c		39c		41c		39c	
Silver Islet	Can.		50					36c									8c	
Sonora Con.	Mex.																	
South Bodie, G	Cal.	100,000		100,000	Mar. 82	15												
South Bulwer, G	Cal.	100,000	100	195,000	May 81	25												
South Hite	Cal.	100,000	100		May 82	10	16c											
South Pacific	Cal.		5				9c		9c	8c	9c		9c		9c		9c	
State Line No. 1, S	Nev.	200,000	1															
" No. 2, S	Nev.	200,000	25															
" No. 3, S	Nev.	200,000	25															
" No. 4, S	Nev.	200,000	25															
" Nos. 1 & 4, S	Nev.		25						4c	3c	4c	3c	4c		3c		3c	
" Nos. 2 & 3, S	Nev.						8c		8c	7c	8c	7c	8c		8c		8c	
Sutro Tunnel	Nev.	1,000,000		*			23c		24c	21c	24c	22c	24c	22c	25c	21c	25c	22c
Taylor-Plumas			10				21c	21c	22c	21c	22c		22c	21c	22c	21c	20c	18c
Tioga, G.	CC.	100,000		285,000	Oct. 82	10												
Tuscarora, S	Nev	100,000	100	110,000	Oct. 81	15	14c				19c		21c		20c		23c	22c
Unadilla, S.	Ariz	500,000	100	*			5c		4c		4c				4c			
Union Cons, G. S.	Nev.	100,000	1	1,460,000	Oct. 82	$1		4c					2.75					
Utah		20,000	100	1,360,000	Dec. 82	$1												
Vandewater	Nev.	200,000	100	*			32c		33c	32c			33c		32c			
Washington	Ariz.	200,000	10								11c							
Whalen Copper	Nev.	100,000	25				10.00											
Wide West																		
Willshire	Cal.	50,000	5	*														

SALES.—Albion, 1525; Alta-Montana, 2500; American Flag, 800; Barcelona, 10,000; Best & Belcher, 50; Big Pittsburg, 12,500; Bonanza Chief, 9100; Boulder Consolidated, 3600; Bradshaw, 4700; Buckeye, 18,900; Bull-Domingo, 1200; Bye-and-Bye, 1900; Calaveras, 9000; Carbonate Hill, 1100; Central Arizona, 800; Cherokee, 6300; Chollar, 100; Consolidated Imperial, 5000; Crowell, 1500; Decatur, 25,500; Durango, 100; Elko Consolidated, 38,500; Enterprise, 5200; Fannie Barrett, 3200; Goodshaw, 1600; Hortense, 7300; Lacrosse, 500; Mexican, 100; Oriental & Miller, 35,200; Quartz Creek, 8500; Rappahannock, 1600; Red Elephant, 1300; Silver Cliff, 3100; Sonora Consolidated, 500; South Hite, new, 100; South Pacific, 38,800; State Line, Nos. 1 & 4, 4400; State Line, Nos. 2 & 3, 11,600; Sutro Tunnel, 20,500; Taylor-Plumas, 74,350; Tuscarora, 5100; Unadilla, 6600; Union Consolidated, 150; Vandewater, 2100; Washington, 500; Whalen Copper 10. Non-dividend shares sold, 395,985. Total shares sold at all the Exchanges, 606,100.

Foreign Bank Statement.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 5 per cent. During the week, the bank gained £637,000 bullion, and the proportion of its reserve to its liabilities was raised from 37 11-16 to 40⅝ per cent against 37 11-16 per cent at this date last year. The weekly statement of the Bank of France shows a gain of 2,000,000 francs gold and a loss of 112,500 francs silver. The Imperial Bank of Germany reduced its rate for discount from 5 to 4 per cent, and during the week gained 19,660,000 marks in specie.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended January 19th, as compiled from various sources, amounted to $251,836.94, as against $374,877 reported for the previous week. The receipts from January 1st, 1883, to date, are $1,123,293.81.

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BOSTON MINING STOCKS.

	Jan. 12.		Jan. 13.		Jan. 15.		Jan. 16.		Jan. 17.		Jan. 18.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Atlantic													
Aztec													
Best & Bel													
Bodie Con	1.87½										2.50	2.36¼	1,200
Bonanza D					3.87½								10
Bruns. Ant													
Bulwer													
California					246	245	246		246	245	245½	245	64
Cal. & Hec	.252												
Carbon. Hill					.87½	.80	1.00	.90	1.12½	1.02½	1.00	.85	8,000
Catalpa	.80		.75										
Central Ariz									.25				2,000
Cherryfield													
Chrysolite													
Con. V'ginia													
Copp'r Falls					.31	.30	.37½	.35	.42½	.40	.42½		4,550
Crescent													
Cumberl'd									.14				8,800
Deer Isle	.14	.13	.13	.11	.15	.13	.14	.12					
Denver City									1.00				100
Douglas													
Duncan													
Dunkin					.31		.31		.30				3,800
Empire	.32												
Eureka Con.													450
Franklin	15.12	15.00	15.00		15.50		15.50	.25	15.50	15.00			3,900
Gila County	.25		.26		.25		.26						100
Hancock G			9.00										
Harshaw													
Horn-Silver													
Huron	2.00	1.87½			1.87½		1.75		1.87½		1.93¾		1,425
Independ'ce													
Indian Q'n													
Little Pitts													
Madison													9,300
Mammoth	.02	.01											10,350
Mass. & N.M.	.21		.22		.25	.22	.24	.23	.24	.20			
Milton											3.25		100
Napa													
National							1.75½						
North. Belle													134
Osceola	32.50		32.00		32.00	31.75	32.00		32.50	32.50			
Penn-Breck											9.00	8.75	760
Pewabic	10.00												
Pine Tree									.28				1,850
Plymouth					.28								
Quincy	63.00		63.00	62.25	62.50	61.00	60.00	59.00	60.00	58.50	61.00		536
Ridge													
Robinson													
San Pedro	.40		.42½	.40	.40½		.40				.42½	.40	1,150
S'ra Nevada					7.00								25
Silver Islet													
Silver King													
So. Pacific													
Standard													
State Line Nos. 2 & 3													
Sullivan					1.00	.87½	1.12½				1.00		1,004
Sutro Tun					.23				.23				400
Sycamore													
Twin Lead	.24	.22	.25	.23	.26	.25	.28	.23	.23				15,000
Vizina													

PHILADELPHIA MINING STOCKS.

	Jan. 12.		Jan. 13.		Jan. 15.		Jan. 16.		Jan. 17.		Jan. 18.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American	.24	.19	.24	.23	.32½	.24	.40	.35	.35	.30	.37½	.30	*
Argent							.25		.25				2,000
Arizona So													
Aztec													
Battle Mt			.02		.02		.02						10,200
Black Sul													
Bodie			.04		.05	.04	.05		.06	.05	.06	.05	24,225
Buena	.04												
California													
Calista			.04		.05						.05		6,000
Cincinnati	.11		.12	.11	.35	.30	.32½		.13		.14	.13	6,100
Comprom'e	.30		.30								.3-½		5,300
Dauntless													
Del Monte													
Denver City	.19		.18		.20	.19	.21		.25	.21	.23		13,000
Fairview			.01		.01		.01		.01				8,000
Eureka													
Girard	.18		.18	.17	.20	.19	.25	.20	.35	.20	.21	.16	63,200
Golconda			.01				.01						5,300
Golden Age													
Governor			.05		.06	.05	.07	.06	.09	.08	.08		25,500
Grand Uni'n	.10		.10		.10		.12	.10	.13	.12	.11		32,900
Gunnison							.50		.50		.50		600
Hancock									.01				2,600
Intervener													
Iowa Gulch	.10	.09	.18	.11	.15	.14	.15	.14	.14	.11	.13	.12	†
King Bul'on													
Little Dia'd	.07		.08										5,000
Little Maud	.05		.06	.05	.08	.06	.08		.09	.08	.08		32,500
L'g & D'y Hl									.01		.01		5,100
McCullough													
Magnolia													
Montana													
Mt. Lincoln			.01		.01		.01		.02		.02		1,000
Mt.Sheridan					.05	.04	.05		.06		.06		10,600
National													20,500
Orion	.09				.06		.11	.07	.12	.08	.08		
Palmetto E.			.01										9,200
Pembina	.21	.18	.22	.20	.20		.20	.15	.23	.19	.20		1,500
Penn-Breck	.13	.12	.13	.12	.15	.14	.18	.14	.18	.12	.14		23,800
Permanent													52,300
Pizarro													
Pizarro Ex							.03						1,000
Potosi													
Rara Avis							.40		.42½		.50	.47½	4,800
Rara Avis E									.05		.05		17,000
Record													
Rico Pion'r													
San Pedro									.02	.01			3,000
Sierra G'nde	3.15	3.00	3.00	2.90	2.95	2.75	2.55				2.60	2.52½	7,950
Silver Cord			1.40		1.40								800
Silv'r Plume			.01		.01		.02				.02		14,000
Silver Rock													
Sovereign													
Standard					.03		.03		.03				11,000
Sultana	.05		.05		.01				.04		.04		15,300
Sutro Tun'l													
Tombst'ne	.85	.82½	.85		.87½		.87½		.87½		.87½	.85	3,650
Tranquilli'y													
Tyrone													47,800
Victor					.01		.02		.02		.01		1,600
Yale Mt					.15		.11		.08		.05		

* 140,050. † 137,100.

United States Assay-Office at New York.—Statement of business for the month ended December 30th, 1882:

Deposits of gold:		
Foreign coin	$799,000.00	
Foreign bullion	246,000.00	
United States bullion	586,000.00	
United States bullion (re-deposits)	191,000.00	
Jewelers' bars	99,000.00	
Refined gold	80,000.00—	$2,001,000.00
Deposits of silver:		
Jewelers' bars	$12,800.00	
Foreign coin	5,000.00	
Foreign bullion	41,500.00	
United States bullion (contained in gold)	8,600.00	
United States bullion (re-deposits)	6,000.00	
United States bullion, Arizona	18,000.00	
United States bullion, Colorado	21,100.00	
United States bullion, Dakota	1,000.00	
United States bullion, Idaho	24,700.00	
United States bullion, Lake Superior	4,500.00	
United States bullion, Montana	85,800.00	
United States bullion, Nevada	1,100.00	
United States bullion, New Mexico	12,500.00	
United States bullion, Utah	140,000.00	
Refined silver	75,000.00—	444,000.00
Total deposits		$2,445,000.00
Transmitted to Mint of the United States at Philadelphia for coinage:		
Gold	$1,701,691.43	
Silver	596,388.20—	2,298,079.63

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 19.

American Pig.—The feeling of uncertainty continues, and the market is consequently dull and featureless. We quote at tidewater as follows, with the market in buyers' favor: Standard to choice Foundry No. 1, $24.50@$26; No. 2, $22.50@$23; and $20.50@$21, for Gray Forge. At the close of last week, 10,000 tons of Bessemer pig, foreign, were sold at private terms; since then, holders are firmer, asking $22.75@$23, which does not meet buyers' views. England cables 55s. Spiegeleisen is quiet at $33@$34, for 20 per cent; $30 for 15 per cent; and $27.50@$28 for 10@12 per cent.

Scotch Pig.—The market is exceedingly dull, and we have very little new business to report. Nominally, quotations are a little lower, but it is probable that better conditions could be obtained by good buyers for good lots. We quote Coltness, $25@$25.50; Summerlee, $23@$23.50; Glengarnock, $22.50@$23; and Eglinton, $21@$21.50. At the Wall Street Exchange, the cables are to-day a trifle lower: Carnbroe, 55s 3d.; Gartsherrie, 63s. 6d.; Summerlee, 62s.; Coltness and Langloan, 66s. 6d.; Glengarnock, 55s.; and Eglinton, 50s. 3d. Warrants are 48s. 4d.

Steel Rails.—Beyond a few sales of small lots, aggregating about 15,000 tons, for spring and summer delivery, nothing has been done. Makers are firm, and have no difficulty in getting $40 at mill.

Old Rails.—There is little interest, and very limited business. We quote Ts $23.50@$24.

Scrap.—Transactions are on a small scale, and prices are low. We quote: $24.50@$25 ex ship, for No. 1.

Philadelphia. Jan. 19.

Interest is still centered at Washington, though not a few manufacturers have discounted probable legislation, satisfactorily to themselves, at least. Business is quiet, and both makers and buyers are awaiting with much concern the action of Congress. Every thing has been done that can be to secure the Tariff Commission rates, and either these or nothing will be had. The iron interests are in earnest and mean business. The active members here and elsewhere think the iron interests will save themselves either in the House bill or by delay.

Pig-Iron.—The business of the week has been of a retail character in most cases. A few good-sized contracts have been entered into for special and standard brands of iron, which will not fluctuate much in any event. Quotations given to-day by large producers are $25@$26.50 for ordinary to best Foundry, $23@$23.50 for No. 2 iron, and $20@$21.50 for Gray Forge. Bessemer is somewhat unsettled by special ocean freight rates and by fluctuations at foreign furnaces. Buyers are in the way of providing for future requirements, and terms have been made which will lead to business.

Charcoal Blooms are in fair demand at $65@$67 and anthracite at $55@$56. Muck bars have been neglected, though sales have been made between $38@$39. The tendency is to lower prices, and offers have been made under $38, which will be taken, though the iron is not the best.

Merchant Iron has been selling very quietly at $2.25@$2.40, according to make and date of delivery. Neither makers nor buyers care to do business far ahead, as one side looks for lower prices and the other side better figures. Consumers would before this have bought freely but for tariff agitation. They have very little iron on hand. Makers believe business will improve as soon as the uncertainties are removed. If capacity were run to utmost limits, demand would soon be overtaken, and hence a conservative sentiment prevails. Country mills manage to keep busy, and stores are doing a fair retail trade. Prices are firmly held for the best makes of refined.

Nails are a little firmer for car-load lots, and factories are generally running full. An active spring trade is anticipated, and makers will prepare for it with a large assortment. Business for the week has been done at $3.30@$3.40.

Sheet-Iron is under better inquiry, and thin sheets are selling in small orders for early delivery. Quotations have departed from card rates for large lots, but buyers think the chances in their favor for easier prices from this out.

Shapes.—Structural shapes are in moderate request. Prices are weak and fluctuating. Large orders would be taken considerably under card rates. Buyers are waiting rather for bottom prices than for lower prices.

Tank Iron sold this week at $2.50@$2.60. A few inquiries have come to hand for spring requirements. Competition is active, and the market is in buyers' favor.

Steel Rails.—Birmingham mills have done a fair week's business in large and small orders at $39@$42. Considerable business is to be had. There is less competition than in December, and makers are trying to tone up prices.

Old Rails.—Transactions have been made for spring delivery at $25@$28.50. Ocean freights are favorable, and negotiations are in hand for several lots, which will be placed as soon as one or two uncertainties are removed.

Scrap.—Sales from yard in small lots were made at

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$26 for medium to $27@$28 for No. 1. Cast, $19. Crop Ends, dull.

METALS.

NEW YORK, Friday Evening, Jan. 19.

Copper.—The market during the week has relapsed into quietness. We hear of no transactions of magnitude either in Lake or in other coppers, which are slightly lower, 17⅞c. being asked for Baltimore, and 17c. bid with hesitation. Lake is quoted 18⅛@18¼c. nominally. London cables to-day £72@£72 5s. for Best Selected and £67@£67 5s. for Chili Bars.

Lead.—Here, this metal was stagnant, nothing but ordinary amount of jobbing sales being recorded. Our Western dispatch will be found of more interest. Common lead is now nominally quoted 4·65@4·70c., and Refined 4·75c.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

The market is very steady at some advances on last week's quotations, with a good demand. Sales for the week sum up over 300 tons of Refined at 4·35c., and 100 tons Hard lead at 4·30c.

Tin.—We hear of no transactions of magnitude, and the market is quiet, with a weakening tendency. We quote spot Straits nominally 21¼@21⅜c. London cables to-day £93 12s.

Spelter.—The market is exceedingly dull and quiet, with no features worthy of special mention. We quote Domestic 4⅝@4¾c., with Foreign entirely nominal. London cables £16 5s.@£16 10s.

Antimony.—With free arrivals and a light demand, the weakness continues, particularly as regards Cookson's, which we quote 11¼c., while Hallett's is 10·30c.

Quicksilver.—The spot price declined to 34½c. on receipt of the London quotation of £5 10s. per bottle.—*San Francisco Commercial Herald.*

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 19.

Anthracite.

The announcement made on Monday that the companies had decided to restrict, stopping work three days in the week, for an indefinite period, has apparently put an end to the low prices at which buyers were able to get coal in some quarters. There has been considerable "shopping" since, and a little more buying; but the business is still limited, because purchasers seem unwilling to take coal except at the cut figures of the past week. Local stocks in yard are running lower, and there is a little more inquiry for the covering of immediate wants. It will take some weeks probably before the accumulations in the hands of the companies are removed and the reduced output begins to tell.

The production of anthracite for the week ended January 13th was 570,084 tons, as compared with 490,734 tons the previous week, and 584,014 tons for the corresponding week of 1882. The total product from January 1st to January 13th was 990,793 tons, as against 956,094 tons for the like period of last year, showing an increase this year of 34,699 tons.

Mr. John H. Jones has just published the following statement of anthracite coal tonnage for the year:

	For year 1882.	For year 1881.	Difference.
Phila. & Read. RR.	7,000,113	6,940,283	*59,829
Lehigh Valley RR.	5,933,739	5,721,869	*211,870
Central RR. of N. J.	4,211,052	4,085,423	*125,628
Del., Lack. & W. RR.	4,638,717	4,388,968	*249,748
Del. & Hud. Canal Co.	3,203,168	3,211,496	†8,328
Pennsylvania RR.	2,332,973	2,211,363	*121,610
Pennsylvania Coal Co.	1,469,820	1,475,380	†5,559
N. Y., L. E. & W. RR.	330,516	465,230	†134,719
Total	29,120,096	28,500,016	*620,079

* Increase. † Decrease.

The stock of coal on hand at tide-water shipping points, December 31st, 1882, was 562,116 tons; on November 30th, 535,891 tons; increase, 26,225 tons. The amount on hand December 31st, 1881, was 497,024 tons. Of the total production of 1882, 13,971,371 tons, or 47·98 per cent, was from the Wyoming Region; 5,689,437 tons, or 19·54 per cent, from Lehigh Region; and 9,459,288 tons, or 32·48 per cent, from Schuylkill Region. Competitive tonnage, including all coal which, for final consumption or in transit, reaches any point on Hudson River or the Bay of New York, or which passes out of the Capes of the Delaware:

1881..... 12,169,030 tons.
1882..... 12,018,764 "

Bituminous.

Business is fair for the season, and there are indications that the lots pressing for sale a week ago are disappearing. We quote unchanged, alongside, Clearfield, $4.60@$4.75, and Cumberland, $4.65@$4.85, according to quality.

Our attention has been called to a growing abuse, which consumers should take good care to avoid. A number of dealers have been flooding the country with carefully-worded circulars, in which they style themselves "miners and shippers" of George's Creek Cumberland coal. These parties do not mine a pound of that coal, and there is good reason to believe that they fraudulently assume a title to which they have no right, in order to be able to market inferior coals, as some consumers have already discovered to their loss. This game is not only hurtful to consumers, but is also injurious to the good reputation of Cumberland coal. Buyers may at once detect these parties by finding them unrepresented in the following list, which comprises all the miners of Cumberland coal. All others so styling themselves are frauds:

Borden Mining Co., Consolidation Coal Co., Blaen Avon Coal Co., Hampshire & Baltimore Co., George's Creek Coal and Iron Co., New Central Coal Co., Atlantic & G. C. Co., Piedmont Coal and Iron Co., Swanton Mining Co., Potomac Coal Co., Maryland Union C. Co., American Coal Co., Maryland Coal Co.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended January 13th, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	84,967	142,698	81,778	131,109
D. L. & W. RR. Co.	84,366	164,411	87,952	158,452
Penna. Coal Co.	27,385	49,495	23,059	42,896
L. V. RR. Co.	34,724	51,673	48,358	66,810
P. & N. Y. RR. Co.	3,887	6,989	4,185	6,982
C. RR. of N. J.	45,993	73,399	44,903	64,800
	281,322	488,665	290,235	471,049
Lehigh Region.				
L. V. RR. Co.	93,324	176,172	93,927	163,475
C. RR. of N. J.	44,885	69,400	46,947	66,927
S. H. & W. B. RR.	726	726	172	523
	138,935	246,298	141,046	230,925
Schuylkill Region.				
P. & R. RR. Co.	128,860	218,176	129,718	215,311
Shamokin & Lykens Val.	19,474	35,237	21,609	36,502
	148,334	253,413	151,327	251,813
Sullivan Region.				
St Line & Sul. RR. Co.	1,493	2,417	1,406	2,367
Total	570,084	990,793	584,014	956,094
Increase		34,699		
Decrease				

* Week ending January 6th.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878.....774,488 tons.
" " " " 1879.....650,273 "
" " " " 1880.....838,679 "
" " " " 1881.....638,560 "

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 4,103 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended January 13th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)		125	
Coal for shipment at South Amboy	19,130	34,063	32,251
Coal for distribution	17,935	31,956	26,583
Coal for company's use	3,653	6,364	4,181
Total	40,718	72,508	63,015
Increase		9,493	
Decrease			

The Production of Bituminous Coal for the week ended January 6th was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons
Cumberland Region, Md.		
Tons of 2240 lbs.	40,316	
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,452	
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,258	
East Broad Top	1,500	
Clearfield Region, Pa.		
Snow Shoe	4,176	
Tyrone and Clearfield	44,880	
Alleghany Region, Pa.		
Pennsylvania RR.	10,593	
Pittsburg Region, Pa.		
West Penn RR.	7,370	
Southwest Penn. RR.	3,654	
Penn & Westmoreland gas-coal, Pa. RR	25,111	
Pennsylvania RR.	8,959	
Total	156,269	

The Transportation of Coke over the Pennsylvania Railroad for the week ended January 6th and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	1,849	
West Penn. RR.	834	
Southwest Penn. RR.	47,267	
Penn. & Westmoreland Region, Pa. RR	5,657	
Pittsburg, Penn. RR.		
Snow Shoe (Clearfield Region)	53	
Total	55,660	

Wholesale Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports, per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Weehawken	4 05	4 05	4 00	4 10	4 55	4 55
Scranton at Hoboken	4 30	4 30	4 30	4 55	4 85	4 85
Lackawanna at Weehawk'n	4 15	4 15	4 30	4 55	4 85	4 90
Wilkes-Barre at P. Johnston	4 30	4 30	4 30	4 55	4 85	4 75
Plymouth R. A. at P. John.			4 40	4 75	5 20	4 85
LEHIGH COAL.						
Honey Brook at Port John.	5 25		4 50	4 55	4 85	4 75
Fulton at South Amboy	5 25			4 60	4 85	4 75
U. L. & Coun. Ri'ge at Eliz'pt						
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash	5 15	5 15	4 50	4 70	4 90	4 70
Free-Burning White Ash		4 30	4 30	4 55	4 90	4 70
Schuylkill Red Ash				4 55	5 00	4 70
Shamokin				4 70	5 00	4 70
Lorberry				4 85	5 25	4 85
Lykens Valley (Brookside)			5 35	5 65	5 85	5 20
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 75	4 75	4 15	4 35	4 55	4 35
Free-Burning White Ash		3 95	3 95	4 20	4 55	4 35
Schuylkill Red Ash				4 20	4 65	4 35
Shamokin				4 35	4 65	4 35
Lorberry				4 35	4 75	4 35
Lykens Valley (Brookside)				5 25	5 35	4 70

Wholesale Prices of Bituminous Coals.

Clearfield, at Philadelphia	$3.40@$3.50
" " South Amboy	4.40@ 4.55
" " New York, alongside	4.70@ 4.80
Cumberland, at Baltimore	3.30@ 3.50
" " Georgetown	3.25@ 3.35
" " South Amboy	
" " New York, alongside	4.65@ 4.85

Horsford's Acid Phosphate
For Wakefulness.

DR. WM. P. CLOTHIER, Buffalo, N. Y., says: "I prescribed it for a Catholic priest, who was a hard student, for wakefulness, extreme nervousness, etc., and he reports it has been of great benefit to him."

PATENTS.

SECURED and **SOLD** in all countries. Partners procured, Joint Stock Companies organized. 52 page "Inventor's Handbook" free, giving patent laws of all countries and full information how to procure, sell, develope or secure capital on patents. **E. L. RICHARDS & CO. 814 B'way, N.Y.**

ANNUAL REPORT OF THE "ARIZONA QUEEN GOLD MINING CO."

The capital stock of the company is $1,000,000. No part of which has been paid in cash, but all of it was issued in payment for the property necessary for the business of the company.

Amount of existing debts does not exceed $6703.

Dated New York January 15th, 1883.

ROBERT B. GILMAN, President and Trustee.
EDWARD M. CLARK, Trustee.
ERNEST MERINGTON, Trustee.

City and County of New York, ss.:

Robert B. Gilman, being duly sworn, says that he is the President of the Company, and that the above report of the trustees is true to the best of his knowledge and belief.

Sworn to before me on this 15th day of January, A.D. 1883. W. S. WOLF, Notary Public. N. Y. County.

DIVIDENDS.

NEW YORK, Jan. 12, 1883.

THE CONTENTION CONSOLIDATED MINING COMPANY this day declared its regular monthly Dividend, No. 12, of

TWENTY-FIVE CENTS PER SHARE,

payable January 28th, 1883, at the office of the Farmers' Loan and Trust Company, No. 26 Exchange Place, on all stock registered in New York. Transfer-books close on January 18th.

W. HART SMITH, Vice-President.

HORN-SILVER MINING COMPANY.
Office, 44 Wall Street,
NEW YORK, Jan. 15, 1883.

DIVIDEND No. 8.

A quarterly dividend of $300,000 has been this day declared, being three per cent on the capital stock, payable to stockholders of record on the 15th day of February next, at the office of the company.

Transfer-books will be closed on February 7th, and reopened February 16th. W. S. HOYT, Secretary.

SAN FRANCISCO, Jan. 15, 1883.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared Dividend No. 25, of Twenty Cents per share, payable at the office of Laidlaw & Co., 14 Wall Street, New York, on the 31st inst. Transfer-books will close 20th inst.

H. DEAS, Secretary.

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THE ENGINEERING AND MINING JOURNAL

VOL. XXXV. No. 4.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D., } Editors.
CHARLES KIRCHHOFF, Jr., M.E.,

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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Advertising Rates.—See page ix.

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Mr. A. R. Brown, Jr., is our accredited representative for Boston and the Eastern States. Office, Room 1, Simmons Building, 40 Water street, Boston.

Mr. J. Viennot, 150 South Fourth street, Philadelphia, is our accredited representative for Philadelphia.

Mr. A. H. Taylor, 159 Lake street, Chicago, is our accredited representative for Chicago and the Northwest.

Mr. O. D. Cotton, Room 36, Wiggins Block, Cincinnati, O., is our accredited representative for Cincinnati, O., Louisville, Ky., and vicinity.

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MR. RICHARD P. ROTHWELL has returned from Europe. All personal communications should be addressed to this office.

THROUGH an oversight, we did the Judson Powder Company a serious injustice in stating that 29,000 *tons* of its powder had displaced 100,000 tons of rock in the great blast at the Glendon Iron Company's limestone quarries. It should have been 29,000 *pounds* of powder to 130,000 tons of rock. We must plead guilty to the error, and can only account for its passing undetected by the uneasiness which a fire in immediate proximity to our printing-rooms naturally created.

THROUGH a misunderstanding of the return in regard to the production of refined copper of the Quincy mine, Lake Superior, we have credited it with a greater yield than it has really made. We understood the figures sent us, 5,665,796 pounds, to be the yield for eleven months ending November 30th, and having at hand the amount of mineral produced in December, estimated the return of ingot copper on the same basis, thus reaching 6,500,000. In reality, as Mr. W. R. TODD, treasurer of the company, promptly informs us, this was for twelve months ending November 30th. He has kindly furnished us now with the actual product of the year 1882, since received, making it 5,682,663 pounds. This reduces the output of Lake copper, as given by our estimate last week, by 817,337 pounds, making it 56,590,446 pounds.

BOTH the Senate and the House of Representatives have at last reached the tariff bills, and the former has already got far enough to consider some of the most important parts of the metal schedule. The Senate resisted all efforts to place the duty on iron ore higher than 50 cents, which must have much grieved Senator MAHONE, who, by some curious process of reasoning, arrived at the conclusion that the "equitable, proportionate duty on iron ore would be at least $1.89 per ton," and for safety's sake, we presume, asked for $2 per ton. In reference to pyrites, a resolution was passed making the duty on all ores containing less than 3½ per cent of copper 50 cents, with an additional rate of 2½ cents per pound on the copper in all ores running higher than 3½ per cent—a provision which would make the copper in the bulk of the foreign pyrites used for sulphuric acid manufacture free.

The Senate has apparently very much hurt the feelings of the pig-iron men by adhering to the $6 per ton duty. Bessemer and open-hearth steel, ingots, blooms, and slabs have undergone a classification and partially also a reduction, a strong discrimination being made between the higher and the lower grades. For steel not exceeding in value two cents per pound, the duty is placed at 0·5 cent per pound ; for grades ranging in value between two and five cents per pound, one cent per pound. Steel rails weighing more than 25 pounds to the yard are to be made 0·7 per pound, or $15.68 per ton.

It remains to be seen what the result of the deliberations of the House of Representatives will be. Should it practically adhere to the report of its own committee, then it seems probable that a conference committee may be appointed to effect a compromise.

A POPULARLY SCIENTIFIC VIEW OF GOLD.

The *Popular Science Monthly* for February contains, together with the usual large and varied list of interesting and valuable articles in all branches of inquiry, a paper by F. VON BRIESEN, translated from the *Fortschritt der Zeit*, on "The Decrease of Gold," which we can not allow to pass without criticism. Both the high standard of accuracy to which this magazine aspires, and the high degree of excellence to which it has attained, render a lapse into crude and loose statements on its part peculiarly unfortunate. The general public is accustomed to accept what it finds in these pages as representing the present stage of scientific knowledge. We have usually found this confidence to be justified, and are consequently all the more surprised at the appearance under such auspices of the audaciously ignorant and absurd article to which we now refer.

Perhaps we can not demand of the editors of the *Popular Science Monthly* that they should be able to detect the blunders of authors in all lines of science. Yet in selecting materials for translation, they might assure themselves beforehand of the authority they thus appropriate. And, at all events, they are responsible for the accuracy and the English style of the translation. Now, the article in question was bad enough in the original : it has been ingeniously made worse by translation. The German amateur who concocted it can not be blamed for such statements as these : that platinum is only found "in excess" in the Ural Mountains ; that gold was "in excess" in ancient times ; or for the awkward and ungrammatical style appearing in every paragraph.

But these faults are cast into the shade by the astounding absurdities of the substance of the article. Beginning with the statement that gold and silver are the so-called precious metals, because they are rare, and that gold is rare because of its specific gravity, which has retained it mainly near the center of the earth, our author proceeds to inquire, "Whence the gold and platinum to be found on the surface of the earth?" We quote literally his reply :

"These two heavy metals are only found in places where volcanic rocks have penetrated through earlier formations, and the granite has split up. Platinum, only found in excess in the Ural Mountains, is obtained from rocks that have come up from below ; gold is found only in quartz veins. These veins have been formed in the following manner : As a natural consequence of the contraction of the earth's crust, internal revolutions, and volcanic eruptions, crevices opened, which were partly filled by hot springs, partly by eruptions with quartz. Rich deposits are often found in these crevices, called by the American miners 'pockets' or 'bonanzas ;' but besides these bonanzas, crevices contain no gold, and only the hope of encountering them leads to their being worked."

Of course, every body who knows any thing about the subject knows very well that platinum is nowhere "in excess ;" that it is nowhere obtained from rocks, but everywhere from alluvium ; that no connection can be traced between volcanoes and the occurrence of either gold or platinum ; that eruptions of quartz are not known ; and that the majority of quartz-veins worked for gold contain it disseminated through the quartz, and not merely in pockets.

But although we have just been told that gold occurs only in quartz veins, we are now informed that

"The places in which gold is found may be divided into the following three classes—auriferous ore, auriferous veins, and auriferous alluvium. The first group contains ore, rich in magnesium, interspersed with gold. It is frequently found in the Ural Mountains. As a transition to the second class may be regarded the auriferous minerals, in rock of volcanic origin, as it occurs on the west coast of South America and in many parts of Brazil. The granite of the Erzgebirge in Bohemia, which contains tin, is a similar formation. Interesting as this class is, it is of little practical value to the gold miner."

We should say it was of value to nobody but the practical joker. The "ore, rich in magnesium, interspersed with gold," which is frequently found in the Urals, must be a humorous name for the occurrence of gold-bearing quartz (in the Urals and in a hundred other regions) in magnesian slates. And the auriferous minerals in volcanic rock, occur-

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ring in South America and Brazil, and resembling stanniferous granite, is doubtless a humorous name for nothing at all. The gold of Peru, Venezuela, and Brazil is found either in alluvium or with quartz inclosed in crystalline schists, and resembles the tin-deposits of the Erzgebirge in one point only—that neither formation is volcanic.

So much for the class of "auriferous ores." Under the next head, "auriferous veins," we are told that

"In the older volcanic veins, the gold is not mixed with silver, and bonanzas are never found in them. In many of these veins, also, granite veins are encountered, and, although remote from volcanic regions, it is presumed that the gold was carried up by the granite. The celebrated 'Mother Lode' of California is a sample of this kind."

Farther on, we learn that

"The entire ridge of the Sierra Nevada consists of granite; but on the western slope, limestone is mixed with it. Where these two rocks come together, a belt from eight to nine miles wide, and running from north to south, is found, which contains all the gold leads of the district."

Of all the theories concerning the "Mother Lode" that human ingenuity has produced, this is the first that has classified that formation of quartz in slates as a contact vein between granite and limestone, into which the gold was carried up by the granite. But the account of the Comstock lode is not less original:

"The largest of these bonanzas is the Gold Hill mine, which lies 700 feet deep, and several companies have commenced to work this rich vein. The most important, the Virginia Consolidated, has sunk a shaft 1600 feet deep, and driven a tunnel of 20,000 feet in length through the side of the mountain, projected by Engineer Sutro, so as to work the lead from underneath. But it is, perhaps, too late, because results have not kept pace with expectations; besides this, the heat below the shaft is so great that work is almost impossible."

It is bad enough that Germans should have such stuff as this put upon them as history; but it is too much to ask the American public to accept second-hand idiocy of that kind. This penny-a-liner knows neither the facts nor the literature of his subject. His pretense to consider it "in its scientific bearing" is the only thing which can exceed for impudence his pretense to give its statistics. He has not even known where to go with his scissors. To serve up such hash as "popular science" would be a disgrace to any magazine; the discovery of such a blunder must be doubly mortifying to the editors of this excellent periodical; and we trust the sharp lesson will not be lost upon them.

REVIEW OF THE IRON MARKETS IN 1882.

The year 1882 has been an eventful one to the iron trade in many departments, but was far from being as prosperous as the year preceding it. The demand for finished iron and steel was not as heavy, and in all branches the course of the markets was downward, although, as a glance at our tables of weekly range of prices will show, the decline was very marked in a few cases only. In crude and finished iron, the long strike in the West stayed the downward tendency for a while; but it is a significant fact that, excepting nails, the long suspension did not produce any scarcity or have a lasting effect in holding up values. It may well be questioned whether we could stand to-day where we are had it not been for the rash attempt of the men to secure an increase in wages in the face of circumstances so unfavorable to their wishes. The course of the markets since their defeat clearly indicates that, even after an enforced curtailment in the production in the most important section in the country for nearly four months, the output of finished iron is slightly in excess of current requirements, and makers' stocks, that had probably run pretty low, are again rapidly replenishing.

The only figures which we possess to fall back upon in illustrating a rise or decline in the demand for iron and steel are the fairly accurate returns published by special journals concerning the mileage of new railroads built during the year. Even this can only furnish a vague idea, because the demand for the equipment, permanent way, and rolling stock for new roads is only a part of the quantity for which the railroads of the country call upon the iron and steel works. Like new construction, renewals fluctuate from year to year, and periods of activity in the former do not by any means coincide with those of a large demand for the latter purpose. It is even possible that relation between the quantities of metal required for new roads and for renewal of old track and equipment will change very materially during the next few years. The tendency of late is to load cars more and more heavily, and to substitute iron for wood more and more in car construction. The result will be, that tracks formerly strong enough to carry their loads will be rapidly battered to pieces, iron rails will require replacement by steel at a rapidly growing rate, wooden bridges will have to give way to iron or steel, and for the time being greater quantities of metal will go into cars.

It will be understood, therefore, that while, apparently, the railroads may be falling off as consumers, if their importance as such is judged by the reports of construction of new roads, they may be really taking largely increased quantities of metal. Such reports furnish valuable hints; but their significance should not be overrated, nor should any conclusions be drawn from them without due appreciation of the fact that they may be very materially modified by special circumstances. During the year 1882, 10,000 miles of new main track were laid, against 9358 miles in 1881, and of the present total of 114,000 miles, probably one half only is steel. While, therefore, the rate of building was as great in 1882 as in 1881, the supplies purchased were probably less, much of the demand having been anticipated. During the present year, there will in all likelihood be a falling off, though it will not be very serious, judging from the large number of projects now carrying out by strong parties.

The great event in the iron trade during the year was the long struggle between the Western rolling-mill owners and their men. After a number of conferences in May, the former refused to accede to the demand of the latter for an increase in the scale of from $5.50 to $6 for puddling on the basis of the 2·5 cent card rate. During June, a few small mills went in at the advance; but the great body of the Wheeling, Pittsburg, and Ohio mills formed a strong alliance, and remained firm during June, July, and August. In the beginning of September, the puddlers, under pressure of the men in the rolling and finishing departments, offered to accept $5.75 as a compromise; and when that was promptly rejected, they found themselves practically deserted by their fellow-workmen, and one by one the mills started up during the last weeks of September.

While the labor questions were thus agitating the iron trade, another great problem loomed up, which has since constantly occupied the minds of those engaged in the trade, and which, according to all appearances, will not reach a settlement for some time to come. The question of a revision of the tariff has found the iron and steel trades firmly united, all evidences of dissensions in the ranks having been promptly dealt with. We have not agreed with the policy pursued, and have frankly said so.

The imports of iron and steel continued very heavy during the year 1882. Official figures have been brought up only for the first ten months of the year, and are as follows:

IMPORTS FOR TEN MONTHS.

	1882.	1881.
Pig-iron, net tons	520,163	463,213
Castings, " "	1,953	396
Bar-iron, " "	68,755	32,591
Band, hoop, and scroll, net tons	5,146	736
Iron rails, " "	40,686	122,246
Sheet-iron, " "	11,098	5,350
Old scrap, " "	131,425	111,774
Anchors, cables, etc., " "	1,319	1,288
Steel rails, " "	163,178	204,437
Steel ingots, bars, sheets, and wire	$11,267,821	$7,983,893

The following returns of the British Board of Trade of the exports of iron and steel from Great Britain to this country during the year 1882 has just been received. They show some remarkable fluctuations, and are particularly valuable because they give figures on steel. It must be remembered, however, that "unwrought steel" includes both ingots and wire rods. The former have declined, while the latter have probably increased heavily. Though a decrease in the quantities is given above, the value has grown enormously, as our own import lists show:

BRITISH EXPORTS TO THE UNITED STATES.

	1880.	1881.	1882.
Pig-iron, gross tons	614,005	394,934	487,697
Old iron for re-manufacture, gross tons	197,653	99,859	94,710
Steel, unwrought, " "	44,066	135,268	131,177
Tin plates, " "	164,167	179,843	214,552
Hoops and sheets, " "	45,237	36,162	37,220
Bar, angle, bolt, and rod, " "	51,413	18,858	22,255
Railroad iron, including steel and iron rails	221,131	292,617	198,278

American Pig.—Mr. James M. Swank, Secretary of the American Iron and Steel Association, estimates the production in 1882 at less than 1881, but as yet we have no data to form a definite opinion concerning the output. It is likely that the decrease will be found to be heaviest in those sections directly affected by the strike, while in other districts, notably those of the South, a marked increase will be found to have taken place.

The year opened actively in Eastern markets, large contracts in Foundry grades being closed during January and a disposition was manifested to carry prices upward. For Forge, quite a Western demand sprang up, which continued far into February, after the booking in Foundry had caused a relapse to quietude in those grades. March was quiet, there being occasional sales at steady figures, until a strike of the molders in the Troy foundries occasioned more uneasiness and led to a weakening of the market. April opened dull, with buyers assuming an expectant attitude and the makers of standard brands showing no disposition to make concessions. During this and the following month, consumers strictly followed the policy of buying from hand to mouth, encouraged by the fact that occasionally lots of less well-known brands were forced on the market. During May, there was considerable activity in foreign Bessemer iron, and large transactions were closed at declining prices with free offerings for future delivery. In June, the market for Foundry seemed to be getting into better shape, and large lots were taken, makers inclining to hold for better prices. Toward the end of the month, however, there were indications of accumulations on the Schuylkill. July opened quiet but firm, makers of choice and standard brands showing no anxiety to sell, while leading consumers held that the strength of the market was abnormal. During the month, a growing scarcity was developed in the better brands, and in many cases buyers had to fall back on brands lower in grade, thus improving the market for the latter. Gray Forge stiffened a little temporarily, and Bessemer pig recorded large transactions at lower figures. In August, No. 2 became more abundant, and there were round sales of mill irons. Makers continued firm, and the demand was encouraging. In September, consumers of inferior brands and forge irons showed a tendency to hold off; and in October, evidences of an over-supply in the West caused the market to weaken, and a downward tendency developed. Meanwhile, the scarcity of the best brands of foundry irons continued, and producers had no difficulty in marketing any available supplies at full figures. A greater disposition among makers in November to take orders led to greater activity temporarily; but the continued cry on the part of consumers for further concessions checked business, and, for a time, little was done. At the close of the month, and during December, greater weakness was displayed, and, although the deliveries on old contracts were heavy, future engagements were light. Buyers and makers maintained an expectant attitude, and inferior brands, at the close of the year, were pressing on the market.

Foreign Pig.—The trade statistics, just at hand from England, are encouraging, particularly so far as the situation in Scotland is concerned. The following figures of the official statistics of Scotch pig-iron will show this:

Stocks, end 1881	940,000		end. 1880		739,000
Production, 1882	1,126,000		1881	1,176,000	
	2,066,000				1,915,000
Consumption, 1882:				1881.	
Foundries	288,000			180,000	
Mill and steel works	297,000			217,000	
Foreign exports	432,175			356,115	
Coastwise "	184,021			103,414	
Rail "	28,804	1,230,000		28,471	975,000
Stocks, end 1882		836,000	Stocks, 1881		940,000
Decrease during 1882		104,000	Increase, 1881		201,000

It will be noted that, while the production was a little less than in 1881,

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MONTHS.	AMERICAN PIG-IRON.			SCOTCH PIG-IRON.				RAILS.				WROUGHT.
	No. 1.	No. 2.	Forge.	Coltness.	Eglinton.	Glengarnock	Gartsherrie.	Iron.	Steel.	Old Ts.	Old D. Hs.	Scrap.
January	$26½@$28	$25 @$26	$23 @$25	$27 @$28½	$25 @$25½	$25½@$26	$25½@$27	$48 @$50	$57½@$60	$29 @$30½	$31 @$32	$31 @$32½
February	26 @ 27	25 @ 25½	22 @ 24	26¾@ 28½	23½@ 25½	25 @ 26½	25½@ 27	47 @ 50	55 @ 58	29 @ 31½	31 @ 32	30½@ 32½
March	25 @ 27	23 @ 25½	22 @ 24	25 @ 28½	23 @ 27	24½@ 26½	25½@ 27	47 @ 50	53½@ 58	29 @ 31½	30 @ 32	30½@ 32½
April	25 @ 25½	23 @ 24	22 @ 23	25 @ 26	22½@ 23½	24 @ 25	24¾@ 25½	46 @ 48	50 @ 55	27 @ 29	28 @ 30	27 @ 31½
May	24 @ 25	23 @ 22½	22½@ 21	25 @ 26½	22½@ 23	24 @ 24½	25 @ 25½	44 @ 47	50 @ 52	26 @ 27½	27 @ 28½	25½@ 28
June	24½@ 25	22½@ 23	21 @ 22	26 @ 27	22½@ 23½	24 @ 25	26 @	46 @ 48	47½@ 52	26 @ 26½	27 @ 27¾	25 @ 26
July	25 @ 20½	22½@ 24	21 @ 22½	26 @ 27½	23 @ 24	24 @ 25½	25½@ 26	45 @ 47	49 @ 50	26¼@ 27	27 @ 28½	25 @ 28
August	26 @ 27	23 @ 24½	21 @ 22	26½@ 27½	23 @ 24	24 @ 24¾	25½@ 26	....	45 @ 47	26½@ 27¼	28¾@ 30	28 @ 29
September	25½@ 26	23½@ 25	20½@ 22	26½@ 28	23 @ 24	24 @ 25	25½@ 26	....	43 @ 47	26½@ 27	29½@ 30½	28 @ 29½
October	25½@ 27	22 @ 25	20½@ 22	27½@ 28	23 @ 24	25 @ 25½	25 @ 26½	....	44 @ 46	26½@ 27½	29 @ 30	28 @ 28½
November	24½@ 27	22 @ 25	20 @ 22	26½@ 28	22 @ 23½	23 @ 25½	25 @ 26½	....	40 @ 45	26½@ 27½	29 @ 31	27 @ 27½
December	24½@ 27	22½@ 24	20 @ 21	26½@ 27	21½@ 22½	22¾@ 24	25½@ 26½	....	38½@ 40	24 @ 26½	27½@ 29	26¾@ 27½

the local consumption was considerably increased and that the foreign shipments were in a less degree heavier. We have not as yet any reports as to the distribution of the foreign shipments. From the Cumberland District, which supplies the bulk of foreign Bessemer pig coming to this country, we have the following figures :

Production 1882	1,606.500 tons
Stocks	175,650 "
Shipments :	
Coastwise	457,966
Foreign	311,036 769,002 "

From the great Cleveland District, we obtain directly only small quantities of pig, the shipments from Middlesborough in 1882 having been 8650 tons against 6150 tons in 1881. The Cleveland market, however, very greatly affects the Glasgow markets, the shipments from Middlesborough to Scotland being heavy, 253,258 tons in 1882 against 323,748 in 1881. The following are the returns of the Cleveland Iron-Masters' Association :

	Production in— 1882.	1881.
Ordinary Cleveland	1,772,239	1,998,824
Hematite	916,411	671,515
Total	2,688,650	2,670,339
Stocks, December 31st	266,179	378,170
Foreign shipments	506,636	430,261
Coastwise "	931,273	931,411

It will be seen that the make for Bessemer steel purposes has more than counterbalanced the falling-off in the production due to a long-continued policy of restriction. Notwithstanding this generally favorable aspect of the statistics, the market is not in a good condition, and this is attributed to "the system of over-selling to such an enormous extent as to overlap the combined legitimate and speculative requirements, thus deluging the market with fictitious quantities, and upsetting all calculations based upon supply and demand."

Under the stimulus of advancing freights and higher quotations in Glasgow, the market for Scotch pig opened firm and a fair business was done, reducing stocks to a low ebb. Freight, which proved to be a leading factor in the trade during the year, and which repeatedly turned in a surprising and unexpected way, rose as high as 22 shillings. In February, a decline took place abroad, but the continuance of high rates here prevented a corresponding decline in our market, having only the effect of rendering the trade very quiet during February. Under the pressure of odd lots seeking a market, a weakening tendency developed in March, which, with declining freights in April, brought about lower quotations in that month. These induced more liberal buying in May, and with higher rates a firmer trade developed toward the end of the month. There were less frequent offerings of pig by outside parties, and toward the middle of June a better inquiry caused the market to gain strength. Holders, encouraged by favorable advices from Glasgow and stiff freights, were firm during the greater part of July ; but toward the end of the month, there were gathering signs of weakness. These, coupled with a falling off in the demand, declining freights, and a receding market abroad, encouraged free offerings for future delivery at lower figures. The month closed with freights down to 7s. 6d. and a generally dull market, which, however, gained some strength in the beginning of September. In the middle of that month, there was a flurry in freights, which rose from 7s. 6d. to 10s. to 12s., and caused a stiffening on the part of holders. Buyers, however, held off in October, considering spot prices too high, and, notwithstanding higher quotations abroad and stiffening freight rates and the acknowledged fact of a limited spot supply, persistently pursued the policy of buying from hand to mouth. This state of affairs continued during the first half of November, when a tendency to greater ease was produced through forced sales of odd lots. December opened with a break in freights to 8 shillings, which was followed by a steady decline till the close of the year. Consumers, anticipating a decline, kept out of the market, buying only in a small way to cover immediate wants, while importers sent a part of the arrivals into store.

During the latter half of the year, the scarcity of the better grades of American foundry irons probably led to a much more extensive demand for Scotch pig than would have otherwise been developed. The volume of business was, therefore, fairly satisfactory, though the unexpected turns of the market were on the whole discouraging to any speculative movements.

Steel Rails.—The greatest share of attention, even far beyond the narrower circles of the interests directly concerned, has been devoted to steel rails. The condition of this industry has given rise to much sensational talk, and, as we have had occasion to point out from time to time, there has been a good deal of exaggeration as to its status. Ingenious theories have been developed, attributing curious motives to the leading parties in the trade, when the simple laws of supply and demand were quite sufficient to account for the heavy decline that has taken place. The market has not alone been forced to take the enormous output of our own mills, estimated by Mr. Swank at 1,500,000 gross tons, and the heavy quantities imported, but it has repeatedly been forced to absorb considerable quantities thrown on it by parties who had bought at former periods, and whose means were not sufficient to carry out the plans they had made. Buyers with great success held off until the anxiety of makers, who, for the first time for years found themselves without engagements for months in advance, led them into a wild scramble for business. It can not be denied that the position of consumers was very much strengthened by the long agitation over the tariff question, the Bessemer mills having tacitly accepted a heavy reduction in the duty. No one cared to contract far ahead for future delivery, so long as it was not certain whether a reduction in the duty of $10 per ton seemed very probable. The reduction has now been fully discounted, and steel rails stand low enough to prevent any importations, even if the duty is reduced, and rails should fall to £4 5s. in England, a figure which they have never reached until now. Our mills are quite able to take care of the demand, and, with prevailing prices, have fully conquered for themselves the entire market which formerly was held by iron rails, and by imported iron and steel rails. For some years to come, the demand is not likely to overwhelm them in the sudden manner which characterized the "boom period," and the scaling down of contract wages in proportion to the increased rapidity of work at our modern mills places them in a better position to-day to repel inroads than they were in a year ago.

The market for rails opened quietly with values ranging between $57½ @$60 at mill, according to section and time of delivery. These were rudely shaken by the closing of a contract of 21,000 tons during the latter part of the month at $55 at mill, and a weaker feeling prevailed. February passed by with some good sales at $57½, until it became known that a large lot was offered, it was said, for effect, by several hands as low as $54½. March passed quietly, with quotations nominally at $55@ $57; but April opened with another plunge to $53½@$55, due to apparently *bona-fide* re-sales of rails caused by the collapse of immature railroad enterprises. Small sales during the middle of the month were made at $52 @$53, when the closing of a large contract at $50 at mill again staggered the market, from which there was a slight reaction at the close, small sales being made at a range of $50@$53. In the second week of May, the market received another shock, by the closing of a 30,000 contract at $47,50, followed again by a somewhat longer period of quietude, filled with a series of small transactions through the month of June at figures ranging from $47.50@51, according to delivery. July was characterized only by small sales, there being quite an active demand for moderate-sized lots, at $49@$50 for prompt and $47@$48 for fall delivery. This state of affairs continued until the middle of August, when one lot of 20,000 tons was closed at $45 at mill. Again the market dragged along, until in the middle of September there were some heavy sales at $45@$46 for winter delivery, closely followed toward the end of the month by transactions aggregating fully 200,000 tons, here and in Philadelphia, which established the quotation at $43@$45. In October, the higher figure remained the basis of the sales of the small lots selling, but, in November, even these were obtainable at $43@$45, the West evidently leading the decline. At the end of the month, it became known that a 40,000-ton lot had been secured at $40, and rumors of lower figures even were numerous. The low prices stimulated inquiry, but there was still a good deal of uneasiness, which culminated in December in the sale of 40,000 tons of steel rails by a number of Eastern mills, at an equivalent at mill of $38.50@$40, quickly followed by additional sales of 100,000 tons at $39@$40. The bottom had been reached, and the fact that the majority of the mills were now fairly supplied with orders began to tell, the next sale of 60,000 tons being made at $40, from which figure the market has now slowly but steadily recovered to $42.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

LODES ON PLACER CLAIMS.

Secretary Teller has rendered the following important decision :

THE COMMISSIONER OF THE GENERAL LAND-OFFICE :

SIR : On the 11th inst., I dismissed the protest of Becker *et al.*, *vs.* J. P. Sears, respecting the issue of patent to the latter for his placer claim on Central City Mineral Entry No. 1790, Lot No. 302, Grass Valley and Ohio Mining District, Colorado. In so doing, I directed your attention to an alleged mistake in the survey, with respect to the relinquished "Soda lode," claimed by Becker, and instructed you to give it proper examination in passing upon the completeness of the final entry, before the issue of patent.

At the outset, Becker claimed this lode by virtue of an alleged location in 1861, defining it as 25 feet in width on each side of said vein or lode. By your order for hearing, dated August 13th, 1880, you required a certified copy of the location, and a diagram or plat showing the boundaries and extent, and its position relative to the survey of the placer claim. Instead of fairly complying with this, Becker filed a copy of what purported to be a copy of said original location, made June 4th, 1861, and recorded September 22d, 1873, calling for 25 feet surface ground on each side, together with an alleged re-location made September 16th, 1880, more than thirty days after your order, claiming by new lines and enlarging the surface ground to 75 feet on each side, and filed a diagram of the re-location only, without showing the boundaries of the original claim.

The testimony of the deputy surveyor shows that he did not follow the original location boundaries and monuments, but re-surveyed the vein according to his own notions of what would be a proper location, and fixed no permanent monuments or bounds to his survey on the ground,

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but merely set two temporary stakes at the north end, "to indicate the points for Mr. Becker to establish permanent monuments hereafter."

Sears objected to this attempted re-location, and demanded that the showing be confined and responsive to the order made by your office in the case, calling for the true limits of the claim originally located. After the hearing, and before your decision, he relinquished the Soda lode claim, referring to his relinquishment to the survey No. 361, which number was given to the diagram filed by Becker, but which does not appear to have been approved by the surveyor-general as a survey of a claim. This number, however, appears to have properly belonged to the original survey made in 1873, filed as an advance claim in the case of the Montague placer claim, with which the Soda lode location conflicted, said survey being but fifty feet in width, and which the present diagram, as already shown, fails to show. Sears claims that it was this proper original survey of the Soda lode location which he intended to describe in his relinquishment; and you find, upon the examination that, as the re-location was entirely illegal, the exclusion of twenty-five feet only on each side of the vein or lode can be insisted upon. The attorneys for Becker ask, by letter of 17th instant, that your decision of 13th instant to this effect be submitted to me for final determination; but instead of basing any claim upon the relinquishment, they take issue with all the antecedent adjudications, and flatly deny the right of Sears to any portion of the placer claim. On the 18th, you submitted the papers accordingly. On the 18th, they also filed notice of their intention to ask for a review of my action of the 11th instant, dismissing the protest; and on the 20th, instead of filing such motion, they ask that the case be referred to the Attorney-General on certain interrogatories assumed by them to be vital, but which were held by me to lie beyond the necessity for consideration with reference to the case as it now stands. The relinquishment was in terms made by the attorney for Sears, October 21st, 1881, "to the end that the applicant for patent may be no longer delayed in securing title." It has never been accepted by Becker, who has persisted in opposing the whole claim up to the present time, and now, in support of his suggestion for a correction, fails to adduce any argument in support of his understanding of the instrument, but, on the contrary, renews his efforts to obtain a reopening of the whole matter. Appearing as a mere protestant he has not, in my opinion, such standing as will entitle him to claim any thing in the case, and can not rely upon mere technicalities; nor can he insist upon the enforcement of a relinquishment offered upon such conditions, even though it clearly covered, as in my judgment it does not, the spurious and unauthorized survey and re-location. He is estopped by his own failure to observe them.

But the law, Section 2333, Revised Statutes, clearly, in my opinion, carves out from a patent to a placer claim all known lodes found thereon at date of application, together with twenty-five feet of surface ground on each side as an incident thereto. As this was a known lode, however insignificant in value, and was not claimed by Sears in the manner provided by law, and is now at his request excluded from his final plat of survey, it necessarily forms no part of his claim. The residue, under your decision, may properly be patented to him, and I decline further to consider the objections raised by the protestants in the case.

Very respectfully, H. M. TELLER, Secretary.

NEW PUBLICATIONS.

SECOND REPORT OF THE STATE MINERALOGIST OF CALIFORNIA. *From December 1, 1880, to October 1, 1882.* *By* HENRY G. HANKS. Sacramento, Cal.: State Printing-Office.

With commendable industry, Mr. Henry G. Hanks, State Geologist of California, has gathered a mass of valuable and interesting data in his second report just issued. As a book-maker, Mr. Hanks does not reach the highest standard, to judge from the report before us. There is a neglect in classifying, in avoiding repetition which, while not detracting from the intrinsic value of the work, makes it less handy than it would be if it due attention were also paid to such an important consideration. Mr. Hanks has made a double volume of it, one part, containing 288 pages, being presumably entirely compiled by himself; while the second, very nearly as large, is termed an appendix, and contains five essays, by different authors, on a variety of subjects. It so happens that Mr. Hanks has written nearly 90 pages on placer and hydraulic mining in the body of his work, while in the appendix we find another short paper by Mr. F. W. Robinson on hydraulic mining, and another by Dr. Henry Degroot on hydraulic and drift mining. We readily concede that it is of the greatest interest to have the observations and experiences of three different authorities on a subject so worthy of elaborate treatment; but we do not understand why they could not be grouped together, or, better still, be brought into one paper, thus avoiding much repetition. We fully value the essays submitted; but we believe that they could have been more effective and useful in a somewhat different form. Mr. Hanks quotes very largely from Bowie, from Hendy and others, and a considerable part of his work seems to have been to furnish the connecting links for his scraps. He would have done better to assume that Mr. Bowie's paper was familiar to all, or if not, that it was accessible to every one interested in the subject whose duty it would be to study it carefully.

There is much material in Mr. Hanks's own writings which is evidently the result of careful observation, and he has made some original investigations. He has, besides, gathered with considerable industry and some skill data relating to the metal gold, its history, chemistry, the localities in which it is found, and the production. He reproduces the census figures without a word of comment.

Mr. Hanks also gives an account on the occurrence of iron ores in California, and a popular account of the works of the California Iron and Steel Company, which betrays his want of familarity with this branch of metallurgy. He has, furthermore, short papers on lumber and fuel, salt and its manufacture, mud volcanoes, diamonds, mica, roscoelite, vivianite, and diatomaceous earths.

In the appendix, we have first the two papers on hydraulic mining already alluded to. That of Mr. Robinson is a somewhat fragmentary series of reflections on questions affecting the mining of gold, and contains many suggestive points. A more elaborate paper is that by Dr. Degroot on hydraulic and drift mining, the second part being the most interesting and valuable. Mr. Melville Attwood, who is well known on the Pacific coast as a writer on gold milling, contributes one of his characteristic papers, which will command attention, although his conclusions may not be accepted as final. Prof. William P. Blake has a series of notes on the minerals and the geology of California, which are gathered for some unaccountable reason under the title of Rare Minerals recently Found in the State. The longest paper in the appendix is that by Dr. A. Kellogg on the forest trees of California. We are not sufficiently familiar with the subject to judge of its accuracy. We are impressed with the care with which it is evidently written, and feel convinced that the details given will be fully appreciated by those who are engaged in mining in California.

AMERICAN FOUNDRY PRACTICE. *By* THOMAS D. WEST. New York: John Wiley & Sons. 1882.

Fortunately the number of works written by men who have grown up in a trade, have gone through its trials, and have spent a lifetime in overcoming its difficulties, are becoming more and more numerous. They give the beginner aid and furnish him with valuable information on points which have never perplexed the polished writer of a text-book. Mr. West, who modestly styles himself "a practical iron molder and foundry foreman," wrote, we believe, a series of articles on molding and foundry practice for the *American Machinist*, and these have now been gathered in an enlarged and revised form in the volume before us. It is a book written and intended for the mechanic, a task for which Mr. West seems well qualified. It abounds in good common sense, and even Mr. West's attempts at the jocular and his occasionally severely didactic tone will be fully appreciated. He is not always happy in his explanations or his descriptions, but that defect is less annoying because the work abounds in good illustrations which materially aid in following him. So far as the detailed description and practical hints about green sand, dry sand, and loam moulding are concerned, Mr. West's is the best and most complete we have seen. The elaborate English, French, and German works on foundry practice which we possess deal more exclusively, unjustly so, on questions relating to the construction of cupolas, melting of iron, etc. The work of the molder, the skilled mechanic, has never yet received so full a presentation, and Mr. West's book fills a gap which will make it exceedingly serviceable to every engineer and founder. They will be glad to overlook Mr. West's manner and the lack of system and order in his work for the value which the practical information it contains possesses. The book is well and clearly printed and well equipped.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

Coal-Tipping Cage.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you please give me the name of the patentee of the coal-tipping cage illustrated in the ENGINEERING AND MINING JOURNAL of December 30th, 1882, pages 346 and 347? I intend to put it in, if practical.

WENONA, ILL., Jan. 18. L. J. H.

The design illustrated is not, to our knowledge, patented, and we believe that our correspondent is at liberty to use it, if it suits his case.

The Cranston Hydraulic Elevator.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you kindly inform me where I can get facts about the Cranston Hydraulic Elevator for placer mining, or of any other new inventions or machines used for a similar purpose; that is, for working placers of small grade, or having insufficient dump? I should like to get descriptive circulars, price-list, etc., of such machinery, and do not know where to apply for the information except to you. S. E. J., Box 2062.

BOSTON, Jan. 22.

Since Mr. Bowie's classic paper on hydraulic mining, the most elaborate account of the methods and machinery has been printed in the annual report, just issued, of the State Mineralogist of California, Mr. Henry G. Hanks. For circulars, price-lists, etc., address Joshua Hendy, Nos. 49 and 51 Fremont street, San Francisco, Cal.

A Warning.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Please caution the mining public against the arts of John Sidney Crawford, who will probably endeavor to place the Arroyo Grande tin mines, which he states are in Mexico, 300 miles southwest of Chihuahua. His specimens are alluring, his essay on tin engaging, and his speech seductive. He may offer one sixth of the mines for $5000 cash, with the understanding that there is no occasion to examine the property, owing to its great distance from market. JOHN W. BERKS.

ALBUQUERQUE, N. M., Dec. 6, 1882.

LAKE SUPERIOR IRON MINING INTERESTS.

Special Correspondence of the Engineering and Mining Journal.

The flurry in iron which contracted and darkened the horizon of Lake Superior producers from the beginning of November to the close of the old year has at least so far passed over our heads as to give us a clearer and wider outlook for future operations. As a rather unusual coincidence, the famous placing of orders for rails at $40 per ton at Scranton, and the ominous prophecies among furnace-men and steel-makers which immediately followed, were simultaneous with the reduction, for the winter, of the working force at the Chapin, Columbia, Jim Pascoe, Dalliba, and many other mines. The venerable Saginaw had petered out and closed down a few days before; the New York agent had made a hiatus of hoisting, to complete repairs of various sorts; the Mitchell engine-house burned to the ground a few days later, causing an entire stoppage of the pumps and hoisting-engine; and, treading on the heels of this calamity, came peremptory orders from the owner of the Goodrich mine to close down until further notice. One would have to be less mercurial and more sanguine than the average mining lessee, who, under the circumstances, did not find his

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spirits working down rapidly toward his boots; and as for the miners, in locations where the stoppage had occurred, there was often not only distress but despair. In general, however, a much more buoyant spirit now prevails among both owners and operators. The Winthrop management has secured the lease of the Mitchell property, and has trained pipes from its boilers to the pumps of the mine, and is now working at high pressure, although the wages are at "half-pay." If there be a reasonable market, this mine, with its 25,000 tons of ore already in sight, can furnish an output next season approximating 60,000 tons. Captain Henry Davis has started up the Goodrich again, though with a curtailed force and none too sanguine hopes. In fact, all the mines of any account at all are now accumulating stock-piles with as great energy as ever before at this season of the year. The piles at the Cleveland, Lake Superior, Republic, and larger Menominee properties are already something formidable. And yet they are a few disturbing elements in the problem which cause uneasiness to those whose fortunes hang upon the die of a lively and profitable market. There is yet an enormous amount of unsold ore on the docks of various Erie ports, 500,000 tons awaiting purchasers in the harbor of Cleveland alone. Nor do there seem to be any very tangible tokens of a revival of demand for non-Bessemer material; as far as your correspondent can learn, no boats have been chartered by second-class producers, nor has he yet learned of any extensive order being placed for these ores here; on the contrary, he does know of several unsuccessful efforts to find buyers of ores of this class.

Another disturbing element is the depleted treasuries of second-class mines which depended upon ready sales for funds to meet current expenses, and which have been unable to find buyers. One of these, which bit off more than it could chew, now has an enormous unsold stock-pile in Cleveland, and a bankrupt treasury at the mine. To go ahead, therefore, this product must be sold for what it will bring, and the bidding of it may for the nonce disorganize the market to the great disadvantage of owners in this district. However, these and all other contingencies make against the non-Bessemer ores alone, and the first-class mines—and in these is the great bulk of mining capital locked up—will find a market, though undoubtedly at lower prices (the Republic $1 per ton less) for all they can possibly unload into the insatiable maw of the Eastern furnaces.

There is one phase of mining journalism which often excites surprise among the readers of this district; I refer to the silence with which the iron industry is treated when discussing the relative profit of mining the various metals—gold, silver, copper, quicksilver, lead, and nickel (the last named of which has paid but $10,000 dividends, as far as can be ascertained, in its whole history); while the remunerativeness of iron is passed over in silence, if not in contempt. And yet probably no industry not excepting coals, in America, is worked on so large a scale or with such an aggregate profit as iron. The dividends paid by the copper mines of Michigan were greater by $800,000, in round figures, than the entire dividends paid in any other State in the Union; but the dividends from the iron mines of this peninsula were undoubtedly greater than this by nearly one quarter, yielding, on the gross value of the output for 1882, $24,300,000, dividends approximating 12½ per cent, or about $3,000,000. This makes the proud record of giving as the net value of mining in Michigan during the year 1882 not far from $6,000,000. I am constrained to write here for the consolation of investors who have put their pin-money in the bauble schemes of other El Dorados, and who may visit this favored spot with a view to investment, the motto of our State, *Si quæris amœnam peninsulam, circumspice.* I had thought to write at some length on the recent movement of our individual mines, especially those copper ones which are listed among the stocks of the New York and Boston boards; but having fought thus far, will run away, in hopes to write some other day.

SPECULAR.

MARQUETTE, MICH., Jan. 20th.

HOT-BLAST STOVES AT THE EDGAR THOMSON FURNACES, D AND E.*

By Julian Kennedy, Braddock, Pa

When it was decided to erect these furnaces, the company also decided to use the Cowper type of stoves. It was, however, desirable to improve upon the plan of the stoves then in operation, to avoid, if possible, some defects which had shown themselves in them. The stoves now in use at furnaces A, B, and C are of the well-known type of Cowper stove, having a circular combustion-chamber placed at one side of the stove, and a regenerator with crescent-shaped section resting at the bottom on cast-iron gratings, which are supported in turn by cast-iron girders, the products of combustion passing up the chamber, down through the flues of the regenerator, and thence to the chimney.

The objection to this shape of stove, that the gases would not pass down the parts of the regenerator lying beside and behind the combustion-chamber—the horns of the crescent, as it were—did not apply to the newer form of stoves, with combustion-chamber having a straight wall next to the regenerator; but there were other defects, the principal ones being the small size of the openings through the regenerator and the material used for supporting it. The small passages (4 inches × 4 inches) soon choked up; and when a part of them became entirely closed, not only was the effective heating surface greatly diminished, but, as the remaining openings were not sufficient to absorb the heat fast enough, the products of combustion reached the bottom of the regenerator at too high a temperature, and caused the cast-iron gratings to crack and warp. The openings being very small and somewhat irregular, from the fact that they were built of tiles set on edge, and each course free to get out of vertical alignment with the preceding one, it was very hard to clean them when choked, it being very often impossible to pass a chain through them without first driving through gas-pipe, the pipe being screwed together in short pieces as fast as driven down.

After careful consideration, I decided, first, to adopt six inches as the smallest admissible size of openings; secondly, to abandon cast-iron supports for the regenerator; thirdly, to use only one pass through the regenerator; fourthly, to discharge gases from stoves and boilers into one common chimney; fifthly, to use round instead of square openings through the regenerator.

It is, of course, desirable not to make openings any larger than is necessary, as the heating surface is reduced by so doing. In fact, our new stoves, 21 feet × 72 feet 6 inches, with 6-inch openings, will have a little less heating surface in the regenerator than the old stoves, 20 feet × 56 feet, with 4-inch × 4-inch openings. I have no doubt, however, that the effective heating surface, after a few weeks' running, will be very much greater in the new stoves. One pass through the regenerator is better than three or more, provided the flues can be kept clean and the hot gases distributed evenly among them, for the reason that a larger area of openings is given and friction reduced, enabling more gas to be burned with a given chimney draught.

When the hot gases pass through a multiflue regenerator from top to bottom, the tendency is to even distribution, as, if one flue gets more than its share, it becomes hotter than the others, and so has more of an upward draught, which tends to crowd the gases down the other and cooler flues. For the same reason, the cold air entering the regenerator at the bottom has a tendency to ascend the hottest flues, so that when being heated and when being cooled the operation goes on very uniformly all over the regenerator. With openings large enough, even a very wide regenerator will work with the greatest uniformity, unless the passages to the chimney are badly proportioned, so as to allow the gases from one part of the regenerator to reach the chimney much easier than those from other parts.

The gases being discharged into the chimney at a temperature of 350 degrees Fahr., the draught is not very strong; but by also discharging the gases from boilers into the same chimney, we get say 40 per cent, at 350 degrees, and 60 per cent at about 700 degrees, which gives us a chimney temperature of say 520 degrees, thus greatly increasing the draught of the stoves. The boiler-draught is somewhat diminished, but this does not matter, as a draught strong enough for the stoves is far more than ample for the boilers.

Any one examining a dirty regenerator, with ordinary square openings, will observe that the most of the dirt accumulates in the corners. By making the openings round, we get rid of the corners, and I feel confident that much less dirt will accumulate in the flues.

The stoves as built at furnaces D and E are shown in the sketch. The regenerator brick are hexagonal in section, ten inches across, and have holes six inches in diameter through them. In building we use, for first course, a row six inches deep, then one three inches deep, etc. We then use six-inch brick all through, until we reach the top, when the work is leveled up by using three-inch brick in every alternate row. By this means, the joints between courses are broken and the openings kept perfectly true and straight from top to bottom. The regenerator is carried on fire-brick entirely, no castings being used. The chimney is 16 feet in diameter, inside, for 40 feet up; then it tapers in to 15 feet, which diameter it retains to the top. The hight from the point of entrance of the boiler-flue to the top is 235 feet.

From the bottom of the chimney, nine-inch partition-walls run up about thirty feet, giving nearly one quarter of chimney to each battery of three stoves, and little over one half to the boilers. From the top of these walls, the gases, of course, have one common flue.

DISCUSSION

MR. JOHN M. HARTMAN: When the Edgar Thomson Steel-Works gave our firm orders to prepare the plans and specifications of the two twenty-foot furnaces, B and C, they directed us to follow the designs of the Lucy furnaces, at Pittsburg, but allowed us to make any changes that would increase the output within certain limits. The largest volume of air blown in any twenty-foot furnace up to that time was 15,500 cubic feet per minute. The B furnace was designed to use 18,500 feet of air per minute, and the stoves contained 92,000 square feet of heating surface. After starting the A furnace and finding that the volume of blast used was greater than that originally intended, it was decided to increase the C stoves to 100,000 square feet of surface and use 20,000 feet of air, the B stoves having been finished by this time. After blowing in B furnace, Mr. Kennedy found he could blow more than originally intended, and increased the volume up to 28,000 feet for maximum, which would require 140,000 square feet of surface. In spite of this excess of air, the 92,000 feet of surface maintained 1050 degrees in the blast.

When C furnace was in full operation, Mr. Kennedy used 30,000 feet of air per minute, and maintained 1050 degrees with the escaping gas at chimney 350 degrees.

To heat this enormous volume of air, Mr. Kennedy was obliged to force the stoves with gas. As all the valves, regenerators, and chimneys were proportioned for 20,000 feet of air, it required constant care to use the large volume of gas properly. This will explain the trouble he speaks of. The two new twenty-foot furnaces, D and E, and that Mr. Kennedy is now building, have larger stoves, with better regenerators and chimneys, and I look forward to a production of 1500 tons weekly from each furnace.

NOTE.—November, 1882. The D furnaces have since produced 1825 tons.

Analyses of Canadian Phosphates.—We are indebted to Messrs. Camm, Kraft & Co., of Philadelphia, for the following analyses of Canadian phosphates. The first was made by I. Baker Edwards, of an average sample of a cargo sent to London from the Summit mines, Portland East, Ottawa County, Quebec:

	Per cent.
Phosphoric anhydride	38·75
Tricalcic phosphate	84·60
Calcite and other lime salts	9·50
Insoluble silicates	0·85

The following are analyses by J. Coupé, Paris, from the same mines, from three separate veins:

	Green Phosphate	Greenish-Red Phosphate.	Reddish-Gray Phosphate.
Phosphoric acid	40·896	41·407	40·129
Silicates	0·600	0·750	3·000
Peroxide of iron	1·900	1·050	1·589
Lime	48·384	48·988	47·476
Fluor	4·005	3·852	3·559
Calcium	4·215	4·003	3.747
Total	100·000	100·000	99·500
Phosphate of lime	89·153	90·267	87·481

* Read before the American Institute of Mining Engineers.

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SILVER MILLING AT CHARLESTON, ARIZONA.*

By W. Lawrence Austin, Ph.D.

Most of the mills working the ores of the Tombstone District are distributed along the line of the San Pedro River, at an average distance of ten miles from the mines at Tombstone.

The works at Charleston, of which I am manager, are the property of the Tombstone Mill and Mining Company, and are under the general supervision of Prof. John A. Church.

These mills were originally intended for dry crushing, and were provided with rotary driers, automatic roasters, and all the necessary paraphernalia for a chloridizing roasting, as it was expected that the ore would become base as depth was obtained in the mines. But, contrary to expectation, the deposits retained their free milling qualities as they went down, and the furnaces were never brought into requisition. Upon ascertaining the true character of the ore under treatment, it was decided to change the batteries to "wet crushers," in order to increase their capacity, which alterations injured the symmetry of the plant, and left it working at some disadvantage over what might have been had such a change been foreseen in the original designs.

The smaller of these mills (the Pioneer mill of the district) was originally built by the company as an experiment, and constructed with an eye to economy; a wise precaution, as many have learned to their cost who have anticipated developments in their mines by the construction of expensive reduction-works. This mill was originally fitted with ten stamps, four pans, and two settlers, and run by a Leffel turbine, water being brought in a ditch from a dam about one mile up the river. Later, in order to increase the capacity, five stamps, two pans, and a settler were added. To run this additional plant up to the necessary speed required more power than the turbine could furnish, so an engine was purchased as an auxiliary. The second and larger mill was subsequently acquired by the company. As both mills run on ore from the same mines and the processes are identical, a sketch of one mill will suffice for both.

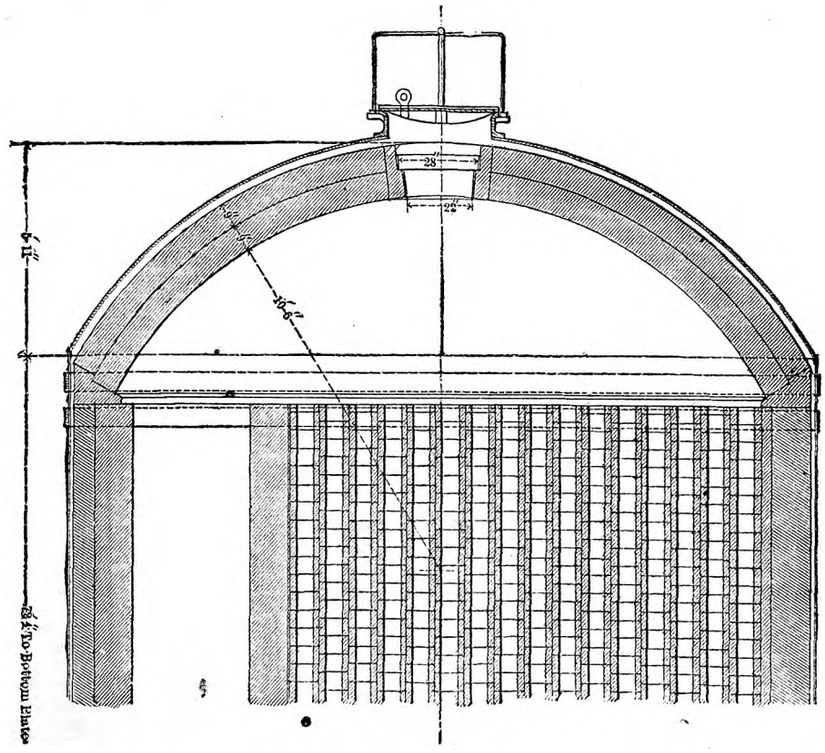
It is to be regretted that, owing to the separation of the mills, consequent doubling of the pay-roll, and increased expenses from every source, the cost of milling given below will be scarcely a guide to what could be done with a properly arranged plant. I do not hesitate to say that, with altered conditions, a reduction of 20 per cent per ton in the cost of ore milled could be effected, the quality of the work remaining the same.

In the following hasty sketch, reference is had to the larger mill alone. The power is furnished by a horizontal engine with Corliss bed and Meyers patent cut-off, making 70 strokes per minute. The cylinder is 16 inches × 36 inches. This engine runs with remarkable smoothness, and is not shut down more than once in sixty days, and then only to afford an opportunity for cleaning out the boilers, in which, owing to the water used, a scale rapidly collects. These latter are tubular, 54 inches × 16 inches, and carry steam from 90 to 100 pounds pressure. Farciot's patent pump and heater feeds them, pumping the water in at boiling-point. They consume on an average seven cords of mixed wood per day, costing $9 per cord; black oak, white oak, willow, and pine being used indiscriminately. All the water for the mill is pumped a vertical hight of 100 feet by a No. 5 Knowles steam-pump, placed 200 yards from the mill, which readily supplies more than is consumed. Steam is carried to this pump from the mill boilers. The ore is brought down from the mines, a distance of ten miles, in wagons. These wagons are connected in pairs, weighing about 5 tons; they carry 14 tons of ore between them, and are drawn by sixteen mules. This hauling is done by contractors at $8 per ton. The bottoms of these wagons consist of a series of pieces of plank, 6 inches × 2 inches, laid crosswise, their ends resting on the framework of the wagon-bed, so that, when removed one at a time, they allow the ore to drop out, and permit a rapid and easy unloading. It requires on an average twenty minutes to unload a pair of wagons constructed on this plan, and, as they are filled at the mines from self-discharging chutes, the driver has little labor in loading and unloading.

The ore is wheeled in barrows from the dump to the crusher, through which it all, coarse and fine, passes, no screens being provided. One of Hendy's breakers is used. The bottoms of the chutes leading from the breaker to the bins are, for a distance of 5 feet, made of ½-inch steel bars set ⅜ of an inch apart, allowing all the finer materials to fall through on to a shaking-screen hung below. This shaker is provided with the same screens that are used in the batteries, and separates that portion of the ore already sufficiently fine not to need crushing, which is sent directly to the pans. This relieves the batteries materially, and decreases the amount of "slimes." By this simple contrivance, the capacity of the mill was increased 5 per cent, or more, the amount depending on the fineness of the ore, and also on its per cent of moisture.

The batteries are fed from the bins by the Hendy-Challenge self-feeders, which here, as elsewhere in my experience, give entire satisfaction. The stamps are 20 in number, drop 100 times a minute, fall 6½ inches, and when freshly shod weigh about 750 pounds; the weight being divided as follows:

Stem	340 pounds.
Boss	200 "
Tappet	90 "
Shoe	120 "

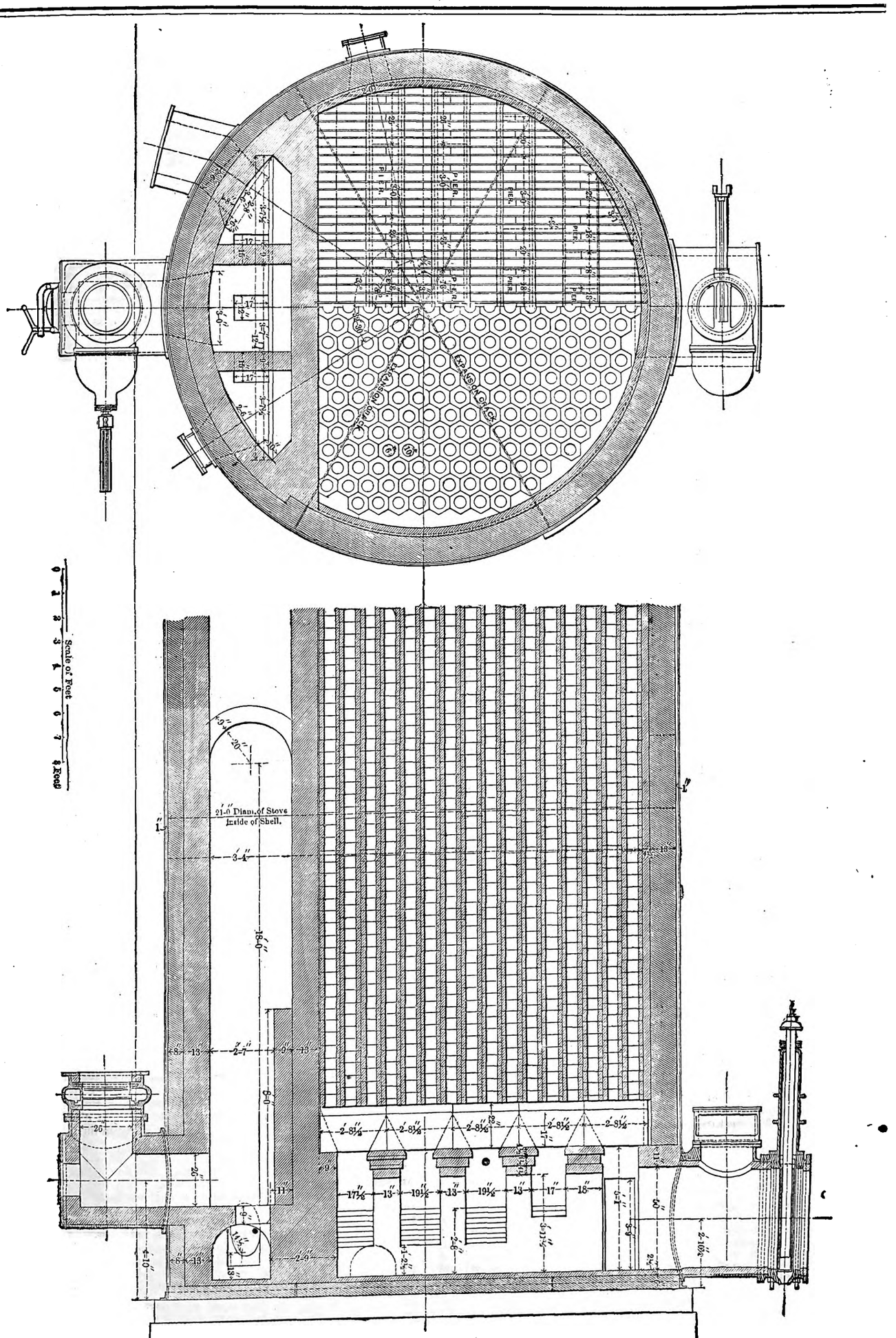


The die weighs about 85 pounds. Some of the stamps carry extra tappets, bringing their weight up to 800 pounds and over. The shoes have an average life of one month, and when worn out weigh about 35 pounds. A novel feature of these batteries is the arrangement of the guides; instead of being grooved to receive the stem, square recesses are cut, into which wooden keys are fitted, so that the grain of the wood is parallel to the motion of the stem, instead of across it, as is usually the case. With such an arrangement, the guide-boards themselves are subject to no wear, the keys being easily taken out and replaced. This plan might be advantageously adopted where light stems are in use which are liable to spring, and in such a condition saw out guide-boards very rapidly. But when stems of from 3½ inches to 3⅞ inches are used, they present no advantages over the old plan. The mortars have double discharge, but the rear discharge has been blocked up with wood faced with iron plates, as close to the stamps as practicable. The average product of these batteries, during the first six months of the year, including stoppages, has been 2·9 tons of medium hard rock to the head of stamps, per day of twenty-four hours, crushed through a 30-mesh screen. Various screens have been tried, but the best results have been obtained from Russian iron screens, vertical slotters, with a "burr" on the inside.

From the batteries, the pulp goes into settling-tanks. The pans, eight in number, are flat-bottomed, 5 feet in diameter, 3 feet high, and have wooden sides of Oregon pine curbs, 2½ inches thick. The die is a solid cast-iron ring 1½ inches thick, weighing 750 pounds, and occupying most of the space between the cone and sides. It is fastened in with Portland cement. The muller, weighing 570 pounds, carries eight shoes weighing collectively 816 pounds. Each pan is provided with three wings shaped like a reversed plowshare. The settlers are 9 feet in diameter, with iron mullers shod with wooden shoes 6 inches high. On the average, a ton and a half, dry weight, of sand and slime are put in a pan for a charge, and the time required for amalgamation varies from three to five hours after charging the quicksilver. Repeated experiments have shown that little is gained by running the pans over four hours; the same ore, treated side by side under the same conditions in pans running respectively on four and six hour charges, gave a gain of one per cent in favor of the

* From a paper read before the American Institute of Mining Engineers at the Denver Meeting.

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THE HOT-BLAST STOVES AT FURNACES D AND E OF THE EDGAR THOMSON WORKS.

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six-hour charge, but this slight advantage did not compensate on low-grade ores for the limited capacity of the pans. Tests made on pulp while undergoing amalgamation showed that one hour after charging quicksilver, 74·66 per cent of the silver was already taken up, and that in the succeeding hours 76·26 per cent, 77·74 per cent, respectively, until the end of the fourth hour, when 81·04 per cent was found to have been extracted.

After that period, nothing material was gained by prolonging the operation. For a long time, owing to the excellent quality of the ore, no auxiliaries, other than steam and the iron of the pans themselves, were needed by the quicksilver to effect amalgamation. Identical results were obtained with or without the use of chemicals. Little by little, a change crept in, the milling percentage sank, the bullion became less fine, and sulphurets of the base metals made their appearance in the ore. Tests made with a view of determining the aid to be derived from the use of bluestone and salt showed that in an ore containing only 7 per cent of its silver in the form of chloride, 87 per cent of the silver present could be brought into combination with that element by the aid of these two "chemicals." The remaining 13 per cent was apparently shut up in the base sulphurets and carbonates, and could not be chlorinated in the pans. The result of a series of experiments with these and other reagents led to the adoption of 150 per cent of bluestone and 500 per cent of salt, the amount of silver in the ore being taken as 100 per cent, and by this means the milling percentage was brought back to its former standing. Still the bullion resulting left much to be desired. The question then resolved itself into this, how to make fine bullion from very base ores, and at the same time to keep up a satisfactory milling percentage.*

Three methods suggested themselves, namely, either to prevent the amalgamation of the base metals on the pans,† or, if that proved impracticable, to eliminate them from the amalgam before retorting, or during the melting. Although several metals were taken up by the quicksilver, in varying quantities, and so found their way into the bullion, still the only one that caused any serious trouble was lead, which was reduced by the action of the pans and almamagated as readily as the silver itself. A noticeable feature in regard to the basing of this bullion was, that it became serious at the same time that wulfenite appeared in considerable quantities in the ore. Whether this mineral was the prime cause of the trouble, I am not prepared to say; but we did not have the same difficulty when the percentage of lead was much higher in the ore, but in the form of cerussite or galena.

The ore was crushed through a screen corresponding to a 35-mesh wire cloth, and subsequently ground for one hour in the pans. By giving up the grinding in the pans, and by using finer screens in the batteries, but little of the lead was taken up; and by the use of lime, etc., in cleaning the amalgam, as already described above, the bullion was brought up to ·970 fine; the remaining base, being principally copper, resulting from the bluestone used, was not of sufficient importance to extract. The extraction of copper, even after it has been amalgamated, presents no difficulties, as has been successfully demonstrated on a working scale at the tailing mills on the Carson River.

The ores of the Tombstone District carry a varying amount of gold, which in some cases is visible; but in others, it only makes its presence known by the assays. At Charleston, it is not positively known in what form this metal occurs, as it is never visible. Assays for the first six months of this year show that only 43 per cent of the total gold value of the ore was saved. This value, however, rarely reaches two dollars to the ton. The amalgam is retorted in 15-inch top discharge retorts. About four cords of willow wood are consumed to the ton of amalgam. The firing lasts five hours, and the charge varies from a ton upward.

For bullion averaging ·938 fine, the loss by volatization and skimming averages 7·55 per cent, and the time required averages three hours twenty-one minutes. The average weight of the bars is 2711 ounces, which require 43 pounds of charcoal and 20 pounds of coke. The average cost of milling for the past five months has been $4.90 per ton. This amount was subdivided as follows:

Fuel	$1.05
Chemicals (including quicksilver)	0.77
Lubrication	0.04
Illumination	0.03
Castings	0.33
Supplies	0.16
Labor	2.52
Total	$4.90

COST OF LABOR IN REDUCING ONE TON OF ORE ‡

Crushing	$0.52
Amalgamation	0.67
Power, pumps, etc	0.47
Foreman, etc	0.87
Tailings pit	0.11
	$2.64

The loss in quicksilver to the ton of ore milled varies according to the grade and character of the ore, but averages about 1·3 pounds. About 0·11 cord of wood and 1200 gallons of water are consumed to the ton.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

BENSON SMELTING AND REFINING COMPANY.—The furnace started on December 28th, and to the 14th of this month has turned out 250 tons of base bullion. The smelter has a working capacity of at least forty tons daily, and with some alterations which are contemplated will smelt from 55 to 60 tons. The company purchases all kinds of ores, and the location is such that it can receive from both ways on the line of the road, and it is also the most convenient point for the Sonora ores. The company owns two large lead mines. For a time, some difficulty was experienced in finding iron ore for flux, but fortunately a large deposit was obtained near Lordsburg.

*The experience of a former management was very similar; when grinding was carried on two hours, the bullion sank to from ·200 to ·300 fine, and even lower. By crushing finer and not grinding at all, it rose in a day or so to ·900 fine and over. By grinding one half-hour, it was kept at ·850 fine.

†I am indebted to Mr. J. M. Adams, of San Francisco, for valuable suggestions in regard to the handling of ores containing lead in pan amalgamation.

‡This table has reference simply to a single month's run, or, what is the same thing, to the working of 1730 tons of ore.

TOMBSTONE DISTRICT.

Recent dispatches state that active operations have been resumed on the Bunker Hill and Rattlesnake mines. A large body of good ore has been struck in a tunnel in Military Hill, in the Big Pedro mine. The Anchor mine is improving in quality and quantity of ore. Some of the ore assays $300 per ton. The hoisting-works on the West Side, Ingersoll, and Stonewall mines are nearly completed. Work on the Horseshoe mine has been resumed. The lessees of the Mamie mine are taking out considerable rich ore.

PIMA COUNTY.

SANTA CATARINA.—It is stated that at a depth of 40 feet a vein of six inches of almost pure metallic copper has been struck.

PINAL COUNTY.

PINAL CONSOLIDATED.—The official report says: Our small furnace is turning out about nine tons bullion daily, from about twenty tons of ore, of which latter we have already mined and stored at furnace, chutes, and drifts, 10,000 tons. Another furnace will soon be added, of a capacity of 50 tons, which will be a matter of little expenditure, there being sufficient boiler capacity to run three furnaces. Besides our lead-ore proposition, we have already developed large bodies of dry free-milling ores, assaying from 50 to 80 ounces silver; and being situated on the Gila River, we have taken up water-rights and mill-site for the purpose of erecting a twenty-stamp mill within this year. However, we are not rushing it, in order to accumulate funds from the result of our smelters. We have plenty of wood and water, and had our Eureka smelter been a more scientific one at the start, we should have been running ten months ago.

SILVER KING.—At the annual meeting, held in San Francisco, January 9th, the following officers were elected: B. A. Barney, President; J. L. Jones, Vice-President; James M. Barney, General Manager and Treasurer; R. M. Phillips, Superintendent; and Joseph Nash, Secretary. The general manager's report shows that the production of the mine has been about the same as the year preceding, and that the mill and reduction-works have been kept in constant operation to their full capacity. Sinking the main vertical shaft will soon be resumed, probably during the present month. The construction of a railroad connecting the mine with the Southern Pacific Railroad is not, as yet, commenced; but its necessity has not been lost sight of, or larger reduction facilities where the water supply would be adequate. The outlook for the future seems as favorable as has been the experience of the past. The superintendent's reports show that the mine looks well throughout, and that the several levels and drifts have been worked very successfully. Below the 510 level the mine is dry. All the ground has to be blasted. The ventilation is good. Eighteen thousand eight hundred and sixty-three tons of ore have been delivered at the mill. Eighteen thousand of them were taken from the 714 level; the rest, with but few from the 408, came from the 510 level. Three hundred and fifty tons remain on the dump. The reduction of ore by leaching ceased October 31st. November gave an opportunity to closely test the work, and the following was the result: 1523 tons of a value by assay of $61 8-100 per ton, gave 78 944-1000 tons of concentrations of a value of from $1094 to 1555-10,000 per ton by assay. Thus, 19 41-100 tons were dressed down to one ton. The ore shipped weighed 5 16-100 per cent of that crushed, the loss being 7 69-100 per cent, or $4 9534-10,000 per ton. Over one third of the value was in native silver.

The secretary's report gives the following:

RECEIPTS.

Balance on hand January 1st	$31,739.02
Ore and concentrations	369,475.19
Bullion	371,910.67
Superintendent	523.45
Freight	1,076.98
	$774,724.71

DISBURSEMENTS.

Sampling and assaying	$286.10
Expenses	4,553.77
Insurance	750.00
Law	1,210.00
Experiments	632.39
Merchandise and lumber	38,893.64
Freight	21,474.81
Dividends	300,000.00
Superintendent's draft account of expenses at mine and mill	364,538.23
Balance in treasury December 30th	39,285.77
	$774,724.71

Forty-five thousand ounces silver on hand, $1 per ounce.

NEW COMPANY.

The following company has filed articles of incorporation:
Ida Gold and Silver Mining Co. Capital, $1,500,000. Operations, Pima County, Ariz. Principal office, Fond du Lac, Wis.

CALIFORNIA.

BUTTE COUNTY.

SPRING VALLEY.—The secretary reports that a telegram states that the clean-up at the mine yielded over $100,000, and that a further clean-up in a month's time will yield $25,000 more. This will represent the product of a little over six months, and now that we are in a position to work the lower tunnel to advantage and shall be using a third more water than hitherto, it is only reasonable to suppose that this rate of production will be largely increased. During the late run, we had not this increase of water, and were not washing through the lower tunnel under favorable circumstances, it having been only recently that a sufficiently large opening was made in the gravel at the mouth of this tunnel.

FRESNO COUNTY—NORTH FORK MINING DISTRICT.

DE SOTO GROUP.—This group consists of the De Soto and River View lodes, lying under the Cathedral peaks on the head-waters of the San Joaquin River. The ores, says the Bodie *Free Press*, are sulphureted, bearing silver, and will average at least $40 per ton. Careful examination and measurement show the ledge to be fifty feet wide from wall to wall, no gangue intervening. The facilities for reduction are second to none, there being dense forests of timber on the mines; water is easily obtained from the high falls on the river above the lead. These mines have been opened at four different points along its trend, and show vast bodies of mineral. The field-rock is a porphyry on the foot and a talcose slate on the hanging-wall, which is so characteristic of a true fissure-vein. Negotiations are now on foot that will probably result in the disposition of this property to Chicago capitalists in the spring.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—During the past week, 135 tons of ore were crushed, average pulp-assay, $48 per ton. Bullion shipments, $5723.

BODIE TUNNEL.—About 40 tons of ore are crushed daily.

NOONDAY AND RED CLOUD.—These companies have filed petitions of insolvency through their secretary.

STANDARD.—During the past week, 1427 tons of ore were extracted, $25,572 bullion shipped. The cross-cut 1000 level, is in 1190 feet, and the east cross-cut from south drift, same level, is in 210 feet. There is no change to report.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—The pumps were started up and are working very well, lowering the water in the shaft four feet per day; at this rate, it will be but a short time before the Ophir vein will be reached from the shaft, when work can be done to much greater advantage than at present. It is the intention to continue the

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drain tunnel around and above the shaft; when this is done, it will intercept and carry off a large amount of water that now finds its way into the mine, and to that extent will reduce expense. The ore continues to be as rich as before, and the body increases in size with further development; eight stamps are running, four more have started up; still other batteries will be put to work as soon as new ground is opened up, till the whole milling capacity is fully employed.

SAN BERNARDINO COUNTY—PROVIDENCE MINING DISTRICT.

BONANZA KING.—The working results of the new ten-stamp mills of this company, at Providence, are said to be highly satisfactory. The bullion shipments for the first half of January were $32,525. The Atlantic & Pacific Railroad will reach these mines in about thirty days.

GORMAN & DWYER.—A recent discovery of a large body of surface ore is reported to have been made.

NEW COMPANIES.

The following companies have filed articles of incorporation:

Addie Gravel Mining Co. Capital, $1,000,000. Directors: Columbus Waterhouse, H. K. Waterhouse, F. A. Waterhouse, J. M. Jackson, S. W. Howland, M. Parker, H. W. Bragg.

Amazon Consolidated Gold and Silver Mining Co. Capital, $10,000,000. Operations, Mono County, Cal. Directors: J. H. Rennshofen, J. J. Ray, Stephen Otis, J. F. Johnson, Francis C. Weston.

Antelope Milling and Mining Co. Capital, $4,000,000; shares $20 each. Operations, Cochise County, Ariz. Directors: Alexander Badlam, E. H. Fritch, Joseph W. Winans, W. P. Coleman, E. B. Baldwin, and E. H. McMillan, of San Francisco, and W. N. Wash, of Cochise.

Black Range Consolidated Mining Co. Capital, $10,000,000. Operations, New Mexico. Directors: S. Heydenfeldt, Henry M. Levy, Morris Hoeflich, Robert Sherwood, and A. Borland.

Guadalupe Mining Co. Capital, $500,000. Operations, Lower California. Directors: Hugh McCormick, George H. Dana, J. P. Manrow, D. P. Drexler, and Homer S. King, of San Francisco.

Head Center and Tranquillity Mining Co. Capital, $2,000,000. Operations, Tombstone District, Ariz. Directors: F. A. Benjamin, T. E. Jewell, A. W. Foster, W. Kohl, R. W. Lilienthal, J. M. Gitchell, J. W. Pew.

Headlight Gold and Silver Mining Co. Capital, $1,000,000; shares, 50,000. Directors: P. Bargion, S. Booth, Walter Story, G. J. Johnson, Thomas Crowley, and Charles Hollister.

Indian Springs Mining Co. Capital, $4,000,000; shares, 80,000. Operations, Indian Springs, Cal. Directors: M. C. Taylor, H. L. Hatch, Jacob Weissbein, John Johnston.

Ibex Mining Co. Capital, $1,000,000; shares, 100,000. Operations, Saratoga District, Cal. Incorporators: G. K. Dias, J. B. McClure, and R. S. Rhodes. Principal office, Chicago, Ill.

Omilah Gold and Silver Mining Co. Capital, $2,000,000. Directors: A. F. Williams, John Lowrie, S. J. Marsten, J. C. Green, D. S. Rouse, and W. W. Whitman.

Rappahannock Gold Mining Co. Capital, $2,000,000. Directors: P. B. Cornwall, Richard Chute, James McCord, Alexander Harner, and John A. Davis.

Superior Mining Co. Capital, $10,000,000. Directors: George C. Perkins, J. B. Haggin, J. C. Logan, J. C. Hump, Louis T. Haggin.

Wallis Consolidated Gold Mining Co. Capital, $1,050,000; shares, 210,000. Operations, California. Directors: N. H. Ball, H. J. Redmond, H. C. Stout, B. F. Littlejohn, H. W. Wallis. Principal office, Forest City.

CANADA.

A well-informed correspondent sends us the following notes: The most prominent among the minerals in Canada which have come to public notice quite recently are iron and phosphate of lime. The former is found in almost all the provinces of the Dominion. Most of the localities where important discoveries of iron have been made are fortunately situated near transportation facilities, and the ore occurs generally near the surface. The remarkably excellent quality of the Canadian metal, and the low prices of labor and material employed in its production, have made it a desirable article to the manufacturers in the United States. The chief districts operated in successfully by American capitalists are the Madoc region and the Kingston and Pembroke region. The output from the latter for the past season amounted to 40,000 tons, which were shipped through the port of Kingston. Preparations are now making to increase the production for the coming year, which will doubtless reach 100,000 tons of Bessemer ore from this port. Numerous new discoveries have been made, and as new lines of railroad are in course of construction through this region, great results may be looked for. There is an excellent opening for the establishment of a blast-furnace in this portion of Ontario, the country being heavily wooded, and the cheap supply of charcoal can be depended on for a long period of years.

Apatite or phosphate of lime is a common mineral in the limestones of the Laurentian rocks, sometimes disseminated in minute green or reddish crystals, and at other times so abundant as to make up a great proportion of the rock, and in some cases to form beds of a nearly pure crystalline apatite. Of late years, the increasing demand for phosphates as fertilizers of the soil has drawn attention to the use of this mineral in a prepared form, and the supplies existing in Canada are receiving considerable attention. In the province of Ontario, the deposits of phosphates which have been worked in the past with good results exist in the counties of Leeds, Lanark, and Frontenac, the most noteworthy being in what is called the North Burgess Phosphate Basin, which has been found to have a thickness of from 2600 to 3000 feet, forming a belt or zone running from the northeast to southwest through the townships of Burgess and Crosby. The analyses made from ore taken from this locality gave on an average 88 per cent of phosphate of lime. Particular attention is now drawn toward the county of Renfrew (the Cobden District), where some important discoveries have been made. Extraordinary deposits and veins of great width and promise containing a quality of phosphate assaying as high as 90 per cent phosphate of lime have been opened, and preparations are making to work them on a large scale.

In the province of Quebec, the Ottawa District has recently become noteworthy, and the production of apatite for shipment to England has been very large. The veins and deposits are of an irregular nature and the country-rock is chiefly of pyroxene. The apatite of this region is always fluor-apatite, and varies from compact or crypto-crystalline to coarse granular, frequently exhibiting a distinct lamellar texture. The analyses of apatite from this region average 88 per cent of phosphate of lime. The product of the Ottawa District for the past season has been over 24,000 tons. This branch of industry is greatly improving, and has proved one of the most profitable and at the same time safest investments yet introduced to the capitalist in the shape of mining.

ALBERT.—The mine was first opened in 1865, but work was discontinued till July, 1881, when it was purchased by a New York firm, which has done much to improve the property. From July to the end of the year, about 1850 tons were shipped to New York. The output in 1882 was 4800 tons. The Albert ore contains from 4 to 6 per cent copper and 35 to 40 per cent sulphur. The number of hands employed in this mine is 70 or 80, with wages the same as in other mines. The depth of the mine is about 300 feet.

CROWN.—This mine, the property of the Orford Nickel and Copper Company, produced in 1882 about 20,700 tons, which contains about 4·8 per cent of copper, 40 to 45 per cent sulphur, and from 2½ to 3½ ounces of silver per ton of ore. The depth of the Crown mine is now about 900 feet on the dip of the vein, which varies from six to thirty feet in thickness. A tunnel 1000 feet long strikes it at the eighty-five fathom level. A hoisting-engine is placed at the inside end of the tunnel, by which the ore is raised from the bottom in cars, which then run out through the tunnel to the dressing-shed, a distance of about 2000 feet. A boiler outside the tunnel supplies the engine with steam by pipes. From the dressing-shed, the ore, after separation from poor rock, is carried by a tramway to the Passumpsic siding, about half a mile, where it is dumped on cars for shipment. The average number of hands employed by the company in 1882 was about 300, with rate of wages as follows: Miners and strikers, $1.25 to $1.50 per day; trammers and laborers, $1 to $1.25, and boys 40 to 60 cents; tradesmen, $1.75 to $2.50 per day.

HARTFORD.—The mines are owned and worked by the Canadian Copper and Sulphur Company (Limited). It is the same vein as that worked by the Orford Nickel and Copper Company, and varies in thickness from a few inches to 15 or 20 feet. The ore contains from 2 to 5 per cent copper and from 35 to 45 per cent sulphur. The output of the mine is about 900 tons monthly, the greater part of which is smelted at Capelton though a small quantity has been shipped to New York for treatment. The number of hands employed by the company is about 100 in the mine and about 50 in the works; wages, about the same as the Crown mine. The depth of the mine is 540 feet on the dip of the vein.

MANITOBA.

ARGYLE.—The machinery for the stamp-mill constructed by Fraser & Chalmers has arrived, and will be put up shortly.

LAKE OF THE WOODS.—The run of gold-bearing quartz known as the Bulldog, which is the property of this company has lately been uncovered and found to be over eight feet in thickness. The ore has been tested and yields a very high percentage of gold. The sinking of a shaft has been commenced. The prospects are encouraging, as the ore gets richer the deeper the mine goes down.

WINNIPEG CONSOLIDATED.—Men are now at work at the company's twenty-stamp mill. It is proposed to begin crushing ore as soon as possible after the opening of navigation. The shaft has been sunk to a greater depth lately, and the vein of ore is widening and getting richer the farther the shaft descends.

NEW COMPANIES.

The following companies have filed articles of incorporation:

Canadian Prospect Mining Co. Capital, $1,000,000; shares, 20,000. The object of the company is to purchase mines and minerals. Incorporators: Lewis Carvell, of Hampton; Charles Hevildes and Amos Henry Chandler, of Moncton; Charles C. Foster, of Boston; and J. E. Carvell, of Charlottetown. Principal office, Moncton, N. B.

Marmora Gold and Iron Co. Capital, $800,000.

Saint Joseph Petroleum Co. Capital, $10,000; shares, 4000. The object of the company is to buy, lease, and sell oil and minerals of all kinds. Incorporators: Rufus S. Merrill, Joshua Merrill, J. Porter Waitt, S. Payson Bradley, Edward E. Allan, Henry Robbins, Frederick Robbins, H. S. Morse, all of Boston; Charles Newell, of Newtonville, Mass.; John S. Fish, and Freeman W. Wisdom, of St. John; and John B. Elliott, of Moncton. Principal office, Dorchester, N. B.

COLORADO.

CHAFFEE COUNTY.

ROYAL GORGE SMELTING COMPANY.—This company has bought the Cañon City smelter, and those works will be enlarged and put in operation at an early day. A ninety horse-power turbine-wheel will be put in, to furnish the necessary power.

CLEAR CREEK COUNTY.

SNOWDRIFT.—After connection had been made with the Thompson shaft, about midway between the Snowdrift and Good Hope levels, a new level was started toward Good Hope Gulch, which at forty feet in began to disclose black sulphurets and other mineral running as high as 800 ounces and over. A cross-cut was run north at the east end of ths Snowdrift level to a vein supposed to be identical with the Good Hope lode above. Here the rock has been chambered out and a lease let to sink 75 feet, and then at 60 feet drift 100 feet easterly preparatory to stoping to the level above, which meanwhile will be run ahead. Assays from this chamber have yielded 840 ounces.

GILPIN COUNTY,

COLUMBIA TUNNEL.—This tunnel is designed to cut the Columbia, Colorado, and Burroughs mines on Quartz Hill. As soon as the contract for driving the tunnel—now in quite a distance—is let, work will be resumed. According to estimates of the course of the veins, and present tunnel heading, it is thought that the Columbia and Colorado will soon be reached.

DUTCHMAN.—This company has completed sinking the working-shaft 30 feet, which gives it a depth of nearly 200 feet.

HASELTINE.—Two shafts are sinking east of the pump-shaft. The latter has been cleaned out and workmen are now engaged in putting in a 12-inch Cornish pump, when sinking will be resumed, drifts driven and stoping inaugurated. The concentration mill of the company recently treated a quantity of waste or dump material from the mine.

HINSDALE COUNTY.

ULE.—The concentrator has started up and works satisfactorily. By this process the slime, instead of being carried directly into the stream, thereby losing the gray copper and lighter mineral, is carried back upon puddling-tables, effecting a great saving. Low water is interfering with steady runs, but as one engine is now in place and another will be next week, it is expected that the mill will run steadily.

LAKE COUNTY.

Late Leadville exchanges contain the following:

EVENING STAR.—This mine will begin shortly making its customary large shipments. The output of the mine for a number of weeks past has been kept at a minimum, owing to the sinking of the main shaft. This shaft has now attained a depth of 330 feet, and has encountered so much water that it is impossible to go ahead with the work in the absence of pumping machinery. The main shaft passed through the principal ore-body in the Evening Star mine at a depth of 180 feet. Since leaving the body of ore, the shaft has encountered no limestone, but has penerated a great mass of gray porphyry, and stopped in a magnificent body of iron ore, two feet below the plane of the contact. While the sinking of this shaft will not be continued to any greater depth now, the iron body will be prospected more extensively, driving drifts just above the water-line. The farther exploration of the lower iron body is also to be prosecuted from the upper shaft of the Evening Star, located three or four hundred feet east of the main shaft. The upper shaft has a depth of 380 feet, and is less extensively used in the hoisting of ore, consequently better suited for development-work.

MIKE & STARR.—Work is vigorously prosecuted. The new pumps are doing excellent work. The mine is expected to resume large shipments of ore shortly.

MORNING STAR.—The ore yield at present averages seventy tons a day. The Lower Waterloo workings are showing great quantities of ore, and promise to be equal to any draft that may be made upon them. The incline from the Waterloo shaft has now advanced about three thousand feet, and has opened large ore resources on both sides. A level driven to the south, from which a prospect-drift is driven, shows three feet of fine ore, about twenty feet directly ahead of the face of the incline. On the north side of the incline, another breast of ore has been opened, having a thickness of four feet. The McHarg shaft has attained a depth of 112 feet. This shaft is to strike the first iron at about 200 feet, and the incline advancing from the Waterloo shaft at between 425 and 450 feet. The shaft is amply large to accommodate the heaviest pumping machinery, and is designed to admit of sinking it if neces-

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sary to a depth of one thousand feet. The main and upper Waterloo shafts are also working and contributing largely to the output of the mine. The ore is all of very fair grade.

REBEL-MINNIE.—This property has been actively worked for over a month past, is showing considerable fine ore, and making some ore shipments.

SILVER CORD COMBINATION.—Seven electric lamps have been put up at this mine.

YANKEE & BREECE HILL.—The property worked on tribute. The Keystone is said to show a carbonate of lead ore in the three different drifts, ranging in value from fifteen to fifty per cent in lead and ten to sixty ounces in silver to the ton. The vein or ore-chute is improving very rapidly, and still higher grades of ore are anticipated.

NEW COMPANIES.

The following companies have filed articles of incorporation :

Atlantic & Pacific Mining and Smelting Co. Capital $100,000. Operations, Summit County, Colo. Directors: Albert Sherwin, Arthur R. Brown, and James N. Templar. Principal office, Leadville.

Colorado Queen Mining and Tunnel Co. Capital, $1,000,000. Directors: Maria Darrah, Minnie Reimers, Mary A. F. Purcell, and Mamie Nelson.

Grace Mining and Milling Co. Capital, $500,000. Operations, San Juan County, Colo. Incorporators: H. Kauffman, S. R. Carpenter, D. R. Kinsell, W. Y. Miles, F. W. Lobdell, F. F. Miller, and H. O. Montague.

Jennie B. Silver Mining and Milling Co. Capital, $300,000. Operations, Summit County, Colo. Directors: J. H. Carle, W. W. Carle, L. J. Carle, W. C. Brett, and Stanley Stokes.

Rebel-Minnie Mining Co. Capital, $120,000 ; shares, 1200. Operations, Lake County, Colo. Directors: C. I. Thompson, Daniel Sayers, P. J. Sours, C. C. Kellogg, John B. Henslee, and John W. Virgin.

Southern Colorado Bismuth Silver Mining Co. Capital, $2,000,000. Operations, San Juan County, Colo. Principal Office, Silverton.

Thompson Valley Coal and Mining Co. Capital, $6000 ; shares, 600. Operations, Larimer County, Colo. Incorporators: C. C. Bushnell, O. D. Shields, E. S. Allen, Frank Harrison, and Lewis Cross. Office, Loveland, Colo.

Washington Gulch Mining and Reduction Co. Capital, $1,000,000. Operations, Gunnison County, Colo. Directors: James S. Delano, D. A. McKnight, and James H. Lowe. Principal Office, Washington, D. C.

Waterloo Mining Co. Capital, $5,000,000. Operations, Lake County, Colo. Directors: William Tremble, John J. McGowan, James Gibbin, W. H. Mathews, and Timothy Broon. Principal Office, Leadville.

DAKOTA.

A recent dispatch from Deadwood says that the intensely cold weather has closed many ditches, causing the hanging up of many stamps and threatening the closing down of all the mills. The stamps of the Golden Star mill have been hung up, and the Highland mill will probably stop.

CALEDONIA.—The superintendent reports for the week ended January 7th : Ore produced, 975 tons. Shipped 795 ounces of gold, value about $13,500. South header advanced 4 feet ; total, 34 feet. North drift advanced 9 feet ; total, 51 feet. The winze is down 8 feet, all in ore of good quality. Stopes are all looking well and furnishing ore enough to keep the mill running to its full capacity.

FLORENCE.—The mill is running successfully.

SITTING BULL.—The smelter will remain closed until spring.

IDAHO.

PENOBSCOT—Ore has been struck in tunnel No. 3, the lowest workings in the property, and at a depth of 150 feet from the surface. The heading had been in ledge matter for over 100 feet, cutting through fine-looking vein matter, but recently ore appeared in the breast. It proved to be only a stratum three inches thick, but this was followed by two other strata of like thickness, and the mere finding of ore at that depth is held to be an exceedingly promising indication.

MICHIGAN.

NEW COMPANIES.

The following companies have filed articles of incorporation :

Agogebic Exploring, Mining, and Manufacturing Co. Capital, $500,000 ; shares, 20,000. Operations, Ontonagon County, Mich. Directors: G. M. Wakefield, Edward Aschermann, Henry Fink, Walter Kempster, Richard Gunther, and P. Mitchell. Principal office, Oshkosh, with a branch office at Ontonagon.

Ellsworth Iron Co. Operations, Michigan. Directors : Norman McLeod, Daniel H. Ball, Henry Shouldice, James Trembath, and I. A. Pool.

Junietta Mining Co. Operations, Michigan. Officers : Edward Breitung, President ; George Runkel, Vice-President ; Frank E. Pierce, Secretary ; Lazarus Silverman, Treasurer.

Longyear Iron Mining Co. Capital, $50,000. Operations, Felch Mountain District. Officers : George H. Hammond, President ; George O. Robinson, Vice-President ; Bryant Walker, Secretary ; Elisha Flinn, Treasurer ; J. M. Longyear, General Manager.

North Felch Iron Co. Capital, $500,000. Operations, Michigan. Incorporators : Vine C. Watkins, Seymour Coleman, J. M. Longyear, Julian M. Case, and C. H. Colton.

Wheeling Mining Co. Capital, $500,000 ; shares, 20,000. Operations, Michigan. Officers : Daniel McGarry, President ; John Q. Adams, Secretary ; Thomas Axworthy, Treasurer ; James F. Foley, General Manager.

MINNESOTA.

NEW COMPANIES.

The following companies have filed articles of incorporation :

Minnesota Iron Co. Capital, $10,000,000 ; shares, 100,000. Operations, Vermillion District, Minn. Incorporators : Charlemagne Tower, of Philadelphia ; Edward Breitung, of Negaunee ; George C. Stone, of St. Paul ; Charlemagne Tower, Jr., of Philadelphia ; Richard H. Lee, of St. Paul.

MONTANA.

The Butte *Inter-Mountain* gives the following statement of the production of Summit Mining District for 1882 : Alice Company, $850,000 ; Moulton Company, $406,920 ; Silver Bow Company, $408,473 ; Lexington Company (three months' run), $340,000 ; Dexter mill (Anaconda Company), $100,000 ; Colorado & Montana Company, $865,000 ; Montana Copper Company (matte), $1,458,000 ; Montana Copper Company (ore), $520,400 ; Bell Company (January to June), $324,00 ; Parrot Company, $1,575,000 ; Longmaid concentrator, $127,000, Total, $6,884,793.

CABLE.—The ore now taken out averages in assay value from $60 to $75 per ton, exclusive of the gold nuggets which are frequently found in profusion, and of all sizes. Two weeks ago, a piece of ore was extracted weighing about 150 pounds, and estimated to contain $6000 in native gold, most of it in nugget form. At present, only fifteen of the thirty stamps are in operation, owing to the scarcity of water, but these stamps are daily crushing ore valued at $100 per stamp. As soon as the water supply can be increased, the daily product of the mill will be $3000.

NEVADA.

ALBION.—The report presented at the annual meeting, held in San Francisco recently, shows that the principal litigation of the company with its opponent, the Richmond Mining Company, which has been going forward for some years, has, upon every point, been decided in favor of the Albion. The Rose case is in the United States Supreme Court at Washington, where it will be reached probably in 1885. The other minor suits are in progress in various courts, and the president has no fear of the results. The cost of litigation has been about $116,000. The report also gives quite fully the reasons that induced the board to construct its own smelting-works at the mine, and states as a definite conclusion that, based upon the expenses in sending some 1700 tons of ore to the Eureka furnaces for smelting, and the result derived from smelting its own ore at its mine in its own furnace, the company saves by the latter process some $17 per ton of ore, or, estimating the monthly capacity of both furnaces at 2500 tons per month, will save some $42,500 per month. The only source of revenue upon which all this work has been done since June last has been from an assessment of 25 cents per share, which was absorbed by prior liabilities, and some $40,000 derived from the ore sent to the Eureka Company. The financial statement shows the following :

RECEIPTS.

Balance from last yearly statement		$4,945.58
Assessment No. 9, levied November 25th, 1881, of 30 cents—balance		3,600.00
Assessment No. 10, levied March 6th, 1882, of 30 cents—amount		44,995.80
Assessment No. 11, levied June 26th, 1882, of 25 cents—amount		37,496.50
Advertising delinquent certificates of No. 9		181.50
Advertising delinquent certificates of No. 10		181.50
Advertising delinquent certificates of No. 11		133.50
Ore sales to Eureka Consolidated Mining Co.		40,938.97
Two thousand bars to Bank of California	$29,457.04	
Less freight	$3,801.33	
Charges	3,554.66— 7,355.99—	22,101.05
Advances from Selby Smelting and Lead Company		163,000.00
Bills payable		42,472.44
E. N. Robinson, Superintendent, drafts yet to be paid to cover liabilities at mine to December 31st, 1882		91,685.69
		$451,736.53

DISBURSEMENTS.

Mine and contract labor	$152,594.19
Mine supplies—timber, tools, powder, etc	57,828.73
Mine expense and construction	47,237.58
Legal account	56,504.76
Furnaces, contract price	22,100.00
Furnaces, construction	9,688.83
Furnace labor	10,930.33
Furnace flux account	2,260.65
Furnace supplies—charcoal, etc	64,654.27
Furnace expenses account	1,180.09
Expense account San Francisco—salaries, advertising, stationery, etc	10,149.80
Interest account	5,009.16
Bullion cartage	607.30
Bills payable from last yearly statement—W. S. Wood, $1000 ; outstanding draft, $8321.98	9,321.98
Balance	1,270.86
	$451,736.53

LIABILITIES.

Advances Selby Smelting and Lead Company, $163,000, less 4339 bars of bullion received and *en route*, $52,068	$110,932.00
Bills payable	42,985.42
Bills rendered	4,410.35
Indebtedness at the mine for coal and supplies, and labor	91,685.69
	$250,013.46

ASSETS.

Personal property, such as charcoal, timber, supplies, etc., at mine January 1st, 1883, as per inventory of superintendent	$170,297.09
Cash on hand, San Francisco	1,270.86
Balance, excess of liabilities over assets January 1st, 1883	78,445.51
	$250,013.46

ARGENTA.—This company has purchased a half-interest in the Grand Prize mill for $50,000.

THE COMSTOCK LODE.

The report that the Comstock miners have agreed to a reduction of wages to $3 per day above the Sutro Tunnel level is denied by officers of the Miners' Union.

GEDDES & BERTRAND.—According to the Eureka *Sentinel*, the mill is reducing about 54 tons daily, the average assay value of which is 28 ounces, for which they got in December $1.13⅝ per ounce, or about $32 per ton. The principal work now going on in the mine is on two uprises from the 75-foot level. These uprises are 150 feet apart where started from the level ; but the ore being followed in them, separated by a formation of black lime and quartzite, they are found making toward each other. Both reveal large bodies of ore, bright yellow sulphurets or antimonial silver, that goes $60 per ton. The indications are, that these uprises will come together about 60 feet from the surface, from which point up to the grass-roots the ore, it is expected, will be found in a continuous body. Plenty of good ore, also, on the 300. Important work is doing on an incline 180 feet in extent, going down at an angle of 45 degrees, from the 150 level. It looks more and more, as developments progress, as if the tremendous body of ore in the Geddes & Bertrand extends in one body from the surface down to the 300 level and indefinitely deeper. The ore taken out is not assorted with much care, loss of time, or expense. It is the intention to utilize all rock that contains the precious metal—silver, there being but little gold in the mine—which accounts for the average value of the ore reduced being about $30 per ton.

NAVAJO.—The winzes sinking from the 350 to the 450 level continue in good ore.

NEW JERSEY.

NEW COMPANIES.

The following companies have filed articles of incorporation :

Mutual Iron Ore Co. Capital, $100,000. Operations, Morris and Passaic Counties, N. J. Officers : Grinnell Burt, of Warwick, President ; G. Hobart, of Paterson, Treasurer ; and Joseph Cunningham, of Greenwood, Secretary.

NEW MEXICO.

SUPERIOR.—A body of high-grade ore was struck in this mine, near Kingston, recently. The shaft had been sunk sixty-five feet and a drift run into the hill to the south about fifty feet, finding some good ore, but not in such quantities as anticipated.

OHIO.

NEW COMPANIES.

The following companies have filed articles of incorporation :

Arizona Buttes Mining Co. Capital, $7,500,000. Office, Sandusky.

Howell's Coal Co. Capital, $60,000. Office, Massillon.

Jacksonville Coal and Coke Co. Capital, $250,000. Office, Jacksonville.

Williams Mining Co. Capital, $50,000. Operations, New Mexico. Incorporators : Messrs. Richard Brown, John T. Williams, John Besore, Anthony Welsh, and Richard B. Tate.

PENNSYLVANIA.

NEW COMPANIES.

The following companies have filed articles of incorporation :

Hillman Vein Coal Co. Capital, $200,000. Office, Wilkes-Barre.

Yguana Smelting and Mining Co. Operations, Mexico. Dr. W. S. Forbes, President ; Francis Heyl, Secretary and Treasurer.

TEXAS.

From a report made for the Fort Worth & Denver City Railroad, we learn that at several points along the road there are fine outcroppings of copper, and the report states that investigation would doubtless discover fine deposits of that metal. The copper is in beds parallel with the Permian strata of the country, which lie almost horizontally. The copper ore lies imbedded in a stratum of blue clay, between sandstone, in the shape of disulphuret of copper.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Jan. 26.

The mining market has been quite active this week, but records no new or interesting features. The Pipe Line Certificates have monopolized most of the business at the New York Board, although a good business has been done in some mining stocks. The Comstock shares have been dull, but show a tendency to better prices. The Leadville stocks show no improvement, but have held their own. The Tuscaroras have been almost the only exception to the general apathy, and have shown considerable activity at very strong prices. We give a summary of the market below. The total number of mining shares sold at all the Exchanges aggregates 454,373 shares, as against 606,100 last week.

The Comstock shares had a moderate business at steady prices. California was quiet and steady at 19 @22@21c. Consolidated Virginia, with a moderate business, was strong, selling from 45@53@51c. Sierra Nevada sold to the extent of 660 shares at $2.85@ $3.10. Mexican had a small business at irregular prices; it sold from $2.38@2.75@$2.50. Ophir has had a fair business and has been steady; assessment-paid shares sold from $2.30@$2.20, and assessment-unpaid shares from $1¼@$1⅝. Consolidated Imperial, under a small business, sold from 2@8c. Yellow Jacket records a small business at steady prices; it sold from $1⅛@$1¼. Best & Belcher was quiet and irregular at $3@$3.75@$3.50. Sutro Tunnel was active and a little weak, selling from 24 @21c.

The Leadville stocks were rather quiet and prices did not materially change either way. Amie was quite active and at steady prices, selling from 17@19 @18c. Chrysolite had a small business at irregular prices; it sold from $1.50@$1.40@$1.45. Hibernia was quiet at 7@5c. Iron Silver records a business of 3100 shares, selling at $2.55@$2.65. Little Chief was very active at steady prices; it sold from 44@41@43c. Little Pittsburg was irregular under a small business, selling from 74@65@69c. Big Pittsburg, with a small business, was a little weak at 20@14c. Climax was quiet and steady, selling at 10@9c.

The Bodie stocks had a moderate business and suffered a slight decline. Bodie sold from $1.90@$1.50, with a business of 450 shares. Standard had a fair business at irregular prices; it sold from $6¼@$5½@ $5¾. Bulwer was also irregular, selling from 91@95c. Goodshaw sold at 5c.

The Tuscarora stocks were active and very strong. Grand Prize had a fair business at strong prices, selling from 47@80@70c. Tuscarora was quiet and strong at 21@20c. Augusta records a small business at strong prices, selling from 45@62c. Belle Isle was quiet and steady at 90c.@$1. Navajo had a small business at irregular prices, selling from $9⅛@$8¾ $9. North Belle Isle was quiet and steady at 60@65c. Independence sold at 67c.

In the miscellaneous list, Alice was quiet and strong at $2.30@$2.50@$2.45. Eureka Consolidated suffered a slight decline under a small business; it sold from $11¼@$10⅝@$10½. The Green Mountain stocks were quiet and steady. Gold Stripe was very active at 8@6c. Green Mountain sold from 47@55@52c. Rising Sun sold at 7@6, and Cherokee at 6c. Hall-Anderson was quiet and a little weak, selling from $1.75@$1.50. Horn-Silver records a moderate business at irregular prices; it sold from $7.50@$7@$7⅞. Hukill was quiet and steady at 18@16@17c. Robinson Consolidated was quite active at very irregular prices, selling from $1.25@$1.15@$1.30. Sierra Grande records an active business at strong prices; it sold from $2.50@$2.80@$2.75.

Alta Montana was quiet and steady at 22c. Bradshaw had a fair business, and was about steady, selling from 39@36@37c. Central Arizona has suffered a decline under moderate transactions, and has sold from 47@40c. Decatur was very active, and has gained some strength; it sold from 9@12@11c. Elko Consolidated continues to be active, but has been very irregular; it sold from 27@20@22c. Lacrosse was quiet and steady at 15@13@14c. Oriental & Miller records a large business, and has been steady, selling at 14@16c. Silver Cliff was quiet and irregular at 40@87c. South Pacific has been active and steady, selling at 9@8c. The State Line stocks have been active at irregular prices. Nos. 1 and 4 sold from 3@4c., and Nos. 2 and 3 from 7@9@8c. Taylor-Plumas has been very active at irregular prices; it sold from 19 @17@18c. Harlem M. and M. Consolidated is a new stock recently listed on the New York Board; it has had a fair business at steady prices, selling from $1@ $1.05.

From the annual report of Vice-President and General Manager Alexander R. Shepherd to the stockholders of the Consolidated Batopilas Silver Mining Company, we learn that from January 1st to November 4th, 1882, the receipts were $229,377.72, and the disbursements $216,796.91, leaving a balance of $12,580.81, represented by $10,275.20 in cash and $2305.61 in silver on hand. The amount of receipts and disbursements from the organization of the company to November 4th, 1882, is: Receipts, $778,314.86; disbursements, $273,823.32; leaving to the credit of the company, exclusive of silver not sold, ores not reduced, exploration-work on mines, and improvements and materials at mines, $504,491.54.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, 55 Broadway, furnish the following *résumé* of the oil market for the week:

This week has witnessed a great revival in speculation, heavy transactions and a large advance. During the preceding two weeks, oil vibrated between 85 and 90c. per barrel, with light trading. This apathy and dullness was in part the result of the great fluctuations of November and December, settling down to a

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	SHARES. No. in 1000's	SHARES. Par Value.	ASSESSMENTS. Lev'd to date in 1000's.	ASSESSMENTS. Date and amount per share of last.	DIVIDENDS. Total paid to date in 1000's.	DIVIDENDS. Date and amount per share.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Jan. 20. H.	Jan. 20. L.	Jan. 22. H.	Jan. 22. L.	Jan. 23. H.	Jan. 23. L.	Jan. 24. H.	Jan. 24. L.	Jan. 25. H.	Jan. 25. L.	Jan. 26. H.	Jan. 26. L.
Alice, Mon.	400	25	*		400	De 81 10	2.30	....	2.40	....	2.50	2.40	2.45	....	2.45	....	....	....
Amie Con., Co.	500	10	*		805	My 80 10	.19	.17	.19	.18	.19	.18	.19	.18	.19	.18	.19	.18
Atlantic, Mich.	40	25	280	Ap 75 1 00	140	Fe 82 2 00	....	....	....	....	....	....	....	....	....	....	....	....
Argenta, Ne.	100	100	225	No 82 25	40	Fe 80 20	....	....	....	....	....	....	.52	.45	.62	.60	....	....
Bar & Walker, Ut.	100	10	*		60	No 80 10	....	....	....	....	....	....	....	....	....	....	....	....
Bassick, Co.	100	100	*		25	Fe 80 25	....	....	....	....	4.50	....	.90	....	1.00	....	1.00	....
Belle Isle, Ne.	100	100	65	My 82 10	300	De 79 25	....	....	....	....	....	....	....	....	....	....	....	....
Black Bear, Ca.	90	100	15	Se 79 50	859	Se 82 30	....	....	....	....	....	....	....	....	....	....	....	....
Belcher, Ne.	104	100	2562	Se 82 25	15397	Ap 76 1 00	....	....	....	....	....	....	1.90	....	1.88	1.75	1.50	....
Bodie Cons., Ca.	100	100	125	De 81 50	1295	No 82 20	....	....	....	....	....	....	....	....	....	....	....	....
Bos'n & Mon., Mon.	200	10	....	....	310	Ja 83 05	....	....	....	....	....	....	....	....	....	....	....	....
Breece, Co.	200	25	*		2	Fe 80 1	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer, Ca.	100	100	80	De 77 50	140	Ja 83 10	....	....	....	....	....	....	.94	.91	.95	....	.95	.93
California, Ne.	540	100	638	No 52 20	31320	De 79 50	.21	.19	.19	....	.20	....	.21	....	.21	....	.22	.21
Cal. & Hecla, Mich.	100	25	....	....	22860	Ja 83 5 00	....	....	....	....	....	....	....	....	....	....	....	....
Caribou Con., Co.	100	10	*	....	50	Mr 80 10	....	....	....	....	....	....	....	....	....	....	....	....
Carolina Q'n, N.C.	100	2	....	....	8	Oc 82 02	....	....	....	....	....	....	....	....	....	....	....	....
Castle Creek, Id.	100	1	....	....	24	Ja 83 03	....	....	....	....	....	....	....	....	....	....	....	....
Catalpa, Co.	300	10	*		210	De 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Central, Mich.	20	25	100	Se 61 6	1610	Fe 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Christy, Utah.	60	100	....	....	1600	De 81 50	....	....	1.50	....	1.45	1.40	1.45	....	1.45	1.40	1.45	....
Chrysolite, Co.	200	50	*	....	1600	De 81 50	....	....	....	....	....	....	.10	....	.10	.09	.10	.09
Climax, Co.	200	10	*	....	180	Au 80 30	....	....	....	....	....	....	....	....	....	....	....	....
Cons' G. Mg., Ga.	100	5	*	....	80	De 82 04	....	....	....	....	....	....	....	....	....	....	....	....
Cons. Va., Ne.	540	100	897	Au 82 30	42930	Au 80 50	.45	....	.51	.50	.48	.45	.52	.49	.48	....	.53	.51
Contention, Ariz.	250	50	....	....	2087	De 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Copper Queen, Ar.	250	10	*	....	850	Ja 83 50	....	....	....	....	....	....	....	....	....	....	....	....
Crown Point, Ne.	100	100	2673	Fe 82 25	11588	Ja 75 2 00	....	....	....	....	....	....	....	....	....	....	....	....
D'dw'd-Terra, Dk	200	25	*	....	900	Ja 83 10	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Co.	200	25	*	....	200	Ju 81 7½	....	....	....	....	....	....	....	....	11.00	10⅝	10.50	....
Eureka Cons., Ne.	50	100	100	My 76 1 00	4817	Jy 82 25	11.25	....	....	....	....	....	....	....	....	....	....	....
Evening Star, Co.	50	10	*	....	1225	Oc 82 50	....	....	....	....	....	....	....	....	....	....	....	....
Excelsior, Ca.	100	100	300	Ja 82 1 00	875	Oc 80 25	....	....	....	....	....	....	....	....	....	....	....	....
Fa. de Smet, Dk.	100	100	....	....	530	De 82 20	5.50	....	....	....	....	....	....	....	....	....	....	....
Findley, Ga.	200	1	*	....	4	My 79 18	....	....	....	....	....	....	....	....	....	....	....	....
Freeland, Co.	200	25	*	....	50	My 80 25	....	....	....	....	....	....	....	....	....	....	....	....
Glass-Pend., Co.	250	20	*	....	25	My 81 10	....	....	....	....	....	....	....	....	....	....	....	....
Gold Stripe, Ca.	150	10	*	....	76	Jy 81 15	.07	....	.07	....	.08	.07	.08	.07	....	....	.07	.06
G'ld & Curry, Ne.	108	100	3478	Se 82 50	3826	Oc 70 $10	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Ne.	100	100	420	No 82 25	450	Se 80 25	....	....	.50	.47	.57	....	.60	.60	.75	.70	....	....
Great Eastern, Dk	300	1	*	....	16	Jy 80 01	.04	....	.04	....	.03	....	.03	....	.03	....	....	....
Gr. Mountain, Ca.	125	10	*	....	212	No 81 7½	....	....	.54	.47	.53	.52	.55	.53	.52	....	.53	.52
Hale & Nor., Ne.	112	100	4006	Se 82 50	1598	Ap 71 5 00	....	....	....	....	....	....	....	....	....	....	....	....
Hall-And's'n, N.S.	150	1	....	....	....	Ja 83 05	....	....	1.75	....	1.70	....	....	....	....	....	1.75	1.50
Hecla Con., Mon.	30	50	....	....	387	No 82 50	....	....	....	....	....	....	....	....	....	....	....	....
Hibernia, Co.	300	25	*	....	180	Jy 81 40	.05	....	.05	....	.07	.06	.06	.05	.05	....	....	....
Holyoke, Id.	200	1	....	....	14	Ja 83 03	....	....	....	....	....	....	....	....	....	....	....	....
Homestake, Dk.	100	100	200	Ju 78 1 00	1812	Ja 83 50	....	....	....	....	....	....	....	....	....	....	....	....
Horn-Silver, Ut.	400	25	*	....	1700	No 82 75	7.50	7⅜	7.50	7.25	7.00	....	7.00	....	7.25	7.00	7⅞	7.25
Hukill, Co.	200	5	*	....	210	De 78 10	.18	.16	....	....	.17	....	....	....	....	....	....	....
Indep., Ne.	100	100	185	Fe 82 15	225	Se 79 25	....	....	....	....	....	....	....	....	.67	....	....	....
In. Queen, Ne.	125	2	....	....	385	No 82 02	....	....	....	....	....	....	....	....	....	....	....	....
Inyo, Ca.	100	5	*	....	45	Ap 82 05	....	....	....	....	....	....	....	....	....	....	....	....
Iron Silver, Co.	500	20	*	....	900	De 82 50	2.55	....	2.60	2.55	2.60	2.55	2.60	2.55	2.55	....	2.65	2.60
Jocuistita, Mex.	100	100	....	....	180	Jy 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Kentuck, Nev.	30	100	342	No 81 30	955	Fe 70 5 00	....	....	....	....	....	....	....	....	....	....	....	....
La Plata, Co.	200	10	*	....	610	Se 82 30	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C., Co.	400	10	*	....	270	Ja 83 05	....	....	....	....	....	....	....	....	....	....	.62	....
Leeds, Ut.	60	100	87	Ju 82 50	78	Oc 78 15	....	....	....	....	....	....	....	....	....	....	....	....
Little Chief, Co.	200	50	*	....	700	Au 80 50	.44	.41	.42	.41	.42	....	.43	.41	.43	....	.43	.42
Little Pitts., Co.	200	100	*	....	1050	Mr 80 50	.74	.72	.70	.65	.70	.69	....	....	....	....	....	....
Marguerite, Cal.	25	20	....	....	19	Oc 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Martin White, Ne	100	100	950	Se 82 25	90	Jy 79 30	....	....	....	....	3.10	....	....	....	....	....	....	....
Minas Nu'v's, Mex	100	3	*	....	20	Jy 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Moose, Co.	200	10	4	....	560	Mr 78 25	....	....	....	....	....	....	....	....	....	....	....	....
Morning Star, Co.	100	10	....	....	565	De 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Ne.	100	100	235	Mr 82 20	100	De 82 25	9⅛	9.00	8.75	....	....	....	....	....	9.00	9⅞	9.00	....
N. Y. & Colo., Col.	50	20	....	....	25	Jy 79 10	....	....	....	....	....	....	....	....	....	....	....	....
N'th'n Belle, Ne.	50	100	....	....	2300	No 82 50	....	....	9.50	....	9⅝	....	....	....	....	....	....	....
N. Belle Isle, Ne.	100	100	76	No 82 20	45	Se 82 15	....	....	....	....	....	....	.60	....	.65	....	....	....
Ontario, Ut.	150	100	....	....	492	Ja 82 50	....	....	....	....	....	....	....	....	....	....	34⅞	....
Ophir, Ne.	100	100	3495	De 82 1 00	1595	Jy 82 1 00	....	....	2.25	2.20	2.30	2.20	....	....	1.50	1.25	1⅝	1.25
Osceola, Mich.	50	25	480	Ap 76 1 60	785	De 82 1 00	....	....	....	....	....	....	....	....	....	....	....	....
Pleasant Val., Cal	100	100	....	....	30	De 82 05	....	....	....	....	....	....	....	....	....	....	....	....
Plumas, Ca.	100	10	*	....	151	Jy 79 8	....	....	....	....	....	....	....	....	....	....	....	....
Prussian, Colo.	150	10	....	....	117	No 32 10	....	....	....	....	....	....	....	....	....	....	4.35	4.20
Quicks. Pref., Ca.	43	100	....	....	664	Ju 82 6 00	....	....	....	....	....	....	....	....	....	....	37⅞	....
" Com., Ca.	57	100	....	....	151	Ju 82 40	....	....	....	....	....	....	....	....	....	....	....	....
Quincy, Mich.	40	25	200	De 62 5 00	3330	Au 82 5 00	....	....	....	....	....	....	....	....	....	....	....	....
Rising Sun, Ca.	150	5	*	....	52	My 81 7½	.07	....	.07	....	....	....	....	....	....	....	.06	....
Robinson Bar, Id.	100	1	*	....	9	De 82 03	....	....	....	....	....	....	....	....	....	....	....	....
Robinson C., Co.	200	50	*	....	575	No 81 50	1.25	1.20	1.25	1.15	1.25	1.15	1.30	1.15	1.30	1.25	1.30	1.25
Robt. E. Lee, Co.	500	500	....	....	100	De 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Savage, Ne.	112	100	5484	No 82 50	4460	Ju 69 3 00	....	....	....	....	....	....	....	....	....	....	....	....
Shoshone, Id.	150	1	....	....	3	No 82 01	....	....	....	....	....	....	....	....	....	....	....	....
SierraGrande, NM	....	....	....	....	300	Ja 83 25	2.60	2.50	2.75	2.65	2.75	2.50	2.65	2.60	2.75	2.60	2.80	2.75
Sierra Nev., Ne.	100	100	5150	De 82 1 00	102	Ja 71 1 00	....	....	....	....	3.00	2.85	2.85	....	3.00	....	3.10	....
Silver King, Ar.	100	100	....	....	1125	De 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Silver King, Co.	500	2	....	....	50	Au 81 10	....	....	....	....	....	....	....	....	....	....	....	....
Socorro, N. Mex.	2.5	100	....	....	4	Mr 82 24	....	....	....	....	....	....	....	....	....	....	....	....
Spr'g Valley, Ca.	200	1	*	....	50	Ja 81 25	....	....	2.50	....	....	....	....	....	....	....	....	....
Standard, Ca.	100	100	....	....	4050	Ja 83 25	6 25	5⅞	6⅛	5.75	5⅝	....	5⅞	5.75	5⅞	5.50	5.75	....
Starr-Grove, Ne.	200	10	*	....	160	Ju 81 10	....	....	....	....	....	....	....	....	....	....	....	....
Stormont, Ut.	200	1	*	....	155	No 81 05	....	....	....	....	....	....	....	....	....	....	....	....
St. Joseph, Mo.	100	10	*	....	390	De 82 20	....	....	....	....	....	....	....	....	....	....	....	....
Tip Top, Ar.	100	100	170	Mr 80 50	100	No 81 20	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone, Ar.	500	25	*	....	1250	Ap 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Vizina, Ar.	200	25	*	....	140	Ap 82 10	1.00	....	....	....	....	....	....	....	....	....	....	....
Yellow Jacket	120	100	5338	Fe 82 1 00	2184	Au 71 2 50	....	....	....	....	....	....	....	....	1.25	1.13	1.25	....

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ 4817·5.

SALES.—Alice, 1000; Amie Consolidated, 25,350; Argenta, 2306; Bassick, 100; Belle Isle, 3700; Bodie Consolidated, 450; Bulwer, 1100; California, 6600; Chrysolite, 4000; Climax, 2100; Consolidated Virginia, 5550; Eureka Consolidated, 850; Father de Smet, 300; Gold Stripe, 10,000; Grand Prize, 3595; Great Eastern, 4900; Green Mountain, 3100; Hall-Anderson, 8900; Hibernia, 3300; Horn-Silver, 1770; Hukill, 1600; Independence, 1000; Iron Silver, 3100; Leadville Consolidated, 100; Little Chief 14,300; Little Pittsburg, 1225; Martin White, 100; Navajo, 700; Northern Belle, 125; North Belle Isle, 900; Ontario, 50; Ophir, 1730; Prussian M. & M. Co., 900; Quicksilver, preferred, 100; Rising Sun, 3400; Robinson Consolidated, 55,800; Sierra Grande, 10,125; Sierra Nevada, 660; Spring Valley, 200; Standard, 2897 Virginia Consolidated, 100; Yellow Jacket, 500. Dividend shares sold, 188,583.

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calm, and partly due to the delay in hearing from the Patterson well. This well lies near the border of the Cooper tract, in Forest County, in which was opened during December the Schultz and Reid and Brenneman. This Cooper tract is very spotted, that is, its wells do not uniformly find oil as they do in the Bradford District, and this led to doubts as to the Patterson, especially as it was near the outside limit of the oil belt. However, on Monday last, it was reported dry, though until Thursday no scouts were allowed to visit it. Hence doubts as to whether it was actually dry or a small producer. It is now pronounced absolutely dry, 23 feet in sand.

The following are the fluctuations during the week:

	Opening.	High-est.	Lowest.	Closing.	Sales.
January 20	.89½	.90⅛	.88⅞	.90⅛	69,000
" 22	.90¼	.94¼	.90	.93¾	191,000
" 23	.94	.94¼	.92½	.93⅛	386,000
" 24	.93⅝	.99¼	.93	.99¼	391,000
" 25	1.00	1.05¼	1.00	1.04⅛	714,100
" 26	1.04½	1.05⅜	1.02½	1.03	680,000
Total sales					2,431,100

A special meeting of the stockholders of the Southern Eureka Mining Company was held on Tuesday last, and a committee, consisting of Messrs. S. B. Johnston, John Van Horne, Stephen W. Massett, and the President, were appointed to devise measures to relieve the company of its financial difficulties.

This week, a meeting was held of the stockholders of the Green Mountain Mining Company, at which reports were read and explanations given. We understand that the gross debt of the company is $49,000, against which there are offsets of approximately $8000. The subscriptions to the $35,000 mortgage bonds authorized by the stockholders thus far aggregate $12,000. The bulk of the debt is for the payment of miners' wages.

UNLISTED QUOTATIONS.

Mr. Alexander C. Lassen, under date of January 26th, three P.M., reports the current quotations of unlisted stocks as follows:

	Bid.	Asked.		Bid.	Asked.
Bodie Tunnel	$0.25	$0.75	Jocuistita	$7.00	$8.75
Breece	.16	.18	Lewiston Hydr.	.10	.27
Buckeye Water	.50	....	Little Rapids	....	1.00
Bunker Hill	.99	1.00	London Cons	.90	1.35
Borva Copper	....	2.00	Mack Morris	....	.75
Batopilas Pref.	9.00	24.00	Madre	.50	2.00
Berkshire	....	.35	Moulton	....	4.00
Calif'rnia Wat'r	.25	....	Native Silver	....	.30
Carbonate Hill	.80	.84	North Horn	....	.30
Centennial	....	.20	Pelic'n & Dives	....	.50
Contention	3.00	8.00	Plata Verde	....	.25
Dahlgren	.40	....	Rico	....	.55
Denver City	.20	.30	Rocker	....	.10
Empire Gold	2.00	....	Santa Maria	.40	1.10
Eureka Tunnel	.45	.90	Silver State	....	1.10
Evening Star	1.00	....	Stormont, new	.20	.30
Freeland	.65	.95	Sampson	.35	....
Grand Central	1.50	....	Silver Cord	1.25	1.35
Glass Pendery	....	1.00	Satemo	.50	.75
Highland Chief	.20	....	Sierra Apache	.32	.34
Hibernia Silver, (New)	.17	.21	Sierra Bella	.62	.63
Hond. Rosario	....	7.00	Terrible	1.75	....

MEETINGS.

Borcel Mining Company, No. 92 Broadway, New York. Annual meeting of stockholders and election of trustees, February 5th, at two P.M.

Irene Mill and Mining Company, No. 2 Nassau street, Room 15, New York. Annual meeting of stockholders and election of trustees, February 13th, from twelve to two o'clock P.M.

Plumas Consolidated Mining Company, No. 50 Exchange Place, Rooms 12 and 13, New York. Annual meeting of stockholders, February 3d, at a quarter past three o'clock P.M.

Standard Consolidated Mining Company, No. 309 Montgomery street, Room 29, San Francisco. Annual meeting of stockholders and election of trustees, February 5th, at one o'clock P.M.

Tremont Coal Company, No. 227 South Fourth street, Philadelphia. Annual meeting of stockholders and election of trustees, February 6th, at twelve o'clock P.M.

Ward Consolidated Mining Company, No. 2 Wall street, New York. Annual meeting of stockholders and election of trustees, February 13th, from two to three o'clock P.M.

DIVIDENDS.

The Fulton Coal Company has declared a dividend of 5 per cent, payable at Philadelphia on and after January 23d.

The Glen Mining Company, of Colorado, has declared a dividend of one per cent, payable February 6th, to shareholders of record, January 27th.

The Glen Mining Company, of Colorado, has declared a dividend of 2 per cent, payable February 1st, to shareholders of record January 27th.

NON-DIVIDEND PAYING MINES.

Name and Location of Company.		Number of Shares.	Par.	Assessments. Total levied to date.	Assessments. Date and amount of last.		Highest and Lowest Prices per Share at which Sales were Made. Jan. 20. H.	Jan. 20. L.	Jan. 22. H.	Jan. 22. L.	Jan. 23. H.	Jan. 23. L.	Jan. 24. H.	Jan. 24. L.	Jan. 25. H.	Jan. 25. L.	Jan. 26. H.	Jan. 26. L.
Advance																		
Albion, s. L	Nev.	150,000	100	472,500	Jan.	83 50												
Allouez	Mich																	
Alpha	Nev.			420,000	Mar.	82 50												
Alta	Nev.	100,000	100	1,392,090	Jan.	83 25								12c				
Alta-Montana, G	Mon.	500 000	10	*			22c		22c									
Am. Flag, s	Colo	125,000	10	300,000	Jun.	77 25												
Barcelona, G	Nev	200,000	25	*			23c		23c		23c		22c		21c	20c	20c	19c
Battle Creek																		
Bear Creek	Cal.	300.000	1															
Beauce																		
Bechtel Con., G	Cal.	100.000	100	185,000	Jan.	83 10												
Best & B'lcher, G. S	Nev.	100,800	100	1,345,790	No.	82 50					3.50	3.00	3.75	3.50				
Big Pittsburg, S. L	Colo	200,000	100	*			20c						15c		16c	14c	15c	14c
Black Jack, G	Cal.	100,000	2½															
Bonanza Chief	Mon	1,000.000	1	*					3c		3c							
Bondholder	Colo	200,000	2½															
Boston Con., G	Cal.	100,000	100	95,000	Oct.	82 25												
Boulder Con																		
Bradshaw, s	Ariz	225,000	10				38c		38c	37c	38c	36c	38c	37c	39c	36c	37c	
Buckeye	Colo	100,000	5	*											3c		3c	2c
" pref																		
Bull-Domingo, S L	Colo	200,000	50	*					5c									
Bullion, G. S	Nev.	100.000	100	3,747,000	Oct.	82 50												
Bye and Bye	Ariz	100,000	10	*														
Calaveras, G	Cal.	500,800	1	*			3c		3c	2c	2c		2c					
C'lav'r's W. & M. Co	Cal.								6c									
Cal., B. H., G	Dak.	100.000	100	480,000	Au.	82 15	85c	80c										
Carbonate Hill, S L	Colo	200,000	10															
Catskill, S	Nev.	300,000	5															
Central Ariz'na, S	Ariz	100.000	100				47c	45c	40c		40c							
Chapparal	Cal.																	
Cherokee, G	Cal.	150,000	10				6c		6c				6c		6c			
Chollar					Sep.	82 50									2c			
Clarence	Can.														1.38			
Colorado Cent'l, S	Colo	300,000	10															
Col'mb'a Con., G. S	Nev.	100,000	50															
Cons. Imp'ri'l, G. S	Nev.	500,000	100	1,425.000	Jan.	82 10					2c		3c					
Con. Pacific, G	Cal.	60.000	100	141,000	Au	82 25												
Crescent, S L	Colo	300,000	10	*														
Crowell, G	N. C.	500,000	1								4c							
Dahlonega, G	Ga.	250,000	1	*					2c									
Dardanelles, G	Cal.	100,000	10															
Decatur							10c	9c	10c	9c	11c	9c	12c	10c	12c	11c	12c	11c
Dunderberg, S	Colo	150,000	10	*														
Durango, G	Dak.	500.000	1	*			9c				10c							
Eastern Oregon																		
Elko Cons							27c	25c	23c	20c	24c		24c		22c			
Empire, S	Ut'h	100,000	100															
Enterprise	Colo								52c	51c			55c	52c	53c	52c	55c	49c
Exchequer	Nev	100,000	100	630,000	Jan.	82 25												
Fannie Barret							2.20		2.20		2.20		2.20					
Globe Copper	Ariz.																	
Gold Placer, G	Colo	200,000	25	*														
Goodshaw, G	Cal.	100.000	100	200,000	Oct.	82 10									5c		5c	
Granville, G	N. C.	800,000	1	*														
Harlem M. & M. Co									1.00		1.05	1.00	1.05	1.00	1.05	1.00	1.05	
Harshaw, s	Ariz	100,000	100															
Head Center, s	Ariz	100.000	100	160,000	May	82 20												
Hortense, s	Colo	200,000	10						15c		16c							
Index	Cal.																	
Julia, G S	Nev.	110,000	100	1,394,000	Jan.	82 20												
Kossuth, G S	Nev.	108,000	100	421,200	Aug.	77 15												
Lacrosse, G	Colo	100,000	10	*			15c	13c	14c		14c		14c					
Leviathan, S	Nev	100,000	100	980,000	Sep.	82 25												
Lucerna, S	Colo	500,000	10	*														
Mariposa Pref. G	Cal.	50,000	100	1,687,500	Dec.	81												
" Com., G	Cal.	100,000	100	1,950,000	Feb.	82												
May Belle, G	Cal.	100,000	100	84,000	Dec.	81 20												
Mayflower, S	Colo	100,000	100	*														
Mexican, G. S	Nev.	100,800	100	2,146,800	Oct.	82 $1					2.75	2.50	2.75	2.38	2.63	2.25	2.75	2.50
Michoacan Synd	Mex.																	
Miner Boy, G S L	Colo	500,000	10	*														
Miller	Nev.	200,000	25															
Mono, G	Cal.	50,000	100	535,000	Jan.	83 20												
Moose Silver, S	Colo	800,000	10															
Nevada Syndi																		
North Standard, G	Cal.	100,000	100	20,000	Nov.	81 10												
N. Horn-Silv'r, S L	Utah	400,000																
Noonday	Cal.	60,000	10	208,000	Dec.	82 $1												
Old Dominion, C	Ariz	200,000	100	*														
Oriental	Nev.	200,000	10															
Ori'nt'l & Miller, S	Nev.	400,000	25				15c		15c	14c	15c	14c	15c	14c	15c	14c	16c	15c
Overman, G S	Nev.	115,200	25	3,604,700	May	82 25												
Potosi	Nev.	112,000	100	500,040	Nov	82 25												
Quartz Creek			100				3c				2c		2c		3c	2c		
Rappahannock, G	Va	250,000		*			10c		11c									
Red Elephant, S	Colo	500,000	1	*							7c		7c	6c				
Retort			10															
San Pedro, G S L	N. M	400,000																
Silver Cliff, S	Colo	200,000	25	*					40c	38c	38c	38c	38c				37c	
Silver Islet	Can.		50															
Sonora Con	Mex.						8c											
South Bodie, G	Cal.	100.000		100,000	Mar.	82 15												
South Bulwer, G	Cal.	100,000	100	195,000	May	81 25												
South Hite	Cal.	100,000	100		May	82 10												
South Pacific	Cal.		5				9c		9c	8c	9c		9c		9c		9c	8c
State Line No. 1, S	Nev.	200,000	1															
" No. 2, S	Nev.	200,000	25															
" No. 3, S	Nev.	200,000	25															
" No. 4, S	Nev.	200,000	25															
" Nos. 1 & 4, S	Nev.		25						3c		4c		4c	3c	4c		4c	
" Nos. 2 & 3, S	Nev.						8c	7c	9c	7c	8c	7c	9c		9c	8c	9c	8c
Sutro Tunnel	Nev.	2,000,000		*			23c	22c	24c	23c	23c	22c	23c	22c	23c	22c	22c	21c
Taylor-Plumas			10				19c	17c	18c		19c	17c	17c		18c		18c	
Tioga, G	CC.	100,000		285,000	Oct.	82 10												
Tuscarora, S	Nev	100,000	100	110,000	Oct.	81 15			20c		21c	20c	20c					
Unadilla, S	Ariz	500,000	100	*														
Union Cons., G. S.	Nev.	100,000	1	1,570,000	Jan.	83 $1	2.10						2.40		2.50	2.25	2.55	2.50
Utah		20,000	100	1,360,000	Dec.	82 $1												
Vandewater	Nev.	200,000	100	*														
Washington	Ariz.	200,000	10															
Whalen Copper	Nev.	100,000	25															
Wide West																		
Willshire	Cal.	50,000	5	*														

SALES.—Alta, 1000; Alta-Montana, 900; Barcelona, 9,400; Best & Belcher, 220; Big Pittsburg, 2800; Bonanza Chief, 1200; Bradshaw, 7600; Buckeye, 2500; Bull-Domingo, 200; Calaveras, 6400; Calaveras, W. & M. Co., 200; Caledonia, B. H., 350; Central Arizona, 2600; Chapparal, 22,000; Cherokee, 2600; Chollar, 100; Consolidated Imperial, 6800; Crowell, 1300; Dahlonega, 100; Decatur, 40,900; Durango, 200; Elko Consolidated, 19,200; Enterprise, 5700; Fannie Barrett, 1100; Goodshaw, 300; Harlem M. & M. Co., 7200; Hortense, 200; Lacrosse, 3300; Mexican, 4580; Oriental & Miller, 19,800; Quartz Creek, 13,100; Rappahannock, 1300; Red Elephant, 1200; Silver Cliff, 700; Sonora Consolidated, 500; South Pacific, 14,200; State Line, Nos. 1 & 4, 1700; State Line, Nos. 2 & 3, 14,800; Sutro Tunnel, 25,600; Taylor-Plumas, 22,200; Tuscarora, 1840; Union Consolidated, 600. Non-dividend shares sold, 265,790. Total shares sold at all the Exchanges, 454,373.

The Granite Silver Mining Company, of Colorado, has declared a dividend of one per cent, payable February 1st, to shareholders of record January 27th.

The Quincy Mining Company, of Michigan, has declared a dividend (No. 29) of $6 per share, payable February 15th.

The San Francisco Copper Mining Company, of California, has declared a dividend (No. 7), payable at San Francisco, on and after January 20th.

The Sierra Grande Mining Company, of New Mexico, has declared its fourth regular monthly dividend of 25 cents per share, or $100,000, payable at Philadelphia on and after February 1st.

The Smuggler Consolidated Mining Company, of

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BOSTON MINING STOCKS.

	Jan. 19.		Jan. 20.		Jan. 22.		Jan. 23.		Jan. 24.		Jan. 25.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez			2.60				16.00				2.60		400
Atlantic													15
Aztec													
Best & Bel													
Bodie Con													100
Bonanza D.	2.50		2.87½		2.81¼	2.25	2.25						700
Bruns. Ant.					3.37½								10
Bulwer													
California													
Cal. & Hec.											2.47		15
Carbon. Hill													
Catalpa	.65				1.05	1.02½	1.00		1.00				2,400
Central Ariz													
Cherryfield	.25		.25										1,000
Chrysolite													
Con. V'ginia													
Copp'r Falls			2.00	1.87½									350
Crescent	.40	.37	.40		.43		.42½		.42½	.40			1,500
Cumberl'd													
Deer Isle	.13		.12				.13		.13				1,600
Denver City													
Douglas	1.00						.85						200
Duncan													
Dunkin													
Empire					.30		.30		.31	.30			7,000
Eureka Con.													
Franklin			14.50	14.00	13.00		13.50	13.44	14.00	13.75			1,050
Gila County			.25		.26								1,000
Hancock G.													
Harshaw									.50				25
Horn Silver													
Huron	2.00		1.87½		1.87½		1.87½						800
Independ'ce													
Indian Q'n													
Little Pitts													
Madison													
Mammoth													
Mass. & N.M.	.22	.21	.21		.21		.21	.18	.19				24,243
Milton													
Napa					3.25								500
National													
North. Belle													
Osceola	31.00		31.50	31.00			31.25		31.00				115
Penn-Breck													
Pewabic	9.00				8.50	8.00							585
Pine Tree													
Plymouth	.29				.27	.26	.25		.25				1,400
Quincy	61.50	61.00	63.00	61.50	62.00		62.75		61.00	59.00	60.00	59.75	788
Ridge													
Robinson	1.25												300
San Pedro	.60	.40	.60		.60	.57	.50		.60	.55	.60		5,037
S'ra Nevada					2.55								100
Silver Islet					6.00		7.00				6.00		170
Silver King													
So. Pacific													
Standard							6.00						
State Line													
Nos. 2 & 3													
Sullivan	1.00		1.00		1.00								950
Sutro Tun	.25		.25				.24						500
Sycamore													
Twin Lead			.25				.25		.25				3,000
Vizina													

PHILADELPHIA MINING STOCKS.

	Jan. 19.		Jan. 20.		Jan. 22.		Jan. 23.		Jan. 24.		Jan. 25.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American	.32½		.35	.32½	.32½	.27½	.37½	.32½	.35	.32½	.32½	.30	*
Argent	.25		.25										2,500
Arizona So.													
Aztec													
Battle Mt.													
Black Sul			.02										1,500
Bodie													
Buena	.05		.06	.05	.06		.06		.06		.06		31,900
California													
Calista	.06				.05						.05		9,000
Cincinnati			.14				.14		.14	.13	.13		1,200
Comprom'e			.32½		.30								5,100
Dauntless			.03				.03						5,050
Del Monte			.04										1,000
Denver City	.23		.23		.20	.19	.21	.18	.19	.18	.20	.18	15,000
Fairview									.01				1,500
Eureka													
Girard	.18		.18				.19	.17	.18		.18	.16	12,700
Golconda	.01				.01								4,800
Golden Age													
Governor	.08		.08				.08	.07					8,000
Grand Uni'n	.11		.13		.12		.14	.13	.15	.13	.14		30,100
Gunnison									.50				100
Hancock	.01												15,000
Intervener													
Iowa Gulch	.12	.11	.13	.12	.12		.15	.13	.14	.12	.13	.12	61,900
King Bul'on													
Little Dia'd	.07						.06						5,300
Little Maud	.10	.07	.11	.10	.12	.11	.12	.11	.12	.10	.11		93,747
L'g & D'y Bl	.01		.01		.01								17,250
McCullough													
Magnolia													
Montana									.08				150
Mt. Lincoln	.02		.02										1,100
Mt. Sheridan	.07	.06	.06		.06		.06				.05		15,100
National													
Orion	.09	.08			.09		.17	.09					1,143
Orion Pref	.14		.17	.15	.17								3,700
Palmetto E.													
Pembina	.21	.2(	.21		.21								4,100
Penn-Breck	.14		.14		.14		.15	.13	.16	.15	.15		16,500
Permanent													
Pizarro													
Pizarro Ex	.03												2,400
Potosi													
Rara Avis	.57½	.55	.65	.57½	.72½	.65	.75	.70	.72½	.65	.67½		17,700
Rara Avis E.			.05		.06		.08	.07	.08	.08			20,600
Record													
Rico Pion'r													
San Pedro													
Sierra G'nde	2.65	2.50	2.50		2.70				2.70		2.75		1,700
Silver Cord			1.35		1.30								2,300
Silv'r Plume							.02				.02	.01	13,000
Silver Rock											.02		3,700
Sovereign													
Standard	.03						.03						2,600
Sultana	.04		.04				.04				.05	.04	19,300
Sutro Tun'l				.23			.35						500
Tombstone	.87½	.85	.90	.87½	.92½	.90	.90		.92½	.90	.90	.87½	9,000
Tranquilli'y													
Tyrone													
Victor	.02				.02								15,000
Yale Mt.							.15						500

* 469,574.

Colorado, has declared a dividend of 5 cents per share.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been active and steady. The middle Comstocks have advanced slightly under a moderate business. Hale & Norcross and Savage have been in good demand in the market, owing, it is said, to the striking of stringers of ore in the joint drift on the 2600-foot level. The ore assays about $40 per ton. Telegraphic dispatches state that an important strike has been made in Columbus Consolidated, Candelaria, Nev., causing activity in stocks of other mines in the same district.

The Tuscarora stocks have been quiet and have suffered a slight decline.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Jan. 19.	Jan. 20.	Jan. 22.	Jan. 23.	Jan. 24.	Jan. 25.
Albion	29-32	15-16	15-16	¾	11-16	¾
Alpha		11-16				13-16
Alta	5-32	5-32	5-32	5-32	3-16	5-32
Bechtel						
Belcher			¾	11-16	¾	
Best & Belcher	3¼	3	3¼	3⅜	3⅜	3⅜
Bodie	1⅞		1¾	1¾	1⅝	15-16
Bullion	29-32		29-32	29-32	29-32	
Bulwer						
California	5-32	5-32	3-16	3-16	5-32	3-16
Chollar	1¼	1⅛	1¼	1¼	1¼	1⅛
Con. Virginia	7-16	9-16	7-16	½	½	½
Crown Point	1			15-16	15-16	15-16
Eureka Con	10¼		10¼	10¼		
Exchequer		3-16	3-16	3-16	3-16	3-16
Gould & Curry	1⅛	1⅛	1¼	1⅛	1⅜	1⅛
Grand Prize	19-32	9-16	11-16	27-32	13-16	11-16
Hale & Norcross	29-32	¾	1	1⅛	1⅛	1⅝
Manhattan						
Martin White	3	2⅞	2⅞	2¾	2⅞	2¾
Mexican	2¼	2¼	2⅝	2⅝	2⅝	2⅝
Mono	3-32					
Mount Diablo				3¾	3¾	
Navajo	9	8⅞		8½	8⅝	8¾
Northern Belle	9⅛		9⅛	10		10
Noonday						
Ophir	1⅛	1	1¼	1¼	1¼	1¼
Oro						
Overman	3-32	5 32	5-32		5-32	
Potosi	1¼	1¼	1¼	1⅛	1⅛	1⅛
Savage	19-32	9-16	10-32	21-32	27-32	1¼
Scorpion		7-16	13-32	½	½	
Sierra Nev		2¼	2¾	2¾	2¾	3
Silver King	10⅝	10½	10⅞	11⅛		
Tip Top						
Union Con	2¼	2	2¼	2¼	2⅛	2⅝
Wales Con	3-16		3-16		3-16	
Yellow Jacket	1¼	1⅛	1¼	1¼	1¼	1¼

The following statement shows the finanacial condition of the companies named on January 1st:

CASH ON HAND.

Alta	$8,505.68
Best & Belcher	30,044.19
Benton Consolidated	4,650.54
Bechtel	9.34
Belding	336.93
Bulwer Consolidated	15,372.30
Bodie Consolidated (bullion on hand $4302.88)	25,928.32
California	33,993.94
Crown Point	20,886.08
General Jackson	830.98
Lady Washington	1,179.58
Mount Diablo	3,075.38
Northern Belle (unsold bullion on hand, $152,400.50)	34,418.11
Oro (indebtedness $5958.14)	98.05
Scorpion	107.62
Standard	91,581.14
Union	6,700.00

INDEBTEDNESS.

Argenta	$2,885.79
Betty O'Neal (over-draft)	7,050.67
Grand Prize	3,970.99
Mono	1,587.80
Sierra Nevada	7,485.70
Star (old indebtedness, $36,839.84)	34,170.00
Utah	6,545.38

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Jan. 25.

There has been a fair degree of activity in the market the past week for the copper stocks, with a decline in the two or three leading stocks, which it is difficult to account for. Franklin, which has been notably strong the past few weeks at $15@$15¼, suddenly declined on small sales to $13. We hear no reason assigned, as all reports from the mine are favorable, and the prospects for a dividend at an early day are very promising. The stock later rallied to $14, and closed to-day at $14 bid. Pewabic was also weak, and declined from $10@$8; later, $8½ bid. There are rumors of another assessment at no distant day, but we are unable to trace them to any reliable source. Quincy advanced early in the week from $59½@$62 regular, and $62½ buyer 60 days; but on the announcement of a dividend of $6 per share, the stock, strange to say, declined to $59, but subsequently rallied to $60, and closed at $59¾. Osceola declined on small sales to $31. Atlantic, sales at $16. Allouez, $2.60. Huron, $2@$1⅞. Copper Falls, $2. Brunswick Antimony, $15.

The market for silver stocks has ruled dull and lower. Catalpa declined to 95c.; later, advanced to $1@1.02½. Bonanza, dull at $2¼. Silver Islet declined to $6. Sullivan sold at $1. San Pedro rather active, and advanced from 40@60c.

At the Boston Mining and Stock Exchange, Massachusetts & New Mexico declined from 23@18c. Empire, steady at 29@30c. Deer Isle, 13@11c. Twin Lead, 25c. San Pedro, 50@58c. Pipe Line Certificates have been freely dealt in at 89¼@94½c.

3 P.M.—The market was dull and inactive this afternoon. Allouez sold at $2.60. Catalpa, 95c. San Pedro, 60c. Calumet & Hecla, $246 bid, $247 asked. This stock has been unusually quiet the past week, only 15 shares changing hands at $247. Quincy, $58 bid, $60 asked. Franklin, $14¼ bid. National, $1⅛ bid. Pewabic, $8¼ bid. Huron, $1⅞ bid. Atlantic, $15 asked. ex dividend, $1 per share Silver Islet, $5 bid.

BULLION MARKET.

NEW YORK, Friday Evening, Jan. 26.

The exchanges on India have strengthened the silver market in London, and it may be regarded as firm at the figures of the annexed table:

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Jan. 20	50¼	109⅜	Jan. 24	50⅜	109⅛
Jan. 22	50 3-16	109¼	Jan. 25	50⅜	109⅜
Jan. 23	50¼	109⅜	Jan. 26	50⅜	*

* 109⅜@109¾.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended January 26th, as compiled from various sources, amounted to $260,320.97 as against $251.836.94, reported for the previous week. The receipts from January 1st, 1883, to date, are $1,383,614.78.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended January 20th	$274,250
Corresponding week last year	494,741
Since January 1st, 1883	807,069
Corresponding period last year	832,280

Imports.

Week ended January 20th	$53,395
Corresponding week last year	27,020
Since January 1st, 1883	159,032
Corresponding period last year	291,367

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, reduced the bank's minimum rate for discounts from 5 to 4 per cent. During the week, the bank gained £553,000 bullion, and the proportion of its reserve to its liabilities was raised from 40⅝ to 44⅛ per cent against 38 15-16 per cent at this date last year. January 25th, the bank gained £34,000 bullion on balance. The weekly statement of the Bank of France shows a increase of 4,875,000 francs in gold and of 280,000 francs silver.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 26.

The iron and steel trades are severely suffering from the suspense attending the deliberations of the tariff question, and importers, as well as producers, are longing for a settlement, and will be satisfied whatever it may be, if it is only done speedily. No one thinks of entering into the large contracts for many months' supply which are usually made at this

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ime of the year, and consumers are running along rom hand to mouth, while the stronger producers are uietly holding on.

The following will explain itself :

The Associates of the Iron and Metal Exchange Company, Limited, desiring to place on record their appreciation of the value of the life of one whom death has taken away, do adopt the following resolutions :

Resolved, That, in the death of John Williams Quincy, the iron and metal trades have lost one of their most respected and useful members.

Resolved, that the members of this Exchange do sincerely regret the close of Mr. Quincy's long and honorable career, conspicuous in business, in social life, and in many charitable works ; and they regretfully tender to the firm and family, who have been deeply bereaved, the assurance of their heartfelt sympathy.

B. F. JUDSON, Chairman.
WILLIAM ALLEN SMITH, Secretary.

Mr. John Quincy was born in Portland, Maine, entered the hardware business in Boston, and in 1835 came to this city. In 1837, he commenced business under the style of Davenport & Quincy, now John W. Quincy & Co.

American Pig.—Business drags along, with the standard grades of foundry pig tolerably firmly held, while inferior qualities are offered at lower figures, to meet the falling markets of Scotch pig. Standard to choice Foundry remains unchanged at $24.50@$26 for No. 1 ; $22.50@$23.50 for No. 2. Gray Forge, of which we note a sale of 3000 tons at private terms, is weaker. We quote $20.50@21. There is no change in Bessemer pig, which is nominally $22.50@$23. England cables to the Wall Street Exchange for equal quantities of Nos. 1, 2, and 3, 52s.6d@55s. Spiegeleisen is dull at $33@33.50 for 20 per cent ; $29.50@$30 for 15 per cent ; and $27@$28 for 10@12 per cent.

Scotch Pig.—The market continues exceedingly dull and weak. Arrivals have been 1500 tons, and sales do not aggregate 700 tons at private terms. Freights are as low as 4s. from Glasgow to New York. We quote Coltness, $25@$25.50; Summerlee, $23@$23.50; Glengarnock, $22@$22.50 ; and Eglinton, $21@$21.50. At the Wall Street Exchange the cables are a trifle lower, as follows : Carnbros, 55s.; Gartsherrie, 63s. 6d.; Summerlee, 62s.; Coltness and Langloan, 66s. 6d.; Glengarnock, 56s.; and Eglinton, 50s.; Warrants are 48s.

Steel Rails.—Beyond a few sales at steady figures for immediate delivery, there is nothing to report. We quote for small lots $40 at mill. London cables £4 15s.@£5.

Old Rails.—We hear of no business, and quote $23¼ bid and $25 asked for Ts.

Scrap.—With little inquiry, the market remains unchanged at $24.50@$25 ex ship.

Philadelphia. Jan. 26.

Pennsylvania markets show a slight improvement in demand, but prices are still at the low limits of the past month. Consumers have found it necessary to provide for urgent requirements. Some of the larger consumers have discounted the probable action of Congress, and believe either the Tariff Commission's bill will be embodied in the law, or, if not that, the debate will be postponed to a re-convened session, or over to next winter. The sentiment of the protectionists in and out of Congress is, that if the Tariff Commission's suggestions can not be embodied in law, the question will go over. There is a very bitter contest going on, d it is impossible to predict even any probable re-

Buyers are holding back as far as possible, and aking purchases for limited requirements. Weak olders have unloaded in some cases largely at $24.50 for inferior No. 1 Foundry, while better grades are held at $25@25.50. The accumulation referred to heretofore is going on at furnaces, though not to a degree which is likely to weaken prices in the future. A careful canvas among large consumers indicates a steady consumption at about old limits, and hence makers are confident that the demand which is to come during February and March will leave them at the opening of spring with nothing on hand and with better quotations than rule to-day. No. 2 iron has sold at $22.75@$23, and up to $23.50, with one or two brands held higher. Gray Forge iron is selling at $20 @21.50 delivered, and a few buyers have bought quite freely at inside quotations. Strong companies are not disposed to crowd down prices any further, for the double reason that there is, first, no necessity for it, and second, no room for it. The entire situation is surrounded with a good many uncertainties, but the enactment of a law will remove most of them, and very probably lead to a revival of the demand which has been held in check for almost two months.

Bessemer Iron is hanging between $22 and $22.50. Scotch iron is in better demand, and a number of founders have been stocking up with a few weeks' supply. English iron is quoted at $20@$21 ; but one to three thousand ton lots have been offered in this market at $19, and even less it is thought would be accepted.

Blooms.—Charcoal Blooms are selling between $65 and $67. Small orders from 10 to 50 tons are booked. Anthracite Blooms are selling from $55@$56, and the productive capacity is absorbed.

Sheet-Iron.—Sheet-iron is selling from 4@4¾ for gauges 16 to 28. Refined is in fairly active demand, though there is not that pressure for stock which has existed for months past. Manufacturers look for an unusually active spring demand, and are endeavoring to stock up for it.

Merchant Bar is selling at card rates in store, 2·40, though 2·30 is the average price quoted for large orders. The consumption going on is very large, and there are indications that, as soon as the tariff question is disposed of, requirements for two months at least will be covered. Competition between the East and the West is inactive, and country mills are booking orders from 2·25@2·35 for Refined and 2·10@2·20 for Common. Boat Plate and Tank iron is 2½@2·6. Skelp iron is 3·40.

Wrought Pipes are 65c.@67½c. off. Inquiry is improving. Boiler tubes are 55c. off, and a better demand is at hand but for small lots only.

Structural Iron is quiet and weak at 2.5@2.6 for angles; 3½ for Ts; 3¾ for Beams. The probable requirements for the current year will be fully as heavy as last year, and hence there is no anxiety among manufacturers, except that the uncertainties now surrounding the trade in consequence of tariff agitation be removed as soon as possible. Prices have declined about as much as they probably will, but consumers are not attracted into the market, though it would seem that now is a good time to buy.

Steel Rails.—Steel rails are quoted at $40@$42, according to size of order. The large buyers are doing nothing, and are waiting for developments. Small buyers are coming around for 500 to 1000-ton lots. The feeling is decidedly better than a month or so ago. The low prices then prevailing will not be named again. The probabilities are that lake ores will sell one or two dollars lower than last year, although contracts are not yet closed. Western markets are affected by the same causes which are operating East ; but the undertone is good and the outlook is favorable for a revival of demand in early spring. Steel for tool and machinery purposes is in moderate demand, and prices are low, Old rails are quoted at $25 for Ts; $28 for double-heads.

METALS.

NEW YORK, Friday Evening, Jan. 26.

Copper.—The market for Lake is steady, first hands asking 18½c., though probably direct offers from consumers would elicit lower figures. In a small way, Lake changes hands at 18@18¼c. In other grades, there are growing signs of weakness, some parties evidently forcing sales. Baltimore can be had for 16½c., and it is rumored that other brands have been offered at considerably less. London has fallen off to £65 15s.@£66 for Chili Bars, Best Selected remaining steady at £72@£72 5s.

Tin.—Under a moderate business during the week, the market is firm, closing at 21¼@21⅜c. London cables to-day, £93 5s.

Lead.—Absolutely nothing has been done in a large way. The state of our market is well characterized by the fact that a lot of 280 tons of common and 180 tons of selected Germania lead which had arrived by vessel from San Francisco, did not bring out bids higher than 4·60c. for the Common and 4·62½c. for the Refined. The lead went into store. London cables £13 10s.@£13 15s.

Messrs. John Wahl, of St. Louis, wire us as follows to-day :

The demand is only moderate, and there is but very little doing. There are more sellers than buyers in the market, and therefore prices are weak. We quote Soft Missouri 4·30c. and Hard lead 4·25c.

Spelter.—This metal is hard to sell, and there is very little doing at 4⅝c.@4¾c. London cables £16 5s. @£16 10s.

Antimony.—Antimony has drooped again. We quote Hallett's 10⅛c. and Cookson's 11¼c.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 26.

Anthracite.

The market is dull and in an unsettled condition. Recently the leading companies issued private circulars announcing a heavy reduction from former nominal rates, but really coming nearer the ruling rates. This action did not serve to have the desired effect, and it is pretty generally understood that even these private prices are heavily cut. There is a growing feeling of distrust among the companies, and we have good evidence that there is ample cause for it. Unless some measures are taken to put an end to this fighting below board, the consequences may be serious, and may lead to a break injurious to all interests. Consumers, meanwhile, are wisely buying only from hand to mouth, a policy which they will not be likely to abandon until they have good cause to feel certain that there will be no open rupture among the trading producers. The local demand is not great temporarily, although yard stocks are running low. On the other hand, some of the companies are carrying accumulations of coal which are pressing on the market. Other companies are well situated in this respect, but have an inclination to fight for their share of current business, particularly for domestic consumption.

The encouraging features in the market are the prospective heavy demand by mill owners in the East, and the inroads upon Western stocks, due to the severe weather in that section.

The production of anthracite for the week ended January 20th was 343,831 tons, as compared with 570,687 tons the previous week, and 364,557 tons for the corresponding week of 1882. The total product from January 1st to January 20th was 1,341,908 tons, as against 1,315,828 tons for the like period of last year, showing an increase this year of 26,080 tons.

Bituminous.

There is an active competition for what trade there is. In Philadelphia, the ice blockade is breaking up, and there is a prospect of larger shipments from that quarter. We quote alongside, Clearfield, $4.55@$4.70, and Cumberland, $4.65@$4.80, according to quality.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended January 20th and year from January 1st :

TONS OF 2240 LBS.	1883.		1882.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co..	41,327	184,025	49,852	180,961
D. L. & W. RR. Co.	64,691	229,102	62,205	220,657
Penna. Coal Co.....	15,013	64,508	11,183	54,079
L. V. RR. Co.....	7,864	59,537	.....	61,988
P. & N. Y. RR. Co..	2,774	9,763	2,098	9,080
C. RR. of N. J.....	37,000	110,399	51,614	116,414
North & West Br. RR.....	10,210	16,452	.....	.....
	178,879	673,780	176,952	643,179
Lehigh Region.				
L. V. RR. Co.....	47,737	323,909	49,392	212,866
C. RR. of N. J.....	35,945	105,345	36,998	103,925
S. H. & W. B. RR..	.....	1,775	.....	523
	83,682	331,029	86,390	317,314
Schuylkill Region.				
P. & R. RR. Co.....	63,352	281,521	78,168	293,479
Shamokin & Lykens Val.....	16,991	52,228	22,434	58,936
	80,343	333,749	100,602	352,415
Sullivan Region.				
St Line&Sul.RR.Co.	927	3,344	613	2,920
Total	343,831	1,341,908	364,557	1,315,828
Increase.....	....	26,080	....	.... ..
Decrease	....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878.... .... 957,989 tons.
" " " " 1879.....1,023,703 "
" " " " 1880.....1,256,053 "
" " " " 1881.....1,198,256 "

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 20,296 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended January 20th :

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	....	125	... .
Coal for shipment at South Amboy.....	12,096	46,159	46,333
Coal for distribution.....	13,157	45,113	36,882
Coal for company's use	2,811	9,175	6,317
Total.....	28,064	100,572	89,532
Increase...	.....	11,040	.....
Decrease.....	.....	.....	.....

Horsford's Acid Phosphate
In Abuse of Alcohol.
DR. JNO. P. WHEELER, Hudson, N. Y., says: "I have given it with present decided benefit in a case o innutrition of the brain, from abuse of alcohol."

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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VIENNA is to have an International Electric Exhibition, to be opened on the first of August this year, and to last three months. Applications for space will be received at the office of the Managing Committee, Wallfischgasse 9, Vienna, until March 1st, and space will be allotted on May 1st. The plan is a very comprehensive one, and the rapid progress of the applications of electricity since the Paris Exposition makes a very interesting and instructive show highly probable.

THE week has been one of no particular interest in tariff matters. The House of Representatives has fairly launched into a discussion of its own bill, has disposed of the general features of it, and has got to work on the first schedules, iron, steel, and the metals not having been reached as yet.

In the Senate, a duty of $18 per ton was substituted for 9 cents per pound for flat bar iron, $20 per ton for 1¼ cents per pound for round, and $22 per ton for smaller sizes of flat and round bar. Boiler suffered a reduction to 1¼ cents per pound, and sheet-iron came down from a range of 1·5 to 1·7 cents per pound, according to gauge, to 1·2 to 1·5 cents, Russia iron being reduced from 3 to 2½ cents, and tin plates to 1 cent per pound. Hoop, band, and scroll were cut down on the basis of 1 cent for No. 10 gauge and over. The proposition to put cotton ties on the free list was rejected. Wire rods passed unchanged, but the addition of one half of one cent to the duty on iron and steel or articles galvanized was cut down one half and wire excluded.

MR. EDWARD ASHMEAD, of London, has computed a table of the mining companies registered in England during 1882. According to his figures, it would appear that 37 companies were organized to work British metalliferous mines, with a nominal capital of £1,811,800; 33 companies to work coal and iron mines, with £1,503,000 capital; and 22 for quarrying clay, slate, granite, etc., with £694,000. In addition, British capital became interested in 15 mines in other countries in Europe, capitalized to the extent of £1,116,000; three only in Asia, with £175,000; seventeen in Africa, chiefly gold mines of the West Coast, with £1,335,000; and three in Australia, with £140,000. The greatest interest, judging from the number of companies formed and their nominal capital, was taken in American mines, and in these the United States take a leading part. Out of the total of twenty-five companies credited to North America, twenty are situated in this country, and their aggregate nominal capital is £3,118,000, out of a total of £3,433,900. Colorado seems to be the favorite, the list figuring up to £1,623,000, and including the Astor, Belcher, Colorado, Crooke, Denver, Henriett, London & Silverton, Puzzle, San Miguel, Silver Cord, Sleepy Hollow, and White Star.

In South America, Colombia and Venezuela divide between them nearly all the new enterprises of 1882, with a nominal capital of £2,352,100. India has dropped off as rapidly as it rose. In 1879, one company was registered with £100,000 capital; in 1880, twenty-three, with £3,732,500; in 1881, twenty-one, with £2,525,600; and in 1882, only one, with £60,000.

THE STEAM AND GAS PIPES IN THE STREETS.

Some weeks ago, we pointed out the defects in the plan of one of the companies (the American) undertaking to distribute through the streets of this city steam for heat and power. Our criticism was confined to features of construction which rendered large leakage of steam inevitable. Two other evils connected with this company's pipes have since made themselves unpleasantly apparent. The first is the foul odor proceeding from the use of soot as a packing; the second is the liability to explosions from gas collected in the manhole-chambers of the company.

The justice of our former observations is shown by the action of the company itself, in shutting off the steam from its pipes, for the avowed purpose of correcting defects in their construction. General NEWTON, whose high reputation has been hitherto used as a guaranty of the technical excellence of this construction, is now reported to say that, though "Consulting Engineer," he was not consulted as to these details. The Public Works Department makes haste to disavow responsibility for the manner in which the work was done. The directing engineer has resigned his position. Altogether, the confession of failure is complete.

Some time ago, there was a legislative inquiry into the Public Works Department. It is popularly supposed to have been a demonstration of Tammany Hall against the County Democracy, and to have carried a demand by the former for a share of the patronage controlled by the latter. The investigation was allowed to drop, and it is supposed that this result was due to the success of that demand. But while the inquiry continued, it developed the fact that several hundred contracts had been given by the department to one man, without previous advertising, the amount of each being less (often but barely less) than $1000, the limit fixed by law for such letting of contracts. The action of the Commissioner had therefore not been illegal; but the result has been to give to a single party a large amount of business without competition. This showed extraordinary confidence reposed in that party, to put it mildly; and when we add that the same individual is reported to have been the contractor who laid the pipes of the American Company, the suggestion is natural that this extraordinary confidence was extended to his operations there, and that, as competition was not deemed necessary in one case, supervision was considered equally superfluous in the other. If it be true that the ground of the confidence referred to was chiefly political, the whole business is a warning to politicians, and an argument for municipal civil service reform.

It is a noteworthy fact that the gas explosions in the manhole-chambers of this company occurred only after steam had been shut off. We think the following a probable explanation: As we have shown in a former article, the company provided for the expansion and contraction of its pipes by means of stuffing-boxes at the street corners. Each of these had to be inclosed in a chamber of masonry, large enough to permit a man to descend and work at the stuffing-box when it leaked. These chambers became very hot. Every body noticed, during the recent storms, that snow melted at once on the surface over them. The pipes of the gas company near them would naturally be expanded by the heat. But in some cases, we are told, the steam company, following its plan of cheap construction, actually built around the gas-pipes, so that the latter passed through the chamber. Of course, in such cases, they were directly exposed to heat.

Now, the gas company, not foreseeing the advent of such warm neighbors, had provided no expansion arrangements—not even stuffing-boxes

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—and the expansion of its pipes would naturally affect their joints. Yet it is likely that large leaks were not caused until, by the withdrawal of steam from the American pipes, the chambers were allowed to cool, and contraction took place, pulling open the joints of the gas-pipes. This permitted the collection of gas and its mixture with air in the chambers at a temperature too cool to cause immediate ignition—the most fatally favorable conditions, as every mining engineer knows, for a disastrous explosion.

Whether this evil can be prevented without an almost entire reconstruction of the steam company's system, is questionable. The plan necessitates the carrying of highly superheated steam (a piece of thermodynamic foolishness anyhow, since saturated, not superheated, steam is the best conveyer of heat for such purposes); and the pipes must therefore be hot. Whether the chambers can be filled with something equivalent to the mineral wool employed by the New York Company, and thus can be made to offer no spaces for the accumulation of gas, remains to be seen. But it will be useless to fill up the chambers without doing something to prevent the heating of the gas-pipes. *

THE FLUCTUATIONS IN THE PRICE OF SILVER.

Since September last, the price of silver in this and the London markets has been the subject of much attention, the quotations falling in the course of four months two pence in London and fully six cents per ounce here. The year 1882 opened with silver at 51 11/16 pence in London and $1.12 3/4 here, and toward the close of January last reached $1.14, above which figure it remained till March 14th, when it temporarily receded to $1.13 7/8. It rallied again, and on May 4th had risen to $1.15, with London at 52 3/8 pence. It then fell off, going below $1.14 in the middle of June, but recovering that figure at the end of July. It dropped a little in August, but in the middle of the month recovered to $1.14, and entered the month of September with London at 52 1/16 and New York at $1.14@ $1.14 1/8. Light shipments of silver to the East, and very meager bids for India Council bills, offered at a minimum of 1s. 8d. per rupee, caused a steady decline in September, as proved by the following summary of our daily quotations, for which we are indebted to Messrs. HANDY & CRONISE, of this city:

Date.	London.	New York.
September 1	52 1/16	$1.14 1/4@$1.14 3/8
" 7	52	1.14 1/8
" 11	51 15/16	1.14
" 12	51 7/8	1.13 7/8
" 16	51 3/4	1.13 5/8
" 22	51 7/8	1.13 1/2
" 27	51 13/16	1.13 3/8
" 28	51 13/16	1.13 1/4
" 29	51 11/16	1.13 1/8

At the beginning of the month, a stronger downward tendency developed, owing to the offering of India Council bills at a concession, on October 4th, at 1s. 7 1/2d. per rupee. The market then recovered a little, in consequence of a limited demand for silver from the continent, chiefly Austria; but, as the following summary of changes during the month shows, again fell off toward the close, owing to the pressure of a lower exchange in India, and meager bids for India Council bills at the weekly offerings. The October quotations were:

Date.	London.	New York.
October 2	51 3/4	$1.12 3/4@ $1.12 3/8
" 4	51 5/8	1.12 5/8
" 5	51 5/8	1.12 1/2
" 11	51 11/16	1.12 5/8
" 14	51 11/16	1.12 3/4
" 16	51 11/16@51 3/4	1.12 5/8@ 1.12 3/8
" 17	51 3/4	1.13
" 18	51 13/16	1.13 1/8@ 1.13 1/4
" 21	51 3/4	1.13 1/8
" 24	51 3/4	1.13
" 25	51 3/8@51 11/16	1.12 1/2
" 27	51 3/8	1.12 5/8
" 28	51 3/8	1.12 1/2@ 1.12 3/8

November began with a slight rise, due to orders from the continent; but the decline again set in on the 6th, when India bills were again put down to 1s. 7 3/4d. per rupee; and with increased offerings of these bills and larger receipts from Mexico, due to the removal of the export duty on silver on the 1st inst., the market dropped off steadily. The variations in the quotations were as follows during the month:

Date.	London.	New York.
November 1	51 1/2	$1.12 1/4
" 3	51 3/8	1.12 3/8@$1.12 1/2
" 4	51 3/4	1.12 1/2
" 8	51 1/2	1.12
" 10	51 3/8	1.11 3/4@ 1.11 7/8
" 11	51 5/16	1.11 5/8
" 18	51 7/16	1.11 7/8
" 22	51 3/8	1.11 3/4@ 1.11 5/8
" 24	51 1/4	1.11 1/4
" 27	51 1/8	1.10 5/8@ 1.10 3/4
" 29	51	1.10 1/4

In December, the decline continued until the middle of the month, when purchases on Spanish account caused a slight temporary reaction. The offerings of India Council bills were stimulated by successive reductions, until they stood at the end of the year at 1s. 7 1/16d. It is estimated that of the £15,238,000 to be drawn during the fiscal year from April 1st, 1882, to March 31st, 1883, £8,000,000 remained to be drawn for the first three months of the current year. The rapid decline in December must not be attributed to excessive supplies of silver, the arrivals being fully absorbed by Spanish and Austrian orders. The shipments of silver to East India in 1882 were £4,233,000, against £2,550,000 in 1881; and besides these amounts sent from England, about £2,000,000 of Austrian florins were sent to India via Venice during the beginning of the year. The month of December closed with a demand for the continent and with the acceptance of all bills offered by the India Council. The December quotations were:

Date.	London.	New York.
December 1	50 7/8	$1.10
" 7	50 3/4	1.09 3/4
" 9	50 11/16	1.09 1/2
" 10	50 1/2	1.09
" 11	50 3/8	1.08 3/4@ $1.08 1/4
" 14	50 1/4	1.08 3/4
" 15	50 3/8	1.08 3/4
" 18	50 1/8	1.08 1/4
" 19	50 3/8	1.08 3/4
" 20	50 1/4	1.08 3/4@ 1.08 1/4
" 21	50	1.08 1/2
" 28	50	1.08 3/8

January opened with a more active and an enlarged demand for Eastern exchange, and through the sale by the India Council of a large amount of bills at improved rates, the decline was checked. It then reacted in London; and but for the advance here in sterling exchange, our market too would have shown a considerable decline. Toward the close of the month, the exchanges on India strengthened the silver market in London. The fluctuations during the month were as follows:

Date.	London.	New York.
January 2	50 3/16	$1.08 3/8
" 3	50 1/4	1.08 3/8
" 4	50 3/8	1.09 1/8
" 5	50 7/16	1.09 1/4
" 8	50 3/8	1.09 1/8
" 11	50 1/4	1.09
" 12	50 1/8	1.08 7/8
" 13	50 1/8	1.09
" 17	50 1/8	1.09 1/8
" 19	50 3/16	1.09 3/8
" 20	50 1/4	1 09 3/8
" 24	50 3/8	1.09 1/2
" 26	50 3/8	1.09 3/8@$1.09 1/2

The recent action of the House Committee on Coinage, Weights, and Measures, in rejecting, by a vote of seven to three, a resolution to suspend the coinage of silver, makes it practically certain that no change will be made during this session of Congress in the present rate of coinage, notwithstanding the recent statement by the Secretary of the Treasury that the storage-vaults are practically filled.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Export of Copper from Imported Pyrites.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Allow me to call your attention to an error in your issue of January 20th. In your annual review of the metal market for 1882, under the head "Copper," you state that "the copper from imported pyrites is obtained chiefly from Canadian ore, and the bulk is probably re-exported in the form of matte." On the contrary, the entire copper product of the imported Canadian pyrites is eventually handled by the Orford Nickel and Copper Company, and sold entirely as refined ingot copper. Yours truly,

EDWARD D. PETERS, Jr.,
Ass't-Manager O. N. and C. Co.

NEW YORK, Jan. 26.

Rolls versus Stamps.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reading the article of C. A. Stetefeldt in the JOURNAL of November 11th, 1882, I noticed in particular his remarks on increasing the capacity of a dry crushing battery. I have had long experience with stamp-mills, having begun milling in Colorado in 1861, and until this time did not believe that any machine made could take their place.

When the Bertrand mill was built, the managers concluded to try Krom's improved steel rolls. I was placed in charge of the mill at its starting up on June 20th, 1882, and felt great fear that we should not be able to crush the required amount of ore. I intrusted the entire management of the rolls to the machinist who set them up. He soon condemned them, and under his management, which continued until the first of September, they did not crush on an average more than thirty-five tons per day. At that time, I put a new machinist in charge of them, and from then until now we have averaged over fifty tons daily; and could we roast it, I am satisfied we could crush 75 tons daily.

We have crushed with two sets of Krom's rolls nearly 9000 tons of hard quartz ore, without any breakage, turning off, or repairs of any kind, and this with less than half the power that would have been required to drive a forty-stamp battery. For a long time, we crushed our ore to pass through a 30-mesh screen; but as we lixiviate, we have found it was better to leave it coarser. But we find very little difference in the capacity of the rolls then and now.

If I wished to prepare fine pulp for amalgamation, I should add the third set of rolls, set close and rigid without springs, and arrange to have all the nails, pieces of steel, etc., sifted out of the coarse pulp before it is fed to them. By this arrangement, I am quite sure that more ore could be pulped to any degree of fineness than could possibly be done with a forty-stamp battery. Any mill-man can readily see that the cost of shoes, dies, tappets, etc., to keep a stamp-mill in order to crush 9000 tons of ore would be as much as three sets of rolls would cost. I can now see

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why so many have condemned their use and thrown them out. They require to be properly managed, and they will then do the work much cheaper than stamps. We certainly would not change now for the stamps, if they could be put in without cost.

We have demonstrated the following facts:

First. That we can pulp more ore with the rolls than can be done with a forty-stamp battery.

Second. That we have crushed 9000 tons of ore without a dollar's expense for repairs.

Third. That we have done it with less than one half the power that would have been required had we used stamps.

Fourth. That they make less dust, jar, and noise.

Respectfully yours, R. D. CLARK,
GEDDES, NEV., Jan. 22, 1883. Supt. Bertrand Mining Co.

THE PRODUCTION OF THE PRECIOUS METALS WEST OF THE MISSOURI RIVER.

Mr. J. J. Valentine, Vice-President and General Superintendent of Wells, Fargo & Co.'s Express Company, has just issued the following statement of precious metals produced in the States and territories west of the Missouri River, including British Columbia (and receipts in San Francisco by express from the west coast of Mexico), during 1882, which shows aggregate products as follows: Gold, $30,193,355; silver, $50,155,288; copper, $4,055,037; lead, $8,008,155. Total gross result, $92,411,835.

California shows a decrease in gold of $1,696,351. Nevada shows a total falling off of $1,484,188; the yield from the Comstock being $1,333,018, as against $1,726,162 in 1881—a decrease of $393,144. The product of Eureka District is $3,176,656. as against $4,127,265, in 1881—a decrease of $953,609. Utah, Colorado, New Mexico, and Arizona each show a notable increase on the products of last year.

The increase of transportation facilities for carrying bullion, pig-metal, ores, etc., has increased the difficulty of verifying the reports of products from several important localities; and the general tendency is to exaggeration when the actual values are not obtainable from authentic sources; but the aggregate result, as shown herein, we think may be relied on with reasonable confidence:

STATES AND TERRITORIES.	Gold-dust and bullion express.	Gold-dust and bullion other conveyances.	Silver bullion by express.	Ores and base bullion freight.	Total.
California	$14,733,643	$736,682	$509,342	$352,831	$16,332,498
Nevada	752,506	.....	6,588,023	3,022,847	10,363,376
Oregon	431,924	215,512	.....	.....	646,536
Washington	93,892	46,046	.....	.....	140,838
Alaska	.....	240,000	.....	.....	240,000
Idaho	1,091,208	191,568	882,890	1,160,072	3,325,738
Montana	2,150,000	215,000	4,065,000	1,574,000	8,004,000
Utah	76,954	6,201	3,139,020	4,921,000	8,143,175
Colorado	2,536,500	.....	4,803,925	18,592,840	25,933,265
New Mexico	43,728	21,864	919,047	2,682,493	3,667,132
Texas	.....	.....	257,597	.....	257,597
Arizona	386,517	100,000	5,631,083	3,180,667	9,298,267
Dakota	2,595,570	259,557	.....	.....	2,855,127
Mexico (West Coast)	510,192	.....	1,710,249	312,000	2,532,441
British Columbia	537,476	134,368	.....	.....	671,844
	$25,939,210	$2,167,694	$28,506,176	$35,798,750	$92,411,835

The gross yield for 1882, shown above, segregated, is approximately as follows:

Gold	32$\frac{97}{100}$ p. c	$30,193,355
Silver	54$\frac{77}{100}$ p. c	50,155,288
Copper	4$\frac{39}{100}$ p. c	4,055,037
Lead	8$\frac{67}{100}$ p. c	8,008,155
		$92,411,835

ANNUAL PRODUCT OF LEAD, COPPER, SILVER, AND GOLD IN THE STATES AND TERRITORIES WEST OF THE MISSOURI RIVER, 1870-1882.

YEAR.	Product as per W. F. & Co.'s statements, including amounts from British Columbia and W. Coast of Mexico.	Product after deducting amounts from British Columbia and W. Coast of Mexico.	The net product of the States and territories west of the Missouri River, exclusive of British Columbia and West Coast of Mexico, divided, is as follows:			
			Lead.	Copper.	Silver.	Gold.
1870	$54,000,000	$52,150,000	$1,080,000	.....	$17,320,000	$33,750,000
1871	58,284,000	55,784,000	2,100,000	.....	19,286,000	34,398,000
1872	62,236,959	60,351,824	2,250,000	.....	19,924,429	38,177,395
1873	72,258,693	70,139,860	3,450,000	.....	27,483,302	39,206,558
1874	74,401,045	71,965,610	3,800,000	.....	29,699,122	38,466,488
1875	80,889,057	76,703,433	5,100,000	.....	31,635,239	39,968,194
1876	90,875,173	87,219,850	5,040,000	.....	39,292,924	42,886,935
1877	93,421,754	93,811,582	5,085,250	.....	45,816,109	44,880,223
1878	81,154,632	78,276,167	3,452,000	.....	37,248,137	37,576,030
1879	75,349,501	72,685,888	4,185,769	.....	37,032,857	31,470,262
1880	80,167,936	77,232,512	5,742,380	$898,000	38,033,055	32,559,067
1881	84,504,417	81,198,474	6,361,902	1,195,000	42,937,613	30,653,959
1882	92,411,835	89,207,549	8,008,155	4,055,037	48,133,039	29,011,318

The exports of silver during the present year to Japan, China, India, the Straits, etc., have been as follows: From Southampton, $27,390,000. From Venice, $9,695,000. From Marseilles, $806,000. From San Francisco, $5,375,000. Total, $43,266,000, as against $27,000,000 from the same places in 1881.

HYDRAULICKING IN RAILROAD WORK.*

By J. T. Dodge.

In constructing the East Approach of Bozeman Tunnel, which is about 550 feet long from the mouth of the cut to the portal of the tunnel, an unusual amount of wet and sliding clay was encountered. The first 200 feet of the cut, being dry, was excavated without difficulty. In the next 200 feet, springs were encountered, and heavy slides occurred, amounting to three or four thousand yards. This material, tough and adhesive and saturated with water, was extremely difficult of removal. Shovels had to be dipped in water to make it slide off. Water had to be put on the cars to make it slide out; and when once started on a slide, it was not disposed to stop, but went from 50 to 100 feet beyond the limits of the embankment. The work was begun in February, 1882, and was prosecuted with as much diligence as the unfavorable season would allow By the 15th of July, the contractor and all immediately connected with the work had become very much discouraged. The division engineer was applied to for advice and direction. Timbers had been tried and swept away by the resistless "mud glacier." Driving piles was suggested as a means of holding back the mass. Tunneling through it was seriously considered. To go on with the work as it had been going on seemed hopeless.

"Sluicing" had been thought of when the work was first commenced; but there did not appear to be a sufficient supply of water within a reasonable distance. The placer mines of Helena being still in process of working, the writer availed himself of the opportunity of examining their methods of using water in the removal of earth. After doing so, and after having an interview with the principal owner, a gentleman of long experience in hydraulic mining, a survey was ordered, and it was ascertained that, by digging a ditch three miles long, we could reach a creek two miles west of the Summit, which gauged 250 miners' inches, and which would probably supply water enough to remove 500 yards of earth per day. It was then decided that, if the contractor would surrender that part of the work, the railroad company would try the experiment of sluicing. Accordingly, the ditch was commenced on the 20th of July, and completed on the 9th of August, so that water began running through the cut on the latter date. The grade of the ditch was assumed at 13·2 feet per mile, and its area at about 4 feet. Several flumes had to be constructed across narrow ravines, and some rock-cutting was encountered. A ground sluice 2 feet wide by 11 inches deep was placed in one side of the cut on a grade 2·2 feet per 100, parallel to the grade of the railroad. Water for the jet was taken from the main ditch in a flume 11 by 12 inches, and conveyed by about 300 feet of six-inch galvanized-iron pipe and 112 feet of cotton hose, down into the cut where it could be operated under a head of 60 feet. The nozzle was provided with one two-inch ring and one 1¼-inch ring, to be used as circumstances might require. To supply this nozzle probably required about 40 inches of water when under 60 feet head. The 1¼ jet was more compact and effective in cutting down tough and hard banks than a 2-inch jet. The whole amount of water reaching the work during the first few days of our operations probably varied from 120 to 150 inches. The weather being dry and hot, it began to diminish soon after, and fell as low as 72 inches about the 10th of September. The weather then turned cooler, it increased again to a moderate extent, and then remained about the same until work was completed on the 24th of September.

By a careful estimate of the work done in the first twelve days, it appears that the amount of earth moved was 727 yards per day. The amount done between the 10th of August and 24th of September was 17,060 cubic yards. The cost of moving the same, including digging the ditch, buying pipe and hose, and all other expenses, was less than 30 cents per yard, which was far below what it would have cost by shoveling. The work was prosecuted night and day by three shifts of two men each. Near the close of the work, a few men were employed in daytime in sloping, and some labor was used in making a dam to save part of the material in embankment. The delay of the work during the time the ditch was digging was probably a benefit, by giving the ground time to dry and drain out, so that no large slide occurred after sluicing was commenced. The amount of earth moved between the 1st of February and the 20th of July by shoveling at the bottom and scraping from the top was 19,730 cubic yards, an amount which could have been removed in twenty-seven days by sluicing with the volume of water used during the first twelve days.

MECHANICAL ORE CONCENTRATION, PNEUMATIC OR HYDRAULIC.

Written for the Engineering and Mining Journal by S. R. Krom, New York.

To the several criticisms which have appeared in the last few years, in technical journals, on the pneumatic system of concentration, it has been my intention, at a convenient time, to reply in such a complete way as to convince these critics that they are entirely wrong in their theories and conclusions. The recent articles of Mr. F. M. F. Cazin, on the subject of ore concentration, and his criticisms on the pneumatic system and every one who has indorsed it, and his personal attack on the author of the system, published in the *Mining Record*, New York, have suggested that the present is a proper time for me to make my reply.

To aid to a clear understanding of the position and arguments of the supporters of the theory that water is the best medium, I shall be obliged to quote more at length than I desire from my opponents, who have written on this subject with the sole purpose of showing the superiority of hydraulic to pneumatic concentration.

Mr. Cazin says: "The promoters of the pneumatic system have resorted to deceptive experiments, deductions, and statements in favor of their system, all of which scurrilous practices should be frowned down by scientific discussions.

"The promoters of the pneumatic system of ore concentration have pretended that, of the two mediums, water and air, water be not the better one, either theoretically or practically, and that they can show the claim in favor of water to be a fallacy; while they not only have not been able to make good their pretensions, and while theory as well as

* Read before the Western Society of Engineers.

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practice have both passed to the order of the day over these pretensions."

I will first devote myself to the theoretical and then to the practical part of my subject. Among those who have in times past entered into the theoretical discussions to prove water the best medium for concentrating ores, I may mention the names of W. P. Ward, M.E., J. A. Church, M.E., Henry Englemann, M.E., J. C. Bartlett, A.M., and Mr. Cazin. All of these gentlemen have relied on the correctness of the theories laid down by Rittinger and Pernolet, to sustain their theoretical discussions.

Mr. Cazin admits that motion can be substituted for lack of density, saying, "that one can be a possible substitute for the other," but contradicts himself afterward in declaring it unnecessary to search for a common medium "for the separation of solids by their specific gravity inasmuch as the best one in one case may be the worst in another." (Why not, then, substitute motion for density, as one can be the possible equivalent of the other?)

Mr. Cazin names water and air as the only mediums practically used; but enumerates the following substances, sodium amalgam, molten lead, molten combination of lead and sodium, solutions of salts, and finally compressed air, as mediums applicable for ore separation, and he names the latter, as he says, to prevent its use being impeded in future by somebody taking out a patent on its use.

It so happens that compressed air has been used whenever air was used at all for ore concentration, whether that compression was more or less; and Mr. Cazin is a little late in naming compressed air as something new, and promising it as a gift to the public.

Mr. Cazin also holds to the great superiority of a medium of intermediate density, and gives the following ingenious proof: "That a boulder of quartz, specific gravity 2·5, and a piece of wood, density 0·7, are carried off by a creek flooding its banks; and that the wood will float, while the rock will sink, so that a local separation is effected at once, whatever the difference in volume of quartz or wood may be."

Precisely what Mr. Cazin intends to prove by this illustration I am unable to see.

Mr. Cazin in his arguments further affirms the views of his friend Bartlett: "That of two fluids, both lighter than the ore, the one is preferable which is heavier of the two." And why? "Because," he says, "it then requires less ascending velocity (motion) than the other, in order to lift the lighter above the heavier material."

The advocates of the wet system of ore-dressing hold that the so-called ideal medium is one whose density is intermediate between the minerals to be separated, and that if we possessed such a medium, "no machinery would be necessary;" and that as we can not obtain the ideal medium of the required varying densities, the one nearest to the intermediate is theoretically and practically the best. It is interesting to note also that they admit the possibility of substituting motion for density; and as the pneumatic system is based on that very axiom, their complete inconsistency in opposing that system is clearly exposed.

According to the present developments of the art of ore-dressing, it is admitted by all, and we shall take it for granted, that some fluid is necessary to effect separation, except with some magnetic ores; and although Mr. Cazin does not fully admit that air and water are the only two practical mediums, yet he allowed the question to be narrowed to air or water. We shall now first consider and analyze the question whether a medium of intermediate density (without motion) is the ideal or perfect one. Experience has sufficiently shown that no medium at rest is practicable for ore-dressing. An exact ideal medium of intermediate density without motion, or the necessary resistance obtained by giving the medium a continuous uniform motion, has been the dream of many experimenters, and that it would be perfection in ore-dressing is not an unreasonable supposition. We can imagine such a closely-regulated current, representing exact intermediate density; but while so beautiful in theory, it will not work in practice, and we do not find all the heavy mineral sinking and the light all floating upward and off, like Mr. Cazin's pine board in the flood. Mr. Cazin has failed to give us an example of any successful, practical application for ore-dressing of his principle of intermediate density. What plan he had in his mind when he made his famous offer to the skeptical Ducktown manager, does not appear in his article. For the separation of certain substances, the theory does prove effective; but for the general application of ore-dressing, the theory is fallacious. Mr. Cazin, following Professor Bartlett, says that "the difference between diameters of spheres being equal falling in air, is less than between diameters of spheres being equal falling in water."

This statement has no application to the subject, because it has reference to the spheres falling in air without motion. By giving motion to the air to make its resistance equal to water, the behavior of the spheres in falling must be theoretically exactly the same in both mediums, and such a statement as just quoted is calculated to mislead, and is therefore deceptive. The formula should read as follows: Equal falling spheres in liquids of different densities will be also equal falling in a current of air, regulated by compression, to give the equivalent resistance offered by the liquid. To illustrate the above formula, I instituted an experiment to demonstrate the incorrectness of previous formulæ on the subject of the free fall of mineral grains in air and water. I erected two glass tubes, each 2 inches in diameter and 8 feet long. One of these tubes I filled with water; through the other I forced a current of air. I found that practically, as stated, ½-inch globule of galena and ¼-inch globule of quartz fall in equal time in a column of water; but when the current of air was adjusted to retard the galena in falling to the same extent as water, then the ¼-inch globule of quartz was sustained by the current of air, and did not fall, but oscillated up and down in the open end of the tube, while the galena ball fell as rapidly as in the tube of water. I also employed bodies of other forms with conical-shaped heads (which has been illustrated in previous publications). In experimenting with these, I regulated the current of air in the air-tube, to give exactly the same resistance as water would to the falling bodies of equal weight and size, one in the water, the other in the current of air: both reached the bottom in equal time. I then let fall Nos. 1 and 3 in water; and when No. 1 reached the bottom, No. 3 was about 10 inches behind. Next I let fall the same Nos. 1 and 3 in air, and No. 1 fell in the same time in air as it did in water; but No. 3 did not fall, but, like the quartz ball, oscillated in the open end of the tube.

Ordinary philosophical reasoning could lead to no other conclusion than that which the above experiment demonstrated, namely, that the galena and quartz would be equal falling in the air-current under the conditions here described. But the experiment demonstrated that air would give some superior results as the concentrating medium beyond what I had expected.

Professor Bartlett, in his criticisms of this experiment, makes use of Rittinger's treatise to prove that the experiment was not tried under proper conditions. He says: "The quartz ball did not fall in the experiment as performed, because the condition under which the experiment was tacitly supposed to have been performed, the condition upon which every discussion on the laws of bodies falling in liquids" (Mr. Bartlett says), "was violated." "This condition was, that the air should be perfectly free to move, that the tension of the air below the ball should be the same as above it. In the case of the galena ball, this was practically complied with." In other words, Mr. Bartlett asserts that the more favorable effect was due to the narrow cross-section of the glass tube.

To avoid this sort of criticism, which was in no sense a just one, because the condition of the water-tubes was exactly equal to the condition of the air-tubes, I performed the second part of the experiment with steel wire tacks of uniform diameters, but different lengths and with uniform diameters of heads, so that each presented the same surface to both the air and water alike, and their form caused them to keep in a perpendicular position. In this experiment, the proper conditions as required by Mr. Bartlett were perfectly complied with; but he overlooked this part of the experiment, for the reason, I suppose, that it would interfere with the conclusions he wished to arrive at, and nullify his statements, as it does most completely. The experiments with the galena and quartz ball were, however, properly performed, and even smaller tubes would have been proper.

The tubes with the water proved large enough to allow the galena and quartz ball to fall in equal time, and of course the air-tube should not, for this experiment, have been any larger than its companion.

The distinguished Councilor Althans answered fully Mr. Bartlett's criticisms in the following words: "It must not be overlooked that in pneumatic jigging the equal falling grains suspended in the stream of air are always in narrow air-spaces, and that in this case the large grains, in comparison with the adjacent smaller but specifically heavier grains, are similarly situated to those in Krom's experiments in narrow glass tubes. In the opinion of the author, therefore, practical experience alone can decide which process, the hydraulic or the pneumatic, can effect the closer separation according to specific gravity and size of grain."

The remark of Councilor Althans is a sensible and correct observation, and illustrates the difference between unbiased and intelligent reasoning, and the blind following of theories which have never been realized in practice. Mr. Cazin criticises some experiments by remarking, "Krom's experiment with glass tubes gives results absolutely contrary to real facts."

The exact meaning of Mr. Cazin's remark is not clear. We generally suppose that the results are the facts themselves. In another place, he mentions compressed air as a substitute for a medium of an intermediate specific gravity, and he also says, "Compressed air would be more successful" for concentrating ores.

If we now sum up the conclusions, as far as we have gone, we find that the theory of a so-called ideal medium of intermediate density without motion is a fallacy, as it will not work in practice. We further find that motion given to water or air is an exact equivalent for density, and serves all the purposes of a medium of intermediate specific gravity. We find that the formulæ in relation to the free fall of spheres in water and air are not correctly stated; and that, contrary to the impressions intended to be given by such theoretical writers as Professor Bartlett and Mr. Cazin, spheres which are equal falling in water are also equal falling in air when raised to the same resistance by motion.

By simple reference to facts, we learn that a medium dense enough to support the lighter in specific gravity without motion or whether the exact equivalent in density is obtained by giving continuous uniform motion to the fluid, has not proved a successful means to effect the separation of ores, and that all the theoretical discussions to prove water the best medium have been founded on an erroneous basis.

(TO BE CONTINUED.)

OUR PRODUCTION OF BESSEMER STEEL IN 1882.

Mr. James M. Swank, Secretary of the Iron and Steel Association, has received complete statistical reports from the companies owning the fourteen completed Bessemer steel-works which were in operation in the United States in 1882. From these reports, he announces in the *Bulletin* that the quantity of Bessemer steel ingots produced in the United States last year was 1,696,450 net tons, or 1,514,687 gross tons. The increase over the production of 1881 was 10 per cent. This is a much smaller annual rate of increase than has been made for several years. The increase in the production of 1881 over that of 1880 was 28 per cent, while 1880 increased 30 per cent over 1879. The production of Bessemer steel ingots in the last six years has been as follows, in net tons:

1877	560,587	1880	1,203,173
1878	732,226	1881	1,539,157
1879	928,972	1882	1,696,450

The quantity of Bessemer steel rails produced in 1882 by the fourteen works above referred to was 1,334,349 net tons, or 1,191,383 gross tons. This was an increase of six per cent on the production of the same works in 1881, which amounted to 1,253,129 net tons, or 1,118,865 gross tons.

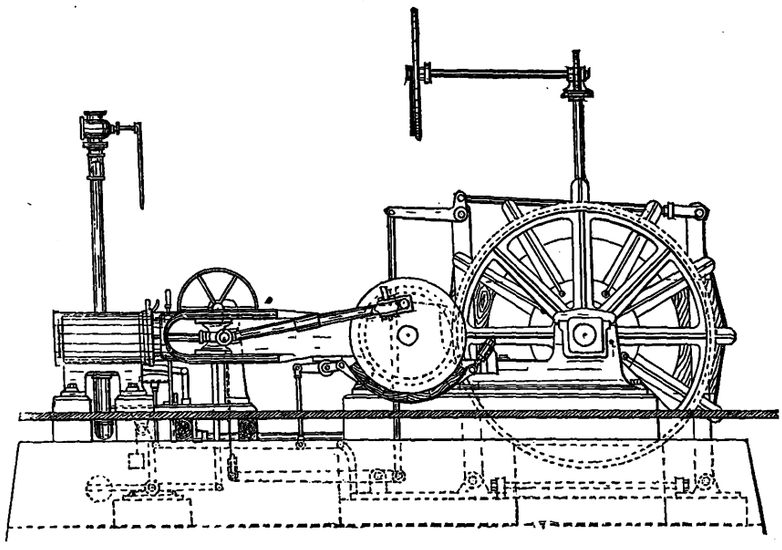
These figure do not cover the total production of steel rails in the United States, as there were some rails rolled in 1882 from imported steel blooms, and there were also some open-hearth steel rails rolled. Complete statistics of the production of these kinds of rails, however, have not yet been received; they will probably not quite reach 100,000 gross tons, making our total steel-rail production in 1882 approximate 1,300,000 gross tons, against a total in 1881 of 1,210,285 gross tons.

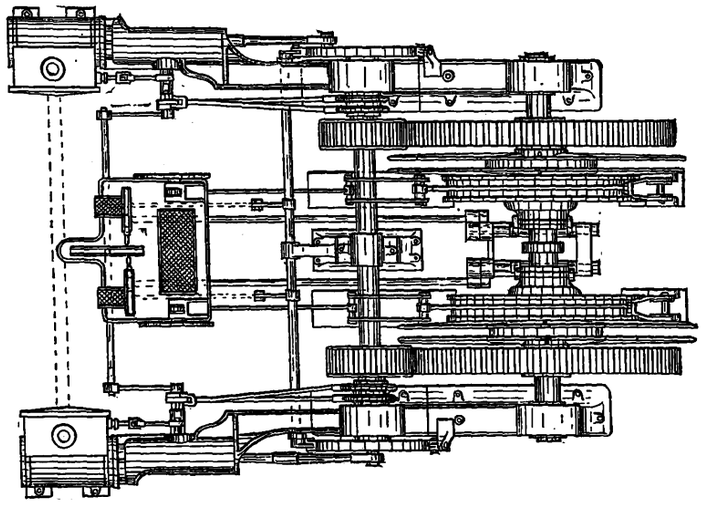
The fourteen Bessemer steel-works referred to above contain 35 converters. The Scranton Steel Company is building a two-converter plant at Scranton, Pennsylvania, which it is expected will be completed and will be put in operation in the spring.

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DOUBLE REEL GEARED HOIST FOR FLAT ROPE.

In the accompanying engraving, we illustrate a hoisting-engine, built by Messrs. Fraser & Chalmers, of Chicago, which is being widely introduced in Western mines for great depths. Two sizes have been recently built, the one with 10 by 16-inch cylinders, for the Parrott Silver Copper Company, at Butte City, Montana, and the Monarch mine, of the Atlanta Mining Company, Rocky Bar, Idaho; and the other, with 12 by 16-inch cylinders, for the Lexington mine, Butte City, and the Champion mine, Central City, Colorado. We give below the specifications of the former size, adding the corresponding figures for the latter in parentheses. The 10 by 16 inch (12 by 16) engines are designed for hoisting from a depth of 1000 (1200) feet, the reels winding 1000 (1200) feet of 2¼ by ⅝ inch (3 by ⅝) flat wire rope. Starting with a speed of 170 (200) feet, it is increased to 460 (500) feet at the mouth of the shaft, the reel becoming larger by the winding of the rope on it. When the cages are balanced, the engine will hoist 5500 (7000) pounds. The weight of the engines proper, exclusive of boilers, etc., is 38,000 (58,000) pounds.





The engines are double reversible, the cylinders being dry-sand castings with double slide-valve and short steam-ports. The frames are of improved pattern, with circular guides bored true in line, the bases planed on the same plane with the cylinder feet. The composition-metal crank-box is adjustable, and is provided with oil-grooves. The crank-shaft is made of hammered iron 5 (8¼) inches in diameter with 6-inch bearings and two heavy disk-turned and polished cranks of large diameter to act as fly-wheels. The main driving-pinion is fitted and keyed to the center of the shaft, and bearings are provided on both sides near the pinion, to avoid vibration. The pinion is 16 (19) inches in diameter, with a 10 (10½) inch face and 3 (3½) inch pitch. The spur-wheel is 7 (8) feet in diameter, with 10-inch face and 3 (3½) inch pitch. The four eccentrics are fitted to the shaft. The piston is of the double-ring pattern, the piston-rod being made of steel. The cross-head is cast-steel, with adjustable slide-plates of bronze and steel wrist-pin, the connecting-rod being made of forged iron and provided with bronze boxes. The links of the revolving gear are cast-steel. There is a crank-brake for each crank, lined with wood blocks, both being connected with one shaft, to be worked by foot-levers on both sides of the reversing-lever.

The two reels have 30 (42) inch centers, and are large enough to take up 1000 (1500) feet of 2¼ by ⅝ (3 by ⅝) inch flat rope. They are provided with sleeves lined with composition metal, so arranged that they can be taken out easily and be re-babbitted when worn out. The brake-wheels are cast in one piece with the centers, and are turned true on the rim. The reel-shaft is hammered iron, 8 (10) inches in diameter in the center, tapering down to 6 (7½) inch bearings. It is turned and provided with deep key-seats for gear and clutches.

The post brakes are all of wrought-iron, with brake-blocks of wood, mounted in heavy cast-iron shoes, to be bolted to the foundation. The brakes are adjustable on the top and bottom, and are worked by strong wrought-iron levers, racks, pinions, and hand-wheels. The latter are mounted on well-designed cast-iron stands near the reversing-levers. It will be noted that Messrs. Fraser & Chalmers have throughout studied the details carefully, and have made good arrangements for easily erecting the machinery, for convenient handling, and for avoiding repairs which so much hamper mining operations, particularly in inaccessible regions.

The forge department of the Elba Bolt and Iron Company, Limited, Pittsburg, was destroyed by fire recently. In the packing-room, 1100 kegs of nuts, bolts and washers were stored, which were badly injured. In the forge department proper, were twenty-four puddling-furnaces, one train of muck rolls, an the main engine of the mill, all of which are probably either ruined or badly damaged. The destroyed portion of the works will be rebuilt at once.

THE EFFICIENCY OF MODERN TURBINES.*

By Robert H. Thurston.

The mechanical engineer has open to him as his exclusive province one department which is as yet only partially developed in practice, although well advanced in theory. I refer to that of hydro-mechanics, and especially the utilization of water power. Although one of the earliest opened by the old Greek engineers, it has been one of the latest developed. Archimedes, Ctesibus, and Hero were familiar with the principles of fluid pressure; Torricelli, Pascal, Newton, and Bernouilli developed the fundamental principles of hydro-dynamics; Du Buat, D'Aubuisson, Prony, Eytelwin, and, above all others, Darcy, supplied experimental data; but it has been reserved for our own generation to apply the knowledge so early acquired to the production of efficient hydraulic engines. But a few years ago, the vertical water-wheel, as constructed by Fairbairn for moderate and for high falls, and the undershot wheel of Poncelet, were the standard wheels in all countries, notwithstanding their cumbrous size, their slow movement, and the great cost involved both in their own construction and in that of their machinery of transmission. Their efficiency was thought high, although rarely exceeding 75 per cent. These wheels have had their day, and nothing is likely to occur to save the whole class from ultimate disuse. The turbine—introduced in an effective form by Fourney-on a half-century ago, and especially in the late forms of Fontaine, Henschel, Jonval, Schiele, and others abroad, and by Boyden and his successors in the United States—has become the only water-motor in general use. This small, cheap, quick-running wheel has completely displaced all the older forms, whether overshot, undershot, or breast wheels. The three principal types—parallel, inward flow, and outward flow—are all in use and doing good work. In Europe, they are all made by good builders, as here; but the tendency seems to be, in the United States at least, to introduce most generally another and peculiarly American type—the inward and downward flow wheel—as illustrated in the wheel built by Risdon. In efficiency, notwithstanding the comparative neglect of these motors by scientific investigators, there has been a steady and important gain during late years. The improvements which have been *felt out* by makers, working often in the dark—for few builders claim to understand the principles of their art, and no two even ever agree in their statements of the principles underlying their practice—have resulted in a gradual elevation of standard, until, to-day, a wheel which, under favorable circumstances, can not exhibit an efficiency of 80 per cent, must drop into the background. I have been asked to certify a trial giving, as claimed, 95 per cent; but that figure could, I am sure, only be attained by chance, if at all, when all conditions conspired in its favor. But wheels are, I have no doubt, doing work by the day and by the week at 80 per cent. It may be said tha Boyden did as well a generation ago. True, but only with large wheels, built as carefully as the chronometer is made, and fitted with polished buckets and diffusers, and tested under conditions purposely made the best possible. To-day, our builders of turbines give their wheels such exact proportions, and take such care in the ordinary work of the foundry, that they obtain these high figures from wheels almost directly from the sand. So far has this change gone, that our theory of the turbine, as modified by friction, requires careful revision. Accepting the older coefficients for friction and losses of energy, it will probably sometimes be made to appear from experimental trials that the wheels of our best makers are a trifle better than perfect. It would seem from figures sent me that friction in a well-formed wheel becomes partly a means of transfer of energy from water to wheel, and that the loss of

* From the President's Annual Address before the American Society of Mechanical Engineers.

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efficiency due to that element is much less than has been supposed. In some of the later wheels, losses of energy due to eddies occurring within the flowing mass have been reduced to such an extent as to considerably improve their performance. In the regulation of the turbine, an excellence has been attained that is thoroughly satisfactory in some cases, and the best wheels have been found to give an efficiency at half and at three quarters gate nearly equal to the best at full gate. As the efficiency at part gate is often more important than at full gate, it is easily seen that this means a vitally important gain.

THE PRODUCTION OF THE MINES AND SMELTING-WORKS OF THE GERMAN EMPIRE IN 1881.

The mineral statistics of Prussia are promptly published; but they do not in many points represent the total production of the German empire, many of the smaller States not being readily accessible. The following figures, given in metric tons, at 1000 kilograms or 2205 pounds, show the entire output of the empire for 1881:

	Tons.
Coal	48,688,161
Lignite	12,852,324
Asphaltum	42,330
Petroleum	4,108
Graphite	1,510
Rock-salt	311,907
Salt from salt-works	456,958
Kainite	160,538
Other potash salts	745,353
Chloride of potassium, from solutions	113,168
Chloride of magnesium, "	11,070
Glauber salt, "	49,062
Sulphate of potassa, "	13,280
Sulphate of potassa and magnesia, from solutions	5,620
Sulphate of magnesia "	25,908
Sulphate of alumina, "	12,837
Alum, "	5,068
Iron ore (German empire)	5,411,890
" (Luxemburg)	2,161 882
Manganese ore	13,642
Iron pyrites	125,057
Pig-iron (charcoal) 44,564	
" (coal or coke) German empire 2,567,550	
" " " Luxemburg 293,615	
" (mixed fuel) 8,280	
Total, pig-iron	2,914,009
Spelter	105.477
Lead	86.729
Litharge	4,514
Copper	14,803
Silver (kilograms)	186,990
Gold "	381
Cadmium "	3,367
Nickel	135
Tin	102
Bismuth	56
Sulphur	2,994
Sulphuric acid	257,112
Fuming acid	1,514
Green vitriol	7,414
Blue vitriol	4,804
Zinc vitriol	616

QUICKSILVER STATISTICS FOR 1882.

The San Francisco *Commercial Herald* prints the following figures for the exports of quicksilver:

EXPORTS OF QUICKSILVER.

	1881.		1882.	
To.	Flasks.	Value.	Flasks.	Value.
Mexico	15,141	$447,573	9,741	$288,546
New Zealand	139	4,099	105	3,000
China	17,006	487,495	19,451	560,353
Japan	315	9,504	620	17,601
Central America	38	1,088	55	1,494
Australia	1,220	35,910	1,960	50,280
British Columbia	14	395	21	616
South America	816	23,889	1,986	59,621
Bombay	10	287	.....	.....
New York	400	12,000	1,100	34,500
Panama	176	5,268	.....	.....
Honolulu	.....	.....	1	28
Total	35,269	$1,027,508	34,770	$1,056,039

And our exports previously have been:

	Flasks.		Flasks.
In 1852	900	In 1868	44,506
In 1853	12,737	In 1869	24,415
In 1854	20,963	In 1870	13,788
In 1855	27,165	In 1871	15,205
In 1856	23,740	In 1872	13,089
In 1857	27,202	In 1873	6,359
In 1858	24,142	In 1874	6.770
In 1859	3.399	In 1875	28,960
In 1860	9,448	In 1876	41,140
In 1861	35,995	In 1877	46,280
In 1862	33,747	In 1878	34,280
In 1863	26,014	In 1879	52,180
In 1864	36,927	In 1880	34,648
In 1865	42,469	In 1881	35,269
In 1866	30,287	In 1882	34,770
In 1867	28,853		

In speaking of the tariff on quicksilver, the *Commercial Herald* has the following interesting summary of the relative position of the industry in this country and in Spain:

The Almaden mine, in Spain, owned and worked by the government of that country by peons or laborers, at a tithe of the prices paid here, dates back in its history thousands of years, is of surpassing richness and extent, exceeding in value all known mines of this character in the world, is furnishing 50,000 flasks yearly, with a capacity of sufficient mercury for the whole world's needs for ages to come, and at a price profitable to that government that would close up every mine in this State, bankrupt the thirty to fifty millions of dollars invested in them, and turn out of employment more than two thousand persons engaged in working them. That this can be done, and is even contemplated, we shall attempt to show. A party holding semi-official relations with the Spanish government stated, some months since, that the "mine with its new furnaces is in a position to utterly swamp the market, so as to make every competition impossible and utterly unprofitable." An exhaustive report on the "mines and works of Almaden," made by M. H. Kuss, M.E., brought down to the year 1875, shows that the cost there per flask, including "personal expense of office, exploiting (which covers stoping, timbering, and masonry, drainage, ventilation, extraction, and transportation), distillation and bottling, shops, hospital and chapel, domain of Castilseras, extra expenses and sundries," in fact, any and every expense connected in the remotest manner with the production and placing on the market, averaged for the five years ended 1875 46¼ francs per flask, and for the year 1875, 45·67 francs, equal to $8.50 per flask, or 11·11 cents per pound, less than one third the ruinously low prices the article is selling at to-day. An extended and careful inquiry made here, covering over five sixths of the production of 1881, showed that the labor required to produce a flask of quicksilver was eight days, say for 60,000 flasks produced that year, 480,000 days' labor, and at the moderate figure of $2 per day, equal to $960,000, or $16 per flask, and this for labor alone, to which, if we add the cost of the flask or package, fully $1 each, including a duty of 35 per cent exacted by the government, we have a cost for labor and the package $17 per flask, just double the expense of that from the Spanish mine when laid down in the London market. We have been considering the cost of producing at the Spanish mine in 1875, since which time it is understood that there have been important improvements made there, especially in the treatment of its ores, reducing the expenses very largely, and proportionately the cost of the article, to what extent we are not advised, but if, in the reduction of ore, the same as here during the past ten years, probably fully 25 per cent. Referring again to Professor Kuss's report, we find that the "Spanish mine produced from 1564 to 1700, 17,863,720 tons; from 1700 to 1800, 42,149,501 tons; from 1800 to 1875, 60,166,379 tons; in all, 120,179,600 tons mercury (equal to 3,518,984,866 flasks of 76½ pounds each). When we attempt to determine the value of this enormous quantity of mercury, we find it rather difficult to estimate. The price of mercury reached 12 to 15 francs per kilogram before the discovery of the mines of California—New Almaden and others." Estimating a kilogram at 2·2 pounds 15 francs, the price obtained before the discovery of quicksilver in California is the equivalent of about $1.20 per pound. In the year 1850, when we had barely commenced producing here say 7700 flasks, the London price was £15 per flask—about 95 cents per pound. In 1861 and 1862, when our product reached from 35,000 to 42,000 flasks a year, the price here fell as low as 45 cents per pound, and at London to £7 per flask, with a production of about 25,000 yearly at the Spanish mine. This condition of prices remained without material change until 1870, when our mines were straitened in their bodies of ore, particularly the New Almaden, and our total production of 53,000 flasks in 1865 fell to less than 30,000 yearly, on an average for five years, say 1870–74 inclusive, and the price, owing to the small supply, was advanced in London to £26 per flask, and here to $1.55 per pound. It could not have been that the Spanish mine was short of ore at that time; for its reserves are always years ahead of its out-turn; but rather, that the management chose to take advantage of our misfortunes by withholding its product, and so forcing prices to an extravagant figure, which would doubtless be done again as soon as a few more of our mines could be seriously crippled and compelled to shut down, by the increased production of that mine thrown upon the market at about 30 cents per pound, which would still leave the Spanish government a profit of about 200 per cent upon the cost of producing and putting its quicksilver upon the market. For some time past, the Rothschilds have had the handling of the product of the Spanish mine, to protect them for a loan made to the government. It has been authoritatively stated that they were required by the terms made for selling the quicksilver to return not less than £6 per flask to the government, and this is so stated in Professor Kuss's report, to wit: "If the price of the metal should descend below this figure (£6), the government would not receive less than £6 sterling per flask." Evidently there has either been a change in the terms of agreement, or the Rothschilds have a secret understanding with the government; for during the past year, Rothschilds' price has ranged, for the most part, below £6, say £5 15s., and since the beginning of the year as low as £5 10s., as we have already stated, and these gentlemen are not likely to make a present to the Spanish government of 5@10s. a flask on 50,000 flasks and upward yearly. It is not easy to divine what can be the motives of the Rothschilds in pressing the price down so low, unless it be their object to force our mines to close up, and so give them the monopoly of the market for this article. A further decline of 10s. per flask in London, say £5, would be the equivalent of about 30 cents per pound, at which figure it is doubtful if more than two mines in this State could be operated without loss. Some time since, an attempt was made between the Rothschilds and parties here in interest to restrict the production with a view of bringing about better prices. The Rothschilds demanded, as a *sine qua non*, that the reduction should come wholly from this State, while the Spanish mine should be allowed to retain its full former quota, and even increase it. The proposed arrangement fell through, as there was known to be a large stock in London, and our producers were not disposed, after selling their own production at moderate figures, to stand aside and see the heavy stock in London worked off at advanced figures. It was about this time that we were given to understand that the Spanish mine was in a "position to utterly swamp the market, so as to make every competition impossible and entirely unprofitable." The duty proposed by the Tariff Commission, 10 per cent, and the equivalent of less than 3½ cents per pound on the present London price, would give our government a mere bagatelle, $25,000 to $30,000 a year, upon imports as large as those of last year, and *they* were without precedent in our history. With a specific duty of 10 cents per pound aiding the producer when the article is low, and enabling him to sell at from 40 to 50 cents per pound, a fair price for the consumer, indeed for both parties, we might hope for marked improvement in this important industry. There need be no apprehension in such a case of high figures, as Rothschild and others holding heavy stocks in London would stand ready to give us quicksilver, say 30@34c. in London, which, with a duty of 10 cents per pound, would prevent the local price going above 45@50c. There is no argument that can be made in favor of protecting other metals and industries that does not apply with equal force to this, and now that we are confronted with both the threat of being crushed out by a foreign government and with an accumulated stock of 100,000 flasks liable to be thrown upon our markets at any moment, it would seem that Congress could not do less, under a proper representation of facts, than to give us a duty of 10 cents per pound. When prices were high in 1874 and 1875, active prospecting

followed in this State, and some good developments resulted, notably the Sulphur Bank, Guadalupe, Napa Consolidated, and others. But they are not able to compete with the Spanish mine in richness and cheapness of labor, and we venture to say that, unless Congress does extend aid in the shape of a reasonable duty, we shall find ourselves, sooner or later, dependent upon the foreign article, and at such prices as the owners choose to fix for us. Whether, when all our mines are closed down for the want of a judicious duty, that figure will be anywhere near as favorable for the consumer as the present one, may well be questioned.

Mr. J. B. Randol, manager of the New Almaden mine, has published his usual valuable report on the production and price of quicksilver, from which we extract the following figures:

PRODUCTION OF QUICKSILVER, FLASKS.

Mines:	1880.	1881.	1882.
New Almaden	23,465	26,0.6	25,867
New Idria	3.209	2,775	1,954
Redington	2,139	2,194	2,228
Sulphur Bank	10,706	11,152	5,133
Guadalupe	6,670	5,228	1,138
Great Western	6,442	6,241	5,279
Pope Valley	275	.....	.....
Napa Consolidated	4.416	5,552	6,838
St. John	492	.....	.....
Altoona	245	.....	.....
Oakland	166	.....	.....
California	422	.....	.....
Great Eastern	1,279	1.065	2,127
Loverdale	.....	207	.....
Various mines	.....	376	256
Total	59,926	60,851	50,820

The following table shows the production of the mines of California, Austria, and Spain, and the variations in the price of the metal in San Francisco and in London, from 1850 to 1882, both inclusive:

YEAR.	Total yearly production of California mines.	Exports from San Francisco by sea and rail.	Price in San Francisco per pound.		Production of the Idria mine of Austria.	Production of the mine of Almaden Spain in periods of five years.	Price in London per flask.	
	Flasks.	Flasks.	Highest.	Lowest.	Flasks.	Flasks.	Highest.	Lowest.
1850	7,723	6,497	$1.50	$1.10	4,100		£ s. d.	£ s. d.
1851	27,779	10,791	1.00	.75	4,092		13 15 ..	12 5 ..
1852	20,000	21,458	.80	.72½	4,085	101,517	11 10 ..	9 7 6
1853	22,284	18,800	.72½	.72½	4,409		8 15 ..	8 2 6
1854	30,004	20,963	.72½	.72½	4,060		7 15 ..	7 5 ..
1855	33,000	27,165	.72½	.67½	4,446		6 17 6	6 10 ..
1856	30,000	23,740	.67½	.67½	5,935		6 10 ..	6 10 5
1857	28,204	27,262	.70	.60	9,189	110,058	6 10 ..	6 10 ..
1858	33,000	24,412	.65	.60	4,977		7 10 ..	7 .. ..
1859	13,000	3,399	1.00	.65	8,239		7 5 ..	7 .. ..
1860	10,000	9,488	.75	.65	4,821		7	7 .. ..
1861	35,000	35,095	.65	.45	8,493		7	7 .. ..
1862	42.000	23,747	.50	.45	4,712	122,117	7	7 .. ..
1863	40,531	26,014	.60	.50	5,878		7	7 .. ..
1864	47,489	36,927	.60	.60	7,263		9	7 10 ..
1865	53,000	42,469	.60	.60	4,908		8	7 17 6
1866	46,550	30,287	.75	.60	5,327		8	6 17 6
1867	47,000	28,853	.60	.60	7,532	153,224	7	6 16 ..
1868	47,728	44,506	.60	.60	8,253		6 17 ..	6 16 ..
1869	33,811	24,415	.60	.60	9,179		6 17 ..	6 16 ..
1870	30,677	14,240	.90	.60	10,745		10	6 16 ..
1871	31,686	16,339	.90	.75	10,904		12	9 .. ..
1872	31,621	16,780	.87½	.85	11,116	165,608	13	10 .. ..
1873	27,642	11,164	1.20	.90	10,930		20	12 10 ..
1874	27,756	11,750	1.55	1.20	10,789		26	19 .. ..
1875	50,250	37,829	1.55	.65	10,717		24	9 17 6
1876	75,074	49,046	.70	.45	10,794		12	7 17 6
1877	79,396	52,695	.57½	.40	11,020	208,200	9 10 ..	7 2 6
1878	63,880	41,877	.47	.39	10,403		7 5 ..	6 7 6
1879	73,684	62,845	.45	.33	12,153		8 15 ..	5 17 6
1880	59,926	46,294	.45	.36	12,356	41,040	7 15 ..	6 7 6
1881	60,851	45,799	.41½	.36½	12,500	50,353	7	6 2 6
1882	50,820	40,203	.38	.35½	12,500	45,000	6 5 ..	5 10 ..
Totals	1,308,766	934,019	$1.55	$0.33	264,834	997,717	26 .. .	5 10 ..

A MAMMOTH coke-car, built for the Powelton furnace at Saxton, has just been turned out of the Harrisburg Car Manufacturing Company's shops. It is not only remarkable on account of its size, but its novel construction attracts a great deal of attention. It is thirty-five feet in length, eleven feet four inches in hight, and has a capacity of twenty-four tons. There are three gates on each side that are raised and lowered by means of pulleys and are designed for convenience in loading. Six trap-doors in the bottom of the car can be let down instantly, when the load will discharge itself without further assistance. The car is to be used for conveying coke from the ovens to the furnace.

THE EFFECT OF WORK UPON THE QUALITY OF IRON AND STEEL.

Since the middle of 1879, the Association of German Railroads and the Association of German Iron and Steel Makers, have been quarreling about the specifications on the delivery of iron and steel for railroad purposes, the former carrying the requirements, determined by mechanical tests, very high, against which the latter have vigorously protested. Both parties have attempted to fortify their position, not alone by elaborate reasoning, but also by carefully conducted experiments. The facts which have been accumulated during the test are very valuable, and have thrown much light upon the relation between the actual duty in service and the quality as revealed by mechanical tests. The railroads insist that great tensile strength is a proof of good quality, and they have attempted to gather facts to show that there exists a relation between the figures obtained by test and the record of the material in service. Herr H. Brauns, of Dortmund, stated, at a recent meeting of the German Association of Iron and Steel Makers, that a careful examination of all the facts gathered by him bearing on this question has failed to bring out any such relation. He concedes that, for resistance against dead weight, against steady stress, the tensile strength of iron and steel furnishes a good guide for estimating quality. But the duty which rails, tires, and axles are called upon to meet in actual service is different in character. The German railroads demand high tensile strength and great durability, judging the latter from the contraction of area.

In order to show that their position is at least open to serious doubt, Herr Brauns has made a very interesting series of tests. It is generally acknowledged by consumers that the quality of iron and steel is improved by "putting work into it," that is, by reducing the section by hammering or rolling when hot. Now, if the ground taken by the railroads were correct, both tensile strength and ductility should be increased by work. Herr Brauns therefore prepared a series of samples, taking one half of a piece of metal and forging it down by 65 per cent of its original area, and then working down the other half by 85, 90, and 95 per cent of its original area and cutting out test pieces of equal size cold. The following were the results obtained. We have not converted the figures to our units, because the relation is plainly shown:

Worked down by. Per cent.	Tensile strength. Kilos. p. sq. mil.	Elongation. Per cent.	Contraction.
	First Group.		
65	47·7	25·00	54·2
85	52·6	18·70	41·8
65	49·0	24·00	47·2
90	50·3	23·50	46·6
65	48·9	23·00	27·1
95	51·0	21·25	47·3
	Second Group.		
65	63·9	14·50	30·1
85	64·1	14·50	25·9
65	60·3	15·00	35·0
90	63·8	15·00	37·0
65	61·7	17·00	32·9
95	65·3	13·50	32·8
	Third Group		
65	48·6	21·75	42·5
85	51·0	20·75	44·1
65	48·6	21·00	42·7
90	52 0	19·50	42·0
65	47·7	22·50	41·2
95	55·6	18·00	40·8
	Fourth Group		
65	45·9	20·50	46·0
85	48·6	17·00	49·0
65	47·0	23·50	48·4
90	51·0	20·00	40·6
65	48·3	23·00	46·7
95	51·3	22·00	48·1

A second series of tests was made by working them to 60 per cent of original area, and working two other samples out from the same piece down to 80 and 90 per cent of original area, with the following results:

Worked down by. Per cent.	Tensile strength. Kilos. per square mil.	Elongation. Per cent.	Contraction of area. Per cent.
	First Group.		
60	50·6	22·70	42 7
80	54·4	19·25	43 0
90	56·6	16·00	42·0
	Second Group.		
60	50·3	22·70	53·6
80	50·0	19·50	52·1
90	53·3	14·00	47·4

In a general way, these tests show that with the greater work the tensile strength increases, while the ductility, as shown by the elongation, decreases. There is no evidence of any law in the figures found for the contraction of area.

A third series of tests was made with steel ingots prepared in the following way. They were forged down by 65 per cent of the original area, and then one half of their length was left intact, while the second half was worked down farther. The former half is termed *a*, the latter *b*, in the following table, in which the first group shows the results obtained by straining to fracture; while in the second, the elastic limit was first determined, and then the test continued until fracture appeared imminent:

FIRST GROUP.

Part *b*. worked to per cent.	Fracture in part		Elongation measured from center.		Contraction of area at fracture.
	a.	*b*.	In *a*.	In *b*.	
85	50·6	0	21·0	16·7	43·9
90	51·6	0	24·7	12·0	35·1
95	53·6	0	24·0	7·0	38·0
85	47·7	0	27 0	14·0	48·1
90	50·4	0	26·5	12·7	41·8
95	48·6	0	19·0	12·0	20·0

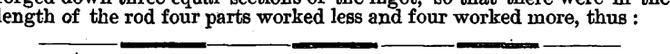
SECOND GROUP.

Part *b*, worked to per cent.	Elastic limit reached.		Load continued to.	Elongation measured from center.	
	In *a*.	In *b*.		In *a*.	In *b*.
85	36·0	34·4	49·7	18·75	17·75
90	33·6	34·7	48·7	19·50	16·00
85	32·4	36·4	45·7	16·50	10·00
90	37·5	37·5	56·4	8·50	7·25
95	35·2	40·7	57·9	16·00	7·25
95	39·2	41·6	61 5	18·00	8·75

The tests of the first group show a very great difference between the ductility of that half which was less worked, *a*, and the other half, *b*, worked down in different proportions, and fracture always took place in the former.

In order to show the effect of work put into steel, upon the contraction of area, Herr Brauns carried out the following tests. He forged steel ingots down to 65 per cent of their original area and then worked some

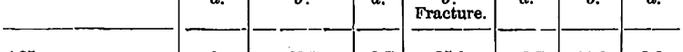
parts of it down farther, finally cutting a test rod from it cold. He forged down three equal sections of the ingot, so that there were in the length of the rod four parts worked less and four worked more, thus:



the heavy lines indicating the parts *a*, where more work had been put in, and the others *b*, with only 65 per cent. The following were the results:

Parts *a* worked down. Per cent.	Fracture in part.		Contraction of area. Per cent.				
	a.	*b.*	*a.*	*b.* Fracture.	*a.*	*b.*	*a.*
85	0	63·7	2·7	35·9	2·7	11·2	2·6
95	0	61·4	1·5	26·7	5·1	11 2	0·4
85	0	49·1	10·9	36·9	10·9	15·5	6·7
95	0	48·0	9·4	37·2	10 5	12·1	5·4

A second set of well-forged steel rods were slightly hammered cold with a light hand-hammer at a number of places, thus:



the heavy lines indicating the parts *a*, where the rods were struck. The results are given in the following table:

Fracture in part.		Contraction of area. Per cent.				
a.	*b.*	*a.*	*b.* Fracture.	*a.*	*b.*	*a.*
0	52·6	2·7	38·0	3 0	10·7	2·6
0	51·5	4·2	43·9	1·2	12·8	1·8
0	51·4	4·8	45·7	4·5	13·7	4·8
0	49·8	4·3	48·1	4·9	16·5	2·7
0	49·0	4·4	46·6	4·9	16·8	4·5
0	48·1	4·8	30·2	1·8	22·4	4·8

Herr Brauns explains the phenomena noted by the fact that the cold as well as the hot working caused the material to become denser, so that those parts resist a distortion better. But he argues that, if causes so small are capable of producing such results, then a system of testing which relies so much as does that of the German railroads upon a distortion of form, must be weak.

PROGRESS IN SCIENCE AND THE ARTS.

A Carriage for Melted Iron.—At a recent meeting of the Franklin Institute, Mr. F. Lawrence, of Philadelphia, described an arrangement designed by him to carry ladles of melted iron, which must be conveyed quickly and without spilling. Instead of a turn-table, a very short curve may be used, and a short curved length of supplemental central rail is used, slightly above the level of the two regular rails. Both wheels are rigid on each axle, and there is no swivel to either axle. But there is a central "fifth wheel" between the two main axles, and this swivels on a vertical pivot; and as it engages the central supplemental rail at the turn, the front wheels on the fore axle are raised clear from the regular rails, and the truck runs on three wheels, rounding the sharpest curves with ease.

Transmission of Power by Electricity.—A novel application of the electrical transmission of power has lately been made at the Trafalgar collieries, Forest of Dean. The electrical arrangements were carried out by the Pyramid Electric Company, under the supervision of their managing director, Mr. A. Le Neve Foster. In this case, an electric motor is used to drive a pump in the underground workings. The pump is employed for pumping the drainage water from some of the deep workings to the bottom of the shaft, whence the ordinary steam-pumps raise it to the surface. The total vertical lift of the electric pump is 115 feet, while the length of pipes through which the water is forced is some 500 yards. A dynamo-machine is placed on the surface, for generating the current for working the motor, and is connected with it by wires led down the shaft and along the workings, a distance of some 500 yards. Messrs. Brain are satisfied with the result of the undertaking, and propose still farther to extend the utilization of electricity as a motive power.

A New Explosive.—Mr. Charles W. Siemens has just patented a new explosive which is stated to be very powerful. The compound is a mixture of saltpeter, chlorate of potash, and a solid hydrocarbon, and is suitable both for mining purposes and fire-arms, while, if ignited in the open air, the combustion takes place slowly and imperfectly. It is stated that the incorporation of the ingredients is by preference effected as follows: The saltpeter, chlorate of potash, and hydrocarbon (for which may be taken paraffine, asphaltum, pitch, caoutchouc, gutta-percha, etc.) are mixed together in pulverulent form by passing through sieves or otherwise, and the mixture is then treated with a liquid volatile hydrocarbon, which acts as a solvent to the solid hydrocarbon. A plastic mass is thus produced, which is then formed into cakes or sheets by passing through rollers or otherwise, and is rendered hard by evaporating the liquid solvent used, the sheets or cakes so produced being then converted into grains or pieces of any desired size in the same manner as ordinary gunpowder. The new compound, which has about the same density as ordinary gunpowder, and is very hard, is said to possess with equal volumes more than double the explosive force of the latter. The intensity of explosion can be regulated at will by varying the proportions of the ingredients and the size of the granules. These proportions should, generally speaking, be such that for each volume of the hydrocarbon, when converted into a gaseous state, there shall be present in the other ingredients three volumes of oxygen.

The Behavior of Nitrogen in Coal during Destructive Distillation.—It is usually stated in text-books that coal contains about two per cent of nitrogen, which, when the coal is heated in close vessels, usually comes off as ammonia. Prof. W. Foster, however, who has brought his investigations before the Chemical Society, finds that only a small fraction of the total nitrogen comes off as ammonia. Durham coal was employed which contained 1·73 per cent of nitrogen, and left 74·46 per cent of coke. A weighed quantity of the coal was placed in a combustion-tube sealed at one end, and the issuing gas was washed free from ammonia by hydrochloric acid; the gas thus freed from ammonia was passed through a second heated combustion-tube containing slacked lime; the additional ammonia thus obtained came from the decomposition of cyanogen in the gas. Taking the total nitrogen in the coal as 100, only 14·5 per cent is evolved as ammonia, 1·56 per cent as cyanogen, 35·26 per cent is present in the coal-gas as nitrogen, while 48·68 per cent remains behind in the coke. Dr. Percy Frankland said that Dr. Hoffmann, in his report in connection with the Exhibition of 1862, stated that only one third of the nitrogen was evolved as ammonia, two thirds remaining behind in the coke; and, as far as he knew, nothing had been done with the subject until Mr. Foster had taken it up. He had made some combustions of the coal used by that gentleman, using the apparatus employed in the combustion of a water residue; about ·024 gram of coal was taken; great difficulty was experienced in getting all the nitrogen off.

A New System of Hauling Coal from Mines.—Mr. C. B. Finley, of the Kittanning Coal Company, in the Clearfield region, has perfected a system for hauling coal out of the mines of the company, which appears to be both simple and inexpensive. He utilizes the switching locomotive used on the tracks outside of the mine as the motive power for drawing the loaded cars from the mine, instead of a stationary engine. The power is applied in the following manner: From the place where the trains are made up, in the mine, to the outside is some 1200 feet. Under the track which extends between these two points is an endless wire rope, passing around a large drum at each end. To the drum on the outside is geared a large cog-wheel, which in turn is geared to four smaller wheels, which are so arranged under a side-track parallel to the main track that, when the locomotive is run on this side-track to the proper position, its four driving-wheels are directly over and its weight is resting upon the four smaller wheels. Accordingly, when the train of loaded cars, varying in number from twenty-five to forty, is made up at the bottom of the slope, the last car is clamped to the rope, the locomotive is run on the side-track outside and up on the friction-wheels, and consequently the drum revolves, and the train moves up out of the mine. When it arrives at the surface, the locomotive is run off the siding, is attached to the train, and performs its ordinary duties. One of the advantages of this arrangement over the stationary engine plant seems to be that, while the trains are making up in the bank, the engine can be used for other purposes, at other places.

Forestry Statistics.—Mr. C. S. Sargent, special agent in charge of the forestry statistics of the Census, has just issued a bulletin in which he gives a partial estimate of the consumption of wood for domestic use in the United States. He figures out the enormous aggregate of 140,537,439 cords, valued at $306,950,040. The States which consume the greatest quantity of wood are the following, in the order named:

	Cords.
New York	11,290,975
Ohio	8,191,543
Tennessee	8,084,611
Kentucky	7,994,813
Michigan	7,838,904
North Carolina	7,434,690
Pennsylvania	7,361,992
Wisconsin	7,206,126
Indiana	7,059,874
Alabama	6,076,754
Georgia	5,910,045
Virginia	5,416,112
Illinois	5,200,104
Mississippi	5,090,758
Texas	4,883,852
Iowa	4,090,649
Missouri	4,016,373
Arkansas	3,922,400
South Carolina	3,670,959

It will be noticed that even those Southern States which are known to have very large and valuable deposits of coal, and some of the Western States similarly situated, are still very heavy consumers of wood for domestic purposes.

The general consumption of wood in a number of other industries is as follows:

	Cords.	Value.
Domestic purposes	140,537,439	$306,950,040
Railroads	1,971,813	5,126,714
Steamboats	787,862	1,812,083
Precious metal mining	358,074	2,874,593
Other mining	266,771	673,692
Brick and tile	1,157,522	3,978,331
Salt	540,448	122,681
Wool	158,208	425,239
Total	145,778,137	$321,962,373

This does not include the consumption of charcoal, which is given as follows:

	Bushels.	Value.
In twenty largest cities	4,319,194	$521.316
Manufactures of iron	69,592,091	4,726,114
Precious metals	97,687	29,306
	74,008,972	$5,276,736

What an enormous quantity this is—and we are confident that it does not fully represent the total consumption—will be noted, when we estimate that charcoal weighs on an average 20 pounds per bushel. We then arrive at an aggregate weight of fully 750,000 net tons.

THE PEARL FISHERIES OF LOWER CALIFORNIA.—The pearl fisheries near La Paz, in Lower California, says the *Mexican Financero*, are not a recent industry, though they have recently attracted great attention. For more than twenty years, they have been pursued in a quiet and somewhat unsystematic manner, but have been the means of very large wealth to many families, who have controlled the riparian rights. Some remarkable pearls lately found there have excited much interest. Three such extraordinary events have taken place during the past month. Probably the largest pearl on record, weighing 75 carats, was found toward the close of December. The fisherman sold it on the spot for $14,000, which, however, was an insignificant sum compared with its real value. Now

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comes the announcement that one of the fishermen employed has just discovered a finely tinted and perfectly formed pearl weighing 47 carats, and valued on the spot at $5000; while yet another pearl was found about the same time, smaller than the former, but of perfect shape, weighing 40 carats and valued at $3000. We have already remarked that American buyers have hitherto strangely ignored that promising district; but large European houses are represented by resident agents, under whose purchases all the products of these fisheries are shipped to European markets.

SHIPBUILDING IN ENGLAND DURING 1882.—It is calculated, says the *Iron and Coal Trades Review*, that upward of 783 vessels were launched in Great Britain during the year 1882, of an aggregate gross total of nearly 1,200,000 tons, a record considerably in excess of that of 1881, though that year was the most prosperous that had ever been known previously. Nearly all the vessels launched have been either of iron or steel, and very few have been sailers, the bulk of the latter being constructed on the Clyde. Wood as a material for shipbuilding is almost completely abandoned in England. Only two wooden vessels were built on the Clyde last year, one on the Tyne, and none on the Wear or Tees. The fact is well known that, year by year, our wooden shipping is rapidly decreasing in number and importance; for, as the vessels are removed from the register, their owners find it to their advantage to replace them with iron steamers. The old wooden collier, so common a few years ago in the London trade, is steadily disappearing, and the largest proportion of the coal conveyed is now in moderate-sized vessels, say of 800 or 1000 tons. In the days of wooden shipbuilding, New York was the second shipbuilding port in the world, Sunderland being the first; but the introduction of iron and steel has quite put the former "out of court," while Sunderland having adapted itself to the use of the new material, was last year the second most important district in the world, the Clyde being now the first, and the Tyne third, judged by the tonnage of vessels launched last year. As iron superseded wood, so steel is gradually superseding iron, many of the largest vessels being built of it. In fact, in 1882, there were 60 steel vessels launched, their aggregate gross capacity being 108,254 tons. Steel-makers are steadily cheapening the cost of production of plates, and thus reducing the difference between them and iron plates; and as engineers are much less distrustful of them than they were a couple of years ago, their use is naturally extending, principally on the Clyde, where in fact seven eighths of the steel vessels have been built, and one fourth of the tonnage constructed on that river during the past year has been of steel. In 1879, only 18,000 tons were built; in 1880, about 40,000 tons; in 1881, the increase was to 66,609 tons; and last year, to 108,254 tons.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

The latest reports state that Contention is taking out 90 tons of ore daily, the quality remaining the same as for the past month. The Empire shaft is nearly 500 feet deep, and it is expected that a heavy flow of water will be struck soon. Some ore was taken from near the surface of the Bradshaw mine last week, when the mine was attached and shut down by a creditor whom the company has owed for some time. The whim has been completed on the Rattlesnake mine, and some good ore is extracted.

GRAND CENTRAL.—At the annual meeting of the stockholders, the following directors were elected: Charles D. Arms, J. H. McEwen, Robert McCurdy, Youngstown; Thomas Struthers, A. J. Haseltine, Warren, Pa. The directors elected C. D. Arms President, and Robert McCurdy, Secretary and Treasurer.

PIMA COUNTY.

OLD DOMINION.—The company is now working vigorously all the groups of its mines in the district, the Old Globe, the Keystone, and the Black Copper. At the Old Globe, a fine body of ore is opening up on the first level, 215 feet from the surface, and from 30 to 40 tons of ore are daily extracted and sent to the furnace. The Keystone keeps two teams steadily hauling, and the Black Copper has just commenced sending ore. On the Black Copper claim of this group, the ledge has been stripped by two pits, respectively 75 and 90 feet in length, exposing the ore for a width of from 10 to 20 feet, and in depth, so far as developed, 10 feet. On the Copper Jack location, the ledge has been stripped 64 feet in length, showing an average width of 28 feet and a depth of 14 feet, with the extent downward yet to be determined. The ore, from numerous assays made, averages from 15 to 20 per cent in copper. One furnace is kept constantly running, the supply of water and coke being insufficient for two at present. After a successful run, furnace No. 2 has been closed down for general overhauling, and No. 3 furnace started up and is now in full blast.

PINAL COUNTY.

SANTA CATALINA.—This company, which has recently bought the O'Brien copper mines, is moving its smelter from the Santa Catalinas to the Gila River. The furnace will shortly start up. There is an abundance of wood at hand to make all the charcoal needed, and the Deer Creek coal-fields are near. This coal makes a superior quality of coke, and the company need not import the latter.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended January 20th shows: Tons of ore crushed, 13,217; assay value of pulp, $45.32 per ton, that of ore being $252.33. The tailings averaged $6.63 per ton. Bullion shipped, $5558.60. The vein is very strong in the bottom of winze No. 3, and carries more quartz than when the winze was started. The south drift on the rich vein, 780 level, is in 140 feet. The water is decreasing somewhat, so that the pumps are making a little more than eight strokes per minute.

BULWER CONSOLIDATED.—The north drift from the west cross-cut is in 291 feet. The formation in this drift is very favorable.

STANDARD CONSOLIDATED.—The official report for the week ended January 20th shows: Ore extracted and shipped to mills, 1428 tons. Shipped to the company, $25,661.60. East cross-cut from south drift, 1000 level, is 224 feet long, and the face is still in hard blasting rock. South drift from east cross-cut, 700 level, is in 365 feet, showing the vein one foot wide. North drift from west cross-cut is 302 feet long, and is in favorable formation. Total length of south drift No. 1, 500 level, is 370 feet, and the vein is 9 feet wide. The uprise from this drift has reached a hight of 248 feet, where the vein is 12 feet wide. South uprise No. 2 is up 60 feet and shows ten feet of ore. North drift is 414 feet long. North uprise is up 258 feet, showing vein 10 feet wide. South drift No. 1, 385 level, is in 459 feet, where the vein is 6 feet wide. South drift No. 2 is 570 feet long, and shows the vein 4 feet wide. The different stopes show no important change.

SAN BERNARDINO COUNTY—PROVIDENCE MINING DISTRICT.

It is reported that large lead mines have been discovered in Timber Mountains, 100 miles north of Providence.

CANADA.

PROVINCE OF NOVA SCOTIA.

The intense cold weather that has prevailed during the month of January has materially interfered with milling operations throughout the various mining camps, although the underground work has steadily progressed.

HALL-ANDERSON.—The milling operations have been at a stand-still, owing to the inability of the coil-heater to keep the water from freezing the pipes. A large quantity of ore of better quality than ever is ready for the mill, and the mine throughout is looking well.

KENT.—This company is making arrangements to put up a dam on the Tangier River, so as to obtain power for a proposed 35-stamp mill. A large surplus of power, probably of several hundred horse, is expected to be rented by the company to other mills and factories. The underground work of this mine is ready to furnish ore to keep 35 stamps at work.

OXFORD.—The superintendent telegraphs that he has just cleaned up from ten days' run $2850, and opens the month with more ore on the dump, and of higher grade, than at the beginning of any previous month. Every thing running smoothly.

SATEMO.—The cold weather has rendered it impossible to keep the mill on full time; but the clean-up just reported for the month is $1800. All developments on the Kent lode show the lode to continue with regularity, both in width and in grade. The recent settlement made by this company for its claims against Clark & Bothwell places it in a strong financial condition.

WELLINGTON.—At a depth of 1200 feet, a cross-cut has been made, and only six feet away from the lode has been found another wider and even richer than the main lode.

A discovery of copper is reported to have been made at Malaquash Point, Cumberland County.

COLORADO.

CLEAR CREEK COUNTY.

CORA MAY.—Work is steadily pushing on this lode, on Seaton Mountain. The adit is now in 70 feet, showing a pay-streak of four inches (galena, iron pyrites, and gray copper) on the hanging-wall.

DIAMOND.—The Colorado *Miner* says that a vein showing a pay-streak of about ten inches of rich ore was struck in the tunnel recently, gray copper showing plentifully. Several sample assays were made which gave an average of 235 ounces silver and 30 per cent lead per ton. Since the foot-wall of this lode was intersected, the tunnel has penetrated a distance of nearly fifty feet through dike rock, in which have been opened three veins of unusually rich ore. This last vein, supposed to be the north vein of the lode, has now been penetrated a distance of about six feet, without reaching the north or hanging-wall. A large Baker blower has been purchased to supply ventilation for the tunnel-heading and to enable the working of the late intersected veins to be prosecuted without intermission. There is a large amount of ore on the dump.

POLAR STAR.—Work was begun at clearing out this well-known Democrat Mountain property, preparatory to systematic and extensive development, in the early part of October last. Three men are at work, and have cleaned out 650 feet of the lower tunnel, retimbered it, and laid new track where necessary. A contract has been let to sink a shaft sixty feet near the lower tunnel, from the bottom of which levels will be run. The tunnel was chambered out over the 128-foot shaft when the mine was worked before. This chamber will be retimbered and a 15 horse-power engine put up for hoisting and pumping.

LAKE COUNTY.

BIG PITTSBURG.—The company's properties are all worked on a lease. Colonel Bright, who has the lease on the Bates and Pierson shafts, is taking out some very fine lead carbonate ores. The Lent and Haytrosser shafts are also working successfully.

CATALPA.—The manager has shipped two car-loads of iron ore to the iron and steel works at Pueblo, where the ore is to be tested, and its value for making steel rails and merchant iron is to be ascertained. The ore all averages about five ounces in silver to the ton. For some time past, the shipment of iron ore has been an important feature of several of the Carbonate hill mines. The Catalpa mine has lately shipped 300 tons of iron to the Grant smelter at Denver, where it is used for fluxing purposes, and about 2500 tons to the smelters of this city, and other points along the Rio Grande Railroad.

CHRYSOLITE.—Two additional leases were let on the Chrysolite mine, January 28th. The first of these was let to Messrs. S. Ayres, Jr., and Frank Ballou, on the old workings about Colorado Chief No. 2 shaft. The other lease was let to Mr. J. C. Langhorne, one of the original discoverers of the Vulture mine, now one of the group of the Chrysolite consolidation. Mr. Langhorne has a lease on the southern portion of the Vulture, and anticipates doing well.

LEE BASIN.—The shaft-house and the machinery were destroyed by fire January 23d. The loss is estimated to amount to $12,000.

MIKE & STARR.—Since putting in the new pumping machinery, the shaft has been sunk to a considerably greater depth, and a drift started forty-five feet below any of the former workings. This drift has now advanced quite a distance to the eastward, and now will be turned toward the south. About fifty feet more of drifting, it is thought, will catch the vein in its south dip. In the mean time, the sinking of the shaft is continued.

ROBERT E. LEE.—Eight thousand tons of third-class ore, which will average about $25 a ton, are now on the dumps.

TERRIBLE.—The Adlaide mine, the property of this company, is looking better and making larger shipments of ore than ever heretofore. The mine for some time past has been making regular shipments of twenty-five tons of ore a day, netting from fifteen to twenty dollars per ton. The working force of the mine numbers about fifty men. At present, the mine shows a breast of ore twenty-five feet in hight and about thirty feet in width, also a large number of minor ore faces, all promising well.

OURAY COUNTY.

Mr. W. Weston, in a letter to the Denver *Republican*, speaking of the ores of Red Mountain District, says that the ores are of two kinds—galena and a copper ore that looks like an antimonial copper glance: that from the Hudson being of a very dark gray color, in fact nearly black; that from the Yankee Girl being of a gray color and associated with copper pyrites; and that from the Orphan Boy having the usual beautiful colors of erubescite, and all these having the appearance of solid masses of metal, without gangue in them, and not having the combed or banded texture noticeable in all the ores of our vertical fissure quartz-veins. I send you specimens herewith, commencing at the lowest point (as you ascend the valley from Ouray), at which I saw ore, the White Cloud mine; the altitude is 10,000 feet above sea-level; half a mile farther up are the Gustin and Robinson mines, altitude, 10,200; 300 yards farther up, the Yankee Girl, 10,300; 100 yards farther, the Orphan Boy, 10,350; then a mile and a half farther up the gulch, the Hudson, 11,100; and 2200 feet farther up, the Congress, 11,300. So, taking every thing I saw into consideration, I am of the opinion that the whole thing is an immense horizontal contact lode, having its outcrop on the side of this chain of Red Mountains, dipping slightly toward the east, or into the mountain, and pitching downward into the earth as you travel from south to north, or down the valley toward Ouray. Of course, subsequent development may prove them to be irregular segregated contact ore-deposits; but in the mean time, I incline to the former belief. True it is that similar ore has been discovered in the Roger and Champion considerably above the line described by the altitudes given above; but I have no doubt that the flat lode, if it is such, will be found to be faulted in place, by upheavals subsequent to its formation. I was unable to visit the two last-named mines.

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SUMMIT COUNTY.

GRAPHIC.—A correspondent of the Leadville *Herald* states that an important strike has been made in the Crown Point mine, the property of the Graphic Company. The old workings of the mine consist of a tunnel several hundred feet in length, from which an incline was sunk upon the vein. In this tunnel and incline, considerable high-grade ore was developed, showing brittle and ruby silver. Some time ago, a new incline was started from the surface, under the direction of Manager Parker, of the Robinson mine. In the new incline, the vein was caught at a depth of fifteen feet, and carried down in the incline to a depth of seventy-five feet, where the vein left the incline. At a depth of about 125 feet, a drift was run, in which, at a distance of about sixteen feet, the vein has just been cut, showing twenty inches of high-grade ore, of which about two tons are already out and on the dump. The new strike adds greatly to the value of the mine, and, in connection with the large amount of ore developed in the old workings, renders it one of the most valuable properties in the Ten Mile District.

GREER WORKS.—The concentrating-works, at Kokomo, have started up, under the direction of Mr. William Penberthy, who has superintended their construction The plant consists of a twenty-stamp mill, with concentrating apparatus. The mill has received shipments of ore during its construction, and has now a great deal of ore on hand. The result of its workings will be of great importance to the Ten Mile District, which possesses immense quantities of low-grade ores, which it is expected that concentration will render available. The stacks of the Greer smelter have been sold to the Cañon City Company.

ROBINSON.—Mr. James W. Davis is now firmly installed as manager of this mine.

DAKOTA.

CALEDONIA.—The superintendent's report for week ended January 14th shows: Ore produced, 950 tons. South header advanced 3 feet; total, 37 feet. North drift advanced 9 feet; total, 60 feet. Very little work done in the winze, on account of using all the men to break ore for the mill. For week ended January 21st, he reports: Ore produced, 825 tons. Bullion shipped, 643 ounces gold; value, about $11,000. South header advanced 3 feet; total, 40 feet. North drift advanced 8 feet; total, 68 feet. Have not been able to do any thing with the winze, on account of the water freezing before leaving the mouth of the tunnel. As soon as the weather moderates, will renew sinking. Only forty stamps running at present, on account of crusher breaking.

FATHER DE SMET.—The superintendent's report for week ended January 15th (delayed in mail) shows ore extracted from first, second, and third levels, 2100 tons. Ore milled, 2100 tons. The widening of the third level header 5 feet is completed. The body of ore struck in the Golden Gate cross-cut is proving to be quite extensive. A chamber has been cut out 40 feet wide and 70 feet in length, to be known as Cook's chamber. In this chamber, at a point about 150 feet southeast from the McGinty winze, a winze has been started, to connect with the third level header. It will be known as the Italian winze, and has advanced 16 feet. The product of the mine for December, bars 149 and 150, was $47,892.12; superintendent's drafts for expenses, $19,000; net profit, $28,892.12. The report for week ended January 22d shows: Ore extracted from first, second, and third levels was 1715 tons, while 1865 tons of ore were milled. The Italian winze was advanced 6 feet, and is now down 22 feet. The third level header advanced 13 feet, and is 107 feet in.

SAVAGE.—Work is prosecuted with two shifts and air-compressors in the tunnel. The breast of the tunnel is in about 800 feet.

GEORGIA.

PIGEON ROOST.—The mill is running regularly on ore from the Ogle cut. Veins which show free gold were struck recently.

SINGLETON.—The five-stamp mill at the Lockhart mine is running on ore from the stope on the Findley ridge. Work at the new 20-stamp mill is pushed vigorously.

IDAHO.

EAST FORK MINES.—A correspondent of the Salt Lake *Tribune* says that these mines are situated near the head of East Fork of Salmon River, seven miles from Galena. Little has as yet been done in this new mining district. Several locations have been made and some work done on several of the prospects, such as the Tyrolese, Lyon, Carbonate, Washington, Langtry, Germania, and others, all of which look remarkably well and have good ledges and show fine ores in quantities. Considerable ore was shipped last season from this neighborhood from Germania and other mines. The ore is chiefly galena and carbonate, which assays from 150 to 600 ounces per ton and from 30 to 60 per cent galena. These mines can be very easily and cheaply worked. Smelters and concentrating-works are wanted in this district. Water-power is unlimited in the vicinity, and a great abundance of excellent timber for charcoal, mining, building, and other purposes.

MINNIE MOORE.—The Bellevue *Chronicle* says that a fine vein of ore two feet thick was recently cut in the cross-cut on the 150 level of this mine. The ore assays 116 ounces silver and 70 per cent lead. There is no end to the ore that can and will be shipped from this mine as soon as the railroad is completed to Bellevue.

MAINE.

DEER ISLE.—A special meeting of the holders of this company was held in Portland, on January 31st, for the purpose of reorganization, or to devise some other plan for relieving the company of its financial embarrassment.

STEWART COPPER.—A special stockholders' meeting will be held at the company's office, in Bangor, February 9th, to determine what disposition shall be made of the shares of stock remaining in the treasury.

MEXICO.

The *Imparcial* announces that at Parral, Chihuahua, Messrs. George Thomas, of San Francisco; J. W. Provard, of Arizona; J. Wiley, of New Mexico; and A. B. Sawyer, of Parral, with a number of Eastern parties, have bought the Jesus Maria for $227,000. The hoisting and pumping machinery and a part of the 40-stamp battery are on the way to the mines. Mr. J. W. Provard, of the Ward Mining and Milling Company, has finished the foundation for a Stetefeldt furnace and 40 stamps, in addition to the 15 now at work.

MONTANA.

JEFFERSON COUNTY.

ALTA-MONTANA.—The company's works at Wickes are running smoothly and steadily. At the Comet mine, they are working on a five-foot vein of ore that assays 79 per cent galena and 64 ounces in silver.

SILVER BOW COUNTY—SUMMIT VALLEY DISTRICT.

The Butte *Miner* says that operations at the mines during the past week have been considerably retarded by the extremely cold weather.

ALICE.—Work is pushed with the customary vigor. A strike was made in the south cross-cut of the Magna Charta 500, which is considered important. The cross-cut intercepted the south vein, and a three foot ledge of fine ore, characterized by heavy sulphurets, was uncovered, which assays 57·91 ounces in silver per ton.

CABLE.—From the face of the 2500-foot tunnel, which intersects the ledge at a perpendicular depth of 300 feet, east and west drifts have been forwarded for a total length of 100 feet on a body of high-grade gold ore, which has an average width of 40 feet. A 40-foot ore breast is now extracting. The clean-up in the mill for the past month, during which but fifteen and sometimes only ten stamps were in operation, is said to be about $50,000.

CLEAR GRIT.—The mine is still worked for development and uncovering the ore-bodies. The ledge in the west drift holds out and improves. A new ore dump has been built, and arrangements will soon be completed to begin milling the ores.

LEXINGTON.—The 500-foot station has been started and cross-cutting commenced to intercept the south vein. The mill is running steadily, with a larger average output than ever before, that of last week being ninety per cent of assays

MOULTON.—Work progresses steadily. The body of high grade in the winze west of the 400 cross-cut holds out in good shape, assays running from sixty to eighty ounces. The ore-house is full and the mill running steadily.

NEVADA.

EUREKA TUNNEL.—The tunnel is sending to the furnaces about ten tons of ore a day. The new double-compartment shaft, situated about 100 feet westerly from the main south drift, and 40 feet south of the main tunnel, is carried down as far as the work can be done, passing through limestone, spar, iron, and small veins of low-grade ore. Preparations are making to set up the engine, which is of 40 horse-power, and will be run by steam from a large boiler set up at the mouth of the tunnel. The main south drift has been run 225 feet on a seam in ledge-matter almost the entire distance, and shows spots of ore in several places, which will be thoroughly prospected as soon as a new air-connection is made with the surface, which at present is seriously contemplated.

SILVER STATE.—The tunnel is in 315 feet. A cross-cut is driving easterly into the hill in an open seam which is incrusted with water formation. Running even with this seam is a sort of ledge-matter, carrying quartz and iron very different from the gray limestone on each side of it. These indications are favorable.

THE COMSTOCK LODE.

CALIFORNIA.—From a report presented at the annual meeting in San Francisco, we take the following: In June last, some prospecting on our croppings having shown streaks of ore yielding fair assays, a winze was sunk for the purpose of ascertaining their value. The result has been the extraction of 610 tons 1910 pounds of ore, yielding bullion to the value of $10,122.80, or $16.58 per ton, this yield being 74 per cent of the assay value of the ore, no allowance being made for moisture. Work on the croppings was discontinued in December, and will be resumed as soon as the weather permits. Our other work has been confined to opening out and partially prospecting the 2500 and 2700 levels, in the accomplishment of which there have been hoisted from the mine 11,319 tons of waste rock. On the 1650, 1750, 1950, and 2300 levels, a large amount of work has been done, jointly with the Ophir Company and by the California Company individually, in repairing the various drifts and connecting winzes on and connecting these levels, it being necessary to maintain those air-ways for ventilating purposes. It has not been considered prudent as yet to reopen our old stopes. Our work the past year has demonstrated the fact that the Comstock lode in our lower levels continues to show great strength of formation, and the cutting of seams of quartz, giving assays, in the various drifts, on the 2500 and 2700 levels, shows that it is mineralized, with a probability of finding ore-deposits of value when the lower levels are fully opened. By the judicious use of the diamond drill, I have been able to avoid or control the influx of larger quantities of water than our pumping machinery could handle. The financial statement shows total disbursements, $233,369.40, including $51,553.81 for wages and salaries, $10,344 for compressed air, $51,905.28 for legal expense, $7450.70 for a suction-fan, $93,200 for construction of C. & C. shaft, $5498.59 for reduction, $2507.20 for hoisting, $2300 for water and ice, and $1996.80 for powder, caps, and fuse. The real estate, machinery, hoisting-works, and supplies on hand are about the same as shown in last year's inventory.

TUSCARORA.

The Tuscarora *Mining News* says that the work of developing and prospecting the mines goes on steadily. Evidences of the improvement of the known existing ore-bodies, and of the approach of drifts to ore-bodies not now developing, is constantly received. Grand Prize and Argenta are each doing important work. The North Belle Isle shaft has passed its 300 level, and is progressing downward at the rate of 11 feet per week. On reaching the 400 level, sinking will be stopped, when drifts and cross-cuts will be driven. Navajo, Belle Isle, and Independence are looking well. The ore-body in Navajo widens and improves in quality as depth is attained, while the drift in Belle Isle and Independence continually shows seams and bunches of good ore. The Elko Consolidated shows ore carrying a large percentage of gold. An average assay gives $101.29 in gold, and $91.66 in silver.

SOUTH CAROLINA.

HAILE.—The development of this mine continues to show the great extent of the newly discovered vein. It is fully forty-five feet wide, and seems to increase in value as they drive in on it. It now averages about $16 per ton. The stamp-mill has been run steadily through the month of January. The clean-up will show an increase of nearly fifty per cent on the December run. The new furnace is nearly completed, and will be working early in February. All of the concentrates now awaiting treatment will average $40 per ton, some of them running much higher. With the furnace and amalgamation-works running, it is a certainty that the monthly yield will reach $15,000. It is understood that another mine, known as the Gay mine, adjoining the Haile, is about to be opened and worked. From all accounts, it will prove equally good with the latter.

UTAH.

CRESCENT.—The Salt Lake *Tribune* says that the announcement was made during the week that this company had effected a purchase or consolidation of the Walker & Buckeye with its other mines, and it was true as far as the Jennings control in the Walker & Buckeye was concerned. But since then, there has been a suit filed by the Wahsatch Mining Company against the Jenningses, founded on certain transactions in 1877, which resulted in a judgment in the District Court at that time, ending in the sale of the mine by the United States marshal, when it was bought by William Jennings.

GERMANIA.—The company has stopped shipping lead to Salt Lake City, and will manufacture its lead hereafter into white-lead and pipe to a large extent.

MAMMOTH.—Operations at Tintic are pushed with energy. Besides the erection of additional furnaces, the work of erecting the refining-works for the copper matte goes on energetically, and is so far advanced that the manager has gone East to purchase the machinery necessary for the copper refining process.

NEW COMPANIES.

The following companies have filed articles of incorporation:

Baltimore Mining Co. Capital, $5,000,000; shares, $25 each. Operations, Summit County, Utah. Directors: S. D. Connor, William H. Knox, Park City; W. P. Lynn, F. R. Jones, S. J. Lynn, and James McGregor, Salt Lake City; and Patrick Eagan, Park City. Principal office, Salt Lake City.

Cosmopolitan Mining Co. Capital, $3,000,000; shares, $20 each. Operations, Alturas County, Idaho. Directors: Samuel P. Connor, J. C. Conklin, James McGregor, and Hugh Anderson. Principal office, Salt Lake City.

Lexington Mining Co. Capital, $500,000; shares, $5 each. Operations, White Pine County, Nevada. Directors: John W. Epley and George F. Hill, Washington, D. C.; William W. Libby, W. W. Wood, Frank Hoffman, Salt Lake; and J. H. Johnson, Evanston, Wyoming. Principal office, Salt Lake City.

WISCONSIN.

NEW COMPANIES.

The following companies have filed articles of incorporation:

Consolidated Vanderbilt Mining Co. Capital, $1,200,000; shares, 120,000. Operations, New Mexico. Incorporators: The Imre Brothers, Oluf M. Meyer, John Teich, Charles Mitchell, John Mitchell, Alexander G. Gordon, Henry M. Wilmott, and Christopher C. Fletcher.

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Jackson County Iron Co. Capital, $6,000,000; shares, 6000. The object of the company is the mining and milling of iron and lead, and the quarrying of stone. Incorporators: J. A. Instead, John C. Spooner, and A. J. Goss, of Hudson. General office, Hudson, Wis.

ANNUAL FINANCIAL STATEMENTS.

We give below some additional reports of the financial standing of mining companies. These statements are taken from affidavits filed with the County Clerk, and are, therefore, accurate:

	Indebtedness.	Reporting Officer.
Achi Mining Company	$1,000.00	W. R. Wade, President.
Adams Prospecting Company	None.	W. B. Dickerman, President.
Alpine Silver Mining Company, of Colorado.	20,000.00	Horace Waldo, President.
Alturas Consolidated Mining Company	9,750.00	T. R. White, Jr., Secretary.
Amador Pacific Gold Mining Company	None.	Warner Van Norden, Sec'y.
American Flag Gold Mining Company	5,500.00	A. J. F. Van Deventer, Sec'y.
Amie Consolidated Mining Company	10,000.00	Robert Sewell, Vice-President.
Animas Silver Mining Company	None.	Lindley M. Hoffman, Sec'y.
Arizona Consolidated Copper Company	350.00	Frank Rudd, Secretary.
Atlanta Hill Gold Mining and Milling Company	19,000.00	S. B. Johnston, President.
Aurora Gold Mining Company	13,000.00	Thomas C. Platt, President.
Bassick Mining Company	25,000.00	William S. Hoyt, Secretary.
Beaton Silver Mining Company	5,000.00	Everett Clapp, Secretary.
Beauce Gold Mining and Milling Company.	7,500.00	Eugene Howard, President.
Belle of Ouray Silver Mining Company	50,000.00	A. R. Chisholm, President.
Bellevue Mining Company	2,000.00	S. B. Johnston, President.
Berkshire Consolidated Gold and Silver Mining Company	12,500.00	A. J. Malterner, Asst. Sec'y.
Bessemer Mining Company	12,000.00	Charles P. Bates, Secretary.
Bidwell & Beaver Extension Mining Company	5,000.00	J. W. Hedenberg, Secretary.
Big Pittsburg Consolidated Silver Mining Company	325,000.00	Abraham L. Earle, Secretary.
Black Jack Mining and Milling Company	20,000.00	A. T. Beach, Secretary.
Blue Lead Consolidated Mining Company	None.	A. W. Frothingham, President.
Bondholder Mining Company	6,000.00	M. S. Isaacs, President.
Bonanza & Union Tunnel Mining Company	500,000.00	G. H. Danforth, President.
Boreel Mining Company	None.	Augustus Ebert, Secretary.
Boston & Montana Gold Mining Company	None.	George B. Child, Secretary.
Boulder Consolidated Gold and Silver Mining Company	45,000.00	George H. Morrison, Secretary.
Bremen Silver Mining Company	1,000.00	Henry Thompson, President.
Brooklyn & San Miguel Mining and Reduction Company	75,000.00	C. C. Savage, Secretary.
Buda Mining Company	75.00	T. R. White, Jr., Secretary.
Bull-Domingo Consolidated Mining Company	326,000.00	N. B. Stevens, Secretary.
Cagle Gold Mining Company	3,500.00	Julius A. May, President.
California Placho Quicksilver Company	None.	Charles W. Ellis, Secretary.
California Water and Mining Company	42,101.72	Bernard Whitman, Secretary.
Camuchin Consolidated Silver Mining Company	14,000.00	Lindley M. Hoffman, Sec'y.
Carupano Silver Mining Company	13,000.00	William Q. Judge, President.
Centennial Silver Mining Company	75,000.00	Charles B. Colton, Secretary.
Champlain & Essex Mining Company	25,000.00	Sumner R. Stone, Treasurer.
Cherokee Gold Mining Company	57,000.00	Augustus Storrs, President.
Cheyenne Consolidated Mining Company	45,000.00	R. McNaught, Secretary.
Chrysolite Silver Mining Company	Taxes, 1882	Henry C. Cooper, Secretary.
Cimarron Mining Company	25,000.00	Isaac W. England, President.
Clarence Gold Mining Company	1,500.00	A. Y. Comstock, Secretary.
Climax Mining Company	25,000.00	Harry Allen, President.
Codorus Mining Company	255,000.00	William W. Rossiter, Sec'y.
Columbia & Beaver Silver Mining Company.	45,000.00	Joseph H. Tucker, President.
Columbia Consolidated Gold and Silver Mining Company	128,678.19	Washington Lee, President.
C. O. D. Gold and Silver Mining Company	2,500.00	Everett Clapp, Secretary.
Consolidated Batopilas Silver Mining Company	155,000.00	G. W. Quintard, President.
Consolidated Excursion Mining Company	10,000.00	Walter S. Logan, President.
Consolidated Gold and Silver Mining Company	4,000.00	James W. Smith, Secretary.
Consolidated Mineral Point Mining Company	942.49	Nathan E. Seeley, President.
Cosette Mining Company	200.00	James McLean, Secretary.
Crowell Mining Company, of North Carolina	1,000.00	George F. Mann, Treasurer.
Crown Prince Mining Company	2,500.00	Frank D. Bunce, Secretary.
Cumberland Mining and Milling Company	1,000.00	H. S. Vanderbilt, Secretary.
Cusihuirischic Mining Company	230,000.00	A. H. Barney, President.
Dahlonegga Gold Mining Company	10,000.00	C. A. Trowbridge, Sec'y.
Deadwood-Terra Mining Company	5,000.00	R. P. Lounsbery, President.
Denver Rainbow Mining Company	1,700.00	Charles H. Emerson, Pres.
Derre-Townsend Arizona Mining and Mineral Land Company	50,000.00	C. A. Trowbridge, Secretary.
Descubridora Consolidated Silver Mining Company	20,000.00	Lindley M. Hoffman, Sec'y.
Deveau Mining Company	None.	Moses E. Worthen, President.
Diamond Flume and Hydraulic Company	4,600.00	James King, President.
Dinero Consolidated Mining Company	1,000.00	W. W. Horton, President.
Dolores Valley Mining Company	4,000.00	Edward Einstein, Secretary.
Eagle River Consolidated Mining Company.	80,000.00	A. J. Malterner, Secretary.
Eagle Silver Mining Company	20,000.00	C. H. Waterbury, Secretary.
Eddy Silver Mining Company	8,600.00	Edward W. Milligan, Sec'y.
Edgar Gold and Silver Mining Company	1,000.00	Alvin F. Hill, Secretary.
El Capitan Mining Company	6C,000.00	Henry L. Clapp, President.
Elko Consolidated Mining and Smelting Company	125,000.00	M. A. Miller, President.
Emerson Gold and Silver Mining Company.	1,500.00	C. H. Emerson, President.
Empire Gold Mining Company	10,000.00	Charles P. Crosby, President.
Equitable Silver Mining Company	25,000.00	W. De F. Edwards, President.
Esmeralda Mining Company	62,000.00	Charles R. Buckley, Secretary.
Estrella Del Norte Mining Company	18,000.00	R. N. Prestidge, Secretary.
Evening Star Mining Company	None.	W. B. Dickerman, President.
Evening Star Silver Mining Company	1,000.00	J. A. Barker, Secretary.
Exchange Silver Mining and Milling Company	25,000.00	William H. Guion, President.
Fairmount-Shafter Mine	20,000.00	James L. Dawes, Secretary.
Findley Gold Mining Company	8,000.00	D. A. Boody, President.
First National Gold Mining Company	52,500.00	William Man, Secretary.
Fischer Gold and Silver Mining Company.	100.00	O. L. Gardner, President.
Fletcher Gold and Silver Mining Company.	500.00	J. J. Humphreys, Secretary.
Fryer Noble Metal Mining Company	50,000.00	Robert L. S. Hall, Secretary.
Garibaldi South Gold Mining Company	5,000.00	Auguste H. Girard, Secretary.
Georgetown Eureka Mining Company	14,747.74	Rufus Hatch, President.
Gilded Age Mining Company	15,000.00	D. S. Sanford, President.
Glen Cove Mining Company	335.95	Frank Rudd, Secretary.
Gold Cliff Gold Mining Company	2,600.00	John M. Nixon, Secretary.
Gold Cup Mining and Milling Company	5,300.00	George W. Crane, Secretary.
Gold Gravel Hydraulic Company	5,000.00	Monroe E. Babcock, Sec'y.
Gold Stripe Mining Company	17,500.00	R. E. Brewster, President.
Golden Gate Mining and Milling Company.	30,000.00	A. T. Beach, Secretary.
Golden Horn Mining and Milling Company.	200.00	H. L. Powers, President.
Golden Rule Consolidated Mining Company.	3,000.00	M. S. Isaacs, President.
Gold Park Mining Company	115,000.00	William J. Osborn, Secretary.
Good Return Mining Company	14,000.00	Mial Mason, President.
Grand Mesa Mining Co	16,000.00	E. F. Hollister, Secretary.
Grand View Mining and Smelting Company	195,000.00	T. Dean, President.
Granger Mining and Reduction Company	203.57	James H. Ferguson, Pres.
Granite Mountain Consolidated Mining Company	43,528.35	Samuel L. Harris, Secretary.
Granville Gold Company	6,000.00	W. Brandreth, Treasurer.
Graphic Consolidated Mill and Mining Company	12,000.00	Edward Beadle, Secretary.
Gregory Consolidated Mining Company	200,000.00	Jesse W. Lilienthal, President.
Haile Gold Mining Company	80,000.00	Louis E. Genin, Secretary
Harlem Mining and Milling Company	10.00	W. G. Lord, Secretary.
Hector Mining Company	20,000.00	B. G. Noble, President.
Helmet Mountain Tunnel Company	1,500.00	John Van Nest, President.
Hering Gold Company	4,000.00	Frank Rudd Secretary.
Herkill Gold and Silver Mining Company	40,000.00	Robert J. S. White, Secretary
Heuson Creek Reduction Company	50,000.00	Robert L. Harrison, Secretary
Hite Gold Quartz Company	110,000.00	C. H. Waterbury, Secretary.
Hortense Mining Company	55,000.00	Robert Sewell, President.
Hukill Gold and Silver Mining Company	40,000.00	Robert J. S. White, Secretary.
Hydro-Carbon Furnace Company	None.	Henry A. Jones, President.
Inez Gold Mining Company	2,375.46	Gabriel Furman, Secretary.
Irene Mill and Mining Company	None	Ammi R. Sewall, Secretary.
Iron Bonnet Silver Mining Company	1,500 00	Asa C. Brownell, President.
Iron Cap Consolidated Mining Company	5,000.00	John D. McKenzie, President.
Iron Duke Mine	500.00	A. M. Bigelow, President.
Jocuistita Mining Company	5,000.00	R. P. Lounsbery, President.
Kearsage Silver Mining Company	2,500.00	William Bush, Secretary.
Kesler Mining Company	65,000.00	Francis H. Weeks, Secretary.
King Bee Mining and Milling Company	1,000.00	A. T. Beach, Secretary.
Kings Mountain Mining Company	50,880.00	Horatio N. Twombly, Pres.
La Crosse Gold Mining Company	1,500.00	John Van Nest, President.
La Ligua Gold Mining Company	250,000.00	Edward W. Lowe, Secretary.
Landon Hill Mining and Manufacturing Company	2,500.00	Bayard Clarke. President.
Lang Syne Gold Mining Company	5,000.00	N. S. Walker, Jr., Secretary.
La Plata Mining and Smelting Company	150,000.00	Harry Allen, Vice-President.
Last Chance Mining Company	900.00	Dwight Studwell, Secretary.
Leadville Mining Company	None.	Augustus Ebert, Secretary.
Lexington Copper Mining Company	100,000.00	Luther C. Warner, Secretary
Lexington Mining Company	200.00	George B. Child, Secretary.
Little Chief Mining Company	5,000.00	Abraham L. Earle, Secretary.
Little Rapid Placer Mining Company	12,000.00	Benjamin Homans, President.
L. M. Mining Company	6,870.04	W. M. Barnum, Secretary.
Madelon Consolidated Silver Mining and Milling Company	100.00	O. L. Gardner, President.
Magnette Mining Company	2,000.00	J. W. Maclay, Secretary.
Maid of the Mist Silver Mining Company	3,833.00	C. T. Lewis, President.
Mapleton Mining Company	500.00	Herbert G. Hull, Secretary.
Marion Copper Mining Company	800.00	James H. Kidder, Secretary.
Marshall Basin Mining Company	10,000.00	W. W. Rossiter, Secretary.
Mayflower Consolidated Gold and Silver Mining Company	35,000.00	Robert J. S. White, Secretary.
Memphis Gold and Silver Mining Company	10,000.00	A. R. Chisholm, President.
Menlo Gold Quartz Company	8,000.00	Thomas L. Carpenter, Sec'y.
Michoacan Syndicate	36,021.81	Bernard Whitman, Secretary.
Mike & Starr Gold and Silver Mining Company	5,000.00	Harris K. Smith, Secretary.
Milo Consolidated Mining and Smelting Company	4,600.00	A. F. Higgins, President.
Milton Mining Company	None.	Joel B. Erhardt, President.
Mineral Park Mining Company	5,000.00	E. L. Stoddard, Secretary.
Monitor Milling Company	10,000.00	Charles Appleby, Secretary.
Montrose Mining Company	8,000.00	Alfred H. Roach, Secretary.
Mount Pleasant Mining Company	None.	William N. Olmsted, Sec'y.
Morey District Mining Company	28,894.79	Samuel M. Schafer, President.
Morning Star Consolidated Mining Company	None.	W. B. Dickerman, President.
Mocupia & New York Mining Company	None.	A. S. Arias, Secretary.
Mutual Prospecting and Mining Company	1,000.00	J. T. Warner, Vice-President.
Negaunee Concentrating Company	184,000.00	G. C. Wetmore, Secretary.
Newark Gold and Silver Mining Company	5,000.00	R. J. S. White, Secretary.
New England Gold and Silver Mining Company	800.00	Frederick Nichols, Secretary.
Newark Silver Mining Company	135,000.00	E. B Woodruff, President.
New York & Colorado Company	1,148.35	H. Groenemeyer, Secretary.
New York & Honduras Rosario Mining Company	20,876.16	W. T. Marvin, President.
New York & Idaho Gold and Silver Mining Company	5,000.00	William H. Guion, President.
New York Lone Mountain Mining Company	None.	E. R. Johnes. Secretary.
New York Ore-Separator Company	1,000.00	Robert L. Kleen, Treasurer.
New York Smelting and Refining Company.	75,378.83	Bernard Schultz, President.
Nordenskjöld Silver Mining Company	1,200.00	E. K. Hayt, President.
Ocean & Seneca Consolidated Mining Company	41,509.00	Edward Selleck, Secretary.
Ohio Consolidated Mining Company	5,500.00	Auguste H. Girard, Secretary.
Ojinaga Mining Company	None.	Samuel M. Carter, President.
O. K. Consolidated Mining Company	250.00	C. E. Wadsworth, Secretary.
Old Dominion Copper Mining Company	400,000.00	F. W. Brooks, Secretary.
Old Furnace Mine Company	52,000.00	F. H. Smith, President.
Old River Bed Gold Mining Company	15,000:00	E. B. Dorsey, Vice-President.
Olsen Gold Mining Company	36,000 00	A. T. Beach, Secretary.
Ophir Gold Mining Company	330,000.00	L. C. Warner, Secretary.
Oriental Mining Company	115,000.00	R. S. Walker, President.
Original Butte Mining Company	15,000:00	T. M. Durfee, President.
Oro Plata Mining and Milling Company	49,000.00	Z. A. Willard, President.
Osprey Consolidated Mill and Mining Company	3,000.00	A. Wakeman, President.
Ouray Union Mining Company	None.	W. M. Long, Secretary.
Palmetto Consolidated Mining and Milling Company	10,000.00	George A. Smith, President.
Parral Mining and Milling Company	250,000.00	N. A. Cowdrey, President.
Pharis Gold Mining Company	10,000.00	Auguste H. Girard, Secretary.
Plumas National Gold Mining Company	90,000.00	W. H. Guion, President.
Polaris Gold Mining Company	5,000.00	Auguste H. Girard, Secretary.
Princeton Mining Company	6,750.00	J. W. Scott, Secretary.
Prospect Mining Company	6,000.00	George H. Brown, Secretary.
Quartz Hill Gold Mining Company	None.	William Man, Secretary.
Queen of The West Silver Mining Company	40,000.00	J. A. Alexander, V.-President.
Quinnipiack Mining Company	63,748.28	George W. Lyon, President.
Quintera Mining Company	100,000.00	E. Hegewisch, Secretary.
Red Elephant Mining Company	16,812.50	Frank Rudd, President.
Reese River Consolidated Company	11[illegible],035.59	John Rankin, Secretary.
Republic Gold Mining Company	41,438.93	Joseph E. Gay, President.
Resumption Mining and Smelting Company.	100,000.00	William V. Carr, Secretary.
Revere Concentrating Company	25,000.00	H. M. Benedict, President.
Richardson Gold and Silver Mining Company	3,750.00	T. J. Barbour, Secretary.
Rising Sun Gold Mining Company	26,000.00	R. E. Brewster, President.
Rivilla Consolidated Mining Company	14,726.36	Albert L. Ranson, President.
Ruby Silver Mining and Smelting Company	50,000.00	Ira D. Warren, Secretary.
Ruby Trust Mining and Milling Company	500.00	H. P. Findley, President.
Safe Deposit Silver Mining Company	20,000.00	Thomas S. Acheson, Sec'y.
San Bartolo Mountain Mining Company	10,000.00	W. T. Hotchkiss, Secretary.
San Bruno Copper Company	3,500.00	Emerson Coleman, Secretary.
San Catarina Copper Company	20,000.00	C. A. Trowbridge, Secretary.
St. Catherine Gold Mining Company	83,000.00	Louis G. Bertram, Secretary.
St. Joseph Lead Company	80,000.00	Hugh N. Camp, Treasurer.
San Juan & New York Mining and Smelting Company	201,050.00	H. Amy, President.
San Miguel Gold and Silver Mining Company	2,000.00	William J. Osborn, Secretary.
Santa Eulalia Silver Mining Company	65,000.00	George C. Magoun, President.
Sappho Mining Company	10,000.00	Richard G. Page, Secretary.
Sarane Mining Company	5,000.00	Herbert G. Hull, Secretary.
Satemo Gold Quartz Company	11,000.00	Frederick Gould, Secretary.
Saturday Mining Company	32,000.00	Thomas Minford, President.
Scotia Gold Mining Company	1,080.80	A. Stoddart, President.

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	Indebtedness.	Reporting Officer.
Second National Gold Mining Company	None.	William Man, Secretary.
Silver Belt Company	5,000.00	L. E. Granger, President.
Silver Chord Consolidated Mining Company	3,500.00	S. L. Hutchinson, Secretary.
Silver City Mining and Milling Company	12,000.00	John Gray, Secretary.
Silver Cliff Mining Company	250,000.00	James R. Keene, President.
Silver Dale Mining, Milling, and Improvement Company	2,500.00	Dudley H. Norris, Secretary.
Silver Islet Consolidated Mining and Lands Company	155,000.00	C. A. Trowbridge, Secretary.
Silver King Mining Company	1,500.00	Charles H. Olney, Secretary.
Silver Lake Mining Company	100.00	Lewis W. Hyde, President.
Silver Mining Company, of Silver Islet, Lake Superior	99,701.96	C. A. Trowbridge, Secretary.
Silver Peak & Red Mountain Gold and Silver Mining Company	140,883.42	H. Groenemeyer, Secretary.
Silver Peak Mines	266,065.38	C. J. Canda, Secretary.
Silver Ridge Mining Company	33,879.64	George E. Ford, President.
Singleton Gold Mining Company	20,000.00	W. T. McJilton, Secretary.
Small Hopes Consolidated Mining Company	None.	Augustus Ebert, Secretary.
Snow Silver Smelting Company	3,000.00	E. L. Snow, President.
Socorro Milling and Mining Company	600.00	C. F. Mackenzie, Secretary.
Sombrerete Mining Company	None.	W. N. Olmsted, Secretary.
Sonora Consolidated Milling and Mining Company	12,000.00	E. R. Neeley, Secretary.
South Silver King Mining Company	1,000.00	John D. McKenzie, President.
South Yuba Water and Mining Company	369,614.37	Warner Van Norden, Sec'y.
Spanish Hill Mining Company	30,000.00	R. C. Livingston, Secretary.
Spring Valley Hydraulic Gold Company	443,000.00	N. S. Walker, Jr., Secretary.
Stanislaus River Gravel Company	30,000.00	Auguste H. Girard, Secretary.
Star Grove Silver Mining Company	35,000.00	Charles H. Waterbury, Sec'y.
Starr King Gold Mining Company	15,000.00	C. A. Trowbridge, Secretary.
Stirling Mining Company	None.	W. B. Dickerman, President.
Stormont Silver Mining Company	60,000.00	Charles S. Hinchman, Pres.
Summit Mining Company	13,000.00	L. V. Walkley, President.
Sunshine Mining Company	None.	H. P. Bell, Secretary.
Thorington Gold Mining Company	987.00	Amedee Vatable, President.
Tikup & Geneva Mining Company	37,500.00	Aug. Heard, President.
Tip Top and X-10-U-8 Mining Company	1,000.00	W. S. Gurnee, Jr., President.
Todos Santos Silver Mining Company	8,000.00	Isaac Easton, Secretary.
Torrence Mining Company	61,300.00	T. T. Waller, Secretary.
Trust Gold Mining Company	None.	H. B. Turner, Secretary.
Uncompahgre Mining Company	None.	J. T. Stevens, President.
Uncompahgre Mining and Smelting Company	500.00	Charles G. Cronin, Secretary.
United Mining Company	None.	James M. Hurd, Secretary.
United States Ore-Separating Company	46,909.00	W. Dodsworth, President.
Valenzuela Consolidated Silver Mining Company	None.	Lindley M. Hoffman, Sec'y.
Van De Water Gold and Silver Mining Company	60,000.00	W. M. Duncan, Secretary.
Virginia Coal Company	10,000.00	John Silsby, Jr., Secretary.
Vizina Consolidated Mining Company	1,000.00	James Amm, Secretary.
Vulcan Mining Company	28,000.00	T. M. Durfee, President.
Waldron Consolidated Silver Mining Company	18,629.17	Nathan E. Seeley, President.
Ward Consolidated Mining Company	None.	W. Adams, President.
Way-Up Mining Company	10,000.00	E. D. Benedict, Secretary.
WellingtonMine	500.00	A. M. Bigelow, President.
Wet Mountain Mining Company	2,000.00	James R. Keene, President.
Wilson & Cass Gold Mining Company	305,480.59	G. B. Forrester, Secretary.
Winnebago & O. K. Mining Company	25,000.00	W. F. Buckley, President.
Woodside Mining Company	718.50	Rufus Hatch, President.
YorkshireMining Company	1,500.00	W. Westervelt, President.
Zephyr Mining Company	2,500.00	C. H. Emerson, President.

FURNACE, MILL, AND FACTORY.

The universal and the 18-inch rolls at the Union Rolling-Mills, Carnegie Brothers & Co., Limited, Pittsburg, were put in operation a few days ago.

Experiments are making at the Edgar Thomson and the Cambria steel-works to take molten pig from the blast-furnace directly to the Bessemer converters, after the system largely practiced in England and on the continent. It remains to be seen whether the blast-furnaces can be made to produce sufficiently uniform in grade and quantity to carry out this plan.

The Midvale Steel-Works, Philadelphia, have made some improvements in the dies used in the becking and punching department, which will lessen labor considerably, and will do away with the cost of two heatings.

The East Tennessee Valley Zinc Company, organized a short time ago with a capital of $300,000, let the contract a few days ago for the erection of furnaces and buildings in Knoxville. Several thousand tons of zinc are already mined a few miles from Knoxville. The furnaces will be in operation by next spring.

A second bar of open-hearth steel, 6 inches wide, ¼ inch thick, and 300 feet long, was recently rolled at the Superior Rolling-Mill, Alleghany, for the United States Spring Motor Company, of Philadelphia.

Krupp's works, at Essen, now employ some 439 steam-boilers; 456 steam-engines, with an aggregate horse-power of 18,500; eighty-nine steam-hammers, weighing from 200 pounds to 50 tons; twenty-one rolling-mills; machines for making tools, 1622; furnaces, 1556, of which fourteen are high furnaces; twenty-five locomotives, and five propellers, with a tonnage of about 8000. Annual production, 300,000 tons steel and 26,000 tons iron.

The strike at the Wabash mill, Terre Haute, Ind., begun on November 4th, is still in progress. The men struck for $6 per ton, and now some of them have gone in for $5.50.

The number of works in the United States engaged in the manufacture of cut nails, spikes, and tacks is 76, employing altogether 4323 machines, and the works and machines are divided among 14 States, as follows: Maine, 1 establishment and 30 machines; Massachusetts, 11 establishments and 663 machines; New York, 2 establishments and 55 machines; New Jersey, 2 establishments and 187 machines; Pennsylvania, 28 establishments and 1366 machines; Virginia, 4 establishments and 86 machines; West Virginia, 6 establishments and 630 machines; Kentucky, 1 establishment and 80 machines; Tennessee, 2 establishments and 102 machines; Ohio, 9 establishments and 625 machines; Indiana, 4 establishments and 182 machines; Illinois, 4 establishments and 264 machines; Nebraska, 1 establishment and 26 machines; Colorado, 1 establishment and 27 machines.

The Springfield Iron Company, at Springfield, Ill., has stopped making iron and steel rails. It is preparing for the manufacture of steel plates, bars, and forgings.

The works of the Joliet Steel Company, at Joliet, Ill., are now completely idle.

The new steel plant of the Indianapolis Rolling-Mill Company, is nearly completed. It will begin rolling rails on March 1st.

The Onondaga Tube Company has been organized at Syracuse, N. Y., with a capital of $25,000.

The first shipments of hoop-iron have left the new rolling-mill at Duncansville, Blair County, Pa.

The furnace of the Kirkland Iron Company, near Utica, N. Y., has been entirely rebuilt, and was put in operation on the 1st of January. It is 65 feet high, and 13 feet in diameter at the bosh, and is supplied with iron stoves for heating the blast.

Messrs. W. D. Kelly & Sons are running their Grant furnace, at Ironton, O., on West Virginia coke, in place of charcoal. They are going to change to coke after remodeling.

The Cleveland rolling-mill has resumed work in its steel and rail departments

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb. 2.

The mining market has been rather dull and featureless this week, though some of the low-priced shares have been largely dealt in. Prices have been very irregular for all stocks during the week, but a tendency was shown to-day to better prices. There is no change to note in the Comstocks, they having been dealt in in sympathy with the San Francisco market. The Leadville stocks have shown some strength under a large business. The Tuscaroras have not been as strong as usual, but are still held in favor. Sierra Grande has been very active and was quite strong to-day. The sales of mining shares at all the Exchanges aggregate 449,560 shares, against 606,100 last week.

The Comstock shares have had a moderate business, but at very irregular prices. California has been very active and irregular, selling from 25@20@21c. Consolidated Virginia records a moderate business at irregular prices; it sold from 68@48@52c. Sierra Nevada was quiet and irregular at $3.65@$2.60 @$3.80@$3.25. Union Consolidated sold to the extent of 475 shares at $3.40@$2.30. Ophir was quiet; assessment-paid shares sold at $2.90, and assessment-unpaid shares at $1.38@$1.15. Consolidated Imperial sold at 9@11c., with a small business. Belcher records one transaction at 88c. Hale & Norcross sold at $3. Best & Belcher had a small business at very irregular prices; it sold from $4@$3.50@$4.10. Sutro Tunnel has been quite active at irregular prices, selling from 24@21c.

The Leadville stocks were moderately active at steady prices. Amie has been active and strong, recording sales of 38,700 shares at 18@22c. Chrysolite, under a large business, has been very irregular; it sold from $1.60@$1.45. Dunkin was quiet and steady at 22@26@25c. Iron Silver records small transactions at strong prices; it sold from $2.60@ $2.80. Leadville was quiet and strong, selling from 59@70c. Little Chief had a small business, and was steady, selling at 48@42c. Little Pittsburg records sales of 589 shares at 72@68c. Big Pittsburg has been quiet and strong, selling from 14@17@16c. Climax sold from 10@9c., with a small business.

The Bodie stocks record a small business at steady prices. Bodie Consolidated was quite strong, selling from $1@$2@$1.75, with transactions of 1250 shares. Bulwer had a fair business at irregular prices, selling from 95@90@93c. Standard has been very irregular under a small business, and has sold from $6⅛@ $5¾@$6. Goodshaw has been quiet and steady at 6@8c. Bechtel sold at 5c.

The Tuscarora stocks have been quiet and irregular. Grand Prize, with a moderate business, has been very strong, selling from 72c.@$1. Belle Isle was quiet and a little weak, selling from $1@90c. Navajo has suffered a decline from $8¾@$7¾, with transactions of 2600 shares. North Belle Isle was quiet and strong, selling from 62@91c. Independence records a moderate business at steady prices, selling from 72 @75c. Elko Consolidated has been active and weak; it sold from 22@14c., with a business of 13,400 shares. Tuscarora was quiet and strong at 18@20c.

In the miscellaneous list, Alice has been fairly active at strong prices, selling from $2.40@$2.55@ $2.45. Eureka has suffered a decline from $11@ $9¾, under a small business. The Green Mountain stocks have been quiet and steady. Gold Stripe sold at 7@6c. Green Mountain has been active and strong at 54@61c. Rising Sun sold at 7@5c., and Cherokee at 6@5c. Hall-Anderson records a fair business at irregular prices; it sold for $1.35@$1.45@$1.60. Horn-Silver has also been irregular, under a fair business, and has sold from $7⅝@$6¾@$7, Prussian has been active and strong; the sales amount to 4100 shares at $4.30@$4.65. Robinson Consolidated records an active business, but has grown weak; it sold from $1.25@ 95c.@$1.10, closing at the latter figure. Sierra Grande has had a large business at very irregular prices; it sold from $2.50@$2.05@$2.75, closing firm at $2.65 to-day.

Albion has been quiet and irregular at $1@$1.50 @$1.35. Alta-Montana has suffered a decline, under a small business, selling from 22@15c. Bradshaw records a fair business, and has grown a little weak; it sold from 37@33c. Decatur has been very active and has suffered a slight decline from 12@8c. Harlem Mining and Milling Company has been moderately active at steady prices, selling from $1.10@$1.05. Hortense records a small business at steady prices, selling from 16@14c. Oriental & Miller has been active and steady at 16@15c. Silver Cliff has been very quiet at steady prices, selling from 38@60c. Sonora Consolidated records a very active business to-day at 11@15c. South Pacific was active and steady, selling from 8@9c. The State Line stocks were very quiet and about steady; Nos. 1 and 4 sold from 4@3c., and Nos. 2 and 3 from 7@ 8c. Taylor-Plumas was active and steady, selling from 17@19c.

We have received from Mr. F. M. F. Cazin, of Ely, Vermont, a letter in which he begs us to warn the public not to invest in the present Vermont Copper Mining Company on the basis of a report made by him and dated July 26th. The parties now in possession—without right, as Mr. Cazin claims—are the same who, according to his statement, had in former years embarrassed the company by mismanagement. Mr. Cazin's statements as to the future of the property, in his report, are based on the supposition that the new management would be in the hands of parties capable of grasping and coping with the technical and financial difficulties of the problem. Mr. Cazin incloses a letter, dated January 31st, and addressed to the Mutual Trust Company of this city, in which he warns them against issuing or delivering any of the 2500 $100 bonds as per agreement of January 22d, 1883, with the Vermont Copper Mining Company, on the ground that a recent conveyance made by the Vermont Copper Mining Company is illegal and invalid for a number of reasons, one of which is, that creditors of the former company representing claims of $90,000 have not waived their right to interfere, and therefore have a prior claim, so that the new mortgage bonds are practically without security.

MEETINGS.

Bull-Domingo Consolidated Mining Company, No. 115 Broadway, New York. Annual meeting of stockholders and election of trustees, February 17th, at twelve M.

Fairmount Coal and Iron Company, No. 58 South Third street, Philadelphia. Annual meeting of stockholders and election of trustees, February 14th, at twelve M.

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Gold Placer Mining Company, No. 60 Broadway' Room 11, New York. A meeting of shareholders, February 9th, at twelve M.

Kittanning Coal Company, No. 328 Walnut street, Philadelphia. A special meeting of stockholders, March 1st, at twelve M.

Locust Mountain Coal and Iron Company, No. 224 South Third street, Philadelphia. Annual meeting of stockholders and election of trustees, February 26th, at twelve M.

Maryland Coal Company, No. 104 Broadway, New York. Annual meeting of stockholders and election of trustees, February 6th, from twelve M. to one P. M.

Silver Islet Consolidated Mining Company, No. 52 Broadway, New York. Annual meeting of stockholders and election of trustees, February 6th, at twelve o'clock M.

Socorro Milling and Mining Company, No. 3 Broad street, New York. Annual meeting of stockholders and election of trustees, February 5th, at twelve M.

DIVIDENDS.

The Atlantic Mining Company, of Michigan, has declared a dividend of $2 per share, payable February 15th.

The Bulwer Consolidated Mining Company, of California, has declared its monthly dividend of five cents per share, payable February 12th, at the office of the Farmers' Loan and Trust Company, 26 Exchange place, New York.

The Castle Creek Mining Company, of Idaho, has declared its regular monthly dividend (No. 91) of three per cent, payable February 16th.

The Central Mining Company, of Michigan, has declared an annual dividend of $3, payable February 15th.

Dividends paid by mining companies during the month of January, and from January 1st, 1883:

Name of Company.	Location of mines.	Paid during month of January.	Since January 1, 1883.
Boston & Montana, G	Mont	$10,000	
Bulwer Consolidated, G	Cal	5,000	
Castle Creek, G	Idaho	3,000	
Con. Gold M. Co. of Ga	Ga	4,000	
Contention, S	Ariz	62,500	
Copper Queen, C	"	125,000	
Cosmopolitan	Utah	50,000	
Deadwood-Terra, G	Dak	20,000	
Father de Smet, G	"	20,000	
Gem, S	Colo	1,250	
Glen, S	"	1,000	
Granite Silver, S	"	1,000	
Hecla Consolidated, S	Mont	15,000	
Homestake, G	Dak	50,000	
Kentuck, S	Nev	3,000	
Leadville Consolidated, S	Colo	20,000	
Navajo, G. S	Nev	25,000	
Northern Belle, S	"	25,000	
Ontario, S	Utah	75,000	
Prussian Mg. and Mill. S. L.	Colo	15,000	
Quincy, C	Mich	240,000	
San Francisco Copper, C	Cal	2,500	
Shoshone, G	Idaho	1,500	
Sierra Grande, S	New Mex.	100,000	
Silver King, S	Ariz	25,000	
Smuggler, S	Colo	3,000	
Standard, G	Cal	25,000	
		$927,750	

G., gold. S., silver. C., copper. L., lead. N. nickel. Q., quicksilver.

UNLISTED QUOTATIONS.

Mr. Alexander C. Lassen, 61 Broadway, under date of February 2d, three P.M., reports the current quotations of unlisted stocks as follows:

	Bid.	Asked.		Bid.	Asked.
Bodie Tunnel	$0.25	$0.75	Jocuistita	$7.00	$8.75
Breece	.16	.18	Lewiston Hydr.	.10	.27
Buckeye Water	.50	....	Little Rapids	....	1.00
Bunker Hill	.99	1.00	London Cons	.90	1.35
Borva Copper	....	2.00	Mack Morris	....	.75
Batopilas Pref	9.00	24.00	Madre	.50	2.00
Berkshire	....	.35	Moulton	....	4.00
Calif'rnia Wat'r	.25	....	Native Silver	...	.30
Carbonate Hill	.80	.84	North Horn	....	.30
Centennial	....	.20	Pelic'n & Dives	...	.50
Contention	3.00	8.00	Plata Verde	....	.25
Dahlgren	.40	....	Rico	....	.55
Denver City	.20	.30	Hond. Rosario	....	7.00
Empire Gold	2.00	....	Santa Maria	.40	1.10
Eureka Tunnel	.45	.90	Silver State	....	1.10
Evening Star	1.00	....	Stormont. New	.20	.30
Fanny Barrett	.50	2.50	Sampson	.35	....
Freeland	.65	.95	Silver Cord	1.25	1.35
Grand Central	1.50	....	Satemo	.50	.75
Glass Pendery	....	1.00	Sierra Apache	.30	.35
Highland Chief	.20	....	Sierra Bella	.70	.80
Hibernia Silver, (New)	.19	.21	Terrible	1.75	....

DIVIDEND-PAYING MINES.

Name and Location of Company.	Shares. No. in 1000's	Shares. Par Value.	Assessments. Lev'd to date in 1000's.	Assessments. Date and amount per share of last.	Dividends. Total paid to date in 1000's.	Dividends. Date and amount per share.	Highest and Lowest Prices per Share at which Sales were Made. Jan. 27. H.	Jan. 27. L.	Jan. 29. H.	Jan. 29. L.	Jan. 30. H.	Jan. 30. L.	Jan. 31. H.	Jan. 31. L.	Feb. 1. H.	Feb. 1. L.	Feb. 2 H.	Feb. 2 L.
Alice, Mon	400	25	*		400	De 81 10	2.50	2.40			2.50		2.50		2.55	2 50	2.50	2.45
Amie Con., Co	500	10	*		305	My 80 10	.18		.19	.18	.19	.18	.19		.20	.18	.22	.21
Atlantic, Mich	40	25	280	Ap 75 1 00	140	Fe 82 2 00												
Argenta, Ne	100	100	225	No 82 25	40	Fe 80 20												
Bar & Walker, Ut	100	10	*		60	No 80 10	4.75		4.63									
Bassick, Co	100	100	*		25	Fe 80 25	1.00		.90									
Belle Isle, Ne	100	100	65	My 82 10	300	De 79 25												
Black Bear, Ca	30	100	15	Se 79 50	859	Se 82 30												
Belcher, Ne	104	100	2562	Se 82 25	15397	Ap 76 1 00	1.05	1.00	1.05				1.75	1.70	2.00		2.00	1.75
Bodie Cons., Ca	100	100	125	De 81 50	1295	No 82 20												
Bos'n & Mon., Mon.	200	10	*		310	Ja 83 05												
Breece, Co	200	25	*		2	Fe 80 1	.95	.92	.94	.92	.94		.90		.92		.95	.93
Bulwer, Ca	100	100	30	De 77 50	140	Ja 83 10	.25	.23	.25	.21	.23	.21	.20		.23	.20	.23	.21
California, Ne	540	100	638	No 82 20	31320	De 79 50												
Cal. & Hecla, Mch	100	25			22850	Ja 83 5 00												
Caribou Con., Co	100	10	*		50	Mr 80 10												
Carolina Q'n, N.C	100	2			8	Oc 82 02												
Castle Creek, Id	100	1			24	Ja 83 03												
Catalpa, Co	300	10	*		210	De 82 10												
Central, Mich	20	25	100	Se 61 6	1610	Fe 82 25												
Christy, Utah	60	100			78	De 82 10												
Chrysolite, Co	200	50	*		1600	De 81 50	1.60	1.45	1.50		1.55	1.50	1.55	1.50	1.55	1.50	1.55	1.45
Climax, Co	200	10	*		180	Au 80 30	.09				.09		.10	.09	.09		.09	
Coos. G. Mg., Ga	100	5	*		30	De 82 04												
Cons. Va., Ne	540	100	897	Au 82 30	42930	Au 80 50	.63	.55	.60	.56	.53	.50	.48		.56	.54	.53	.52
Contention, Ariz	250	50			2087	De 82 25												
Copper Queen, Ar	250	10	*		850	Ja 83 50												
Crown Point, Ne	100	100	2878	Fe 82 25	11588	Ja 75 2 00												
D'dw'd-Terra, Dk	200	25	*		900	Ja 83 10												
Dunkin, Co	200	25	*		200	Ju 81 7½												
Eureka Cons., Ne	50	100	100	My 76 1 00	4817	Jy 82 25	11.00								9.75			
Evening Star, Co	50	10	*		1225	Oc 82 50												
Excelsior, Ca	100	100	300	Ja 82 1 00	875	Oc 80 25									5.00		5.00	
Fa. de Smet, Dk	100	100			530	De 82 20												
Findley, Ga	200	1	*		4	My 79 1c												
Freeland, Co	200	25	*		5	My 80 25												
Glass-Pend., Co	250	20	*		25	My 81 10					.06		.07		.07	.06	.06	
Gold Stripe, Ca	150	10	*		76	Jy 81 15												
G'ld & Curry, Ne	108	100	3478	Se 82 50	3826	Oc 70 $10	.75	.72			.95		.85		.85	.60	1.00	
Grand Prize, Ne	100	100	420	No 82 25	450	Se 80 25									.04	.03	.03	
Great Eastern, Dk	800	1	*		16	Jy 80 01	.54		.55		.61	.58	.61	.60	.61	.60	.61	.60
Gr. Mountain, Ca	125	10	*		212	No 81 7½												
Hale & Nor., Ne	112	100	4006	Se 82 50	1598	Ap 71 5 00	1.55	1.35	1.50		1.50		1.55		1.45		1.60	1.45
Hall-And's'n, N.S.	150	1			7	Ja 82 05												
Hecla Con., Mon	30	50			387	No 82 50												
Hibernia, Co	300	25	*		150	Jy 81 40												
Holyoke, Id	200	1			14	Ja 83 03												
Homestake, Dk	100	100	200	Ju 78 1 00	1812	Ja 83 50	17.75										7.00	
Horn-Silver, Ut	400	25	*		1700	No 82 75	7¾	7.25	7.25		7.25	6.75	7.50	7.25	7.25		.21	.18
Hukill, Co	200	5	*		210	De 78 20	.20										.75	.73
Indep., Ne	100	100	185	Fe 82 15	225	Se 79 25			.75	.72			.75					
In. Queen, Ne	125	2			365	No 82 02												
Inyo, Ca	100	5	*		45	Ap 82 05												
Iron Silver, Co	500	20	*		900	De 82 20	2.65	2.60	2.80		2.80	2.75					2.80	
Jocuistita, Mex	100	100			750	No 82 1 00												
Kentuck, Nev	30	100	342	No 81 30	955	Fe 70 5 00												
La Plata, Co	200	10	*		610	Se 82 30												
Leadville C., Co	400	10	*		270	Ja 83 05	.64	.59	.64	.60	.65		.70	.65				
Leeds, Ut	60	100	87	Ju 82 50	78	Oc 78 15												
Little Chief, Co	200	50	*		700	Au 80 50	.42		.43	.42	.43		.43		.42		.42	
Little Pitts., Co	200	100	*		1050	Mr 80 50	.72	.68										
Marguerite, Cal	25	20			19	Oc 82 25												
Martin White, Ne	100	100	950	Se 82 25	90	Jy 79 30												
Mines Nu'v's, Mex	100	3	*		20	Jy 82 10												
Moose, Co	200	10	4		550	Mr 78 25												
Morning Star, Co	100	10			565	De 82 25												
Navajo, Ne	100	100	285	Mr 82 20	100	De 82 10	8.75	8¾	8¾	8.25	8.50	8¾	8.50	8.00	8.00	7¾	8.00	7.75
N. Y. & Colo., Col	50	20			25	Jy 79 10												
N'h'n Belle, Ne	50	100			2300	No 82 50			9.75									
N. Belle Isle, Ne	100	100	75	No 82 20	45	Se 82 15			.62		.64		.91					
Ontario, Ut	150	100			4925	Ja 82 50					.35							
Ophir, Ne	100	100	3495	De 82 1 00	1595	Jy 82 1 00	2.90	1.38			1.15							
Osceola, Mich	50	25	480	Ap 76 1 60	785	De 82 1 00												
Pleasant Val., Cal	100	100			30	De 82 05												
Plumas, Ca	100	10	*		151	Jy 79 8												
Prussian, Colo	150	10			117	No 82 10	4.35	4.30	4.55	4.40	4.55	4.50	4.55	4.50	4.60		4.65	4.60
Quicks. Pref., Ca	43	100			654	Ju 82 6 00			33.25	38.00					40.00		40.00	
" Com., Ca	57	100			151	Ju 82 40									8.00			
Quincy, Mich	40	25	200	De 62 5 00	3330	Au 82 5 00												
Rising Sun, Ca	150	5	*		52	My 81 7½	.08		.07	.05	.07	.06	.06	.05	.06	.05	.05	
Robinson Bar, Id	100	1	*		9	De 82 03												
Robinson Co., Co	200	50	*		575	No 81 50	1.25	1.20	1.20	1.00	1.15		1.15		1.15	1.00	1.10	.95
Robt. E. Lee, Co	500	500			100	De 82 10												
Savage, Ne	112	100	5484	No 82 50	4460	Ju 69 3 00	2.00											
Shoshone, Id	150	1			3	No 82 01												
SierraGrande, NM					300	Ja 83 25	2.55	2.50	2.50	2.15	2.20	2.05	2.05	2.10	2.50	2.35	2.75	2.50
Sierra Nev., Ne	100	100	5150	De 82 1 00	102	Ja 71 1 00	3 65	2 38			3.50	3.25	2.60		3.80	3.80	3.25	
Silver King, Ar	100	100			1125	De 82 25	11¼				11.25	11.00	10¾					
Silver King, Co	500	2			50	Au 81 10												
Socorro, N. Mex	2.5	100			4	Mr 82 ¾												
Spr'g Valley, Ca	200	1	*		50	Ja 81 25												
Standard, Ca	100	100			4050	Ja 82 25	6.00	5.75	6.00	5.88	6.13		5.75				6.00	
Starr-Grove, Ne	200	10	*		160	Ju 81 10												
Stormont, Ut	200	1	*		155	No 81 05												
St. Joseph, Mo	100	10	*		390	De 82 20												
Tip Top, Ar	100	100	170	Mr 80 50	100	No 81 20												
Tombstone, Ar	500	25	*		1250	Ap 82 10							.96				.98	
Vizina, Ar	200	25	*		140	Ap 82 10												
Yellow Jacket	120	100	5338	Fe 82 1 00	2184	Au 71 2 50												

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ 4817.

SALES.—Alice, 3400; Amie Consolidated, 38,700; Bassick, 455; Belle Isle, 400; Belcher, 100; Bodie Consolidated, 1250; Bulwer, 3525; California, 13,400; Chrysolite, 12,680; Climax, 1710; Consolidated Virginia, 8910; Dunkin, 2500; Eureka Consolidated, 160; Father de Smet, 300; Gold Stripe, 4900; Grand Prize, 1450; Great Eastern, 900; Green Mountain, 8800; Hale & Norcross, 50; Hall-Anderson, 8000; Homestake, 1450; Great Eastern, 900; Green Mountain, 8800; Hale & Norcross, 50; Hall-Anderson, 8000; Homestake, 25; Horn-Silver, 3005; Hukill, 3500; Independence, 1300; Iron Silver, 1800; Leadville, 3075; Little Chief, 2740; Little Pittsburg, 539; Navajo, 2600; Northern Belle, 100; North Belle Isle, 430; Ontario, 40; Ophir, 782; Prussian, 4100; Quicksilver, preferred, 700; Quicksilver, common, 100; Rising Sun, 4900; Robinson Consolidated, 64,259; Savage, 100; Sierra Grande, 23,050; Sierra Nevada, 1055; Silver King, 450; Standard, 490; Vizina, 200. Dividend shares sold, 230,930.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, Petroleum and Mining Brokers, 55 Broadway, furnish the following *résumé* of the oil market for the week. It is a singular fact that on Tuesday, when Shannon No. 5 well in Forest County was announced as a new producer of 1425 barrels the first twenty-four hours, the market should have rallied within a few hours from 96⅛c. to $1.03⅝ the highest price of the week.

The general sentiment in the oil-producing regions is, that oil is worth $1 per barrel, and the bulls point to the rapidly declining production of the Reno, the Schultz and Reed and Brenneman wells in proof of their assertion that production is falling below the daily consumption.

Bears, however, claim that the demand and supply are about equal; that new wells in Forest County will offset declining production of old wells; that "wild-cat" wells opening up new territory are always likely to come in at an unexpected time; that the present stock on hand is the largest ever known, and that, as money is tight in Oil City and Bradford, holders will conclude to realize soon on the present steady market.

The general public is coming into oil speculation more than ever before, and it would now appear that prices made in the New York exchanges will soon have an influence on Oil City prices, and finally that New York will control quotations. The margin required to buy oil is from fifteen to twenty cents per

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barrel, or $150 for every thousand barrels bought or sold.

The following table will show the fluctuations of the market during the week:

	Opening.	High-est.	Lowest.	Closing.	Sales.
January 27....	$1.02½	$1.02½	$0.99¼	$1.01	834,000
" 29....	1.00¾	1.00¾	.97⅞	.97¼	772,000
" 30....	.97¼	1.01⅛	.97	.99¾	961,000
" 31....	.99	1.03⅛	.98	1.02¼	706,000
February 1....	1.03¼	1.03⅜	1.01¼	1.02	433,000
" 2....	1.01½	1.02½	1.00⅝	1.02¼-⅜	413,000
Total sales...					4,152,000

REVIEW OF THE SAN FRANCISCO MARKET.

There is no news of interest from the San Francisco market. The Comstock shares were quite active and strong at the beginning of the week, and then suffered a sharp decline, but reacted and closed a little firmer. There is no news from the mines. The Tuscaroras were quiet and firm. The news from the mines continues favorable. The Bodie stocks have shown a little strength, especially Bodie Consolidated, which has been quite strong under a fair business.

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

Name of Company.	Closing Quotations. Jan. 26.	Jan. 27.	Jan. 29.	Jan. 30.	Jan. 31.	Feb. 1.
Albion	27-32	15-16	29-32	27-32	13-16	¾
Alpha	....	1	29-32	13 16	13-16	13-16
Alta	....	¼	5-32	5-32	5-32	5-32
Bechtel	3-32	1-16	....	....	1-16	....
Belcher	13-16	11-16	¾	13-16	¾	11-16
Belle Isle	....	....	....	....	15-16	....
Best & Belcher	4⅛	4⅛	3⅞	3⅝	3¾	3⅝
Bodie	1	1	1⅛	1⅝	2	1¾
Bullion	29-32	....	29-32	....	....	....
California	¼	....	¼	3-16	3-16	¼
Chollar	1¾	1¾	1⅝	....	....	....
Con. Virginia	21-32	19-32	½	½	9-16	½
Crown Point	1⅛	....	29-32	29-32	....	29-32
Elko Cons	....	....	....	3-16	3-16	....
Eureka Con	....	....	....	10¼	10¼	10
Exchequer	11-32	11-32	5-16	¼	¼	5-16
Gould & Curry	2¼	2	1½	1⅞	1⅝	1⅝
Grand Prize	13-16	13-16	11-16	11 16	11-16	¾
Hale & Norcross	2⅝	3¼	2¼	1⅝	2⅜	2⅛
Independence	....	....	....	¾	11-16	21 32
Martin White	2¾	2⅛	2¼	1½	2⅝	2⅝
Mexican	3	3⅛	2⅝	1¾	2¾	2⅝
Mono	....	1-16	1-16	1-16	3-32	5 32
Mount Diablo	....	....	....	3¾	....	....
Navajo	8⅝	....	8½	8½	8⅝	8
Northern Belle	9¾	9½	9½	....	10	10
North Belle Isle	....	....	....	21-32	21-32	21-32
Ophir	1½	2¾	2⅝	2⅛	2½	2½
Overman	3-16	3-16	5-32	....	....	....
Potosi	1⅜	1⅜	1⅜	1¼	1½	1⅜
Savage	2⅛	2¼	1½	....	....	....
Scorpion	11-16	21-32	9-16	....	....	....
Sierra Nev	3⅝	3⅜	3⅛	2¾	3⅛	3¼
Silver King	11¼	11¼	11¼	....	11⅛	11
Tip Top	....	....	....	....	....	....
Union Con	3¼	2¾	2⅝	2	2⅛	2¼
Wales Con	....	3-16	5-32	3-16	3-16	....
Yellow Jacket	1⅝	1⅜	1⅜	1¼	1½	1⅜

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Feb. 1.

The market the past week has been heavy, and quotations show generally lower prices, especially on the copper stocks. Quincy takes the lead in the decline, selling from $59¾ down to $50¾, ex dividend $6. Calumet & Hecla also seems to be weak, from no special reason except a lack of buying orders, and some pressure to sell the stock by parties desiring to realize. Franklin is the only stock on the list showing an advance, and that only 50 cents per share, selling at $14½, against $14 last week. The report of this company, made up to the 1st instant, shows that it had on hand copper valued at $258,767.10, and supplies worth $69,000, making a total of $327,767.10. Its outstanding liabilities, at the same time, were $94,905.60, leaving on hand a surplus of $232,861.50, out of which it is very probable that a two-dollar dividend will be declared. Osceola declined from $31@$30, but later rallied again to $31. Huron sold at $1⅞, and Allouez at $2.55. There is no disposition to deal in the speculative copper stocks, and holders will be under the necessity of keeping their stocks until, in the dim future, something turns up to bring them to life again.

In the silver stocks, the dealings are confined to only a few specialties. There has been a little more activity in Bonanza Development, and the price has advanced from $2¼@2¾ on sales of about 3000 shares. Catalpa and Crescent hold their own very well, the former selling at 97½c.@$1.02½, and the latter at 42½c. Both companies are reported as looking well, and the Catalpa will doubtless continue the payment of quarterly dividends for some time to come. There has been a steady demand for San Pedro this week, and nearly 5000 shares have sold at 60c. Sullivan sold as before at $1. Harshaw sold at 50c., and is in better demand at $⅝ bid. The stockholders of the Harshaw have directed their trustees to expend $10,000 in prospecting the company's property at the point where the two veins would unite if their lines were carried out. The company has a surplus over all liabilities of about $80,000, of which about $10,000 is in supplies on the property.

At the Mining and Stock Exchange, transactions have been light and prices generally lower. Massachusetts & New Mexico continues steadily to decline, and sold to-day at 16c. Empire, dull at 28@30c. Deer Isle, 12@14c. Pipe Line Certificates declined from $1.04¼@98¾c., but later advanced to $1.03.

3 P.M.—The market this afternoon was without any special feature. Catalpa sold at $1.05. Pewabic sold at $9. Quincy declined to $50. Bonanza sold at $2.75. Closing prices: Calumet & Hecla, $242 bid, $243 asked. Catalpa, $1.05 bid, $1.07½ asked. Franklin, $14 bid, $14½ asked. Huron, $1¾ bid, $1⅞ asked. National, $1½ bid, $1¾ asked. Osceola, $29 bid, $31 asked. Quincy, $50, asked. Silver Islet, $6 bid, $6⅞ asked. Sullivan, $⅞ bid $1 asked. San Pedro, 57½c. bid, 60c. asked.

NON-DIVIDEND PAYING MINES.

Name and Location of Company.		Number of Shares.	Par.	Assessments. Total levied to date.	Assessments. Date and amount of last.		Highest and Lowest Prices per Share at which Sales were Made. Jan. 27. H.	Jan. 27. L.	Jan. 29. H.	Jan. 29. L.	Jan. 30. H.	Jan. 30. L.	Jan. 31. H.	Jan. 31. L.	Feb. 1. H.	Feb. 1. L.	Feb. 2. H.	Feb. 2. L.
Advance	Nev.	150,000	100	472,500	Jan. 83	50	1.00	....	....	....	....	....	1.50	....	1.35	....	1.35	....
Albion, s. L	Mich	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Alpha	Nev.	....	....	420,000	Mar. 82	50	....	....	....	....	....	....	....	....	....	....	....	....
Alta	Nev.	100,800	100	1,892,090	Jan. 83	25	....	....	....	....	....	....	....	....	....	....	....	....
Alta-Montana, G	Mon.	500 000	10	....	....	....	22c	....	....	....	....	....	....	....	16c	15c	15c	....
Am. Flag, s	Colo	125,000	10	300,000	Jun. 77	25	....	....	....	....	....	....	....	....	....	....	....	....
Barcelona, G	Nev	200,000	25	*	....	....	21c	20c	21c	....	21c	....	....	....	20c	....	21c	....
Battle Creek	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bear Creek	Cal.	300,000	1	....	....	....	....	....	....	....	....	....	22c	....	20c	....	21c	20c
Beauce	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bechtel Con., G	Cal.	100,000	100	185,000	Jan. 83	10	....	....	....	....	....	5c	....	....	....	....	5c	....
Best & Belch'r, G & S	Nev.	100,800	100	1,345,790	No. 82	50	4.00	3.88	....	....	3.75	3.50	3.63	3.50	4.10	....	....	....
Big Pittsburg, S L	Colo	200,000	100	*	....	....	15c	14c	....	....	14c	....	17c	14c	17c	16c	16c	....
Black Jack, G	Cal.	100,000	2½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bonanza Chief	Mon	1,000,000	1	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bondholder	Colo	200,000	2½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Boston Con., G	Cal.	100,000	100	95,000	Oct. 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Boulder Con	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradshaw, S	Ariz	225,000	10	....	....	....	37c	36c	37c	36c	37c	36c	37c	35c	36c	35c	37c	33c
Buckeye	Colo	400,000	5	*	....	....	3c	....	....	....	....	....	....	....	....	....	....	....
" pref	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bull-Domingo, S L	Colo	200,000	50	*	....	....	....	....	....	....	5c	....	5c	4c	5c	....	....	....
Bullion, G. S	Nev.	100.000	100	3,747,000	Oct. 82	50	....	....	....	....	....	....	....	....	....	....	....	....
Bye and Bye	Ariz	100,000	10	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Calaveras, G	Cal.	500,000	1	*	....	....	....	....	....	....	2c	....	....	....	....	....	....	....
C'lay'r's W. & M. Co	Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal., B. H., G	Dak.	100.000	100	480.000	Au. 82	15	....	....	....	....	....	....	1.05	1.00	....	....	....	....
Carbonate Hill, S L	Colo	200,000	10	....	....	....	81c	80c	....	....	....	....	....	....	....	....	....	....
Catskill, S	Nev.	300,000	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Central Ariz'na, S	Ariz	100.000	100	....	....	....	....	....	38c	....	....	....	....	....	....	....	....	....
Chapparal	Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherokee, G	Cal.	150,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Chollar	....	....	....	....	Sep. 82	50	....	....	1.88	1.75	....	....	6c	5c	6c	5c	5c	....
Clarence	Can.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Colorado Cent'l, S	Colo	300,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Col'mb'a Con., G & S	Nev.	100,000	50	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cons. Imp'r'l, G & S	Nev.	500,000	100	1,425,000	Jan. 82	10	9c	....	....	....	....	....	11c	....	11c	....	....	....
Con. Pacific, G	Cal.	60,000	100	141,000	Au 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Crescent, S L	Colo	300,000	10	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Crowell, G	N. C.	50 .000	1	....	....	....	5c	....	5c	4c	4c	....	....	....	....	....	....	....
Dahlonega, G	Ga.	250,000	1	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dardanelles, G	Cal.	100,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur	....	....	....	....	....	....	12c	10c	11c	9c	11c	9c	11c	10c	11c	9c	10c	8c
Dunderberg, S	Colo	150,000	10	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Durango, G	Dak.	500,000	1	*	....	....	....	....	10c	....	10c	....	....	....	9c	....	8c	....
Eastern Oregon	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elko Cons	....	....	....	....	....	....	21c	20c	....	....	22c	20c	22c	18c	18c	15c	15c	14c
Empire, S	Utah	100,000	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Enterprise	Colo	....	....	....	....	....	53c	52c	55c	53c	54c	53c	55c	54c	60c	55c	62c	57c
Exchequer	Nev	100,000	100	630,000	Jan. 82	25	2.20	2.15	2.20	....	2.20	....	2.25	2.20	2.25	2.20	2.25	2.20
Fannie Barret	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Globe Copper	Ariz.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Placer, G	Colo	200,000	25	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Goodshaw, G	Cal.	100,000	100	200,000	Oct. 82	10	6c	....	....	....	....	....	8c	6c	8c	7c	8c	....
Granville, G	N. C.	800,000	1	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Harlem M. & M. Co.	....	....	....	....	....	....	1.05	....	1.05	....	1.10	....	1.05	....	1.05	....	1.05	....
Harshaw, S	Ariz	100,000	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Head Center, S	Ariz	100.000	100	160,000	May 82	20	....	....	....	....	....	....	....	....	....	....	....	....
Hortense, S	Colo	200,000	10	....	....	....	16c	15c	15c	....	16c	14c	15c	14c	....	....	....	....
Index	Cal.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Julia, G & S	Nev.	110.000	100	1,394,000	Jan. 82	20	....	....	....	....	....	....	....	....	....	....	....	....
Kossuth, G & S	Nev.	108,000	100	421,200	Aug. 77	15	....	....	....	....	....	....	....	....	....	....	....	....
Lacrosse, G	Colo	100,000	10	*	....	....	....	....	....	....	....	....	....	....	14c	....	....	....
Leviathan, S	Nev	100,000	100	380,000	Sep. 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Lucerne, S	Colo	500,000	10	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mariposa Pref., G	Cal.	50,000	100	1,687,500	Dec. 81	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., G	Cal.	100,000	100	1,950,000	Feb. 82	....	....	....	....	....	....	....	....	....	....	....	....	....
May Belle, G	Cal.	100.000	100	84,000	Dec. 81	20	....	....	....	....	....	....	....	....	....	....	....	....
Mayflower, S	Colo	100,000	100	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, G & S	Nev.	100,800	100	2,146,600	Oct. 82	$1	3.25	2.63	3.00	2.88	2.90	2 63	....	....	2.63	2.50	2.50	2.35
Michoacan Synd.	Mex.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Miner Boy, G & L	Colo	500,000	10	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Miller	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mono, G	Cal.	50.000	100	535,000	Jan. 83	20	....	....	....	....	....	....	....	....	....	....	....	....
Moose Silver, S	Colo	300,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nevada Syndi	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Standard, G	Cal.	100.000	100	20,000	Nov. 81	10	....	....	....	....	....	....	....	....	....	....	....	....
N. Horn-Silv'r, S L	Utah	400,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Noonday	Cal.	60,000	10	208,000	Dec. 82	$1	....	....	....	....	....	....	....	....	....	....	....	....
Old Dominion, C	Ariz	200,000	100	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oriental	Nev.	200,000	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Or'nt'l & Miller, S	Nev.	400,000	25	....	....	....	16c	15c	16c	15c	16c	15c	15c	....	15c	....	16c	15c
Overman, G & S	Nev.	115,200	25	3,604,700	May 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Potosi	Nev.	112,000	100	500,640	Nov 82	25	....	....	....	....	....	....	....	....	....	....	....	....
Quartz Creek	....	....	100	....	....	....	3c	....	....	....	2c	....	....	....	....	....	....	....
Rappahannock, G	Va.	250,000	....	*	....	....	....	....	12c	....	11c	....	11c	....	10c	9c	....	....
Red Elephant, S	Colo	500,000	1	*	....	....	....	....	....	....	....	....	....	....	....	....	7c	....
Retort	....	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
San Pedro, G & L	N. M	400,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cliff, S	Colo	200,000	25	*	....	....	38c	....	....	....	....	....	40c	38c	40c	....	....	....
Silver Islet	Can.	....	50	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con	Mex.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	15c	11c
South Bodie, G	Cal.	100.000	....	100,000	Mar. 82	15	....	....	....	....	....	....	....	....	....	....	....	....
South Bulwer, G	Cal.	100,000	100	195,000	May 81	25	....	....	....	....	....	....	....	....	....	....	....	....
South Hite	Cal.	100,000	100	....	May 82	10	....	....	....	....	....	....	....	....	....	....	....	....
South Pacific	Cal.	....	5	....	....	....	9c	....	9c	....	9c	8c	9c	8c	9c	8c	9c	....
State Line No. 1, S	Nev.	200,000	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" No. 2, S	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" No. 3, S	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" No. 4, S	Nev.	200,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" Nos. 1 & 4, S	Nev.	....	25	....	....	....	4c	....	3c	....	4c	....	4c	....	4c	....	3c	....
" Nos. 2 & 3, S	Nev.	....	....	....	....	....	5c	7c	8c	....	8c	....	8c	....	7c	....	8c	....
Sutro Tunnel	Nev.	3,000,000	....	*	....	....	24c	22c	23c	21c	22c	21c	23c	21c	23c	22c	23c	21c
Taylor-Plumas	....	....	10	....	....	....	17c	....	18c	17c	18c	....	18c	....	19c	18c	19c	18c
Tioga, G	CO.	100,000	....	285,000	Oct. 82	10	....	....	....	....	....	....	....	....	....	....	....	....
Tuscarora, S	Nev	100,000	100	110,000	Oct. 81	15	18c	....	20c	....	....	....	....	....	....	....	....	....
Unadilla, S	Ariz	500,000	100	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Cons, G & S	Nev.	100,000	1	1,570,000	Jan. 83	$1	3.40	3.25	3.00	2.88	2.70	....	....	....	2.30	....	....	....
Utah	....	20,000	100	1,360,000	Dec. 82	$1	....	....	....	....	....	....	....	....	....	....	....	....
Vandewater	Nev.	200,000	100	*	....	....	32c	31c	....	....	....	....	26c	....	....	....	23c	....
Washington	Ariz.	200,000	10	....	....	....	11c	10c	....	....	....	....	....	....	....	....	9c	....
Whalen Copper	Nev.	100,000	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wide West	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Willshire	Cal.	50,000	5	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

SALES.—Albion, 600; Alta-Montana, 3000; Barcelona, 8000; Bear Creek, 900; Bechtel Consolidated, 815; Best & Belcher, 645; Big Pittsburg, 1900; Bradshaw, 8500; Buckeye, 500; Bull-Domingo, 1900; Calaveras, 100; Caledonia, B. H., 200; Carbonate Hill, 1500; Central Arizona, 100; Cherokee, 3000; Chollar, 200; Consolidated Imperial, 1000; Crowell, 1600; Decatur, 23,400; Durango, 4300; Elko Consolidated, 13,400; Enterprise, 8600; Fannie Barret, 4500; Goodshaw, 3600; Harlem M. & M. Co., 5100; Hortense, 2300; Lacrosse, 500; Mexican, 9295; Oriental & Miller, 16,300; Quartz Creek, 2900; Rappahannock, 2600; Red Elephant, 1000; Silver Cliff, 1200; Sonora Consolidated, 14,660; South Pacific, 13,100; State Line, Nos. 1 & 4, 3400; State Line, Nos. 2 & 3, 5700; Sutro Tunnel, 19,300; Taylor-Plumas, 30,600; Tuscarora, 500; Union Consolidated, 475; Vandewater, 1400; Washington, 2100. Non-dividend shares sold, 218,630. Total shares sold at all the Exchanges, 449,560.

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 2.

The Exchanges on India having improved, the London market for silver was correspondingly advanced the past week, as indicated by the figures of rates current here, given in annexed table. The lower rates for India Exchange and silver in London on the opening of the year stimulated imports from India, and thus caused a recovery in value of silver.

Date.	London Pence.	N. Y. Cents.	Date.	London Pence.	N. Y. Cents.
Jan. 27	50⅜	109¾	Jan. 31	50⅝	110⅜
Jan. 29	50 7-16	109⅞	Feb. 1	50⅝	110½
Jan. 30	50½	*	Feb. 2	50 9-16	110⅝

* 110⅛@110¼.

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BULLION PRODUCTION FOR 1882.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1882.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13½ per cent, to arrive at actual value.

MINES.	States.	For the week.	Month of December.	Year from Jan. 1st, 1882.
*Alice, G. S.	Mont.			$789,591
*Alta-Montana, S. L.	"		$31,677	$ 417,713
Barbee & Walker, S.	Utah			84,262
*Belmont	Mont.			26,916
Betty O'Neal, S	Nev.			59,159
*Black Bear, G	Cal			69,015
Bodie, G. S	"		31,225	485,890
Bodie Tunnel, G	Cal			129,217
*Boston & Montana, G.	Mont.		20,283	285,898
*Caledonia, G	Dak.			76,655
*Caribou, S	Colo.			126,918
*Central Arizona, S.	Ariz.		15,020	213,873
*Christy, S	Utah		38,312	372,426
*Chrysolite, S. L	Colo.		19,488	635,829
Cons. Bobtail, G.	"			99,784
*Contention, S	Ariz		122,039	1,814,643
Crismon-Mammoth, G.	Utah			63,579
*Custer, G. S	Idaho			682,331
*Deadwood-Terra, G.	Dak.			551,052
*Derbec Blue Grav., G.	Cal		5,704	139,485
*Eureka Con., G. S. L.	Nev.		79,446	982,984
Evening Star, S. L.	Colo.			862,520
*Father de Smet, G	Dak.		47,892	417,873
*Frisco M. & S. Co., S. L	Utah		22,061	370,635
Girard, S	Ariz.			177,540
Grand Central, S	"			1,358,820
*Hall-Anderson, G	N. S.		1,325	14,375
*Head Center, S	Ariz.			145,636
*Hecla, G. S. L	Mont.			77,945
*Homestake, G	Dak.			1,114,568
Horn-Silver, S. L	Utah		204,500	3,539,516
*Hope, S	Mont.		25,685	329,752
Idaho, G	Cal			395,540
*Independence, S	Nev.			152,527
*Indian Queen, S	"			183,650
*Inyo Cons., G	Cal			59,421
Ingersoll, S	Ariz.			90,000
Iron Silver, S	Colo.			865,436
*Jocuistita, S	Mex.			700,585
*Kentuck	Nev.			8,526
*†Leeds, S	Utah			11,988
Lexington, S	Mont.		92,346	279,822
*Little Pittsburg, S. L.	Colo.		5,860	140,328
Manhattan, S	Nev.			64,300
Mack Morris, S	Ariz.			281,024
*Marguerite, G	Cal		15,800	95,490
Morning Star, S. L	Colo.			478,676
Moulton, G. S	Mont.			406,920
Mount Diablo, S	Nev.			294,397
*Navajo, G. S	"			364,193
New York Hill, G	Cal			105,136
Noonday & North Noonday, G	"			231,000
Northern Belle, S	Nev.			740,012
*†Ontario, S. L	Utah		174,000	2,395,000
Ophir, G. S	Nev.			39,472
*Oxford, G	N. S.		4,009	19,573
Pascoe, S	Utah			4,575
*Pleasant Valley, G. S.	Cal			46,360
Robert E. Lee, S	Colo.			292,550
Russell, G. S	Ariz.			266,686
*Satemo, G	N. S.		630	11,725
Savage, S	Nev.			33,281
Sierra Grande, S	N. Mex.			735,260
*Silver Bow, G. S.	Mont.			330,182
Silver King, S	Ariz.			815,000
*Spring Valley, G.	Cal			212,000
Standard, G	"		92,023	1,258,057
Star, S	Nev.		4,515	61,716
Stonewall, S	Ariz.			240,000
Stormont, S	Utah		19,690	283,934
*Sullivan, S	Maine			4,903
Syndicate, G	Cal			75,458
Tintic M. & M. Co.	Utah		10,576	76,231
*Tip Top, S	Ariz.		20,084	229,512
*Tombstone, G. S.	"		550,988	1,440,894
*Union Con., S	Nev.			318,291
*Vizina, S	Ariz.			107,339
Total amount of shipments to date				$31,763,370

* Official. † Net. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended February 2d, as compiled from various sources, amounted to $288,263.71, as against $260.320.97 reported for the previous week. The receipts from January 1st, 1883, to date, are $1,671,878.49.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended January 27th	$251,745
Corresponding week last year	236,400
Since January 1st, 1883	1,058,814
Corresponding period last year	1,060,680

Imports.

Week ended January 27th	$383,444
Corresponding week last year	47,708
Since January 1st, 1883	542,476
Corresponding period last year	339,075

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £308,000 bullion, and the proportion of its reserve to its liabilities was raised from 44½ to 47 13-16 per cent, against 31½ per cent at this date a year ago, when the rate of discount was 6 per cent. February 1st, the bank made a further gain on balance of £17,000 bullion. The weekly statement of the Bank of France shows gains of 13,250,000 francs gold and 1,100,000 francs silver.

United States Assay-Office at New York.—Statement of business for the month ended January 31st, 1883:

Deposits of gold:		
Foreign coin	$210,000.00	
Foreign bullion	49,000.00	
United States bullion	475,000.00	
United States bullion (re-deposits)	129,300.00	
Jewelers' bars	161,700.00	
Refined gold	73,000.00	$1,098,000.00
Deposits of silver:		
Jewelers' bars	$24,300.00	
Foreign coin	6,400.00	
Foreign bullion	28,700.00	
United States bullion (contained in gold)	6,000.00	
(Re-deposits)	5,000.00	
Bullion, Arizona	6,000.00	
Colorado	15,000.00	
Dakota	12,000.00	
Idaho	1,500.00	
Lake Superior	1,500.00	
Montana	95,500.00	
Nevada	11,000.00	
New Mexico	15,000.00	
Utah	153,300.00	
Refined silver	63,600.00	446,000.00
Total deposits		$1,544,000.00
Gold bars stamped	$1,851,004.08	
Silver "	433,252.89	2,284,256.97

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 2.

All departments of the iron trade are in a state of absolute quietude, and look with hope to the relief which the adjournment of Congress is expected to give. Whether business will then take a fresh start, remains to be seen.

American Pig.—Both buyers and sellers hesitate and seem uncertain how to act. This is clearly shown by one transaction of magnitude which took place this week, 5000 tons of Thomas iron selling with the understanding that the price shall be the market price at time of delivery. Our quotations remain universally for standard to choice brands at tide-water, $24.50@$26; for No. 1 Foundry, $22.50@$23.50; and No. 2, $20.50@$21. Outside brands may be obtained at a concession, and some lots of foreign Forge have sold very low. Nothing has been done in Bessemer pig, which is nominally $22.25@$22.50. England cables lower, 52s.@54s. 6d. Spiegeleisen is dull and slack, with 20 per cent at $32.75@$33, and 10@12 per cent $27@$28.

Scotch Pig.—The market is fairly steady, with prices showing a slight upward tendency, due to a feeling that freights will advance, although they are still 4s. from Glasgow to New York. The demand is fair, but poorer brands are being stored. We quote: Coltness, $25@$25.50; Langloan, $24.25@$24.75; Glengarnock, $22.50@$23; and Eglinton, $21@$21.50. At the Wall Street Exchange, the cables are nearly the same; Carnbroe, 55s. 3d.; Gartsherrie, 63s. 6d.; Summerlee, 62s.; Coltness and Langloan, 66s.; Glengarnock, 56s.; and Eglinton, 49s. 9d. Warrants are 47s. 8d.

Steel Rails.—There are occasional sales of small 3000 to 5000 lots at firmly $40 at mill, and in one instance an 8000-ton order for prompt delivery was declined because of the inability of the mill to deliver promptly. Yesterday, the failure of the Union Iron and Steel Company at Chicago, capable of producing 150,000 tons of rails per annum, was announced. It was due to mismanagement, and the appointment of a receiver is expected to stop the low sales of that mill, which have been a troublesome feature in the market for some time. It is not expected that the mill will be closed down for any length of time. London cables £4 15s.@£5.

Old Rails.—A good many rumors are afloat of sales at low figures, $23 being frequently mentioned as the basis of transactions, which we have not, however, been able to trace to any reliable source. There have been offers to buy several lots at $24.50, and we quote $24.50@$25.

Scrap.—Very little is doing. We quote, nominally, $25 ex ship.

Philadelphia. Feb. 2.

Pig-Iron.—Transactions in iron for the past six days have lacked usual interest. A few large consumers have bought freely of foundry iron especially, and a few mill-owners have placed contracts for forge iron which will carry them into the spring. The demand would be much larger but for the uncertainty of tariff legislation. Opinions differ as to the outcome of it. It is the intention of the iron men to fight the question over until next winter unless the House bill is accepted. No. 1 Foundry sold this week as low as $24.50. Better grades sold at $25, and some few special brands brought $25.50. Confidence continues among makers of special brands. Concessions are possible only for inferior brands. Mill irons are moving a little more freely than last week, though chiefly of better brands. The purchasers who use such brands are a little apprehensive that prices might harden on them in case tariff legislation was favorable to manufacturing interests. Furnace prices, in some transactions, are, for future delivery, $20.50; for others, $20. Sales have been made as low as $19, though exceptional, and even this figure has been shaded. Middlesborough has sold at $19; small lots, $20. Scotch iron is moving a little more freely, though in small lots, for foundry purposes, at $22.50@$26.50. Importers have inquiries for fair-sized lots, which will probably be placed. Bessemer is $22.50@$23, according to quotations, but there are parties in the market with offers as low as $21.50, and they expect to make arrangements at that figure for future shipments.

Manufactured Iron.—The demand for finished iron is not improving as makers would desire; but since Monday a fair amount of business, chiefly in small orders, has been booked for near-by delivery. Manufacturers are satisfied that the demand will be such as to keep their capacity fully engaged. Buyers are out of iron, and running along in a retail sort of way, waiting for something to happen which will either harden prices or weaken them. A large amount of work is in hand, and the lack of confidence is not so bad as newspaper reports would make it appear, although there is a great deal of feverishness and dissatisfaction with the way tariff matters are piddling along. Small lots of iron are selling at 2·40c. Country mills have been known to take business as low as 2·10c. These figures cover the extreme limits. Average quotations may be set down at about 2·30@2·35c. for a good iron. Skelp iron is weak, and very little business can be reported. Blooms are without any activity, and weak. A few contracts are worked up, but consumers are not rushing in with fresh contracts. Muck Bars are weak and fluctuating around $38, though some special qualities are held at $39.

Wrought Pipes—Are moving a little more freely at 65 per cent off list, though business is by no means satisfactory, and some few orders for boiler tubes at 55 off. Sheet-iron is improving quietly, though the capacity is still unfilled. Makers have fair inquiry, and, as soon as buyers feel it safe to come in, will book up for a winter and spring output. Card rate runs from 4@4·34c. ordinarily for gauges 16 to 28. Buyers of large lots have had offers at sharp concessions on these rates.

Shapes.—A very little fresh business has been done in structural iron. Manufacturers report a fair amount of business in sight, and a probability of the usual volume during the spring and summer; but excuses are made which delay business and keep quotations weak at about 2·12c. for angles.

Plate and Tank Iron.—Quotations are 2½c. for Tank. Flange, Shell, and Fire-Box are called for in small quantities, to finish out the work in hand. The indications point to a very fair demand, and all consuming establishments are busily (?) engaged on work enough to keep them running for the winter. Steel rails are quoted at $40. Limits are, perhaps, $39@$41, though the tendency is upward. The correspondence of late shows up well, and some heavy railroad building will be pushed during this summer.

Old Material.—Tees are quoted at $25; Double-Heads, $27.50; American, $27@$28. Transactions are small, and negotiations are in hand for spring shipment.

Scrap.—Scrap continues dull and transactions of but little consequence. Yards are well supplied, and sellers are willing to make concessions on inferior stuff to get rid of it. Business has been done all the way from $25@$28. For ordinary No. 2, $26 is paid; and for No. 1, $27@$27.50.

METALS.

NEW YORK, Friday Evening, Feb. 2.

Copper.—The market for lake copper is steady at 18@18½c. It is learned now, by way of England, that some time ago 17c. was refused to parties there by the Lake companies for a mixed lot. In other words, the market is somewhat unsettled through the

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forced sale of 16c. Holders of Baltimore and Lake copper decline, however, to part with their metal at such figures, and for these 16¼@16¾c. is the ruling quotation. It is stated that the Copper Queen Company declined to sell a 100,000-pound lot at 17c.

It is learned that a number of Arizona mines, four being mentioned by name, have closed down, owing to inability to obtain the necessary supplies of coke and to other troubles.

At the recent meeting of the Canadian Copper and Sulphur Company in London, it was stated that the company has made a trial contract to deliver 12,000 tons of cupriferous pyrites to a New York concern, the price being kept private.

London cables lower, Best Selected £72@£72 5s., and Chili Bars, £64 15s @£65.

Tin.—The market is firm, although moderate business not exceeding 150 tons during the week has only been done. We quote spot Straits, cash 21c. London cables £92@£92 5s.

Lead.—The market has stagnated, and beyond a small jobbing trade, absolutely nothing has been done. We quote nominally 4·60c. for Common, and 4⅝c. for Refined, although any larger lots, say 300 to 400 tons, could not be placed at these figures. London cables £13 10s.@£13 15s., for English Common.

Messrs. John Wahl & Co., of St. Louis, write us as follows to-day :

Our market has declined slowly since our last report. Sales will aggregate 200 tons Refined, at 4·25c. We quote Common nominally 4·20c.

Spelter.—This market continues dull and lifeless. We learn that a large producer at La Salle has offered to deliver spelter in March at 4·65c. We quote 4·65@4·75c. London cables £15 15s.@£16.

Antimony.—With sales of about 100 cases, this metal has declined further to 10@10⅛c. for Hallett's, and 11@11⅛c. for Cookson's.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended January 27th, and year from January 1st :

TONS OF 2240 LBS.	1883.		1882.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co..	43,309	227,424	28,546	209,507
D. L. & W. RR. Co.	58,850	287,952	48,428	269,085
Penna. Coal Co.....	13,608	78,116	11,723	65,802
L. V. RR. Co.....	*	59,537	11 211	73,199
P. & N. Y. RR. Co..	2,925	12,688	2,330	11,410
C. RR. of N. J.....	*	110,399	35,301	151,715
North & West Br. RR.....	*	25,381	.....	.....
	118,782	801,497	137,539	780,718
Lehigh Region.				
L. V. RR. Co.....	55,171	279,080	46,471	259,337
C. RR. of N. J.....	*	105,345	32,890	136,815
S. H. & W. B. RR..	*	3,065	.....	523
	55,171	387,490	79,361	396,675
Schuylkill Region.				
P. & R. RR. Co.....	70,715	352,243	75,681	369,160
Shamokin & Lykens Val.....	19,385	71,613	22,218	81,154
	90,100	423,856	97,899	450,314
Sullivan Region.				
St Line&Sul.RR.Co.	1,563	4,908	730	3,650
Total	265,616	1,617,751	315,529	1,631,357
Increase.....	....	....	.....	.....
Decrease	....	.....	.....	.....

* No returns later than January 20th.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb 2

Anthracite.

The market has been exceedingly quiet and flat, and the only transaction of interest, as shedding light upon the present situation, is the awarding of the contract called for by the Commissioners of Charities and Correction. The quantity involved was about 35,000 tons, 26,000 of it being broken, with some stove and egg, all to be delivered to institutions in the harbor. The contract was awarded to Messrs. David Duncan & Son, at the uniform price of $3.82 per ton, delivered alongside of dock, equivalent approximately to $3.62 on board, the freights in summer and winter, extra towing, demurrage, etc., figuring up at least to an average of 20 cents per ton. The two other parties bidding offered to take the contract at $4.09, alongside.

The only feature of interest is the fact that, in order to supply the blast-furnaces in the Schuylkill and Lehigh valleys with lump coal, of which they were short, it has been decided to work full time next week. This may be satisfactory to the furnaces, but it does not strengthen the moral effect which restriction is supposed to have upon buyers of other sizes. The three days' stoppage arrangement is not looked upon with favor by many in the trade, and it is a question well worthy of serious consideration whether it is not by far better to stop all work for a week or two or three, if necessary, at a time, rather than struggle along in the present fashion.

The Baltimore *American* has the following :

Mr. Charles F Mayer, President of the Consolidation Coal Company, was yesterday presented with a handsome testimonial in the shape of a solid silver punch-bowl and salver, made by Kirk, and valued at about $2000, by the coal trade of Baltimore. The presentation was made the occasion of a dinner to Mr. Mayer, which took place at the Merchants' Club, at which there were present as invited guests Messrs. John W. Garrett, President of the Baltimore & Ohio Railroad Company ; Senator Henry G. Davis, of West Virginia ; Hon. Lloyd Lowndes, Mr. Enoch Pratt ; Messrs. D. S. Jones, President of the Piedmont Coal Company, of Philadelphia ; William Jacques, President of the New Central Coal Company, of New York ; A. H. Stump, President of the George's Creek Coal and Iron Company ; Simon Rosenberg, President of the Atlantic Coal Company ; James Boyce, President of the Maryland Union Coal Company ; Stephen S. Lee, of the Swanton mines ; Gilmor Meredith and Benjamin Barroll, of Gilmor Meredith & Co. ; John K. Shaw, of Shaw Brothers ; John A. Boyce, Harry Lee ; H. Crawford Block, Treasurer Potomac Coal Company ; Charles W. Keim, Secretary and Treasurer of the Consolidation Coal Company ; and Decatur H. Miller. Mr. S. S. Lee, presided, and in behalf of the coal trade presented the testimonial to Mr. Mayer, taking occasion to compliment that gentleman on his recognized and valuable services to the coal trade generally, and congratulating him on the present status of affairs in the Cumberland coal regions.

Bituminous.

The bituminous coal trade is very quiet, and notably Clearfield coal is offering more freely at a concession, which is by some parties in the trade believed to be due to some arrangements of favorable rates made with the Pennsylvania Railroad. We quote Clearfield, alongside, $4.50@$4.65 ; and Cumberland, $4.65@$4.85, according to quality.

In giving a list of the miners of George's Creek Cumberland coal last week, we inadvertently omitted the name of the National Coal Company, operated by Messrs. Hitchins Brothers, of Frostburg, Md.

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gives strength where there has been exhaustion, and vigor in place of impaired vitality.

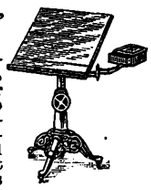
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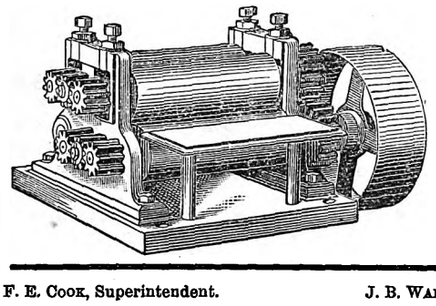
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THE ENGINEERING AND MINING JOURNAL

VOL. XXXV. No. 6.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, JR., M.E., } Editors.

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IT is announced by telegraph from Mexico that the National Mining Society was duly organized on the 6th inst. We have already, in a previous issue, alluded to the aims of this new association.

A VERY important addition to our available supplies of Bessemer ores is promised from the mines which the Hudson River Ore and Iron Company is about to open south of Hudson, in this State. It is said to be a siderite, running about 48 per cent of iron, one half of one per cent of sulphur, and 0·025 of phosphorus. The vein is reported to be 18 feet thick, and has been traced by Prof. JOHN C. SMOCK, of the New Jersey Geological Survey, over a distance of four miles.

THE programme of the Boston Meeting of the American Institute of Mining Engineers has been announced. There will be an evening session on Tuesday, the 20th inst., two sessions on Wednesday, one on Thursday, and one on Friday. The subscription-dinner will take place on Thursday evening. A number of excursions have been planned by the local committee, of which Gen. F. A. WALKER is President and Prof. R. H. RICHARDS Secretary. The visits to the Watertown Arsenal, where the famous Emery testing-machine will be inspected ; to the Leavitt pumping-engine, and the Norway Iron-Works will prove particularly interesting. A large number of papers have already been announced, and from the reports we hear from all quarters, the attendance will be exceptionally good, so that there is every prospect of a very successful meeting.

MR. HORATIO C. BURCHARD, Director of the Mint, who advocates a cessation of the coinage of silver at the present rate, and who opposed the issue of new bullion certificates on the ground that there was no need for an increase in the coin or paper circulation in the country, has submitted the following eloquent figures :

AMOUNT OF CIRCULATION FEBRUARY 1ST, 1883.

	In treasury.	In banks and active circulation.	Total.
Gold bullion	$51,449,382	.....	$51,449,382
Silver bullion	3,761,958	.....	3,761,958
Gold coin	121,868,451	405,510,541	527,378,992
Silver dollars	97,530,969	37,874,111	135,405,080
Other silver	27,135,244	53,428,257	80,563,501
Gold certificates	25,107,300	47,669,640	72,776,940
Silver certificates	4,306,650	68,438,820	72,745,470
U. S. notes	33,592,236	313,088,780	346,681,016
National bank notes	10,486,291	350,972,860	361,459,151
Fractional currency	7,101	7,010,992	7,018,093
	$375,245,582	$1,283,994,001	$1,659,239,583

THE managers of the Ontario Silver Mining Company, of Utah, have issued a circular in which they announce that, for the present, the payment of dividends will be suspended. There is nothing alarming in this conclusion ; in fact, it is another ample proof of the well-deserved confidence which the officers have in the permanence of their mine. During 1881 and 1882, the property, besides yielding $1,700,000 dividends, paid for permanent improvements to the extent of $500,000, and increased the accumulated surplus from $39,500 on April 1st, 1881, to $238,000 on December 1st, 1882. It has now been decided to purchase the ground adjoining the Last Chance, being an extension of the Ontario property, and to obtain the control of the Utah Eastern Railroad and the coal mines with which it is connected, in order to receive a permanent supply of cheap fuel. It is estimated that these additions to the property of the company will cost about $550,000, or $350,000 above the cash in hand. This sum the mine will have to earn before dividends can again be paid and a good surplus be accumulated. On the basis of past earnings, this would take a little more than half a year.

SCHEDULE C, on metals, has been finally reached by the House of Representatives in its discussion of the Tariff Bill submitted by the Ways and Means Committee ; and although it began its work on the 6th, it has not as yet done much. It has rejected Mr. KELLEY'S attempt, seconded by representatives from some of the Southern States, to make the duty on iron ore 60 cents per ton, and adhered to the 50 cent rate. The House declined to allow an extra protection of $3 per ton to charcoal pig-iron makers, and on the other hand rejected a proposition to reduce the duty on all pig to $6 per ton. The duty on Bessemer, open-hearth, basic, and other steel, except crucible metal ingots, blooms, billets, and slabs, has been changed from 0·6 cent per pound to 45 per cent *ad valorem*, while steel rails have been cut down to $15 per ton. Rails seem to have become the pet object of tariff reformers, and their zeal is carrying them so far that their position in the list, compared with the raw material, is entirely a false one. Charcoal bars, blooms, and billets are to come in under a duty of $22 per ton, while slabs, blooms, and billets of iron made with other fuel, are to be protected by a 35 per cent *ad valorem* rate. Bar iron, according to size, is to be dutiable at from 0·9 to 1·2 cents per pound.

On the whole, the revision of the Ways and Means Committee's bill, thus far, has been a surprise to those who professed to know the position of the majority in the House of Representatives. The result of the many close votes thus far has been a patchwork, the inconsistencies of which even the most ardent reformers will find it impossible to defend. Even they can not wish either of the bills to pass in its present form, and the prospect that no final action will be taken during this session of Congress will be a relief to all, because it will afford the time for an equitable adjustment. It is much to be deplored that business should be forced to languish to a certain degree, pending the settlement of the tariff question ; but we believe that the industries of the country will gladly submit to a delay if there is any hope that a wise and just measure will be ultimately framed.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Export of Copper from Imported Pyrites.

EDITOR ENGINEERING AND MINING JOURNAL :

SIR : I must once more trespass on your space to explain a statement that I made in your correspondence column last week in regard to the disposition of the copper produced from Canadian pyrites.

In making the statement that "the entire copper product of the imported Canadian pyrites is eventually handled by the Orford Nickel and Copper Company and sold entirely as refined ingot copper," I fear I may have misled some of your readers in regard to the market that this ingot eventually seeks. I desire to add particularly *that it is all sold in a foreign market.*

EDWARD D. PETERS, JR.,
NEW YORK, Feb. 5. Assistant-Manager O. N. & C. Co.

Mr. Peters's statement confirms the main point which we desired to make in our review, namely, that the copper produced from imported pyrites was exported and did not therefore seek a market here. We were erroneously under the impression that the bulk was shipped as *matte*, while in reality it is sold as refined *ingot* copper.—EDITOR ENGINEERING AND MINING JOURNAL.

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MINING STOCKS IN 1882.

We present this week a list giving the highest and lowest prices and the aggregate of sales of mining stocks in this city, together with the dividends paid by companies whose stock is dealt in. The list does not include dividend-paying mines which are exclusively quoted on other exchanges, nor those which are known to be making returns to their stockholders, nor the mines which are on a paying basis but do not publish statements of their results. Our dividend list enumerates a number of companies which have failed either by mismanagement, impoverishment, or in pursuance of a sound business policy to pay dividends.

The most striking feature which a rapid glance at both of our tables will show is the general decline in values; only a very small number, the very best known, steadiest producers, like the Calumet & Hecla, Ontario, etc., escaping the general depression. In some cases, as in Hall-Anderson, values were artificially advanced by "corners" which had nothing to do with the mine or its representatives. Among the mines which have temporarily or forever ceased to pay dividends are the Alice, which has spent the year in accumulating funds for the payment of machinery and a debt contracted by the acquisition of mining claims; the Amie, which appears to be yielding round profits to lessees whose time soon expires and who are probably taking out ore as fast as they can; the Chrysolite, which has been prospecting for new ore-bodies; the Dunkin, which at one time during the year reported good developments which have not since been realized; the Green Mountain, which has been hampered with a debt and apparently by a lack of ore-reserves; the Hibernia, which has passed into the hands of the sheriff, and is struggling with reorganization schemes; the Indian Queen, the Gold Stripe, the Plumas, and the Rising Sun, the last three collapsing with the Green Mountain, the Robinson Consolidated, the Spring Valley, the Starr-Grove, which went under as soon as the bolstering hand of its managers was withdrawn; the Stormont, which was wrecked by the same parties; and the Tip Top. Other mines, like the Tombstone and the Vizina, stopped paying dividends during the year, and as yet show no symptoms of resuming. Others have fallen off, like the Catalpa, from $120,000 in 1881 to $30,000 in 1882; the Eureka, from $225,000 to $87,500; the Northern Belle, from $387,500 to $225,000; Quicksilver common and preferred, from $525,491 to $280,313; and the Standard, from $975,000 to $725,000, due to the exhaustion of the rich ore-bodies. Not one of the Comstock mines paid a dividend, and under the pressure of regular and heavy assessments, values have gone down to low figures. The Tuscarora stocks, including the Argenta, Belle Isle, Grand Prize, North Belle Isle, Independence, Navajo, and the Tuscarora, now Elko, have latterly improved in consequence of good reports. During 1882, the Navajo paid $750,000 in dividends, against $250,000 in 1881, while the Northern Belle fell off from $387,500 to $225,000. The Dakota gold mining companies did well during 1882, Homestake paying $562,500 in 1882 against $360,000 in 1881; Deadwood-Terra, $205,000 in 1882 and $180,000 in 1881; and Father de Smet, $190,000, against $200,000 in 1881. Among the Leadville stocks, Iron Silver fell off from $500,000 to $400,000, while La Plata improved from $180,000 to $195,000, and Leadville from $20,000 to $80,000. The most prominent mine in returning dividends was the Horn-Silver, yielding $1,200,000. The additions to the list during 1882 were the Prussian Mining and Milling Company, and the Sierra Grande. The Moose has fallen into the hands of the sheriff. In the non-dividend list, there are very few, if any, that seem likely to reimburse the stockholders. Quite a number are worthless, having been sold out by the sheriff, and others are loaded with a debt from which they can not recover. The sales recorded are probably in many instances not based on actual transactions; and in this respect, the American Exchange has acquired an unenviable notoriety.

DIVIDEND-PAYING MINES.

	12 Months.				Dividends paid in 1882.
	Opening.	Highest.	Lowest.	Closing.	Sales.	
Alice	$3.00	$3.35	$1.75	$1.80	48,425	.....
Amie Consolidated	.15	.43	.09	.14	2,124 675	.....
Atlantic	19.00	19.00	14.00	14.00	250	$80,000
Argenta	.25	1.00	.10	.32	3,690	.....
Barbee & Walker	2.00	2.00	.10	.15	12,400	.....
Bassick	5.25	6.00	5.00	5.75	1,587	.....
Belle Isle	.15	.70	.04	.65	78,410	.....
Belcher	1.45	1.50	.10	.90	256	.....
Bodie Consolidated	2.75	6.25	2.00	2.25	48,079	95,000
Breece	.30	.40	.20	.23	11.200	.....
Bulwer	2.85	2.95	.90	1.15	51,048	120,000
California	.35	.68	.02	.20	627,333	.....
Calumet & Hecla	243.00	250.50	243.00	250.25	680	2,000,000
Caribou Consolidated	2.15	2.50	.80	.80	810	.....
Catalpa	.60	.60	.50	.51	700	30,000
Chrysolite	4.00	6.25	.96	1.45	555,689	.....
Climax	.24	.45	.02	.05	176,300	.....
Consolidated Virginia	1.10	1.50	.28	.37	688,267	.....
Copper Queen	6.50	6.50	5.00	5.00	600	325,000
Crown Point	1.00	1.80	1.00	1.80	200	.....
Deadwood-Terra	5.00	6.75	4.00	4.00	2,075	205,000
Dunkin	.35	1.15	.20	.20	113,940	.....
Eureka Consolidated	12.25	24.50	9.13	10.00	21,781	87,500
Excelsior	.75	2.88	.25	1.00	7,440	.....
Father de Smet	7.00	7.00	3.75	3.75	4,235	190,000
Findley	.25	.26	.05	.07	16,900	.....
Freeland	.85	.85	.81	.81	200	.....
Gold Stripe	.18	.48	.04	.05	83,200	.....
Gould & Curry	3.05	5.63	2.50	3.80	1,510	.....
Grand Prize	.10	.85	.05	.35	21,510	.....
Great Eastern	.08	.11	.01	.02	256,733	.....
Green Mountain	2.20	2.65	.26	.40	248,835	.....
Hale & Norcross	.95	3.30	.95	1.70	1,630	.....
Hall-Anderson	1.05	25.00	1.05	1.60	75,300	.....
Hibernia	.25	.27	.01	.02	470,400	.....
Homestake	14.50	20.00	14.50	17.50	10,250	562,500
Horn-Silver	17.00	17.50	4.60	6.50	93,461	1,200,000
Hukill	.65	.75	.06	.13	74,340	.....
Independence	.15	1.60	.01	.65	110,285	.....
Iron Silver	2.10	2.65	1.85	2.40	228,000	400,000
La Plata	9.25	10.00	8.00	8.00	255	195,000
Leadville Consolidated	.90	.90	.47	.65	79,148	80.000
Little Chief	.88	1.25	.30	.38	354,089	.....
Little Pittsburg	1.55	2.55	.40	.50	47,297	.....
Martin White	2.10	7.00	2.10	2.50	1,532	.....
Moose	.96	2.80	.04	.04	343,196	.....
Navajo	.15	8.75	.12	8.25	153,675	75,000
Northern Belle	8.50	13.75	6.00	10.25	25,671	225,000
North Belle Isle	.18	.50	.10	.40	48,300	.....
Ontario	33.00	40.25	27.00	35.75	6,672	900,000
Ophir	5.75	7.00	1.90	1.90	18,514	.....
Plumas	.12	.25	.05	.05	3,600	.....
Prussian M. and M. Co	5.75	5.88	5.25	5.50	400	117,000
Quicksilver, preferred	59.00	62.25	40.00	40.00	26,800	280,313
Quicksilver, common	13.00	14.25	8.00	9.25	25,930	
Rising Sun	.65	.78	.04	.05	215,270	.....
Robinson Consolidated	2.75	4.10	.82	1.30	7,328,077	.....
Savage	1.60	1.75	.78	1.75	1,490	.....
Sierra Grande	5.13	5.13	3.70	4.00	167,150	200,000
Sierra Nevada	9.00	10.00	2.50	3.75	57,452	.....
Silver King	20.00	20.00	10.50	11.00	4,145	300,000
Spring Valley	3.75	4.20	2.25	2.55	7,640	.....
Standard	19.25	20.00	4.00	7.00	50,500	725,000
Starr-Grove	3.00	3.25	.30	.33	8,200	.....
Stormont	1.60	1.60	.20	.30	85,920	.....
St. Joseph Lead	7.63	7.63	7.50	7.50	300	80,000
Tip Top	4.00	4.50	1.35	1.75	2,750	.....
Tombstone	4.50	4.50	.81	.95	5,600	200,000
Vizina Consolidated	2.85	2.90	1.00	1.00	52.410	100,000
Yellow Jacket	2.90	3.15	.70	1.40	2,255	.....
					15,396,892	$8,772,313

NEW PUBLICATIONS.

GOLD: ITS OCCURRENCE AND EXTRACTION. *Embracing the Geological and Geographical Distribution and the Mineralogical Characters of Gold-bearing Rocks; the Peculiar Features and Modes of Working Shallow Placers, Rivers, and Deep Leads; Hydraulicking; the Reduction and Separation of Auriferous Quartz; the Treatment of Complex Auriferous Ores containing Other Metals; a Bibliography of the Subject; and a Glossary of English and Foreign Technical Terms. By* ALFRED G. LOCK, F.R.G.S. *With six double-page Maps and 185 Engravings in the Text.* London and New York: E. & F. N. SPON. 1882. Royal 8vo, pp. 1229. A Geographical and a General Index.

This magnificent work is a model of its kind. It not only supplies a want in our technical literature, but does this so fully and completely as to satisfy the most exacting student. The work of John Arthur Phillips has been out of print for some time; but this is more comprehensive and thorough than that ever was. We are astonished at the proofs of Mr. Lock's patient and intelligent industry which these pages present. The list of books and of living authorities which he cites is evidence of the exhaustive character of his inquiries; and the compilation of this vast material has been executed with critical judgment. Careful indexes facilitate the use of the work for reference, while the student who may desire even more detailed information than its ample pages afford is guided by the bibliographical catalogue to the works of special authority and pertinence. It ought to be in the library of every mining engineer; and we had almost said that its possessor might get along without any other books on the subject of which it treats—at least, so far as the important outlines of history and present practice are concerned. We find in it, for instance, a description of the most recent really practical processes, such as the Mears and the De Signolles.

It is not to be wondered at if the editor of so great a work resigns, to some extent, the judicial function, and adopts or quotes the statements of others, without attempting to decide upon their value. He is trying to give an account of what has been done or is doing; and not a text-book for the dogmatic instruction of beginners. Mr. Lock has figured and described a number of amalgamating processes, for instance, which scarcely deserve to have their distinctive features thus immortalized, the real classification of pans, into big pans and little, grinding and non-grinding, pans all of iron or partly of wood or stone, well-built pans and rickety ones, being the one which in practice supersedes no end of patented confusion; and many of the devices for treating gold ores, heralded in the newspapers, and transmitted to posterity in books, being dead and orgotten in the mining districts before they become famous in literature. Yet we are pleased to notice how much of this sort of rubbish Mr. Lock has managed to omit, and how well he has, on the whole, covered the field of actual approved practice.

But practice is constantly advancing; and no one could safely go to a book a year old to get drawings for a gold-mill of the latest and best form in all details. If this were all that the book before us contained, it would still possess a high present value, but would necessarily decline in usefulness with the lapse of a few years. But the greater part of this large volume is filled with accounts of the gold-bearing regions, and a history of the gold-mining industry in all countries of the world. We know of no single work, not merely; we know of no single library in which this information can be found; and to find it presented, as it is here, in fullness, clearness, and order, is indeed a boon for which the mining engineer should be grateful. The chapter devoted to this subject occupies 745 pages, and is packed with interesting details of geology, history, industrial methods, laws, and statistics. About 100 pages are next given to a summary of the theories advanced during the last twenty years to account for the origin and formation of gold in veins and alluvial deposits, and for the occurrence of nuggets; a systematic epitome of the gold-bearing geological formations; and a catalogue of associated minerals. The following five chapters deal respectively with shallow placers, deep placers, hydraulicking (which, we are sorry to see, Mr. Lock spells without any *k*), stamp-milling, and the treatment of sulphurets.

The *résumé* of theories, above alluded to, comprises a full abstract of the views of Rosales (Victoria), Hartt (Nova Scotia), Hunt; the famous paper of Wilkinson, supporting Selwyn's hypothesis, and the supplementary papers of J. Cosmo Newbery on the formation of nuggets; also the paper of Skey (New Zealand, 1872) on the same subject, and that of Sonstadt on the gold in sea-water; and those of Whitney, Egleston, and J. S. Newberry. The quotations made from these sources cover the most important views announced in late years as to the genesis of gold, except the contribution of Prof. Henry Wurtz to this subject, which is worthy of greater attention than it has received from technical writers. But Professor Wurtz, after all, does not radically differ, as to the later stages of the deposition of gold, with the geologists and chemists of Australasia, who have taken the lead in the experimental elucidation of the question. His peculiar hypothesis of a sulphatic ocean belongs to an earlier stage than they undertake to consider.

We congratulate Mr. Lock and his publishers on this splendid piece of work. And if any body who reads this article suspects that we are deliberately praising the book in order to make people buy it, his suspicion is correct. That is just what we are doing; and Conscience, looking over our shoulder, says we are doing right.

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THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Permanent Machinery.—An action was brought by certain creditors against the owner of land on which there was a steam-engine and accompanying machinery, which were annexed to a building by the owner for permanent and habitual use in smelting lead ore and manufacturing it into pig-lead. In this case—Thomas *vs.* Davis—the Supreme Court of Missouri decided in favor of the grantee of the land. Judge Henry, in the opinion, said: "Between grantor and grantee of land, if the fixture is one to become a part of the realty, it must be so firmly annexed that its removal would involve the destruction, impairment, or substantial injury to the freehold; and the manner of annexation would seem to be a material question. The offer, on the trial, to show that it was the custom to regard machinery for making pig-lead as chattels was properly ruled out. The intention in making the annexation to the freehold is to be determined by the consideration of the character of the annexation, and its appropriation and adaptation to the use or purpose of that part of the realty with which it is connected."

Superintendent Borrowing Money to Pay Miners.—The superintendent of a mine owner borrowed money at a bank to pay the miners, and executed notes in the name of his principal for the loan, and sent letters and telegrams to his principal, at his residence in Cincinnati, advising him of what he had done. No replies were received from him. Upon a refusal to pay, the bank brought suit on the notes and recovered judgment. The defendant appealed to the Supreme Court of Colorado, which also decided the case—Breed *vs.* First National Bank of Central City—in favor of the bank. The Chief-Justice (Elbert), in the opinion, said: "1. Greenleaf, in his work on Evidence, said: 'If a letter is sent by post, it is presumed, from the known course in that department of the public service, that it reached its destination at the regular time, and was received by the person to whom it was addressed, if living at the place and usually receiving letters there.' This presumption has also been held to apply to telegrams. 2. The silence of Breed upon the receipt of the letters and telegrams will, by presumption, ratify the acts of his agent. And it was proper to show, for the purpose of charging Breed, and as bearing upon the question of ratification, that the money borrowed was expended in his business and to his advantage."

MECHANICAL ORE CONCENTRATION, PNEUMATIC OR HYDRAULIC.

Written for the Engineering and Mining Journal by S. B. Krom, New York.

(*Concluded from page* 56.)

Let us now examine the true principle on which success in ore concentration is founded and on which our present practice is based. It is based indeed on a fluid of intermediate density, but not in accordance with the idea furnished by the theoretical opponents of pneumatic concentration—namely, on the principle of free fall, as free fall performs but very little if any part in effecting separation in our present practice. Its basis is well explained by the distinguished Councilor Althans:

"The dynamic effect of a living force produced by an upward jerk through the dense medium has a more energetic effect than by free fall." At every impulse, the medium is raised to a density, or its equivalent, to lift or act upon the lighter of the minerals, and the dynamic effect of the upward jerk ceases before the heavier mineral is materially affected. Thus, with water as a medium, the liquid is raised to the necessary intermediate density from 60 to 120 times per minute; with air as the medium, from 500 to 680 times per minute.

1st. If we begin with a medium sufficiently dense to support the lighter of two minerals without motion, we find it will not succeed in practice; or if we employ air and water, and give them continuous motion, to produce the required density, we find that this does not succeed in practice either.

2d. If we should undertake to give intermittent motion to a medium having a sufficient density to support the lighter minerals without motion, this would not prove effective; and if we select a medium whose density is between mercury and water, and give it intermittent motion, as in our successful practice, we should find it impossible to separate, except coarse grains of mineral possessing a wide difference in specific gravity, and could give but few impulses per minute. If we take water as the medium, we can increase the number of impulses, giving from 60 to 120 per minute, and can separate minerals of less difference in gravity and finer particles. Further, if we had a medium between water and air, we could separate still finer grains and of less difference in specific gravity, and give probably say about 280 impulses per minute. But with air as the medium, we can separate minerals of still less difference in specific gravity and still finer grains, and give from 500 to 600 impulses per minute—500 being about the best limit.

The logical conclusion is, that that medium is best which permits being brought to the required intermediate density the greatest number of times per minute. Such a medium not only effects a more rapid separation, but will separate finer grains and minerals possessing less difference in specific gravity.

The greater number of impulses which can be given by air is an advantage, and an evidence of greater capacity. This quality, which allows such rapid repetition, is indisputably an evidence of superiority, because an impulse given by air is equal, so far as the power of the impulse to act on the ore is concerned, to an impulse given by water. In practice, the extra number of impulses given by air is divided between capacity and closer separation.

Councilor Althans, in his Centennial Report, has forcibly indorsed these views. The favorable opinion expressed on the Krom Pneumatic Separator Mr. Cazin endeavors to break by asserting that the councilor was ignorant of Mr. Cazin's treatise and that of Professor Bartlett when he wrote his Centennial Report. Mr. Cazin also makes the remarkable statement that not only the water-jig can make 600 strokes per minute, but also works with increased effect, without requiring the same velocity. "Water-plungers work with increased effect," says Mr. Cazin. Will he please explain how? Is he not aware that the inherent adhesion which water produces between the particles of ore and itself prevents the full effect of the action of the impulse, and diminishes rather than increases it?

That Councilor Althans, who was one of the judges of Group I in the Centennial Exhibition, was not so ignorant as Mr. Cazin tries to make him, in spite of not having read Mr. Cazin's treatise on that subject, is shown by the complimentary remarks of Dr. R. W. Raymond, who called his report "a model of intelligent criticism, and even as a manual of art far superior to any thing we possessed in the English language before its appearance." At any rate, Councilor Althans came to his conclusions from close and attentive personal observation of the work of the pneumatic machine, and not from reading my publications.

The treatise of Professor Bartlett came into Councilor Althans's hands, it is true, after he wrote the theoretical part of his treatise contained in the Centennial Report; but he added a paragraph. He says: "It must not be overlooked that in pneumatic jigging the equal falling grains suspended in the stream of air are always in narrow air-spaces, similar to those in Krom's experiments," etc. Besides this, some time after the Centennial Report, the same treatise was enlarged and published in German, in which the councilor repeats the same favorable remarks on the pneumatic system.

"Where, then," exclaims Mr. Cazin, "are the effects hitherto unknown which the pneumatic system produces different from those in water-dressing? Althans quotes none. Where are they to be found, these

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	Opening.	Highest.	Lowest.	Closing.	Sales.
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Albion	1.85	4.00	1.70	2.80	4,34
Aljouez	3.50	3.55	2.00	2.00	1,22
Alpha	1.15	1.15	....	1.15	100
Alta	4.75	5.63	.50	.90	1,20
Alta-Montana	1.85	2.00	.10	.26	135,52
American Flag	.11	.14	.03	.03	7,500
Bald Mountain	.01	.01	....	.01	19,700
Barcelona	.23	.32	.05	.22	564,600
Battle Creek	.12	.12	.04	.04	6,000
Bear Creek	.75	.75	.20	.27	12,950
Beauce	1.75	2.00	1.15	1.45	57,700
Bechtel Consolidated	.40	.37	.02	.17	7,400
Belvidere	.44	.44	.12	.12	7,500
Best & Belcher	7.88	10.50	3.25	4.15	38,000
Big Pittsburg	.90	1.10	.10	.10	35,650
Black Jack	.80	.30	....	.30	2,000
Bonanza Chief	.08	.52	.02	.02	41,800
Bondholder	.05	.09	.04	.05	3,600
Boston Consolidated	.45	.51	.01	.05	226,930
Boulder Consolidated	.07	.09	.02	.02	85,880
Bradshaw	.64	.68	.07	.39	577,400
Buckeye	.03	.08	.01	.02	220,735
Buckeye, preferred	.21	.35	.19	.20	20,700
Bull-Domingo	.42	.46	.03	.04	44,050
Bullion	.85	1.00	.85	.85	300
Bye and Bye	.05	.13	.02	.02	140,600
Calaveras	.07	.15	.02	.02	120,400
Calaveras W. and M. Co	.31	.60	.08	.08	46,550
Caledonia, B. H	.50	2.15	.20	1.25	34,926
Carbonate Hill	.22	.85	.20	.85	53,743
Catskill	10.50	10.50	.25	.34	1,000
Central Arizona	1.50	1.63	.37	.37	150,242
Chapparal	.05	.10	.01	.01	1,080,400
Cherokee	.33	.56	.04	.06	206,435
Cheyenne Consolidated	.10	.10	.05	.05	1,500
Chollar	3.25	3.25	1.75	1.75	400
Clarence	1.20	1.60	.72	.75	56,328
Consolidated Imperial	.06	.18	.01	.06	126,725
Consolidated Pacific	.13	.45	.03	.26	15,125
Consolidated Pay Rock	.30	.50	.20	.20	2,272
Crowell	.06	.20	.04	.05	262,050
Dahlonega	.04	.09	.02	.03	49,900
Decatur	.95	2.50	.06	.11	823,008
Dunderberg	.70	.76	.10	.10	7,500
Durango	.07	.60	.05	.08	704,000
Eastern Oregon	1.50	1.55	1.45	1.50	59,350
Elko Consolidated	.10	.10	.08	.08	9,200
Empire	1.20	2.00	.08	1.05	44,670
Enterprise	.65	1.20	.56	.60	406,300
Globe Copper	.65	.70	.01	.01	491,200
Gold Placer	.35	.37	.14	.14	2,000
Goodshaw	.20	.53	.05	.06	60,000
Granville	.02	.05	.01	.02	74,200
Harshaw	3.25	3.35	.60	.60	12,750
Highland Chief	1.75	1.75	.45	.45	700
Hortense	.12	.31	.10	.11	69,700
Index	.50	.51	.48	.48	300
Lacrosse	.25	.32	.13	.15	121,400
Lucerne	.07	.07	.03	.03	4,600
Mariposa, preferred	2.50	2.50	.10	.10	4,285
Mariposa, common	2.00	3.25	.07	.12	21,730
May Belle	.10	.24	.10	.10	800
Mayflower	.20	.24	.10	.10	23,700
Mexican	9.88	12.00	2.90	2.90	35,457
Michoacan Syndicate	12.38	12.50	12.38	12.38	1,100
Miner Boy	.11	.11	.02	.05	758,600
Mineral Creek	.06	.07	.01	.01	345,500
Mono	2.00	2.00	.20	.20	1,550
Moose Silver	.35	.35	.01	.15	9,100
North Standard	.05	.32	.05	.15	28,000
North State	.13	.14	.01	.01	240,900
Noonday	.33	1.60	.05	.05	7,515
Oriental & Miller	.36	.40	.10	.13	936,100
Overman	.75	.75	....	.75	30
Potosi	.70	1.30	.70	1.30	300
Quartz Creek	.37	.85	.01	.03	705,300
Rappahannock	.17	.43	.09	.09	262,100
Red Elephant	.10	.19	.03	.05	47,225
Retort M. and M. Co	.75	.90	.75	.80	11,100
San Pedro	.35	.35	.20	.20	200
Silver Cliff	2.65	2.80	.33	.39	453,015
Silver Nugget, old stock	.09	.09	.06	.06	5,700
Silver Nugget, new stock	.11	.12	.05	.05	227,625
Sonora Consolidated	.50	1.10	.06	.10	15,800
South Bodie	.12	.12	...	.12	200
South Bulwer	.20	.27	.15	.15	2,850
South Hite, new stock	.12	.44	.05	.12	198,200
South Pacific	4.00	8.25	.05	.09	4,867,015
State Line No. 1	.13	.13	.04	.05	1,725
" " No. 4	.34	.35	.05	.05	1,900
" " Nos. 1 & 4	.27	.29	.02	.03	554,450
" " Nos. 2 & 3	1.60	1.80	.07	.05	354,945
Sutro Tunnel	1.00	1.88	.13	.20	1,931,019
Taylor-Plumas	.08	1.00	.01	.21	1,104,600
Tioga	.12	.40	.04	.06	25,950
Tuscarora	.15	.26	.05	.07	367,400
Unadilla	.12	.15	.03	.04	162,105
Union Consolidated	14.63	17.50	3.00	3.25	28,720
Utah	.90	.90	...	.90	100
Vandewater	.34	.40	.16	.33	346,850
Washington	.14	.19	.04	.12	131,800
Whalen Copper Company	17.75	24.13	15.75	24.00	4,115
Wide West	1.50	1.50	....	1.50	100
					26,996,502

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unknown effects? But it is peculiar to the Krom system that its defense moves in darkness and secrecy. It is based mainly on the ignorance of the auditory and on the favoritism of its attorneys." Such eloquence, such crushing and concentrated logic, are certainly overwhelming if not convincing.

I have sold machinery openly, and it has been open for inspection. I have published sufficient information about the pneumatic system, to give a clear idea of the correct theory, and have exhibited at fairs and at the Centennial Exhibition. My laboratory for concentrating samples of ore has always been open for any who wished to examine the workings of the pneumatic concentrator. I do a great deal in testing ores, and my guarantees of results are based on such tests.

"It is based mainly on the ignorance of the auditory and on the favoritism of its attorneys," says Mr. Cazin. I must confess, I have had some very ignorant auditors, and have found it difficult to convert some. Among the most deplorable in ignorance of my auditors I must class Mr. Cazin.

"I have failed," says Mr. Cazin, "to find, as yet, unrevoked praise anywhere, except from Mr. Trippel and from Mr. Althans." It would be sufficient, and also quite satisfactory to me, if such authorities as Councillor Althans and Professor Trippel find no reason for withdrawing their praise. But the statement of Mr. Cazin that praise has been withdrawn is totally untrue, which will appear as we advance.

Mr. Cazin, in the continuation of the criticisms, lays much stress on a publication in the London *Mining Journal* of 1878, written by Mr. G. W. Baker, the former editor of the Central City *Herald*, and purporting to be a review of what had been accomplished in eight years by the Krom pneumatic concentrators. In referring to the just-mentioned article, Mr. Cazin did not give his readers the full text, but merely what suited his purpose. It is to be regretted that Mr. Cazin, who boasts of a scrupulous honesty of purpose, could not see the unfairness of such a proceeding, more especially when ordinary intelligence would recognize that the paper was written by a disappointed man, whose whole desire was one of revenge because of his failure to force me into a contract with him for a concession of territory in which to erect new works on my plans, for which, as he stated, he had interested some friends with himself. After reiterating his early and sincere services for the pneumatic system of concentration, of which he offered himself to be the champion voluntarily, as he says, but nevertheless receiving full pay for all he ever did, and in addition many acts of kindness of a practical nature from me (gifts of money, I mean), he gives a so-called review of the history of the works built on my plan, and with the evident purpose of showing its inferiority. But has he made out a single case? Does he not himself admit that the abandonment or idleness of some of them was in consequence of "unsound business conduct," while the reference to the disaster of others, such as conflagration or the want of ore, has absolutely nothing to do whatever with the principle or merit of my system? Mr. Baker complains of not having authentic reports in some cases; but this can hardly fall on my head, inasmuch as I am unable to force those mining companies who use my machinery to publish reports for the benefit of the public. In what other case would this be done by other companies? It is simply ridiculous in Mr. Cazin to reason that, because of the temporary inactivity of some of my works, the system involved is a failure. How many wet concentrating works are in the same condition, especially the ones built by himself? And yet no sane person will denounce wet concentration because some of these works are inactive or have been closed.

The only case which would actually seem to need any explanation on my part is that of the Manhattan works. In that case, the results are fully on record. It is also on record what the results of working the Austin ore at the Star Cañon mill were before the Manhattan Company decided to build the large works at Austin. It was fully demonstrated that these latter results were entirely satisfactory, and they were supervised by Messrs. Curtis and Trippel at the time. If somewhat similar ore had been used subsequently, the result would have been the same. But instead, ore-stuff from the refuse-heaps was treated, which was absolutely worthless for any purpose, and difficult for any kind of separation. Yet by my machinery, that ore became valuable and paid, and if the agreed percentage in the result had been the main object, it could have been obtained in all of the tests, and was obtained, which will be seen in some of the following tables (the agreed percentage being 75):

44 tons 151 pounds, assay value per ton $29.21, total value $1,288.16

Pounds.	Assay per ton.	Total value.	
3456 of No. 1 concentration	$84.82	$146.56	
2584 of No. 2 concentration	207.35	353.36	
1822 of No. 3 concentration	204.21	159.96	
7353 of granular dust	58.11	210.21	
6484 of chamber dust	48.69	157.85	$1,027.94
Loss in tailings			$260.22

Percentage saved, 79·7.

A general sample of the above lot fixed the value per ton at $27.22, which is quite high enough for this ore.

With the assay value of $27.22, the saving on the above lot is 85·63 per cent.

Third Run, 15 tons, 1823 pounds.—15 tons 1823 pounds, assay value per ton $25.12, total value $399.69

Pounds.	Assay per ton.	Total value.	
1550 of No. 1 concentration	$100.53	$77.81	
1309 of No. 2 concentration	146.63	95.66	
771 of No. 3 concentration	120.93	46.61	
3374 of granular dust	57.13	79.50	
2283 of chamber dust	36.28	41.35	$340.93
Loss in tailings			$58.76

Percentage saved, 85·3.

51 tons 228 pounds, assay value per ton $82.20, total value $4,200 42

Pounds.	Assay per ton.	Total value.	
5832 of No. 1 concentration	$281.15	$819.83	
5413 of No. 2 concentration	413.12	1,116.04	
2967 of No. 3 concentration	375.43	556.95	
13,428 of granular dust	147.63	990.98	
7341 of chamber dust	109.95	408.75	$3,887.55
Loss in tailings			$312.89

Percentage saved, 92·55.

The quality of ore in the last table is similar to that (but lower in value) on which the guarantee of 75 per cent is based. But the economical considerations were better served to have a less and richer quantity of concentrations, even at the expense of some higher loss. With that sole exception, and here only partly, there is not one example introduced by Mr. Baker which would show in the least any fault in my system.

But the want of good faith on the part of Mr. Baker is evident by the very fact that he seeks to make a contract with me, and for me to give him rights such as he would undoubtedly himself denounce as unsound business conduct. If my system is so faulty, why does Mr. Baker inveigle his friends into furnishing capital for a new Krom works, and why does he admit that he expects to have satisfactory results from such a new Krom works? I can not ask for space in your JOURNAL to relate all the details in reference to the works built on my plans; but I am ready at any time to give any desired explanation to those who feel interested in knowing the truth.

Mr. Cazin further criticises my experiments, made and published in your JOURNAL, by which I obtained results in practice (whatever the theory may say) superior to those obtained in wet dressing, when we consider the prevailing theory, that equal falling grains in water are not equal falling in air. We must also consider that this was based on air at rest, and therefore the erroneous inference that water was the superior medium. But when the air is made equal in resistance to water by giving it motion, then grains equal falling in water should also be equal falling in air, and experience has demonstrated that in air there is a margin in its favor.

In these experiments, I followed the examples of Rittinger, who worked out results, and then went back and corrected the theory to accord with the results in practice.

I have already alluded to and shown the incorrectness of Mr. Bartlett's assertion, that my experiments have been made improperly, which assertion is then imitated by our hero Cazin. I am, however, satisfied that had Mr. Bartlett made practical investigations, as I did, he would have arrived at similar results. He would have found that the air-current in my jigs is maintained with great uniformity, and, in the language of Mr. Baker, "with the automatic regularity of a pendulum."

Mr. Cazin next compliments Mr. Bartlett as author for the following theories: "That medium is the best for the separation of two substances for which the ratio of diameters of equal falling squares is greatest; or, in other words, that medium is best which will separate most readily spheres of two substances nearest in size." I would here ask the reader, whether it would not rather be common sense to say, that the medium is best which can separate two bodies that have the *greatest*, and *not* the *smallest* difference in size?

The theoretical medium is not one which can merely support particles of ore without motion, but that which can most readily be converted into the required medium of intermediate density. Air furnishes that medium, as it can be raised to the necessary resistance over 600 times per minute, while this can not be done by the water-jig for obvious reasons, notwithstanding Mr. Cazin's absurd statements to the contrary.

It has been shown, therefore, that the theories upon which the arguments have been based in support of water as the best medium are erroneous, and that the principle of a medium of intermediate specific gravity has been misunderstood to mean a medium of sufficient density to support the ore without motion; whereas the true philosophy is a medium of low density brought up to the required intermediate density by intermittent motion. This proposition is too simple to be misunderstood or questioned. It has also been shown that our present practice of jigging is not based on the principle of free fall, but on a more energetic force, and that free fall plays but an insignificant part in the separation. It has been demonstrated in practice that air can be brought up to the required density with absolute regularity, and at the rate of 500 times per minute. It is well known that the adhesion of water on fine ore particles seriously interferes with their separation, and that the absence of such adhesion in dry sands enables the pneumatic machine to treat much finer grains. It is well established in practice that less difference in specific gravity is required for the pneumatic process than for the hydraulic. It is to be regretted that my opponents have never examined the practical workings of my air-jigs, and are therefore more or less unacquainted with the principle on which they work, and entirely so with the nature of the working parts.

Let us suppose two machines working side by side—one a hydraulic, the other a pneumatic jig, both driven by the same power. We should then perceive but little difference in the operation of both machines. In each the agitation given to the ore by the upward thrust of the air or water appears substantially the same. The speed of either machine may vary within certain limits without detriment to the results, except in the produced quantity of concentrations, and both machines may be equally durable, the pneumatic machine, however, requiring less power. Again, we shall observe that the pneumatic machine can work finer grains than the hydraulic machine, and will allow a less rigid system of sizing than the latter; and lastly, water sometimes is expensive, or can not well be procured, and becomes troublesome in cold weather, while air is free from these objections. Water-dressing leaves a fine slime which is difficult and wasteful to treat. Air-jigging furnishes the same in a dry condition, which often can be used directly, but in the worst case offers no more difficulties for further treatment than the fine slimes from wet dressing. My opponents have accepted existing theories of wet concentration, and all sorts of statements in literature in favor of that system, indiscriminately and as infallible articles of faith, and they have disputed the possibility of a change or modification of these theories, and also plain matters of facts favorable to the pneumatic system of concentration.

If now, after these explanations, the gentlemen who have so violently and unjustly attacked the correctness of the theory and the practical results obtained by my air-jig still maintain their opposite views, they are invited to a competitive test to convince them of their error, and I will leave it for them to name the terms and conditions under which the test shall be conducted.

NEW YORK, November, 1882.

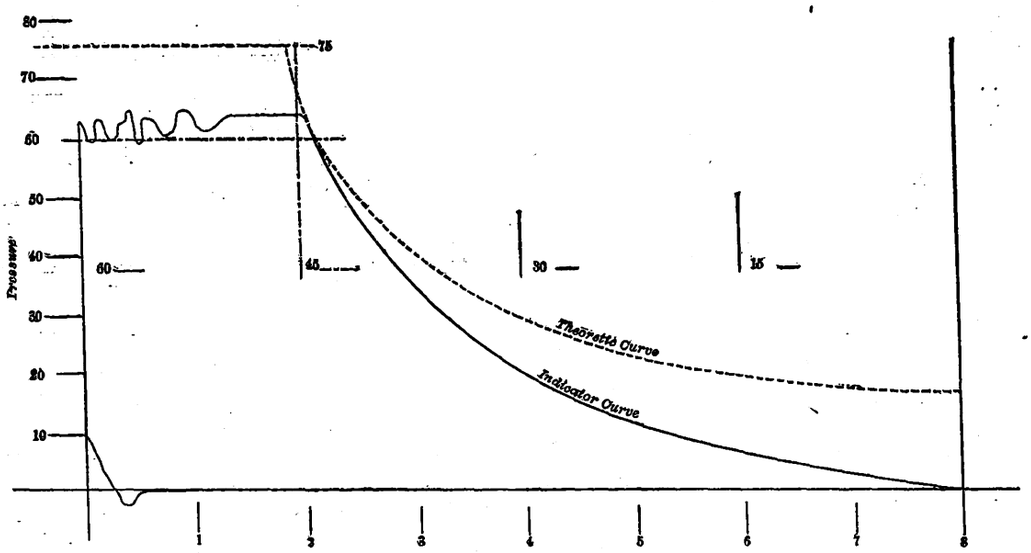
MESSRS. FRASER & CHALMERS, manufacturers of mining, milling, and smelting machinery, have just issued a new catalogue, fully illustrated.

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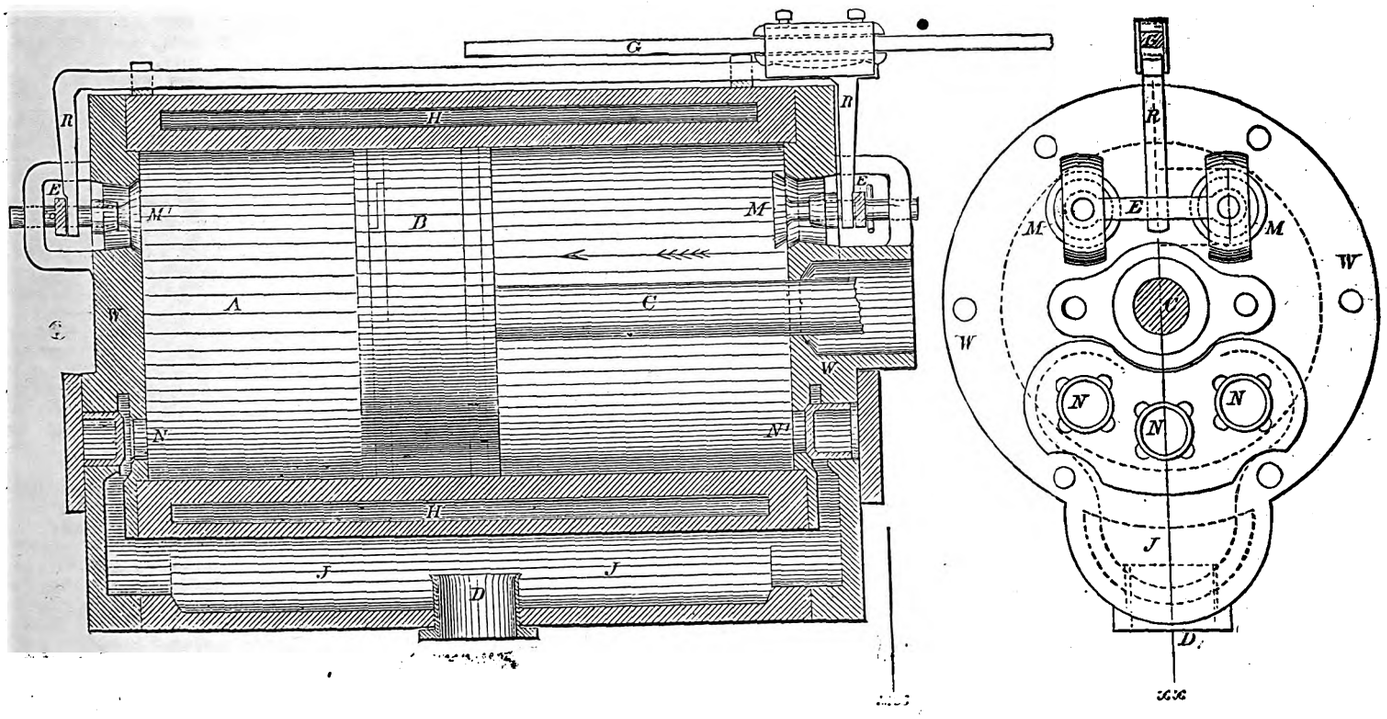
THE BENNETT AIR-COMPRESSOR.

Poppet-valves for the induction of air have always been considered preferable. They have been used, however, on the self-acting principle in various forms, but always with a spring of some description to hold them to their seats, opened by the vacuum formed by the suction of the piston. By reason of the tension of the spring, this vacuum is kept up throughout a greater part of the stroke than is necessary, making so much for the piston to pull against, and never allowing the cylinder to all with free air. The recent growing demand for high speed air-compressors makes it necessary to obviate the fluttering or vibration of the spring valve at high speed. Various forms of slide-valves were resorted to, but the necessity for careful adjustment under various pressures and great loss from friction and waste in port space demanded something better. After much experience with numerous appliances, Mr. C. A. Bennett, the superintendent of the Morris County Machine and Iron Company, of Dover, N. J., has devised and perfected the automatic poppet-valve, which is the main feature of the new high-speed compressor now building by that company. It will be seen, by reference to the sectional views, that the heads of the cylinder are each provided with two poppet-valves. One set *M* is wide and freely open for the admission of air as the piston moves in the direction indicated by the arrow, and the set *M'* on the left-hand end is closed and is held tightly to the seats by means of the bar *R*, which through the rod *G*, is made to press against the cross-piece *E* connecting the valve-stems, until the beginning of the return stroke, when it moves back in the inverse direction of the arrow, and closes the valves at the other end, allowing those at the left-hand end to open at will without the use of any springs whatever. The rod *G* is attached to the cross-head of the gang-bars, which connect the steam-piston directly to the air-piston. The fly-wheel shaft is placed between them, and is in the center of the bed-plate, with steam-cylinder on one end and air-cylinder on the other, thus getting a straight line of action. The discharge-valves *N* and *N'* are of the cup form, which is found to be the most substantial. Each head contains three discharging-valves, which are held in place by a plate on the outside of the head, which is easily detached. When the air is compressed in the cylinder *A* by the piston *B* moving in the direction of the arrow, the discharge-valves at *N* open, allowing the air to pass freely down into the annular space *I I*, at the bottom of the cylinder, and out through the discharge-pipe *D* into the receiver or reservoir, the valves at *N'*, remaining closed until the return stroke of the piston opens them. Thus it will be seen that by this arrangement of induction and discharge-valves all friction (except what little is required to move the rod *R R* ⅜-inch back and forth) is dispensed with, and the air has a free passage in and out, as is shown by the card taken from one of these machines, when the compressor was doing actual work, running at a speed of 78 revolutions per minute, the throttle-valve being open and the steam pressure in the boiler at 45 pounds. No water was used in the jacket nor was any water used in the cylinder to fill waste spaces. The diameter of the cylinder was 12 inches and the stroke 18 inches.

The cylinders are kept cool by water circulating through the water-jacket *H H*. The short piece of pipe *D* collects the oil which is used to lubricate the piston, and by a simple arrangement is returned back to the cylinder. Water is injected into the cylinder in spray if desired.



THE BENNETT AIR-COMPRESSOR.



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THE PROSPECTS OF THE LAKE SUPERIOR IRON MINES.

Those who saddle upon the tariff imbroglio now pending at the capital the uncertainties of the iron trade and the apparent silence which exists between ore and furnace men, do not do so, I am persuaded, from an adequate understanding of the facts. That the prolonged tinkering of our statesmen with the iron question throws some little uncertainty upon the matter of values is undeniable; but this is likely to be overestimated, even when speaking of it in modest terms. Proof of this is seen in the history of rails during the fall months of the lately deceased year. By the middle of August, when there were as yet no premonitions of the volcanic political upheaval of November, nor any pointers toward a reduction in the tariff on iron, rails had fallen off fifteen dollars per ton from the prices at which orders were booked at the beginning of the year; and by the end of September, they could be had at the mills for $43, a decline of over twenty-five per cent from January quotations. This can not be laid at the door of either tariff or political intrigue, but must be accounted for alone by the application of the economic axiom concerning the competition arising from a glutted market. Further proof of this is seen in the upward tendency of prices on rails, in spite of the tariff squabble, within the last few days, from $38.50 to $42 at mill, with prospects of an advance on that figure. In this, iron has shared in the vicissitudes common to all trades, and exemplified lately in the half-time of the coal industry and the uncomfortable falling off of clearing-house business twenty-five per cent over a like period last year. These facts shed a volume of light on the present complete stagnation and halt in communications between furnace and ore men, and it is in the light of these facts that the situation is to be properly judged.

That nothing is doing between producers and consumers is very—I almost said painfully—apparent. By the middle of this month last year, the bulk of our output for 1882 had already been spoken for and secured; but not even the best of our lake properties have as yet been inquired of to any considerable extent; and as for the second-rate mines, they are shivering in the cold with the thermometer 35 degrees below zero, and no buyer to pitch them into furnaces and warm them up. Nor do present symptoms indicate any change in the condition of affairs. The iron outlook on Lake Superior is Janus-faced, and no adequate account of the hopes and prospects of mine workers can be given that does not look both of these "faces" square in the eye. That the "hopes" and "prospects" of our producers are altogether coincident, your correspondent can find little reason to believe. The first "face"—and it is an eloquent one—is the demand which will be made on the lake for ores by furnace men at the opening of navigation. This will undoubtedly be a very small affair. The last year was one of tremendous energy in the production of ores, far eclipsing any previous year, while the consumption by no means kept pace with the supply. Probably 700,000 tons is the minimum estimate of the ore which, sold and unsold, lies unused at the docks and furnaces of Eastern towns, and it is only about two months till spring. Last year, only enough ore was on hand to carry the furnace men over until the flood-gates could be opened from our Northern beds; but this year finds enough ore on hand to carry the mills, with here and there a purchase or two, well on to September. Of course, this puts the lake men more or less in the hands—if they do not prove to be clutches—of the mill men, who will postpone inquiries for our product until along in the season, by which time, probably, many of our smaller concerns will begin to be very nervous about something with which to meet their pay-rolls. Should these concerns be forced to find ready buyers at any price, therefore, it may make the larger mines take in sail at a rate which will reduce their net earnings to a mere shaving. It is easy to see, therefore, why there are so few inquiries for ores here, and why what at first appears to be a deadlock is, after all, only a little good-natured procrastination on the part of consumers, who think to "taper off a bit" until they see how the wind is going to blow from shores along which they themselves must find markets. On the other hand, or rather on the other "face," the mine operators here are no less good-natured than their Eastern cousins. A gentleman whose opinion deserves attention informed your correspondent two days since that, during a visit in detail to all the mines of the Menominee, Ishpeming, Republic, and Michigamme districts, he had failed to find any owner who was not sanguine of a good market at good prices during the present year. The vessel-owners who supply the lake country with the Chicago traffic look forward to a larger carrying trade than ever, and are making calculations accordingly. The demand for rails during the present year, it is said, will be more than equal to that of last year, when the Bessemer and iron plants (less 200,000 tons imports) turned out an aggregate of something better than 1,950,000 tons. Without going into detail, it may, perhaps, be safely prophesied that, with no preventing disaster to crops and other farm products, the demand for rails will not fall below 2,000,000 tons. But as prices now stand, it is probable there will be little call for iron rails, and therefore rails rolled will be from Bessemer mills, the aggregate capacity of which now stands at probably 2,500,000 tons annually. At present rulings, it is not likely that many orders will be booked for English rails, so that our own brothers Jonathan will have a free and easy of the market of 1883. To be sure, this is subject to several more or less grave contingencies; but the lessons of the past year will be helpful in regulating and maintaining a steady flow of supply into a steadily maintained reservoir of demand.

Of course, your correspondent has not talked with all our mining men—from Marquette that would impossible; but he conceives that they reason on the situation about as follows: It is not at all likely that any tariff tinkering will reduce the price of rails beyond present rates; on the other hand, the tendency is already toward a strengthening of the market, and it is possible that, by the end of March, at the farthest, the price of steel rails will be at least $45 per ton. But rails sold for that or less price in immense lots during the months of August, September, and October, and no complaint was made of the prices of ores. If, therefore, the capacity of the mills is exhausted with orders at prices averaging $45 per ton, there will be no need of scaling down the prices of ores to an extent which will make mining an unprofitable industry. Actuated by all these and, perhaps, many less substantial hopes, the operators of our vast system of mines are sinking, drifting, stoping, and otherwise opening up their properties with the greatest alacrity. There is also a very large amount of prospecting quietly done, and options taken in prospect of a profitable market in the summer.

This letter has already been carried to more than modest length; but to arrive at even appropriate exactness in estimating the outlook for 1883, one other point ought to be at least casually canvassed. The contingencies of the market are much more against the ore men than were those of last year. Your correspondent does not lay claim to infallibility in saying that the demand for rails will be equal to what he has already set down, and it may be the figures somewhat exceed the maximum possible demand; be this as it may, it is not at all likely that at present prices there will be any extensive orders placed upon the books of mills which use second-class ores to any extent. What is more, there is no longer any doubt but that there is to be a reduction in hard and hematite ores of the first class, which will make second-class mining an extremely embarrassing and expensive occupation, even if they can inveigle some mill-owner into making them any offer at all for their product. Undoubtedly second-class mines are destined to stand a very hard rub in any event, with the chances against them in every market and in any condition of trade; while the glutted condition of the market and the inevitable reduction in the price of raw material make the outlook of the first-class ores, especially the hematites, any thing but a hopeful one. This may be a picture "untrue to nature;" I myself sincerely hope it will so prove; but I fear our hopes and prospects do not altogether coincide, and to base operations on mere hope would be to reckon without our host. Such, Mr. Editor, is the explanation of the apparent but not real dead-lock between lake producers and Eastern consumers. Each party is willing to wait, the mill-owner in the hope of getting the miner on the hip, and the miner in hope of a convalescence in prices which will bring a year approximating in activity, if not quite in remunerativeness, those of the boom period.

SPECULAR.

MARQUETTE, Feb. 2.

THE COST OF MANUFACTURING SULPHURIC ACID FROM PYRITES.

The following is an estimate made by William G. Crenshaw, President of the Atlantic & Virginia Fertilizing Company, and Vice-President of the Sulphur Mines Company, of Virginia, on the comparative cost of manufacturing sulphuric acid from brimstone and from pyrites, based on one year's working of a set of chambers with 110,000 cubic feet condensing capacity:

FROM BRIMSTONE.	
Cost of plant	$30,000
1100 tons seconds, $31.50	$34,650
88 tons nitrate, $55	4,840
Labor	1,200
Coal	1,200
	$41,890
Interest, repairs, wear and tear, and superintendence, 20 per cent	6,000
	$47,890
Yield, 4950 tons chamber acid, if sold at $11 per ton	$54,450
Profit (say 13·69 per cent on annual expenditure)	$6,560
If sold at $10 per ton	$49,500
Profit (or 3⅓ per cent on expenditure)	$1,610
If sold at $9 per ton	$44,550
Loss	$3,340

Cost of chamber acid, $9.71 per ton of 2000 pounds.

FROM PYRITES.	
Cost of plant	$32,000
2100 tons at $6	$12,600
80 tons nitrate, $55	4,400
Labor	1,200
Coal	1,600
	$19,800
Interest, repairs, wear and tear, and superintendence, 20 per cent	6,400
	$26,200
Yield, 4050 tons chamber acid, if sold at $11 per ton	$44,550
Profit (say 70 per cent on expenditure)	$18,350
If sold at $10	$40,500
Profit (or 54 per cent on expenditure)	$14,300
If sold at $9 per ton	$36,450
Profit (or 39 per cent on expenditure)	$10,250

Cost of chamber acid, $6.47 per ton of 2000 pounds.

PROGRESS IN SCIENCE AND THE ART.

A New Method of Insulating Wire.—Preparations have been recently completed by a new concern in this city, the Triplex Insulated Wire and Rubber Company, to manufacture insulated wire for underground and other telegraph, telephone, and other conductors. Samples which we have carefully examined prove that the system employed avoids the serious drawbacks justly raised against some of the insulating devices now in use, and gives promise of obtaining a wide field of usefulness. Briefly, the principal troubles experienced in connection with the most popular methods have been that the insulating material becomes too brittle in cold weather, making it liable to flake off, and too soft in hot days. Some kinds also do not adhere to the wire, and may be stripped from it easily. The Triplex Company tins the wire, covers it with a layer of soft rubber, around which a strip of soaked linen is wrapped, and which in turn is covered by an outer layer of thick hard rubber. For underground wires, another layer is added. The process of manufacture of this insulated wire is very simple, all the layers being put on in one operation by means of machinery, thus making it possible to furnish a comparatively cheap article. The wire is fed from a reel into a groove cut upon two steel rollers heated with steam, and simultaneously two strips of soft rubber, each more than covering one half of the wire. The excess of rubber is stripped. The coated wire is then automatically wrapped with soaked linen strips, and is carried to a second set of rolls, where two strips of hard rubber are united around it to a third coating. In this the central position of the wire in the insulating material is always secured, a matter in which other methods are not so successful.

"Steel-Iron."—The question of producing a metal possessing the physical properties of both iron and steel has for some time past received attention at the hands of practical metallurgists and others. One of the latest workers in this direction is Prof. M. Keil, who has succeeded in producing a compound metal which is stated to possess the characteristics of both metals. The professor, in giving his experiences on the subject, states that the difficulties can only be obviated when the two materials are intimately united into a whole. After many experiments, success

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has, it is claimed, at last attended them, and a material has been produced answering every requirement, and to which the name of "steel-iron" has been given. The following five descriptions have been made: (1) steel by the side of iron; (2) steel between two layers of iron; (3) iron between two layers of steel; (4) the core of steel, the surrounding shell of iron; (5) the core of iron, the surrounding shell of steel. This steel-iron is manufactured in the following manner: A cast-iron mold is divided into two parts by a thin sheet of iron securely fixed in it. The fluid steel, as well as the fluid wrought-iron, which have been freed before smelting from substances preventing welding, are poured at the same time, and in the same quantity, into this double mold; the separating plate serving as the medium welding both parts, steel and iron, completely together, so that they form an inseparable whole. The plate serves as a separator and a welding agent at the same time. The success of the operation depends upon the quality and the thickness of the plate. The latter must be of a certain thickness, to prevent the two glowing and liquid masses burning through it; and it must not be too thick, so that they are able to bring it up to welding-point while rising in the mold. The dimensions of the plates depend upon experience, and naturally are regulated by the dimensions of the castings. The manufacture of the above-mentioned five kinds is the same in principle. In Nos. 2 and 3, however, the mold is divided into three equal parts, by two strips of plate; in Nos. 4 and 5, the core is formed by a sheet-iron pipe standing in the middle of the mold. It is stated by Professor Keil that the product thus obtained may be used for a great many purposes. Steel upon iron will be useful for rails, armor-plates, and anvils, the hard steel face reducing wear and tear, and also, as in the case of thief-proof safes and armor-plates, withstanding the attacks of even the hardest drill, while the iron prevents cracking consequent upon heavy blows. Parts of machinery and tools which are subject to powerful pressure, and are exposed at the same time to great vibration, are best made of the material with tough core and hard surface. The wear and tear would be slight, while the soft core imparts considerable strength and prevents fractures. From what has been said respecting the quality of this description of steel-iron, it will be seen that the extent of its application promises to be a wide one, partly on account of its undoubted excellence, partly also, from its many qualities, because it may be used for a great variety of manufactures.

WE are informed that Mr. Marsden, of the Farrell Ferro-Dynamic Foundry and Machine Company, of Ansonia, Conn., has challenged the Gates Iron-Works, of Chicago, which manufactures the Gates crusher. Mr. P. W. Gates has accepted the challenge for a trial to take place within sixty days, in the neighborhood of New York, for the purpose of testing which of the two rival machines is superior to the other.

IN a recent issue, the *Railway Age*, of Chicago, published in full the rules and regulations of the National Exposition of Railway Appliances to be opened in that city on the 24th of May. There is a very long list of premiums to be granted to the exhibitors of the best appliances. There are eight gold medals for locomotives, including one for logging and mining, a large number for cars, for axles, springs, tires, trucks, rubber and leather hose, wood-working and iron-working machinery, including drilling, planing, punching, forging, testing, grinding, and tapping machinery. Medals are to be awarded for rails and track tools, metals, scales, office and station appurtenances, oils, varnishes and paints, electric lights, castings, pipes, forges, wire rope, surveyors and draftsmen's instruments, rock-drills, etc.

A STRIKE IN AN ENGLISH ZINC MINE.—A remarkable find of blende at the Magpie mine, Derbyshire, is exciting great interest in mining circles in England. The mine is near Bakewell, in High Peak, and has been worked for three hundred or four hundred years, with the exception of a short interval from 1843 to 1869. In the latter year, it was again opened out, but the proprietors had a prolonged struggle against water, the great enemy of lead mining in North Derbyshire. For nearly two years, pumping was carried on at an expenditure of 80 tons of coal per week. During this period, the owners raised £19,000 worth of ore, at a considerable profit; but in consequence of the great expenditure of coal, it was thought advisable to suspend pumping, and to get rid of the water by driving a level. This work was begun in 1873, and was finished in 1881, at a cost of £14,000, the level, nearly 2000 yards long, unwatering the mine to a depth of 196 yards. A few weeks ago, Mr. Simmons, the captain of the mine, made the discovery of a seam of blende five feet wide, which increases in width the farther it is explored. Mr. Simmons regards the discovery as most wonderful and altogether unparalleled in England. He estimates that there are at least 50,000 tons of ore in the seam, worth £3 18s. 6d. per ton. The company is now making a road to its rich deposit, and laying down a four-foot track, on which the ore will be conveyed out of the workings. Twenty yards from this find of ore, the workmen came upon an immense natural cavern, twenty-two yards long, extending for twelve yards overhead and for an unknown depth below water. This cavern was sufficiently large to hold the whole of the *débris* excavated during six months, and was of great convenience to the company.

FURNACE, MILL, AND FACTORY.

The Steele Ore Company of Pottstown, Pa., which is composed of Messrs. Gabel, Jones & Gabel, has leased the furnace at Bechtelsville, Berks County, Pa., and changed its name to Norway Furnace. Mr. Griffith Jones, the superintendent, informs the editor of the *Bulletin* that the furnace was blown in on the 5th of January, and has been doing very well ever since.

The Morris County Machine and Iron Company, at Dover, N. J., is making several sizes of its new Bennett compressors, and proposes to make two sizes in duplex form. It has recently enlarged its works to meet the demand.

Messrs. R. D. Wood & Sons' foundry, at Millville, N. J., has resumed operations after a prolonged idleness.

The Edgemoor Iron Company, of Wilmington, Del., has completed its contract for furnishing material for the superstructure of the Brooklyn bridge, and has fully closed the transaction.

The Andrew Kloman Iron and Steel Company, at Pittsburg, is reported financially involved. The liabilities are said to be $65,000, of which $43,000 is secured.

The rolling-mill of the Reading Iron-Works, and Orr, Painter & Co.'s stove-works, at Reading, Pa., employing together nearly 600 hands, have resumed operations after six weeks' idleness.

The Bessemer Iron Company, of Avonia, capital $60,000, was incorporated at Albany on the 5th inst.

The second stack of the Dunbar Furnace Company has been blown out. The first one, now repairing, will blow in in two weeks. The company has notified its men that hereafter a certain percentage will be retained from their wages every month for three months, payments in full to be made every quarter. The company is carrying a heavy stock of pig.

Reis Brothers' sheet-mill, at New Castle, Ohio, which has been idle for some time, has started again.

At the new rolling-mill of James Ward & Co., at New Philadelphia, Ohio, it is expected that ten of the puddling-furnaces will be in operation by the middle of February, and the entire mill running by the 1st of March. The mill will furnish employment to 300 men.

New foundations are laying for the recently destroyed plant of the Chicago Smelting and Refining Company. The buildings will be 120×220, with blast-furnace building 60×60. Some new machinery will be added, and it is expected that the works will be ready to receive and refine base bullion by May 1st.

The work of rebuilding the nail mill of the Calumet Iron and Steel Company, which was burned recently, has been commenced and is pushed energetically. It is expected that the new mill will be in running order in about three months. It will cost $200,000, and will, it is asserted, be the largest and most complete nail mill in the country.

Gem Furnace, of the Shenandoah Iron, Lumber, Mining, and Manufacturing Company, at Milnes, Va., was blown in recently.

The Lucinda Furnace, at Norristown, Pa., has gone out of blast.

Copper smelting-works will very probably be erected in Harrisburg by W. H. Babbitt, of Boston. He has been engaged in locating sites, and it is said has fixed upon one as very likely to be selected—the building of the Lochiel Iron Company.

The forge department of the Belfont mill, Ironton, Ohio, has resumed work. The nail department is expected to go on Monday, the 12th inst.

The new 70-foot furnace of the Bethlehem Iron Company, at Bethlehem, Pa., has been blown in.

The Kansas Rolling-Mills, at Rosedale, Kansas, closely allied with the Union Iron and Steel Company, of Chicago, were closed on the 3d inst.

At a meeting of citizens of Coshocton, O., held to take action on rebuilding the steel-works recently destroyed by fire there, it was decided to vote a special tax of $50,000, of which sum $15,000 will be donated to the steel-works, and the remainder to other industries which may locate there.

The receivership of the Oxford Iron Company, Oxford, N. J., is ended, and the works are run by a new organization, the Oxford Iron and Nail Company, of which Mr. Theodore Sturges is president.

The work of re-lining one of the Henry Clay furnaces, of Eckert Brothers, Reading, has been completed, and the furnace will be put in operation as soon as possible. The stack has been raised from 45 to 57 feet. As soon as this stack is blown in, the other will be overhauled.

The following figures regarding a recent month's work at the rod-mill of the Cleveland Rolling-Mill Company are valuable and interesting: In 48 single turns of 9 hours each, 3,844,500 pounds, or 1716·8 gross tons, of rods were produced. The five largest amounts turned out in a single day were 100,015, 95,090, 94,200, 90,675, and 88,370 pounds. The smallest day's work was 66,750 pounds. The average was 80,093 pounds. The rods were No. 4, rolled directly in one heat from a four-inch square 100-pound bloom.

The Virginias reports that each of the sixteen furnaces in Southwest Virginia was in blast more or less during the year 1882, and that they made between 19,000 and 20,000 tons of charcoal pig (probably most of it car-wheel grade), and that about 7000 tons of this output was in hand at the close of the year. The average daily capacity of all these furnaces was about 100 tons. It seems that about half of them will be idle this year unless the price of iron improves.

The Curtis Regular Company, of Boston, reports doing a good business in steam traps and regulators, having recently supplied the Freeman Manufacturing Company and the Massachusetts Mills. They are sending large numbers to New York and Chicago.

The floods in Pennsylvania and Ohio have caused the temporary suspension of work in a number of mills, and by the interruption of railroad traffic will be hampered for some time to come. The direct damage, so far as now reported, is not very great.

The Western Nail Association met at Pittsburg on the 8th inst., and passed a resolution to the effect that, after the resumption on the 12th, the mills in the association will run three weeks only, and then shut down again for a fortnight. The thirty days' suspension expires on the 9th. Stocks are reported very light, and inquiries are multiplying as the building season approaches. No change was made in the existing card rates.

GENERAL MINING NEWS.

ARIZONA.

Dispatches from Lordsburg, New Mexico, indicate that there is trouble brewing with the Indians. Clifton appears to be threatened, and the whole Gila Valley is alarmed.

COCHISE COUNTY.

DREADNOUGHT.—This copper mine, adjoining the Peabody, has been sold to the owners of the Clifton mines for $10,000 cash.

TOMBSTONE DISTRICT.

GIRARD AND TRANQUILLITY.—Work will be resumed at these mines next week.

HEAD CENTER.—Work will be begun shortly. At the annual meeting, held in San Francisco recently, the following trustees were elected: F. A. Benjamin, A. W. Foster, P. N. Lilienthal, J. L. Moody, J. M. Gitchell, M. L. McDonald, and J. W. Pew. The officers will be elected soon. The action of the board of trustees in disposing of the property to a new corporation was ratified.

CALIFORNIA.

MILTON MINING AND WATER COMPANY.—The financial statement for the year 1882 shows the following:

Receipts.		
Gold bullion	$416,044.17	
Water sales	1,425.66	
Personalty reduced	11,759.05	
Total receipts		$429,228.88
Disbursements.		
Bonds redeemed (fifty)	50,000.00	
Interest on bonds	12,818.80	
Improvements on other property	12,908.07	
Expenses of mining	236,592.53	
Dividends	88,424.00	
Total disbursements		400,743
Increase in cash assets		$28

Showing net profit in working the Milton mines of $180,877.30.

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NORTH BLOOMFIELD MINING AND WATER COMPANY.—The financial statement for the year 1882 shows the following:

Receipts.		
Gold bullion	$386,146.23	
Water sales	2,899.12	
Dividends from branch companies	42,885.50	
Personalty reduced	4,069.80	
Total receipts		$436,000.65
Disbursements.		
Bonds redeemed, 106	106,000.00	
Interest on bonds	37,075.49	
Expenses of mining	153,714.03	
Dividends	135,000.00	
Total disbursements		431,789.52
Increase in cash assets		$4,211.13

Showing net profit in working the North Bloomfield mine proper of $285,331.32.

As these properties, says the San Francisco *Chronicle*, are among the leading hydraulic gravel mines in the State, the following tabular statement showing their operations for the past six years will be of interest:

	Bullion produced.	Water sales.	Net profits.	Dividends.
1877	$670,774	$6,754	$364,045	$45,000
1878	849,036	9,694	501,181	484,498
1879	794,518	9,091	462,321	422,640
1880	665,711	12,395	264,075	105,396
1881	637,682	24,233	325,227	...
1882	802,190	4,325	416,209	223,224
Totals	$4,419,911	$66,492	$2,333,558	$1,290,758

These mines were closed by injunctions for four months during the year 1881, which accounts for the small product of that year. At the beginning of 1877, the two companies were in debt over $1,000,000. Since then, this debt has been reduced to $344,000. These payments and interest on this indebtedness chiefly account for the above discrepancy between profits and dividends.

MONO COUNTY—BODIE DISTRICT.

NOONDAY, NORTH NOONDAY, AND RED CLOUD.—The statements of these companies, which recently filed petitions of insolvency, show that they have all been in a bad condition financially. The Noonday Mining Company's liabilities are placed at $204,209.44, $179,258.01 of which consists of a judgment lien from the Superior Court in favor of Henry Wadsworth. The remainder is due to laborers, railroad companies for transportation, etc. The assets are placed at $10,100, consisting of lands, leads, tools, milling property, etc., in Mono County. The North Noonday Mining Company's liabilities are placed at $238,989.93, including a judgment held by Henry Wadsworth for $214,985.85. The assets are stated to be $10,900, consisting of similar property to that held by the Noonday Mining Company. The liabilities of the Red Cloud Mining Company are set down at $168,157.10, including a judgment lien in favor of Henry Wadsworth for $133,786.88 and a claim of the Bodie & Benton Railroad and Commercial Company for $25,859.82, acknowledged to be for transportation of ores, etc. The assets are stated to be $115,854.12, consisting of tools, sluices, land, etc., to the value of $45,000; the Paris Mining Company's property, valued at $28,280.25; the property of the May Belle Consolidated Mining Company, valued at $29,824.29; the Concordia Mining Company's property, valued at $33,824.25; and the property of the Oro Mining Company, valued at $18,925.29.

PLUMAS COUNTY—GREENVILLE DISTRICT.

The Greenville-*Bulletin* gives the following:

GREEN MOUNTAIN.—The new air-compressor has been started up. The machine works perfectly in all its parts; the drills bore four feet per hour, though the ground is hard. During the past week or two, a very marked improvement is seen in the character of the rock, with a corresponding increase in the yield of bullion at the mills.

TAYLOR-PLUMAS.—The mill works smoothly, and the mine is daily improving.

CANADA.

PROVINCE OF MANITOBA.

GEORGE HEENAN.—This company was recently formed in Winnipeg. The *Free Press* says that the promoters have purchased the claim on the Lake of the Woods known as the Thompson lode, situated on Hay Island, about a mile from the Keewatin vein. Specimens of the quartz taken from the lead have assayed as high as a thousand dollars to the ton. The company will be organized under a special act of the Manitoba Legislature. The price paid for the claim is $150,000.

KEEWATIN.—Work is pushed with great vigor.

LAKE OF THE WOODS.—It is stated that this company has on its property one of the strongest fissure-veins on the lake, over eight feet in width, and rich in both gold and silver. It is not expected, however, that much more than desultory work will be done on this until spring, as the company wishes to make thorough and careful surface prospecting over the whole of its large property, before finally determining upon the location of the working-shafts.

WINNIPEG CONSOLIDATED.—The shaft has attained a depth of 55 feet.

COLORADO.

CLEAR CREEK COUNTY.

HARRIS & BONN.—This group of mines was recently sold to the Mint Mining Company. The property consists of six lodes and mill-sites, known as Mint, Mint Extension East, Mint Extension West, Tornado, Coachwhip, and Pocahontas lodes. The principal development has been on the Coachwhip and the Mint. The latter shows ore for 150 feet on surface, which mill-runs over 150 ounces silver per ton, with a pay-streak of from two inches to two feet in width. It has a shaft 100 feet deep, and an adit is running to cut this shaft seventy feet beneath the present workings. This work is done by contractors. A large force of men will be put on as soon as the weather permits. The capital stock of the company is $175,000, with 3500 shares at fifty dollars per share.

GILPIN COUNTY.

POLAR STAR.—This mine, situated on Negro Hill, has been sold to Eastern capitalists for the sum of $6000 cash. It is the intention of the purchasers to continue work on the mine and sink the working-shaft another lift of 100 feet, which will give it a depth of over 200 feet.

HINSDALE COUNTY.

EXCELSIOR.—The shaft is down on the vein about 68 feet. Sinking will be continued until 70 feet is gained, when drifting on the vein will be commenced. The mineral is gray copper and a small percentage of zinc, and is now and then interspersed with brittle silver.

MORNING STAR.—The character of the ore now exposed is a dark, sulphureted rock, and carries galena and gray and yellow copper.

LAKE COUNTY.

Late Leadville exchanges contain the following:

AMIE.—The lessees state that out of nine drifts in their workings, eight show ore, and that there is as much ore in sight as they can possibly extract within the next thirty days. The company receives, it is said, about thirty-three per cent. gross yield of the mine.

BIG PITTSBURG.—Mr. Frank Bulkley, late of the Morning and Evening Star mines, has been appointed manager of the Big Pittsburg consolidation.

HENRIETT.—Development-work is making rapid progress, and the resources of the mine and facilities for extracting the ore are increasing daily. The No. 3 or center shaft has formed a connection with the main incline from the Harker shaft. Recently a good hoisting plant was placed on this shaft. The incline is advancing on the ore-body in the Henriett at the rate of two feet a day, and is disclosing some very high-grade mineral. The shipments of the mine average forty tons a day.

LADY ALICE.—A twelve-inch streak of ore, assaying from six to seventeen ounces of gold to the ton, has been struck. Two hundred sacks of ore are at the mine awaiting shipment.

LEADVILLE CONSOLIDATED.—This property is maintaining its output of twelve tons a day. During the past few weeks, cross-cuts and leads have been extended, until now connections exist between all three of the inclines on the mines. Extensive ore-bodies have been opened in the third level north, and also in a large piece of ground between the tenth and eleventh levels south.

PLATTSBURG-JUNIOR.—During the past winter, considerable work was done on both the Plattsburg and Junior veins. Two shifts of miners are now engaged in sinking a shaft on the Junior vein, beginning on the floor of the Junior tunnel, about one hundred feet from the entrance. The shaft has attained a depth of about twenty feet, following the hanging-wall. The vein at this point has a width of about fifteen feet of solid quartz, carrying free gold, plainly visible to the naked eye. About two feet of this quartz has been shown by assays to run unusually well in gold, returning far above the average of Lake County gold veins. Arrangements are to be made for the erection of a twenty-stamp mill.

ROBERT E. LEE.—There is enough third-class ore stacked up on the dumps to warrant the building of a stamp-mill for its treatment. On the basis of prices charged for milling this class of ore, the eight thousand tons now on the dump, together with what will be taken out in the next few months, would yield a profit that would repay the original cost of a fifteen or twenty-stamp mill, complete with pans, etc.

ROSEVILLE-ALTA.—Owing to the great flow of water in the Roseville shaft on Prospect Mountain, the company has been at a stand-still for some weeks past. It has not yet been decided whether increased pumping machinery will be provided, or a tunnel driven in from the foot of the mountain, about one thousand feet distant from the shaft.

LA PLATA COUNTY.

PUZZLE.—It is reported that this company intends to erect extensive machinery with which to operate the mine next season. So far, the returns from the workings have been very satisfactory.

SAN JUAN COUNTY.

During January, there were shipped from Silverton over the Denver & Rio Grande Railroad 76 cars of silver ore and 19 cars iron ore.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—The Leadville *Herald* of February 2d says: On Thursday evening, Judge Goddard, in the suit of William R. Hall, J. B. Stevens, and L. B. Parker *vs.* the Robinson Consolidated Mining Company, granted the application for a receiver on the part of the plaintiffs, and appointed Mr. J. W. Wallace receiver of the property. The complaint on which the application was granted alleges, on the affidavit of L. B. Parker, late manager of the mine, that Hall is the owner of 200 shares of the stock, Stevens of 1000 shares, and Parker of 500; that the mine could be made to pay $15,000 per month above all expenses; but that during Parker's management he had not been allowed to work it either extensively or advantageously, and, notwithstanding such restraint, there were $43,000 in bank to the credit of the mine on June 1st, 1882, and $20,000 had been added since, besides the payment of $5000 of previously accumulated debt; that on the first of January, 1883, there were but $33,000 in the company's treasury, leaving $30,000 to be accounted for by the New York offices; that the workings of the mine, which are fully described, are very extensive and have cost the company about $750,000; that they were left in fine order by Parker, but that his successor, J. W. Davis, is allowing them to be flooded and damaged by water, and threatens to abandon them; that unless the pumps are kept working, all the drifts below the fifth or tunnel level will fill with water and cause irreparable damage; that a dividend was declared, to be paid on November 1st, 1882, and the amount of money required was forwarded by Parker for that purpose, but was fraudulently and wrongfully withheld by the president and directors, and squandered by them; that on April 1st, 1882, the President, Hiram A. Johnson, of New York, drew from the First National Bank of Denver $35,000 of the funds of the company, and placed it in the hands of Wilson Waddingham, a broker of New York, for the purpose of speculation, and that said funds were either lost or misappropriated; that all of said acts, together with the reports lately circulated in various newspapers as to Parker's having abstracted $200,000 worth of ore through the Wheel of Fortune, and other false statements, are a part of a conspiracy between Johnson, the directors, Waddingham, and other speculators to bear the stock of the mine and buy it in at a nominal sum; that such procedure is detrimental to the stockholders; and none of the said officers or directors is financially responsible; for all of which a receiver was asked.

DAKOTA.

ESMERALDA.—A dispatch from Deadwood says that a cave in the main workings of this mine almost instantly killed three miners, who, while returning from the scene of danger, were hurled through the tunnel by the air compressed by the cave-in, and thrown with deadly force upon the rock. Work in the mine and mill was not interfered with.

FATHER DE SMET.—The superintendent writes, under date of January 17th, as follows: Herewith express company's receipt for bar No. 151, for 1329·70 ounces gold, the result of a run of mill for first half of January. We have made a good start for this year, and intend to keep it up for a time at least. On the 15th inst., I drew for $19,000, which amount covers all expenses incurred for December. The mill is doing excellent work, stopping only to clean up. The body of ore spoken of last summer, as being in Golden Gate cross-cut 2d level, is proving very extensive, as we have excavated a chamber 40 feet wide by 70 feet long, with ore at both ends of chamber. From this chamber, I am sinking a winze to the 3d level, while the 3d level header has to be advanced 75 feet, to intercept the bottom of the winze. From appearances in this header, we are very likely to strike a good body of ore. The 3d level is the lowest point in the mine from which ore has been extracted, and is the level from which we load the cars that run to mill.

GOLDEN SUMMIT.—The mill is about ready to start. The quantity of water that is now conducted from the springs a couple of thousand feet distant is much greater than the company hoped to receive. It is sufficient to supply from sixty to eighty stamps at the present dry season of the year. A large quantity of ore is already on the dump.

GUSTIN BELT.—Negotiations are pending for the sale of the Minerva mine to this company. The sum that has been agreed upon is $40,000. Of this amount, $5000 have already been paid. The remaining $35,000 are to be put up within thirty days, when the Minerva property will pass into the possession of the Gustin Belt Company.

HOMESTAKE.—The last bullion shipment, including the semi-monthly clean-up, has been snowed in at Pierre, with no prospect of getting through for several days. About $200,000 exchange was also caught in the blockade. The only route now open to the hills, or likely to be for some time, is via Sidney, Neb. All the mails, express matter, and passengers are now forwarded by that route.

GEORGIA.

The Dahlonega *Signal* has the following:

BARLOW.—The formation of this mine, where the giants are now at work, is softer if possible than any of the ground that has yet been mined. The slate

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melts before the water like ashes, leaving the quartz clean, and before reaching the mill it is worn as smooth as river pebbles by the water as it rushes through three quarters of a mile of flume-line. All the stamps are running.

CONSOLIDATED GOLD MINING COMPANY.—The mills are under headway and the cuts show large amounts of pay-ore. The ditch to convey water to the Ivey is about finished, the water being in and making its way toward the mine.

PIGEON ROOST.—The recent valuable veins discovered are not yet mined, as it is first necessary to remove a considerable amount of rubbish and low-grade ores.

IDAHO.

EAST FORK MINES.—Advices from the East Fork of the Salmon River report another important strike in that section. The miners running the main working tunnel to cut the Chloride vein, cut into a blind ledge carrying carbonate and galena ores, and samples of the ore sent here for assay run up into the hundreds. The Chloride tunnel is now in 110 feet, and is expected to cut the vein by February 15th. The result is anxiously awaited by owners of adjacent locations.

PENOBSCOT.—The main lower tunnel on this mine, running to cut the vein, is now into the hill a distance of 200 feet. After reaching a distance of 80 feet, the ledge was cut into, and to the present time the tunnel has been crossing vein-matter, and has not yet reached the hanging-wall. This 120 feet of vein-matter which has been passed through so far is mixed with gangue, spar, iron, carbonate, and galena. The ledge is apparently solid on the hanging-wall, and work will be pushed with all dispatch until the other wall is reached.

MAINE.

DOUGLASS.—Operations at the mine continue in a satisfactory manner.

PORTLAND SMELTING-WORKS.—From a letter written to the Maine *Mining Journal*, we learn that these works are to be started again under lease to Messrs. Jones & Davis, who recently built experimental works at Deer Isle, to work the vapor fuel process. They are said to have also secured the Fisher process of working refractory sulphuret ores, which, it is asserted, far outstrips the celebrated Swansea process.

STEWART.—The machinery is nearly all completed, and underground work will be begun shortly.

SULLIVAN.—The Waukeag shaft is sinking as rapidly as possible. It is expected that considerable work of a more comprehensive character will be done at this mine in the spring.

MICHIGAN.

Mr. Collyer, of the firm of Wilson & Collyer, of Chicago, which is a creditor to the amount of $30,000 of the Union Iron and Steel Company, was at Ford River, Mich., when he heard of the failure. He immediately went to Marquette, procured a writ, and chartering a special train, proceeded to Crystal Falls, where he attached the mine and other property of the company, thus getting ahead of the other creditors.

MONTANA.

LEXINGTON.—At the meeting of the company, held in Paris, France, on the 5th of January, it was shown that during the first four months of the working of the mill, it treated 11,800 tons of ore at a gross profit of 647,000 francs, or 56 francs per ton.

NEVADA.

ELKO COUNTY—TUSCARORA DISTRICT.

NAVAJO.—The superintendent reports, for the week ended January 22d, that work on the 450 level was discontinued, to admit of the necessary work being done at the station before sinking could be resumed. Good progress has been made in cutting out for the water-tank, and all other work is pushed ahead rapidly. Winze No. 2 was sunk seven feet, showing an unusual width of very rich ore. Stopes on the different levels are without material change. South drift, east lateral vein, 350 level, advanced fourteen feet. No material change to note. As we shall have to close down the mill for a few days this week, to make some repairs and clean out the boiler, our bullion shipment will not be so large next week. The run has extended over fifty days without stopping.

EUREKA COUNTY.

HAMBURG.—The Eureka *Sentinel* says that a new strike has been made. The strike is in a shaft down 175 feet from the surface, situated about 75 or 100 feet west of the cañon. The mine was worked successfully for a long time by prospectors who took out ore from near the surface, realizing large amounts of money. Since it has been in the hands of the present company, the ore extracted has yielded about $370,000. There is a good plant of machinery on the main shaft of the mine, and every convenience at hand for the economical working of it. The main shaft is down 860 feet, and several drifts have been run from it through the limestone, with ore in places and good indications to follow.

NYE COUNTY.

TYBO CONSOLIDATED.—Mr. N. S. Trowbridge, the manager of this property, has furnished the Salt Lake *Tribune* with the following information: The ores of this company's mine are base, containing gold, silver, and lead, and in the process of reduction require roasting. The property is located in an expensive place to operate, because all supplies have to be hauled long distances at a cost for some articles of six cents per pound freight. Salt used in chlorinization is about the cheapest article of supplies, and costs delivered at the mill $60 per ton. The mine is a large one, and could not be operated at a profit if the manager had not secured remarkably good results and low cost of reduction for the locality. The lead is not saved, and its presence in the ore to a large percentage makes the cost of reduction larger than it would otherwise be. The mill has twenty stamps, and is similar to other silver and gold mills. The following is a *résumé* of the work done during the past season:

Total running time by mill	137 days.
Total amount of ore worked	3776·2 tons.
Deduct loss of dust, etc., 2 per cent	75·2 tons.
Actual number of tons worked	3701
Average tons worked per day	27·57
Average value per ton in silver	23 ounces.
Average value per ton in gold	$4
Average amalgamation, silver	89·5 per cent.
Average amalgamation, gold	$2.50 per ton.
Average cost of mining and chloridizing	8.75 "
Average cost of milling	16.65 "
Net proceeds per ton	24.36 "
Net profits per ton	4.96 "

Many good prospects lie idle because of the excessive cost required to operate mines in that locality.

WHITE PINE COUNTY—CHERRY CREEK MINING DISTRICT.

A correspondent of the Salt Lake *Tribune*, in speaking of the mines, says: Enough work has been done in this district to confirm the opinions formed by the pioneers, many of whom remain with it, with the full assurance that sooner or later their fondest anticipations will be realized. Among the most prominent mines is Exchequer or Exchange, now the property of a Boston company. Large bodies of ore are now developing above water-level by Cornish tributers. This mine is without a doubt good property, but it should have a proper expenditure of capital to erect machinery properly to develop it.

The Star mine is by far the best developed in the camp. A twenty-stamp mill has been constantly at work, though at a small loss. This mine has only attained the depth of a little over 600 feet; yet in spite of insufficient machinery, a twenty-stamp mill has run constantly over five years, and now has very many thousand tons of low-grade ore on the dumps, which the company will utilize by the aid of concentrators recently erected, and the prospects in the mine are now better than they have been; but in order to be worked at a profit, it needs more powerful machinery.

The Gray Eagle is situated immediately adjoining the Star on the west, and the developments made in the levels of the latter demonstrate the continuity of the ore-bodies to the former, having worked to the Gray Eagle boundary in three or four levels.

NEW MEXICO.

Contracts are making for the survey and construction of the road from El Paso to White Oaks.

The United States & Mexico Syndicate has purchased and is opening several mines on the lead of the Little Buck and Merrimack, in the Organs, and is reported to be arranging for putting up a smelter and other machinery.

UTAH.

A correspondent of the Salt Lake *Tribune*, in speaking of the Carbonate Mining District, says:

The most prominent of the mines here now, and around which there is much interest, is the Copper King, which is a large mine, bearing copper ore of unusual richness and fineness. The lead proper just unearthed shows now about four feet of the richest kind of ore; how much wider, is not yet known, but at present only one wall has been found. The lead works easily, the copper ore coming out in big chunks, which is intermixed with beautiful yellow sand carbonates. The mine is situated near the top of one of the high mountains, and is between a contact of beautiful white quartzite and blue lime. A short distance below is a fine layer of hematite of iron, and still lower in the contact of the old red sandstone, showing very clearly that this bed at least lies near the bottom of this gigantic formation of lime. Immediately above the mine, towers a high cliff of limestone, quartzite, flints, and various other strata incidental to this per There is now about a car-load of rich ore on the dump awaiting spring for s nment. Besides the copper, the ore runs about twenty ounces silver, and a t of gold, with a strong marked improvement in the silver assays as dept attained.

The Amazon exhibits some strong croppings of copper and galena ores, and is down about eighteen feet.

Most of the claims taken up here some three years ago, during an influx of Colorado prospectors, are now open to relocation.

The Union Consolidated Mining Company is interested in some claims.

MINGO.—According to the Salt Lake *Tribune*, the smelter began operations January 1st, 1877, since which it has run most of the time, and yet at one time it lay idle for four months. Its product of lead bullion has been steady, and has reached an enormous aggregate. Recently it completed its shipment of 2000 cars, which were sent East. The average was a little over thirteen tons to the car, making an aggregate of over 26,000 tons. Most of the ore is brought to the smelter by rail, and all the fuel and fluxes are delivered to the works by the car-load, and it is estimated that it required nearly 10,000 car-loads of ore, iron, limestone, charcoal, coke, coal, etc., to produce this vast pile of bullion.

WYOMING.

Late reports from Cummins City are of a very encouraging nature. The new stamp-mill, formerly at the Florence mine, Douglas Creek District, is in full blast on Union Mining Company ore—mostly from the Gold Hill. Some trouble was experienced at first, owing to the cold weather; but steam-pipes have been put in, and it is evident that the first clean-up will be a good one. This mill runs ten stamps.

Messrs. Burnham & Hudson's mill is also making full time. These gentlemen say they are getting $40 per ton from their ore, but that Denver mill-runs give them $100. They are making arrangements for putting in fifteen more stamps. They are running ore from the Gold Blossom. These gentlemen will also put in a smaller smelter at an early day, to reduce the product of the Silver Mountain, a very promising mine with a six-foot vein, carrying gray copper and copper glance.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents have been issued from the General Land-Office, under date of January 15th, 1888:

ARIZONA.

PRESCOTT DISTRICT.

Noah C. Shekels, Ophir lode.

TUCSON DISTRICT.

Sunset Silver Mining Company, Sunset lode.

CALIFORNIA.

LOS ANGELES DISTRICT.

Robert Gardner, Gardner lode.

MARYSVILLE DISTRICT.

William Hooper, placer.

SACRAMENTO DISTRICT.

J. L. Lewison, U. S. Grant mine No. 1. J. M. Green, Currie quartz mine. Michael Soap, placer.

STOCKTON DISTRICT.

A. B. Preston *et al.*, placer.

COLORADO.

CENTRAL CITY DISTRICT.

Robert O. Old, Linn lode and mill-site. Russell J. Collins *et al.*, Meridian lode. Defiance Gold and Silver Mining Company, Defiance lode. Silver King Mining and Milling Company, Andy lode. Thomas de Coan, Delight lode. Samuel Y. Smith, trustee, Starling lode. Ezra T. Carr *et al.*, Phillips lode. William Luther, Brunswick lode. Mary V. Forbes *et al.*, Erickson lode. Miners' Smelting and Reduction Company, Sunny Side lode. Peter Theobold, P. T. lode. Thomas S. Old, Full Moon lode and mill-site. Albert H. Day *et al.*, Little Harvey lode. Duncan Drumanend, Drummond lode.

DEL NORTE DISTRICT.

Iowa & Colorado Consolidated Mining Company, Eureka, Columbia, Jubilee, Sheridan, Bayard, Iowa, Bay State, Logan, Homestake, and Little Hattie lodes, and a placer.

LAKE CITY DISTRICT.

John Pearson, Silver Lion lode. North Star Mining and Smelting Company, Royal Tiger No. 1 lode. H. A. Wood *et al.*, John J. Crooke lode.

LEADVILLE DISTRICT.

Alleghany Consolidated Mining Company, Right Angle lode. Frank De Mainville *et al.*, Saranac lode. O. H. Harker *et al.*, Kingfisher lode. Archie C. Fisk, Mandy lode. F. Shodl *et al.*, Flora Belle lode. Jacob Marquart *et al.*, Denver City lode. Charles F. Cuno *et al.*, Oriole lode. Hiram Johnson *et al.*, Iron Mask lode. George W. Hunter *et al.*, Emily lode. A. Mayfield *et al.*, Golden Cord and Homestake lodes. M. E. Smith, P. F. and M. E. S. lodes. David C. Martin, Emma lode. George W. Trimble *et al.*, Star of the West lode. Daniel B. Web-

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ster *et al.*, Tompkins and Columbus lodes. Linn K. Thatcher *et al.*, Warsaw lode. William Arnett *et al.*, placer. A. P. Clark, placer. Napoleon J. Bond, Phillips lode and mill-site, and Rock Island lode.

PUEBLO DISTRICT.

J. A. Melvin *et al.*, Victor lode.

DAKOTA.

DEADWOOD DISTRICT.

Frank Vanocker *et al.*, placer.

MONTANA.

HELENA DISTRICT

John A. Leggat, Humboldt lode. Joseph R. Walker, Walkerville lode. Edward B. Coverly *et al.*, Keystone lode No. 2.

NEVADA.

EUREKA DISTRICT.

Lawrence Hartnett *et al.*, Nil Desperandum lode. James H. Rockwell *et al.*, Dog Star lode. Matilda Wittenberg *et al.*, Frederika lode. John C. Lynch, Cotton Tail lode. Henry K. Lyons *et al.*, Eastern Extension Star, Vulcan, and Copperhead lodes.

CARSON CITY DISTRICT.

David H. Jackson, Blue Star lode No. 1.

UTAH.

SALT LAKE CITY DISTRICT.

Joseph R. Walker *et al.*, Nellie lode. James Robbins, Sr., Nemo lode. J. B. Haggin, Henrietta lode.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED JANUARY 2D, 1883.

269,848. Ore-Separator. Alvan P. Granger, Denver, Colo.
269,952. Hand Rock-Drill. Eugene Moreau, San Francisco, Cal., Assignor to Theodore W. Sterling, same place.
270,004. Process of Depositing Metals upon the Surfaces of Iron and Steel Coated with Magnetic Oxide. George Bower, St. Neots, County of Huntingdon, England.
270,005. Furnace for Effecting the Protection of Iron and Steel Surfaces. George Bower and Anthony S. Bower, St. Neots, County of Huntingdon, England.
270,007. Equalizing Apparatus for Pumping and Other Machinery. Charles Bridges, San Fernando, Cal.
270,149. Coal-Hopper. William Swindell, Alleghany City, Pa.
270,156. Amalgamator and Concentrator. Bryan Tyson, Washington, D. C.
270,157. Boiler-Furnace. Ezra W. Van Duzen, Newport, Ky.
270,175. Fire-Brick. William Batty, Philadelphia, Pa., Assignor of one half to George H. Perkins, same place.
270,182. Ventilator for Blast-Pipes. James Devine, St. Louis, Mo., Assignor of one half to Franz Krein, same place.
270,184. Puddling-Furnace. John Evans, Etna, Assignor of one half to Sprang, Chalfant & Co., Alleghany City, Pa.

GRANTED JANUARY 9TH.

270,217. Pulverizing Machine. Ryerson D. Gates, Chicago, Ill.
270,259. Ore-Separator. Charles W. Stickney, Washington, D. C.
270,274. Brick. William Q. Adams, Portsmouth, O.
270,281. Apparatus for Superheating Steam and Heating Air. Solomon N. Carvalho, New York City.
270,315. Miner's Combination Tool. John Jones, Oregon City, Oregon.
270,316. Miner's Candlestick. John Jones, Oregon City, Oregon
270,359. Drying-House or Kiln. William A. Allen, Jersey City, N. J.
270,365. Machine for Sharpening Drills. J. Sellers Bancroft and William H. Thorne, Philadelphia, Pa., Assignors to William Sellers, same place.
270,366. Drill. J. Sellers Bancroft and William H. Thorne, Philadelphia, Pa., Assignors to William Sellers, same place.
270,391. Dumping-Wagon. John G. Coburn, South Carthage, Assignor to himself and George B. Staples, Carthage, Me.
270,488. Drilling Apparatus. William L. Saunders, Jersey City, N. J.
270,489. Process of Testing Oils. Julius Otto Schubert, Parkersburg, West Va.
270,490. Combustion-Chamber for Steam-Boilers. James Scott, Pittsburg, Pa.
270,492. Gold-Separator. Nelson Seymour, Erie, Pa.
270,515. Steam-Pump. George B. N. Tower, New York City, Assignor of one half to Edward L. Lambie, Washington, D. C.
270,516. Ratchet-Drill. William M. Turner, Pensacola, Fla.

REISSUE JANUARY 9TH.

10,267. Explosive Compound. The Giant Powder Company, San Francisco, Cal., Assignee, by mesne assignments, of Alfred Nobel.

GRANTED JANUARY 16TH.

270,574. Steam Pumping-Engine. George F. Blake, Belmont, Mass.
270,582. Furnace Fire-Bars. James G. Galley, Forest Gate, County of Essex, England.
270,613. Rock-Drill. Charles W. Stickney, Washington, D. C.
270,653. Feeding Air to Furnaces. Thomas Mara Fell, Brooklyn, N. Y.
270,671. Means for Operating Pumps in Deep Wells and Mines. John M. Huffer, Jacksonville, Oregon, Assignor of one fourth to C. C. Beekman, same place.
270,689. Mining-Car. Gustav Olsen, San Francisco, Cal., Assignor of one half to Edward A. Rix, same place.
270,736. Coal-Chute. Isaac Burnett and Joseph E. Clifton, Geneseo, Ill.
270,756. Bucket for Conveying Ensilage, Coal, Plaster, etc. Jerome A. Cross, Fultonville, N. Y.
270,762. Lubricator. Levi P. Dollison, Wabash, Ind.
270,763. Manufacture of Sulphuric Acid. Thomas D. Dotterer, Charleston, S. C.
270,823. Gold Washer and Amalgamator. George W. Kirk, Washington, D. C.
270,825. Ore-Sizing Apparatus. Ira F. Monell, Crisman, Colo.

GRANTED JANUARY 23D.

270,892. Coal-Oil Stove. Howard Daisley, Brooklyn, N. Y., Assignor to Ray, Daisley & Co., same place.
270,900. Pump. Surn Jackson, Stockton, Cal.
270,901. Wrought-Iron. William F. Jordan, Brooklyn, N. Y.
270,905. Dumping-Cart. William Loughridge, Baltimore, Md.
270,906. Method of Milling and Apparatus used therein. Abel Mariotte, Véreux, France.
270,919. Coal-Chute. John Vinson, Knoxville, Tenn.
270,956. Ore-Concentrator. Charles Kleinschmidt, Breckenridge, Colo., Assignor to Emilie Kleinschmidt and Caroline Ambrasius, both of Cleveland, O.
270,989. Furnace. George R. Scates, Knoxville, Tenn.
271,090. Manufacture of Anhydrous Sulphide of Zinc. Thomas MacFarlane, Actonvale Quebec, Assignor of one half to Alexander Ramsay, Montreal, Can.
271,115. Portable Hoisting-Machine. Louis T. Pyott, Philadelphia, Pa.
271,138. Rock-Breaker. William S. Sharpneck, Blair, Nebraska, Assignor of one half to Green Majors, same place.
271,144. Drying-Kiln. Garrett F. Speer, Philadelphia, Pa.
271,162. Apparatus for Amalgamating and Separating Gold, etc., from their Ores. Sylvanus L. Trippe, Chicago, Ill., Assignor of one half to Abel H. Bliss, same place.
271,168. Power Rock-Drill. John B. Waring, New York City, Assignor to the American Diamond Rock-Boring Company, same place.

GRANTED JANUARY 30TH.

271,211. Automatic Fan. Charles H. Blanchard, Batavia, O.
271,285. Ore-Pulverizer. Jerome B. Sweetland, Pontiac, Mich.
271,305. Amalgamator. Augustus C. Bowen, Michigan Bluff, Cal.
271,386. Coal and Ore-Chute. George H. White, Escanaba, Mich.
271,393. Furnace. Jacob Altmeyer, Benwood, West Va.
271,418. Furnace. John Carson, Cleveland, O.
271,437. Brick and Fire-Proof Lining for Furnaces. George Duryee, New York City.
271,442. Reverberatory Furnace. George Fenwick, Gateshead, County of Durham, and Brodie Cochrane, Durham, County of Durham, England.
271,450. Pneumatic Apparatus for the Separation of Minerals, etc. Benjamin W. Hart, London, England.
271,508. Grate-Bar for Furnaces, etc. John F. Newton, Jr., Boston, Mass., Assignor to Edward Bertram Newton, same place.
271,523. Steam-Boiler or Generator. Claus Russmann, Hamburg, Germany.
271,537. Heating Apparatus. Roy Stone, New York City.
271,541. Steam-Boiler. Henry H. Suplee, Philadelphia, Pa.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb.

The aggregate number of shares dealt in at the Mining Exchanges this week exceeds that of last, but there is no marked change, either in prices or in dealings, to report. Sonora Consolidated has occupied most of the attention at the New York Board, and the transactions have exceeded that of any other two stocks dealt in.

The Comstocks show a little improvement in price, but have had a moderate business. The Leadville stocks have been quiet and steady. The Tuscarora stocks show a marked decline in the whole list, due mainly to bad reports circulated about the Navajo mine. Sierra Grande and Robinson have both been dealt in largely, but show no change in price. A summary of the market will be found below. The total number of mining shares sold at all the Exchanges aggregates 591,075, as against 449,560 last week.

The Comstock shares had a fair business at steady prices. California was strong, with a moderate business, selling from 18@25@24c. Consolidated Virginia has been quite active at steady prices; it sold from 49@58c. Sierra Nevada sold from $2.75@$3.50, with transactions of 1085 shares. Union Consolidated has been quiet at very irregular prices, selling from $3¼@$2⅛. Mexican, under a small business, has shown some strength, selling from $2⅛@$2⅞. Ophir was quiet and strong, selling from $2⅝@$3⅛. Consolidated Imperial had a small business at steady prices, selling from 11@10c. Best & Belcher was very quiet at $3.70@$3.90. Sutro Tunnel has had a fair business at steady prices; it sold from 21@25@21c.

The Leadville stocks were quiet and steady. Amie records a large business and was steady; it sold at 22@20@21c. Chrysolite was quiet and steady, selling from $1.40@$1.50@$1.45. Dunkin, with a small business, was steady at 33@30c. Hibernia sold at 4@3c. with transactions of 2000 shares. Iron Silver records a small business at strong prices; it sold from $2.75@$2.80. Leadville was quiet and steady, selling at 63@67c. Little Chief had a small business at steady prices, selling from 43@40c. Big Pittsburg, under small transactions, was strong; it sold from 16@23@22c. Climax was quiet and about steady at 10@8c.

The Bodie stocks were very quiet at irregular prices. Bodie was quiet and very irregular, selling from $1.75@$1.25@$1.60. Standard was also very irregular, with a fair business; it sold from $5¼@$5¼@$5⅛. Bulwer records a small business at steady prices, selling from 89@95c. Goodshaw sold at 7c.

The Tuscarora stocks have experienced a sharp decline under a small business. Grand Prize was quiet and weak at 90@75c. Tuscarora sold at 10c., with one transaction. Belle Isle records a very small business and was weak, selling at 95@70c. Navajo was the weakest of the list of these stocks, falling from $6⅛@$5⅛, closing at the latter figure; the sales amounted to 8100 shares. North Belle Isle was quiet and irregular, selling at 60@63@52c. Independence was quiet and steady at 75c. Elko Consolidated was very active at very irregular prices; it sold from 8@15@14c.

In the miscellanous list, Alice continues strong, and had a fair business, and sold from $2.45@$2.75. Eureka Consolidated was quite weak to-day, selling as low as $8.50; it sold all the week at $10. The Green Mountain stocks show some improvement, under a small business. Gold Stripe sold from 5 @c. Green Mountain was strong at 60@70c. Rising Sun sold from 4@5c., and Cherokee sold at 5@6c. Hall-Anderson records a very large business, and has been quite weak; it sold from $1.75@$1.35@$1.45. Homestake has had a fair business at irregular prices, selling from $17⅛@$18@$17⅛. Horn-Silver, under a moderate business, has been weak; it sold from $7@$5. Hukill has been a little weak, selling from 22@17c. Ontario records a small business, and has grown quite weak; it sold from $34@$28@$28¼. Prussian was quiet and strong, selling at $4.65@$4.75. Robinson Consolidated has been quite active at steady prices, selling from $1.15@$1.05. Sierra Grande records an active business at irregular prices; it sold from $2.65@$2.45@$2.60.

Albion has been quiet and strong at $1.35@$1.50. Bradshaw has had a fair business at irregular prices, selling from 31@35@33c. Central Arizona sold from 41@37c. under a small business. Decatur has been quite active at steady prices, selling from 9@10c. Enterprise records an active business on the American Board at weak prices; it sold from 61@47@49c. Harlem M. & M. Co. has been quiet and steady at $1.05@$1.10. Oriental & Miller records an active business at prices a little weak, selling from 16@14. Sonora Consolidated has been the most active stock in the market. It has been quite strong, selling from 15@25@23c., closing at 22c. The sales aggregate 128,100 shares. South Pacific has been active and steady at 8@9c. The State Line stocks record a moderate business at weak prices; Nos. 1 and 4 sold from 4@3c., and Nos. 2 and 3 from 7@8c. Taylor-Plumas has been very active at irregular prices; it sold from 19@20@18@19c.

MEETINGS.

Quicksilver Mining Company, 19 Nassau street, New York. Annual meeting of stockholders and election of trustees, February 25th, between two and three P.M.

DIVIDENDS.

The Holyoke Mining Company, of Idaho, has declared its fifth dividend of two per cent on its capital stock, payable February 12th. Transfer-books closed February 6th, and reopen February 13th.

The Kentuck Mining Company, of Nevada, has declared a dividend of ten cents per share.

The Navajo Mining Company, of Nevada, has declared a dividend of twenty-five cents per share.

The Shoshone Mining Company, of Idaho, has declared its regular monthly dividend of one per cent, payable on the 16th inst.

The Standard Consolidated Mining Company, of California, has declared a dividend of twenty-five cents per share, payable February 12th, at the Farmer's Loan and Trust Company.

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UNLISTED QUOTATIONS.

Mr. Alexander C. Lassen, 61 Broadway, under date of February 9th, three P.M., reports the current quotations of unlisted stocks as follows:

	Bid.	Asked.		Bid.	Asked.
Bodie Tunnel..	$0.25	$0.75	Lewiston Hydr.	$0.05	$0.20
Breece.....	.15	.16	London Cons...	.90	1.35
Buckeye Water.	.50	....	Mack Morris...	....	.75
Bunker Hill....	.99	1.00	Madre.....	.50	2.00
Borva Copper..	....	2.00	Moulton.....	....	4.00
Batopilas Pref..	9.00	24.00	Native Silver...	....	.30
Berkshire.....	....	.35	Pelic'n & Dives	....	.50
Calif'rnia Wat'r	.25	....	Plata Verde....	....	.25
Centennial.....	....	.20	Rico.....	....	.55
Contention.....	3.00	8.00	Hond. Rosario.	....	7.00
Dahlgren.....	.40	.80	Santa Maria....	.25	1.10
Denver City....	.18	.20	Silver State ...	....	1.10
Empire Gold...	3.00	....	Stormont (New)	.20	.30
Eureka Tunnel.	.45	.90	Sampson.....	.35	....
Evening Star...	2.00	....	Silver Cord.....	1.25	1.35
Grand Central..	1.50	....	Satemo.....	.40	.50
Highland Chief.	.20	....	Sierra Apache..	.35	.39
Hibernia Silver, (New).....	....	.20	Sierra Bella. ...	.70	.75
Jocuistita.....	5.00	7.00	Terrible.....	1.75	2.25

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, Petroleum and Mining Brokers, 55 Broadway, report the following for the week ended February 8th, 1883:

Total sales for the week in the three New York City Exchanges 9,865,000 barrels. The highest price within that time, $1.05¼, the lowest $1.00½. The trade has in fact been relatively very dull during the past week, Tuesday having been the most active day at advancing figures, owing to the report that morning that the McKinney and the Book & Grace wells both came in dry. During the past three weeks, there has been a succession of adverse and discouraging reports from the oil-fields, new wells coming in dry and the Forest County wells rapidly declining. This failure to obtain new producing wells and decline in production, although not resulting in much discrepancy between production and consumption, has given an impetus to bull speculation. The bulls also point to the fact that exploration is not more than one third as great as at this time last year, the number of wells now drilling being 255 against 850. But one year ago oil was selling for 85 cents per barrel. The daily production then was about 76,000 barrels, against 60,000 now. Another bull argument is the enlarged constituency of those who are trading in oil, and as the public are nearly always bullish, this naturally helps to absorb the certificates. Money too, can be obtained more freely and on better terms on Pipe Line certificates than heretofore, which encourages bull speculation. On the other hand, the bears point to the fact that money at six per cent interest, and storage charges added, make a tax of about 2 cents per barrel per month. Add to this the commissions, and it is at once seen that a dull stationary market is fatal to bull profits, and that a sharp advance is necessary to make a profit on the long side. The bear saves the expenses of carrying oil, though oil may be well worth $1.05 per barrel. It is to the interest of a great consumer of crude oil like the Standard Oil Company, in converting it into refined, to occasionally depress the speculative market far below intrinsic value, in order to lay in its supplies. The tremendous fluctuations in oil each year in the past can not be explained on any other hypothesis than "a one-man power." The present stock of oil in the custody of the Pipe Line Company is nine millions in excess of the stock in sight one year ago, and the visible supply of refined oil in nine European ports on January 31st, 1883, was 876,000 barrels in excess of January 31st, 1882. This is more significant when it is remembered that the oil exports of 1882 were less than in 1881, which would indicate a diminished consumption in Europe. Brokers and customers are almost all bullish, and consequently long. As a great deal of oil is carried on light margins, a serious break is always possible. Notwithstanding intrinsic value for oil, as in other speculation, every one except bears is reluctant to buy on a falling market, and the short interest in oil is too small to afford any support to the market in the event of a decline.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 3.....	102⅛	102⅛	101	101¼	259,200
Feb. 5.....	101	102¼	101	101⅛	294,000
Feb. 6.....	101¼	105	101¼	104½	660,000
Feb. 7.....	104⅞	105	103½	103¾	336,000
Feb. 8.....	103⅝	103¾	103⅛	103½	221,000
Feb. 9.....	103⅜	104¼	103⅜	104⅛-¼	293,000
Total sales.....					2,063,200

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Feb. 8.

There has been but little doing in mining stocks the past week, and the tendency has been to lower prices as a rule for the copper stocks, although in the later dealings a somewhat better feeling is manifested. Calumet & Hecla declined to $241½, but rallied again to $243, and closed quite strong at that figure. Franklin declined from $14½ @$13½ on smaller sales. Pewabic declined from $9½@ $8 on sale of 100 shares only. Quincy has been the most active stock on the list. Opening at $49¾, it declined to $48¼, rallied to $51, and later declined to $50, closing $50 bid, $51 asked. Osceola declined from $31@ $30. Huron sold at $1¼. The above comprises all the copper stocks dealt in at the regular Board, showing the extreme dullness of the market and the absence of any speculative demand for this class of securities.

In silver stocks, San Pedro has been active, declining early in the week from 60@30c., with a rapid advance on small sales to 75@77½c., at which price quite large blocks were taken, closing strong at 75c. bid. Bonanza has held its own at $2¾@$2⅞. Catalpa, quite firm at $1@$1.05, the last sales being at 97½c., the lowest for the week. Crescent, dull at 40@42½c. Harshaw has been in better demand, and advanced from 75c. to $1. Sullivan declined from 75c.@62½c. Napa sold at $3½, and Brunswick Antimony at $13.

At the Boston Mining and Stock Exchange, the feature for the week is the decline in Massachusetts & New Mexico from 16@8c. on a rumor that a reorganization and an assessment are contemplated. The bonds are offered freely at 20 per cent. Empire declined to 26c., Deer Isle to 11c. In miscellaneous stocks, an active business is transacted at generally higher prices.

3 P.M.—The market this afternoon developed no special features. Bonanza sold at $2¾. Catalpa, 97½c. Harshaw, $1. San Pedro, 75c. Calumet & Hecla, $243. Quincy, $50 bid, $51 asked. Franklin, $13@$13¼. Pewabic, $8@$8½. Atlantic, $14 asked. Osceola, $29 bid. Huron, $1¼ bid. National, $1¼ bid. Silver Islet, $6 bid, $7 asked.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been quite active, the Comstock shares coming in for a good share of the dealings, at strong prices. The chief stock dealt in was Hale & Norcross, although the price has been irregular, being quite strong in the middle of the week but growing weaker toward the close. There is no special news from the mine, and there are different

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	SHARES. No. in 1000's	SHARES. Par Value.	ASSESSMENTS. Lev'd to date in 1000's.	ASSESSMENTS. Date and amount per share of last.	DIVIDENDS. Total paid to date in 1000's.	DIVIDENDS. Date and amount per share.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Feb. 3. H.	Feb. 3. L.	Feb. 5. H.	Feb. 5. L.	Feb. 6. H.	Feb. 6. L.	Feb. 7. H.	Feb. 7. L.	Feb. 8. H.	Feb. 8. L.	Feb. 9. H.	Feb. 9. L.
Alice, Mon..	400	25	*	.....	400	De 81 10	2.50	....	2.55	2.45	2.70	2.55	2.75	2.65	2.75	2 70	....	....
Amie Con., Co....	500	10	*	.....	805	My 80 10	.22	.21	.21	.20	.21	.....	.21	.20	.20	.....	.21	.20
Atlantic, Mich....	40	25	280	Ap 75 1 00	140	Fe 82 2 00	....	....	....	....	....	....	....	....	....	....	....	....
Argenta, Ne.....	100	100	225	No 82 25	40	Fe 80 20	....	....	....	....	....	....	....	....	....	....	....	....
Bar & Walker, Ut.	100	10	*	.....	60	No 80 10	....	....	....	....	....	....	....	....	....	....	....	....
Bassick, Co.....	100	100	*	.....	25	Fe 80 25	5.13	....	5.25	....	....	....	....	....	....	....	....	....
Belle Isle, Ne....	100	100	65	My 82 10	300	De 79 25	....	....	.95	....	....	....	.70	....	....	....	....	....
Black Bear, Ca...	30	100	15	Se 79 50	850	Se 82 30	....	....	....	....	....	....	....	....	....	....	....	....
Bel'cher, Ne.....	104	100	2562	Se 82 25	15397	Ap 76 1 00	....	....	....	....	....	....	....	....	....	....	....	....
Bodie Cons., Ca..	100	100	125	De 81 50	1295	No 82 20	1.60	....	1.75	....	1.25	....	1.50	....	1.38	....	1.60	1.50
Bos'n & Mon. Mon.	200	10	....	....	310	Ja 83 05	....	....	....	....	....	....	....	....	....	....	....	....
Breece, Co.....	200	25	*	.....	2	Fe 80 1	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer, Ca.....	100	100	80	De 77 50	140	Ja 83 10	....	....	.91	.90	.92	.88	.91	....	.90	....	.95	.90
California, Ne....	540	100	688	No 82 20	31820	De 79 50	.20	....	.20	.19	.20	.18	.22	.21	.23	.20	.25	.22
Cal. & Hecla, Mch	100	25	....	....	22850	Ja 83 5 00	....	....	....	....	....	....	....	....	....	....	....	....
Caribou Con., Co.	100	10	*	.....	50	Mr 80 10	....	....	....	....	....	....	....	....	....	....	....	....
Carolina Q'n, N.C.	100	2	....	....	8	Oc 82 02	....	....	....	....	....	....	....	....	....	....	....	....
Castle Creek, Id..	100	1	....	....	24	Ja 83 03	....	....	....	....	....	....	....	....	....	....	....	....
Catalpa, Co.....	300	10	*	.....	210	De 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Central, Mich....	20	25	100	Se 61 6	1610	Fe 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Christy, Utah....	60	100	....	....	78	De 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite, Co....	200	50	*	.....	1600	De 81 50	1.50	1.40	1.40	....	....	....	1. 0	1.45	1.50	1.45	1.45	.....
Climax, Co.....	200	10	*	.....	180	Au 80 30	.10	.09	.10	.09	.09	.08	.09	.08	....	....	....	....
Cons. G. Mg., Ga.	100	5	*	.....	80	De 82 04	....	....	....	....	....	....	....	....	....	....	....	....
Cons. Va., Ne.....	540	100	897	Au 82 30	42930	Au 80 50	.52	.49	.50	.49	.50	.49	.52	.50	.52	.48	.58	.54
Contention, Ariz.	250	50	....	....	2087	De 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Copper Queen, Ar.	250	10	*	.....	850	Ja 83 50	....	....	....	....	....	....	....	....	....	....	....	....
Crown Point, Ne.	100	100	2673	Fe 82 25	11588	Ja 78 2 00	....	....	....	....	....	....	....	....	....	....	....	....
D'dw'd-Terra, Dk	200	25	*	.....	900	Ja 83 10	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Co.....	200	25	*	.....	200	Ju 81 7½	.33	.30	.32	....	....	....	.30	....	.31	.30	....	....
Eureka Cons., Ne.	50	100	100	My 76 1 00	4817	Ja 82 95	....	....	....	....	....	....	10.00	....	10.00	....	10.00	8.50
Evening Star, Co	50	10	*	.....	1225	Oc 82 50	....	....	....	....	....	....	....	....	....	....	....	....
Excelsior, Ca.....	100	100	300	Ja 82 1 00	875	Oc 80 25	....	....	....	....	....	....	....	....	....	....	....	....
Fa. de Smet, Dk..	100	100	....	....	580	De 82 20	....	....	....	....	....	....	....	....	....	....	....	....
Findley, Ga.....	200	1	*	.....	4	My 79 14	....	....	....	....	....	....	....	....	....	....	....	....
Freeland, Co.....	200	25	*	.....	50	My 80 25	....	....	....	....	....	....	....	....	....	....	....	....
Glass-Pend., Co..	250	20	*	.....	25	My 81 10	....	....	....	....	....	....	....	....	....	....	....	....
Gold Stripe, Ca..	150	10	*	.....	76	Jy 81 15	....	....	....	....	....	....	.06	.05	.06	.....	.06	.05
G'ld & Curry, Ne..	108	100	3476	Se 82 50	3826	Oc 70 $10	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Ne..	100	100	420	No 82 25	450	Se 80 25	.90	.85	....	....	....	....	....	....	.75	....	....	....
Great Eastern, Dk	300	1	*	.....	10	Jy 80 01	....	....	.03	....	.03	....	.03	....	.03	....	....	....
Gr. Mountain, Ca.	125	10	*	.....	212	No 81 7½	.61	60c	.65	.61	....	....	.62	.61	....	....	.70	.63
Hale & Nor., Ne..	112	100	4006	Se 82 50	1598	Ap 71 5 00	....	....	....	....	....	....	....	....	....	....	....	....
Hall-And's'n, N.S.	150	1	....	.....	7	Ja 82 05	1.70	1.55	1.75	....	1.65	1.35	1.45	1.40	....	....	1.45	.....
Hecla Con., Mon.	30	50	....	.....	337	No 92 50	....	....	....	....	....	....	....	....	....	....	....	....
Hibernia, Co.....	300	25	*	.....	180	Jy 81 40	....	....	....	....	....	....	.04	....	.03	....	.03	....
Holyoke, Id.....	200	1	....	.....	14	Ja 83 03	....	....	....	....	....	....	....	....	....	....	....	....
Homestake, Dk..	100	100	200	Ju 78 1 00	1812	Ja 83 50	17.75	17.50	18.00	17.50	....	....	....	....	....	....	17.12	....
Horn-Silver, Ut..	400	25	*	.....	1700	No 82 75	....	....	7.00	6.62	6.50	.....	6.50	6.00	6.00	5.12	5.00	....
Hukill, Co.....	200	5	*	.....	210	De 78 10	.20	....	.22	.19	.20	.....	.18	.....	.19	.18	.18	.17
Indep., Ne.....	100	100	185	Fe 82 15	225	Se 79 25	.75	.....	.75	....	.75	.....	....	....	....	....	....	....
In. Queen, Ne....	125	2	....	.....	365	No 82 05	....	....	....	....	....	....	....	....	....	....	....	....
Inyo, Ca.....	100	5	*	.....	45	Ap 82 05	....	....	....	....	....	....	....	....	....	....	....	....
Iron Silver, Co...	500	20	*	.....	900	De 82 20	....	....	2.75	....	2.80	....	2.80	....	2.80	....	2.80	....
Jocuistita, Mex..	100	100	....	.....	750	No 82 1 00	....	....	....	....	....	....	....	....	....	....	....	....
Kentuck, Nev....	30	100	342	No 81 30	955	Fe 70 5 00	....	....	....	....	....	....	....	....	....	....	....	....
La Plata, Co.....	200	10	*	.....	610	Se 82 30	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C., Co..	400	10	*	.....	270	Ja 83 05	....	....	.64	.63	....	....	.67	.66	....	....	....	....
Leeds, Ut.....	60	100	87	Ju 82 50	78	Oc 78 15	....	....	....	....	....	....	....	....	....	....	....	....
Little Chief, Co..	200	50	*	.....	700	Au 80 50	.43	....	.43	.42	....	....	.41	.40	.42	.40	....	....
Little Pitts., Co..	200	100	*	.....	1050	Mr 80 50	....	....	....	....	....	....	....	....	....	....	....	....
Marguerite, Cal..	25	20	....	.....	19	Oc 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Martin White, Ne	100	100	950	Se 82 25	90	Jy 79 30	....	....	....	....	....	....	....	....	....	....	....	....
Minas Nu'v's, Mex	100	5	*	.....	20	Jy 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Moose, Co.....	200	10	4	.....	550	Mr 78 25	....	....	....	....	....	....	....	....	....	....	....	....
Morning Star, Co.	100	1	....	.....	585	De 82 25	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Ne.....	100	100	235	Mr 82 20	100	De 82 25	6.87	.....	6.00	5.50	6.87	6.00	6.50	5.12	5.75	.....	5.37	5.12
N. Y. & Colo., Col.	50	20	....	.....	25	Jy 79 10	....	....	....	....	....	....	....	....	....	....	....	....
N'h'n Belle, Ne...	50	100	....	.....	2300	No 82 50	9.87	.....	9.75	....	....	....	....	10.12	....	.....	9.87	.....
N. Belle Isle, Ne..	100	100	75	No 82 20	45	Se 82 15	.50	....	.62	....	.60	....	.63	.52	....	.....	....	....
Ontario, Ut.....	150	100	....	.....	4925	Ja 82 50	....	....	....	....	34 00	.....	....	....	....	....	28.37	28.00
Ophir, Ne.....	100	100	3495	De 82 1 00	1595	Jy 82 1 00	....	....	....	....	2.50	.....	2.37	.....	2.62	2 37	3.12	.....
Osceola, Mich....	50	25	480	Ap 76 1 60	785	De 82 1 00	....	....	....	....	....	....	....	....	....	....	....	....
Pleasant Val., Cal	100	100	....	.....	30	De 82 05	....	....	....	....	....	....	....	....	....	....	....	....
Plumas, Ca.....	100	10	*	.....	151	Jy 79 8	....	....	....	....	....	....	....	....	....	....	....	....
Prussian, Colo....	150	10	....	.....	117	No 82 10	....	....	4.70	4.65	4.70	.....	4.75	.....	4.75	.....	....	....
Quicks. Pref., Ca.	43	100	....	.....	654	Ju 82 6 00	....	....	....	....	....	....	....	....	....	....	....	....
" Com., Ca.	577	100	....	.....	651	Ju 82 40	....	....	8.00	....	....	....	....	....	....	....	....	....
Quincy, Mich....	40	25	200	De 62 5 00	3330	Au 82 5 00	....	....	....	....	....	....	.05	....	.05	....	.05	....
Rising Sun, Ca....	150	5	*	.....	52	My 81 7½	.05	.04	.05	....	....	....	....	....	....	....	....	....
Robinson Bar, Id.	100	1	*	.....	9	De 82 03	....	....	....	....	....	....	....	....	....	....	....	....
Robinson C., Co..	200	50	*	.....	575	No 81 50	1.15	1.05	1.15	1.10	1.15	1.10	1.10	1.05	1.10	1.05	1.10	1.05
Robt. E. Lee, Co.	500	....	....	.....	100	De 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Savage, Ne.....	112	100	5484	No 82 50	4460	Ju 69 3 00	....	....	....	....	....	....	....	....	....	....	....	....
Shoshone, Id.....	150	1	....	.....	3	No 82 01	....	....	....	....	....	....	....	....	....	....	....	....
SierraGrande, NM.	....	....	....	.....	300	Ja 83	2.35	.....	2.60	.....	2.60	2.75	2.60	.....	2.60	.....	2.60	2.55
Sierra Nev., Ne..	100	100	5150	De 82 1 00	102	Ja 71 1 00	....	....	3 20	2.75	3 25	....	3.50	3.45	3.50	....	....	....
Silver King, Ar...	100	100	....	.....	1126	De 82 25	10.62	....	10.50	....	....	....	....	....	....	....	10.62	10.50
Silver King, Co...	500	2	....	.....	50	Au 81 10	....	....	....	....	....	....	....	....	....	....	....	....
Socorro, N. Mex..	2.5	100	....	.....	4	Mr 82 ¾	....	....	....	....	....	....	....	....	....	....	....	....
Spr'g Valley, Ca..	200	1	*	.....	50	Ja 81 25	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Ca.....	100	100	....	.....	4050	Ja 83 25	....	....	....	....	....	5.50	5.25	5.37	5.25	5.25	5.50	5.25
Starr-Grove, Ne..	200	10	*	.....	160	Ju 81 10	....	....	....	....	....	....	....	....	....	....	....	....
Stormont, Ut.....	200	1	*	.....	155	No 81 05	....	....	....	....	....	....	....	....	....	....	....	....
St. Joseph, Mo....	100	10	*	.....	390	De 82 20	....	....	....	....	....	....	....	....	....	....	....	....
Tip Top, Ar.....	100	100	170	Mr 80 50	100	No 81 20	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone, Ar...	500	25	*	.....	1250	Ap 82 10	....	....	....	....	....	....	....	....	....	....	....	....
Vizina, Ar.....	200	25	*	.....	140	Ap 82 10	....	....	....	....	....	....	.96	....	....	....	....	....
Yellow Jacket...	120	100	5358	Fe 82 1 00	2184	Au 71 2 50	1.45	....	....	....	....	....	....	....	....	....	....	....

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ 4817.

SALES.—Alice, 4400; Amie Consolidated, 30,500; Bassick, 600; Belle Isle, 500; Bodie Consolidated, 1670; Bulwer, 3900; California, 9800; Chrysolite, 1650; Climax, 3950; Consolidated Virginia, 18,100; Dunkin, 3100; Eureka Consolidated, 670; Gold Stripe, 2500; Grand Prize, 600; Great Eastern, 1300; Green Mountain, 6450; Hall-Anderson, 13,600; Hibernia, 2000; Homestake, 755; Horn-Silver, 2165; Hukill, 6700; Independence, 1200; Iron Silver, 2750; Leadville Consolidated, 800; Little Chief, 2800; Navajo, 8800; Northern Belle, 550; North Belle Isle, 1000; Ontario, 195; Ophir, 570; Prussian, 600; Quicksilver, common, 100; Rising Sun, 2100; Robinson Consolidated, 59,100; Sierra Grande, 10,700; Sierra Nevada, 1085; Silver King, 260; Standard, 1850; Vizina, 100; Yellow Jacket, 300. Dividend shares sold, 209,770.

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opinions regarding it. There has been a break in the Tuscaroras and more particularly in Navajo. Damaging reports were circulated regarding the mine, which, it is said, the large owners heard with indifference and refused to support the stock. Consequently it suffered a sharp decline. The other outside stocks were quiet.

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Feb. 2.	Feb. 3.	Feb. 5.	Feb. 6.	Feb. 7.	Feb. 8.
Albion	11-16	11-16	.....	.....	.....	.....
Alpha	.....	.....	27-32	.....	15-16	.....
Alta	3-16	5-32	11-32	11-32	11-32	11-32
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	19-32	7-16	½	13 32	13-32	.....
Belle Isle	.....	29-32	¾	.....	¾	11-16
Best & Belcher	3⅛	3⅜	3⅞	3⅛	3⅜	3¾
Bodie	1⅛	1⅛	1⅛	1⅛	1⅛	1⅛
Bullion	.....	.....	.....	.....	.....	.....
California	3-16	.....	3-16	3-16	3-16	3-16
Chollar	.....	.....	.....	.....	.....	.....
Con. Virginia	1/16	1/16	1/16	9-16	1/16	1/16
Crown Point	29-32	.....	27-32	.....	11-16	.....
Elko Cons	.....	.....	.....	.....	.....	5-32
Eureka Con	10¼	.....	.....	9½	8¾	8½
Exchequer	.....	¼	¼	.....	¼	¼
Gould & Curry	1⅛	1⅛	1⅛	1⅛	1⅛	1⅛
Grand Prize	11-16	1/16	1/16	1/16	7-16	7-16
Hale & Norcross	1⅞	1⅞	2	2⅛	2⅛	2¼
Independence	11-16	11-16	21-32	11-16	.....	¾
Martin White	2¼	2⅛	2¼	2⅛	2⅛	2⅛
Mexican	2⅛	2⅛	2⅛	2⅛	2¼	2⅛
Mono	3-32	3-32	.....	¼	¼	.....
Mount Diable	3¾	.....	.....	3¾	¾	3¾
Navajo	7⅛	6¼	7¼	6⅛	6¼	5¾
Northern Belle	9½	10	10	.....	10	10
North Belle Isle	.....	19-32	.....	19-32	.....	19 32
Ophir	2⅜	2⅜	2⅜	2⅛	2⅜	3
Overman	.....	.....	.....	¼	.....	.....
Potosi	1⅜	1⅜	1¼	1⅜	1¼	1¼
Savage	.....	.....	.....	.....	.....	.....
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nev	3⅛	2⅞	3	3⅛	2⅞	3⅛
Silver King	11	.....	.....	10⅛	10⅛	10½
Tip Top	.....	.....	.....	.....	.....	.....
Union Con	2⅛	2	2⅛	2¼	2⅛	2½
Wales Con	3-16	3-16	.....	3-16	3-16	.....
Yellow Jacket	1⅜	1¼	1¼	1⅜	1⅜	1⅜

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 9.

American Pig.—There has been a little more activity, due principally to concessions in prices. Furnaces in Western Pennsylvania are blowing out, in consequence of an accumulation of stocks, while on the Lehigh there seems to be a tendency to increase the output. Choice brands of No. 1 Foundry are still firm at $26, but ordinary and standard brands are weaker, being quoted $24@$25, while occasional outside lots are offered at even $23.50. We quote No. 2, $22.50@$23.50, and Forge, in which the weakness is most perceptible, $20@$21, at tidewater. We note the sale of 3000 tons of Thomas pig at figures near our quotations.

The stove manufacturers, at a meeting held in this city yesterday, seemed generally convinced that there had been an over-production in their goods, which does not augur favorably for the foundry trade.

Bessemer pig-iron is dull and unchanged, with England quoting by cable 52@54s. 6d.

Spiegeleisen is dull and weaker with rumors of sales at lower figures than quotations, which are for 20 per cent, $32.50@$33, and for 10 to 12 per cent, $27.50@$28.

Scotch Pig.—The market is reported a little more active, consumers apparently taking advantage of low prices. The arrivals are fair, and only a part goes into store. Freights are unchanged, and, as will be noted by the cable quotations below, Glasgow is practically unchanged. We quote: Coltness $25@$25.50; Glengarnock and Carnbroe, $22@$22.50; Gartsherrie, $24@$24.50; Langloan, $24@$24.25; and Eglinton, $21@21.50. The Wall Street Exchange has received the following cables to-day: Carnbroe, 53s. 3d.; Gartsherrie, 62s. 3d.; Summerlee, 62s.; Coltness, 65s.; Langloan, 65s. 6d.; Glengarnock, 55s. 6d.; and Eglinton, 49s. 9d. Warrants are 47s. 4d., a little lower.

Rails.—The market is weaker, and orders to the extent of about 15,000 tons have been placed at $39@$40 at mill, which we quote, with the feeling in buyer's favor. The steel bloom case tried in this city against the Custom-House has been decided in favor of the plaintiffs.

Old Rails.—The market has been very quiet, the only transactions we hear of being a small lot of D. Hs. at $27½. Ts are nominally $24.50.

Scrap.—Nothing has been done. We quote nominally ex ship $25@$25.50.

NON-DIVIDEND PAYING MINES.

NAME AND LOCATION OF COMPANY.		NUMBER OF SHARES.	Par.	ASSESSMENTS. Total levied to date.	ASSESSMENTS. Date and amount of last.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Feb. 3. H.	Feb. 3. L.	Feb. 5. H.	Feb. 5. L.	Feb 6. H.	Feb 6. L.	Feb. 7. H.	Feb. 7. L.	Feb. 8. H.	Feb. 8. L.	Feb. 9. H.	Feb. 9. L.
Advance	Nev.	130,000	100	472,500	Jan. 83 50	1.35	.....	1.40	.....	1.50	1.40	.....	.....	.....	.....	.....	.....
Albion, s. L	Mich	.....	.....	420,000	Mar. 82 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ailouez	Nev.	100,800	100	1,892,000	Jan. 83 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alpha	Nev.	100,800	100	1,892,000	Jan. 83 25	15c	13c	15c	12c	13c	12c	14c	12c	15c	14c	15c	.....
Alta	Nev.	100,800	100	1,892,000	Jan. 83 25	15c	13c	15c	12c	13c	12c	14c	12c	15c	14c	15c	.....
Alta-Montana, G	Mon.	500 000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Flag, s	Colo	125.000	10	300,000	Jun. 77 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barcelona, G	Nev	200,000	25	*	.....	20c	.....	22c	20c	25c	24c	23c	.....	23c	.....	23c	.....
Battle Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bear Creek	Cal.	300,000	1	.....	.....	.....	.....	.....	.....	22c	.....	22c	20c	25c	.....	23c	.....
Beauce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G	Cal.	100.000	100	185,000	Jan. 83 10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'cher, G. S	Nev.	100,800	100	1,345,790	No. 82 50	.....	.....	3.75	.....	3.85	.....	3.90	.....	3.90	.....	.....	.....
Big Pittsburg, S. L	Colo	200,000	100	*	.....	16c	.....	17c	.....	17c	.....	20c	16c	23c	20c	22c	.....
Black Jack, G	Cal.	100,000	2½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza Chief	Mon	1,000.000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bondholder	Colo	200,000	2½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boston Con., G	Cal.	100,000	100	95.000	Oct. 82 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boulder Con	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradshaw, s	Ariz	225,000	10	.....	.....	34c	31c	33c	31c	33c	.....	33c	.....	35c	.....	33c	.....
Buckeye	Colo	100.000	5	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" pref	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5c	.....	5c	.....	.....	.....	.....
Bull-Domingo, S L	Colo	200,000	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bullion, G. S	Nev.	100,000	100	3,747,000	Oct. 82 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bye and Bye	Ariz	100,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calaveras, G	Cal.	500,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
C'lav'r's W. & M. Co	Cal.,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., G	Dak.	100,000	100	480,000	Au. 82 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill, S L	Colo	200,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Catskill, s	Nev.	800,000	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz'na, S	Ariz	100.000	100	.....	.....	40c	.....	41c	40c	40c	.....	40c	.....	37c	.....	.....	.....
Chapparal	Cal.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherokee, G	Cal.	150.000	10	.....	.....	5c	.....	5c	.....	.....	.....	6c	.....	.....	.....	.....	.....
Chollar	.....	.....	.....	.....	Sep. 82 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clarence	Can.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado Cent'l, S	Colo	300,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Col'mb'a Con., G. S	Nev.	100,000	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imp'r'l, G. S	Nev.	500,000	100	1,425,000	Jan. 82 10	10c	.....	11c	.....	10c	.....	.....	.....	.....	.....	.....	.....
Con. Pacific, G	Cal.	60,000	100	141,000	Au. 82 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent, S L	Colo	300,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crowell, G	N. C.	50 000	1	.....	.....	4c	.....	.....	.....	.....	.....	.....	.....	4c	.....	4c	.....
Dahlonega, G	Ga.	250,000	1	*	.....	.....	.....	2c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dardanelles, G	Cal.	100,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	10c	.....	10c	9c	10c	.....	10c	.....	10c	.....	10c	.....
Dunderberg, S	Colo	150,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, G	Dak.	500,000	1	*	.....	9c	8c	9c	8c	.....	.....	.....	.....	.....	.....	.....	.....
Eastern Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Elko Cons	.....	.....	.....	.....	.....	14c	8c	12c	10c	11c	.....	12c	11c	14c	12c	15c	13c
Empire, S	Ut'h	100,000	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Enterprise	Colo	.....	.....	.....	.....	61c	59c	58c	55c	56c	53c	55c	47c	51c	50c	51c	49c
Exchequer	Nev	100,000	100	630,000	Jan. 82 25	2.25	2.20	2.25	.....	2.25	2.20	2.20	.....	2.20	.....	2.25	2.20
Fannie Barret	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Globe Copper	Ariz.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Placer, G	Colo	200,000	25	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G	Cal.	100,000	100	200,000	Oct. 82 10	.....	.....	7c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granville, G	N. C.	800,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co	.....	.....	.....	.....	.....	1.05	.....	1.05	.....	1.05	.....	.....	.....	.....	.....	1.10	.....
Harshaw, S	Ariz	100,000	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Head Center, S	Ariz	100.000	100	160,000	May 82 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hortense, S	Colo	200,000	10	.....	.....	.....	.....	.....	.....	.....	.....	15c	14c	.....	.....	.....	.....
Index	Cal.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Julia, G S	Nev.	110,000	100	1,394,000	Jan. 82 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kossuth, G S	Nev.	108,000	100	421,200	Aug. 77 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G	Colo	100,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	15c	.....	.....	.....
Leviathan, S	Nev	100,000	100	380,000	Sep. 82 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lucerne, S	Colo	500,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., G	Cal.	50,000	100	1,687,500	Dec. 81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G	Cal.	100,000	100	1,950,000	Feb. 82	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May Belle, G	Cal.	100,000	100	84,000	Dec. 81 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mayflower, S	Colo	100,000	100	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S	Nev.	100.800	100	2,146,600	Oct. 82 $1	.....	.....	.....	.....	.....	.....	.....	.....	2⅜	2⅛	2⅛	2.70
Michoacan Synd	Mex.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miner Boy, G S L	Colo	500,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miller	Nev.	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono, S	Cal.	50.000	100	535,000	Jan. 83 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35c	.....
Moose Silver, S	Colo	800,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nevada Syndi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G	Cal.	100,000	100	20,000	Nov. 81 10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S L	Utah	400,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Noonday	Cal.	60,000	10	208,000	Dec. 82 $1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Dominion, C	Ariz	200,000	100	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oriental	Nev.	200,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, S	Nev.	400,000	25	.....	.....	16c	15c	16c	.....	15c	.....	15c	.....	14c	.....	14c	.....
Overman, G S	Nev.	115.200	25	3,604,700	May 82 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potosi	Nev.	112,000	100	500,640	Nov 82 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quartz Creek	.....	.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, G	Va..	250,000	.....	*	.....	10c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Red Elephant, S	Colo	500,000	1	*	.....	.....	.....	.....	.....	.....	.....	7c	.....	.....	.....	.....	.....
Retort	.....	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ruby, of Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	55c	43c	55c	52c	55c	54c	56c	55c
San Pedro, G S L	N. M	400,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, S	Colo	200.000	25	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Islet	Can.	.....	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con	Mex.	.....	.....	.....	.....	23c	15c	21c	20c	21c	20c	23c	21c	22c	.....	22c	.....
South Bodie, G	Cal.	100.000	.....	100,000	Mar. 82 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G	Cal.	100,000	100	195,000	May 81 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	Cal.	100,000	100	.....	May 82 10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific	Cal.	.....	5	.....	.....	9c	.....	9c	8c	9c	8c	9c	8c	8c	.....	9c	.....
State Line No. 1, S	Nev.	200,000	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" No. 2, S	Nev.	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" No. 3, S	Nev.	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" No. 4, S	Nev.	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 1 & 4, S	Nev.	.....	25	.....	.....	.....	.....	4c	3c	4c	3c	4c	3c	4c	3c	3c	.....
" Nos. 2 & 3, S	Nev.	.....	.....	.....	.....	7c	.....	8c	7c	8c	7c	8c	7c	8c	7c	9c	.....
Sutro Tunnel	Nev.	2,000,000	.....	*	.....	22c	21c	22c	21c	22c	.....	22c	21c	21c	.....	25c	21c
Taylor-Plumas	.....	.....	10	.....	.....	19c	.....	19c	.....	20c	19c	19c	.....	18c	.....	19c	.....
Tioga, G	CC..	100,000	.....	285,000	Oct. 82 10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tuscarora, S	Nev	100,000	100	110,000	Oct. 81 15	.....	.....	10c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, S	Ariz	500,000	100	*	.....	.....	.....	3c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cons, G. S	Nev.	100,000	1	1,570,000	Jan. 83 $1	3.25	.....	1.80	.....	.....	.....	.....	.....	2⅜	.....	.....	.....
Utah	.....	20,000	100	1,360,000	Dec. 82 $1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vandewater	Nev.	200,000	100	*	.....	.....	.....	31c	.....	31c	.....	30c	.....	30c	.....	31c	.....
Washington	Ariz.	200,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9c	.....
Whalen Copper	Nev.	100,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wide West	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Willshire	Cal.	50,000	5	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

SALES.—Albion, 800; Alta-Montana, 10.500; Barcelona, 13.800; Bear Creek, 1700; Best & Belcher, 70; Big Pittsburg, 3500; Bradshaw, 7500; Bull-Domingo, 200; Central Arizona, 2500; Cherokee, 1400; Consolidated Imperial, 1200; Crowell, 2900; Dahlonega, 1000; Decatur, 14.400; Durango, 1600; Elko Consolidated, 40.300; Enterprise, 20,200; Fannie Barret, 2900; Goodshaw, 1100; Harlem M. & M. Co., 3500; Hortense, 300; Lacrosse, 400; Mexican, 900; Mono, 100; Oriental & Miller, 14,100; Rappahannock, 500; Red Elephant, 1000; Ruby, of Arizona, 2100; Sonora Consolidated, 128.100; South Pacific, 23,700; State Line, Nos. 1 & 4. 5500; State Line, Nos. 2 & 3, 8300; Sutro Tunnel, 10,600; Taylor-Plumas, 41,300; Tuscarora, 100; Unadilla, 2400; Union Consolidated, 535; Vandewater, 6800; Washington, 500. Non-dividend shares sold, 381,305. Total shares sold at all the Exchanges, 591,075.

A special committee on old iron and steel of the New York Iron and Metal Exchange has, after considerable discussion and correspondence, prepared the following official classification of wrought scrap-iron, for a copy of which we are indebted to Mr. Edward J. Shriver, Secretary:

No. 1 wrought scrap-iron shall consist of all wrought-iron other than plates (except when cut apart and free from angles and rivets), to be one quarter inch thick or upward, round and square, but not of such unusual size or shape as can not be worked by ordinary methods. It must be free from rails, rail ends, nails, anvils, hoes, shovels, gas-pipe, flues, stove-pipe, sheet-iron, hoops, wire and similar light iron, cast, malleable, galvanized, tinned or coppered iron, zinc, steel, or other foreign substances, also from burnt or excessively rusty iron.

No. 2 wrought scrap-iron shall consist of unwieldy pieces, such as large anchors, ship's knees, armor-plates, heavy cranks, heavy shafting, I beams, Tees, angles, or other iron of such unusual size as can not be worked by ordinary methods.

No. 3 wrought scrap-iron shall consist of wrought-iron, unfit to grade as No. 1 or No. 2, but must be free from

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BOSTON MINING STOCKS.

	Feb. 2.		Feb. 3.		Feb. 5.		Feb. 6.		Feb. 7.		Feb. 8.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alloues													
Atlantic													
Aztec													
Best & Bel													
Bodie Con			1.75			2.50		2.75	2.68¾	2.87½	2.75	2.87½	2.62½	100
Bonanza D			13.00											10
Bruns. Ant														
Bulwer														
California														
Cal. & Hec	243	242	243		243¼	243	243		242½	241½	243			187
Carbon. Hill														
Catalpa			1.05	1.00			1.02½	1.00			1.00	.95	2,925	
Central Ariz														
Cherryfield														
Chrysolite														
Con. V'ginia	.53						.48				.53			900
Copp'r Falls														
Crescent			.42		.42½									550
Cumberl'd														
Deer Isle	.12		.11		.12	.11	.10							2,000
Denver City														
Douglas														
Duncan														
Duukin					.35	.32	.32				.30			1,400
Empire	.28		.28				.26		.26					8,700
Eureka Con														
Franklin					14.00		14.00		13.50					221
Gila County														
Hancock G														
Harshaw			.80	.75	.87½		.87½	.75	1.06¼	.95	1.00			1,890
Horn Silver														
Huron	1.87½		1.75						1.75		1.75			440
Independ'ce														
Indian Q'n														
Little Pitts														
Madison														
Mammoth														
Mass. & N.M	.15	.14	.14	.12	.12	.08	.10	.09	.09		.10	.08	63,800	
Milton														
Napa			3.50											100
National			1.37½											100
North. Belle														
Osceola	31.50	30.00	30.00		30.00		30.00							220
Penn-Breck														
Pewabic	8.00													100
Pine Tree														
Plymouth	.21				.21		.21		.22		.22			1,150
Quincy	50.00	48.50	50.75	50.00	51.50	51.00	50.75	50.25	50.25	50.00	51.00			928
Ridge														
Robinson														
San Pedro	.55		.45	.30	.50	.45	.72½	.60	.77½	.70	.75	72½	10,800	
S'ra Nevada														
Silver Islet														
Silver King							10 .50							10
So. Pacific														
Standard														
tate Line														
Nos. 2 & 3														
Sullivan			.75								.62½			250
Sutro Tun	.24						.22							400
Sycamore														
Twin Lead									.20		.20		1,700	
Vizina														

PHILADELPHIA MINING STOCKS.

	Feb. 2.		Feb. 3.		Feb. 5.		Feb. 6.		Feb. 7.		Feb. 8.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American													
Argent	.25		.30	.25	.32½	.27½	.32½	.30	.30		.30		58,301	
Arizona So.														
Aztec														
Battle Mt	.02						.02		.01					18,500
Black Sul							.02							5,600
Bodie														
Buena	.06		.05		.05		.05		.06	.05	.06	.05	51,600	
California														
Calista														
Cincinnati			.10		.11						.10			2,000
Comprom'e	.35	.32½	.30		.35	.32½	.35		.32½		.35			8,400
Dauntless			.02											5,000
Del Monte									.02		.02			2,000
Denver City	.19		.19		.19				.19		.19			13,300
Fairview														
Eureka														
Girard	.17		.17		.17		.17		.17		.17			10,300
Golconda														
Golden Age														
Governor	.08	.07	.08		.8		.09	.08	.10	.09	.10			45,900
Grand Uni'n	.13		.15	.14	.15		.16	.15	.16		.16			36,700
Gunnison	.75		.80	.75	.80		.80		.77½		.75			6,000
Hancock														
Intervener														
Iowa Gulch	.11		.11		.12		.12		.12		.12	.11	51,600	
King Bul'on														
Little Dia'd			.06		.06		.06							14,000
Little Maud	.04						.08							8,000
L'g & D'y Hl														
McCullough														
Magnolia														
Montana														
Mt. Lincoln			.01											1,000
Mt. Sheridan	.04		.04		.04				.05		.04			10,000
National														
Orion	.08	.07			.07		.08		.07					2,800
Orion Pref														
Palmetto E														
Pembina			.22	.20	.22		.23		.24	.23				5,300
Penn-Breck	.13	.10	.11	.10	.13	.11	.13	.12	.12		.11			17,300
Permanent														
Pizarro														
Pizarro Ex														
Potosi														
Rara Avis					.55				.52½					300
Rara Avis E														
Record			.11											1,000
Rico Pion'r														
San Pedro														
Sierra G'nde	2.62½	2.50	2.70	2.60	2.70	2.50	2.60	2.45	2.65	2.55	2.55		5,535	
Silver Cord					1.37½									500
Silv'r Plume														
Silver Rock														
Sovereign														
Standard					.04									2,000
Sultana	.05		.05		.05		.05		.05		.05			20,800
Sutro Tun'l	.25		.25								.23			1,500
Tombstone	.87½		.85		.85		.85		.85		.85			8,300
Tranquilli'y														
Tyrone														
Victor														
Yale Mt	.15		.15											1,000

anvils, rails and rail ends, cast, malleable, galvanized, tinned or coppered iron, zinc, steel, or other foreign substances.

METALS.

NEW YORK, Friday Evening, Feb. 9.

Copper.—The market is still a little unsettled, although the small lots of Arizona and other copper forced on the market by bankers who had advanced on them have been absorbed. Holders of Lake copper, of which very small quantities are in second hands, ask 17⅛@18c., and there have been sales at the lower figure in a small way, while some buyers decline to take hold even at that figure. About 200,000 pounds of Arizona copper, guaranteed, have changed hands at 17⅛@17¼c. while Baltimore is held at 16¾c., and other less known brands have been selling at less. In the interest of a great and growing industry, it is time that producers should make some efforts to teach consumers that the difference between different brands of copper refined by men of experience from a good raw material are not as great as the ruling quotations would make it appear. Buyers should not be perplexed with an endless number of brands.

London cables Chili Bars, £55 5s.@£65 10s., and Best Selected £72@£72 5s.

Tin.—Considerable business has been done during the week under the stimulus of better quotations from abroad. Straits has sold here at 21c., and is now held at 21⅛@21¼c. London at the close cables £93 5s.@£93 10s.

Lead.—In the beginning of the week, a sale of 200 tons of Common was made at 4·60c. On Thursday, the second lot of Germania lead, 360 tons, just arrived from San Francisco, was offered for sale and disposed of at 4·50c., as no better bid could be obtained. Since then, nothing has been done, although a few hundred tons could probably be placed at the same figure, which some holders decline to consider. The stock here is small, but it is believed to be heavy in the West. London cables £13 10s.@£13 15s.

Spelter.—This metal continues excessively dull, with 4¼c. bid and 4⅝c. asked for common Domestic. The last arrivals of Foreign were on the 16th of January, and since then no Silesian spelter has been received here. What little there is on hand is not offered at less than 5·10c. London cables £15 10s.@£15 15s.

Antimony.—This metal is dull and lifeless at 10@10⅛c. for Hallett's, and 11@11⅛c. for Cookson's.

COAL TRADE REVIEW.

Anthracite.

NEW YORK, Friday Evening, Feb. 9.

The anthracite coal market is exceedingly dull and quiet, more so in fact than it has been for many years at this time of the season, which is never remarkable for activity. There is a pressure to sell, and the consequence is, that low prices prevail, even fancy coals being offered at a concession. Restricted as is the market during the winter season, the slightest causes will upset it, and the full time last week has not improved matters. Buyers are persistently holding off, waiting for developments. The demand in the East has been better of late; but the fact that only small vessels are wanted, which are scarce, tends to limit the business. Besides, the greater abundance of water has to some extent eased the mills which were running short of coal.

The production for the week ended February 3d, 1883, was 476,109 tons, against 469,130 tons for the corresponding week in 1882. The total for 1883 up to February 3d was 2,106,329 tons, against 2,100,480 tons in the same period last year, an increase in 1883 of 5849 tons.

Bituminous.

The bituminous coal trade is very quiet and dull. Prices are nominally $4.50@$4.65 for Clearfield alongside, and $4.60@$4.85 for Cumberland, according to quality.

STATISTICS OF COAL PRODUCTION.

The Transportation of Coke over the Pennsylvania Railroad for the week ended January 27th and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	1,589	7,767
West Penn. RR	1,333	9,321
Southwest Penn. RR	37,345	153,300
Penn. & Westmoreland Region, Pa. RR	6,032	22,863
Pittsburg, Penn. RR	39	80
Snow Shoe (Clearfield Region)	369	356
Total	46,707	193,187

Comparative statement of the production of anthracite coal for the week ended February 3d and year from January 1st:

TONS OF 2240 LBS.	1883.		1882.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.	61,935	289,359	74,129	283,636
D. L. & W. RR. Co.	62,718	350,670	73,892	342,977
Penna. Coal Co.	17,694	95,810	17,759	83,561
L. V. RR. Co.	11,550	86,280	24,395	97,593
P. & N. Y. RR. Co.	2,350	15,038	3,758	15,167
C. RR. of N. J.	54,192	164,591	20,903	172,617
North & West Br. RR.	*8,905	31,612		
	219,344	1,033,360	214,836	995,551
Lehigh Region.				
L. V. RR. Co.	69,526	348,555	88,365	347,702
C. RR. of N. J.	53,408	158,813	19,931	156,742
S. H. & W. B. RR.	681	3,746		523
	123,675	511,114	108,296	504,967
Schuylkill Region.				
P. & R. RR. Co.	108,274	460,518	118,975	488,135
Shamokin & Lykens Val.	24,189	95,802	26,855	108,009
	132,463	556,320	145,830	596,144
Sullivan Region.				
St Line & Sul. RR. Co.	627	5,535	168	3,818
Total	476,109	2,106,329	469,130	2,100,480
Increase		5,849		
Decrease				

* No returns later than January 27th.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878.....1,399,548 tons
" " " " 1879.....1,820,099 "
" " " " 1880.....1,981,541 "
" " " " 1881.....1,819,921 "

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 49,914 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended February 3d:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)		125	
Coal for shipment at South Amboy	13,307	68,659	68,049
Coal for distribution	14,621	69,925	60,544
Coal for company's use	2,161	13,345	11,282
Total	30,189	152,054	139,875
Increase		12,179	
Decrease			

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The Production of Bituminous Coal for the week ended January 27th was as follows:
Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons
Cumberland Region, Md.		
Tons of 2240 lbs.	24,057	126,558
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	7,230	27,157
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	4,246	16,932
East Broad Top	1,149	5,121
Clearfield Region, Pa.		
Snow Shoe	5,611	22,257
Tyrone and Clearfield	52,001	190,895
Allegheny Region, Pa.		
Pennsylvania RR.	11,347	52,435
Pittsburg Region, Pa.		
West Penn RR.	10,329	38,783
Southwest Penn. RR.	1,735	9,868
Penn & Westmoreland gas-coal, Pa. RR.	20,876	98,075
Pennsylvania RR.	9,958	37,899
Total	148,539	625,980

Wholesale Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports, per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Weehawken	4 05	4 05	4 00	4 10	4 55	4 55
Scranton at Hoboken	4 30	4 30	4 30	4 55	4 85	4 85
Lackawanna at Weehawk'n	4 15	4 15	4 30	4 55	4 85	4 90
Wilkes-Barre at P. Johnston	4 30	4 30	4 30	4 55	4 85	4 75
Plymouth R. A. at P. John.	.....	....	4 40	4 75	5 20	4 85
LEHIGH COAL.						
Honey Brook at Port John.	5 25	....	4 50	4 55	4 85	4 75
Fulton at South Amboy	5 25	.....	.....	4 60	4 85	4 75
U.L. & Coun. R'g'e at Eliz'pt	.....	....	.....	.....	...	.....
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash	5 15	5 15	4 50	4 70	4 90	4 70
Free-Burning White Ash	.....	4 30	4 30	4 55	4 90	4 70
Schuylkill Red Ash	.....	.....	...	4 55	5 00	4 70
Shamokin	...	.....	.....	4 70	5 00	4 70
Lorberry	.....	.....	.....	4 85	5 25	4 85
Lykens Valley (Brookside)	...	.....	5 35	5 65	5 85	5 20
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 75	4 75	4 15	4 35	4 55	4 35
Free-Burning White Ash	.....	3 95	3 95	4 20	4 55	4 35
Schuylkill Red Ash	.....	.....	...	4 20	4 65	4 35
Shamokin	.....	.....	.....	4 35	4 65	4 35
Lorberry	.....	.....	....	4 35	4 75	4 35
Lykens Valley (Brookside)	.....	.....	.....	5 25	5 35	4 70

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 9.

Under lower exchange on India and absence of continental orders, the London market for silver has weakened since our last issue, as indicated by the figures of annexed table of prices current here.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Feb. 3	50 9-16	110¾	Feb. 7	50½	110¼
Feb. 5	50 9-16	110⅞	Feb. 8	50⅝	109⅞
Feb. 6	50½	110¼	Feb. 9	50 7-16	110

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended February 9th, as compiled from various sources, amounted to $151,295.02, as against $288.263.71 reported for the previous week. The receipts from January 1st, 1883, to date, are $1,823,173.51.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended February 3d	$176,000
Corresponding week last year	3,750,840
Since January 1st, 1883	1,234,814
Corresponding period last year	4,811,520

Imports.

Week ended February 3d	$75,819
Corresponding week last year	65.787
Since January 1st, 1883	618,295
Corresponding period last year	404,862

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £280,000 bullion (supplemented by a gain of £9000 on balance to-day), but the proportion of its reserve to its liabilities was reduced from 47 13-16 to 46⅛ per cent, against 33⅛ per cent at this date last year. The weekly statement of the Bank of France shows gains of 9,175,000 francs in gold and 1,975,000 francs in silver.

BULLION PRODUCTION FOR 1882.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1882.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13½ per cent, to arrive at actual value.

MINES	States.	For the week.	Month of December.	Year from Jan. 1st, 1882.
*Alice, G. S.	Mont.	.....	$77,663	$912,192
*Alta-Montana, S. L.	"	.....	31,677	$ 417,713
Barbee & Walker, S.	Utah	.....	.....	84,262
*Belmont	Mont.	.....	.....	26,916
Betty O'Neal, S.	Nev.	.....	.....	59,159
*Black Bear, G.	Cal.	.....	.....	69,015
Bodie, G. S.	"	.....	31,225	485,890
Bodie Tunnel, G.	Cal.	.....	.....	129,217
*Boston & Montana, G.	Mont.	.....	20,283	285,898
*Caledonia, G.	Dak.	.....	.....	76,655
*Caribou, S.	Colo.	.....	.....	126,918
*Central Arizona, S.	Ariz.	.....	15,920	213,873
*Christy, S.	Utah	.....	38,312	372,426
*Chrysolite, S. L.	Colo.	.....	19,488	635,829
Cons. Bobtail, G.	"	.....	.....	99,784
*Contention, S.	Ariz.	.....	122,039	1,814,643
Crismon-Mammoth, G.	Utah	.....	.....	63,579
*Custer, G. S.	Idaho	.....	.....	682.331
*Deadwood-Terra, G.	Dak.	.....	.....	551,052
*Derbec Blue Grav., G.	Cal.	.....	5,704	139,485
*Eureka Con., G. S. L.	Nev.	.....	79,446	982,984
Evening Star, S. L.	Colo.	.....	.....	862,520
*Father de Smet, G.	Dak.	.....	47,892	417,873
*Frisco M. & S. Co., S. L	Utah	.....	22,061	370,635
Girard, S.	Ariz.	.....	.....	177,540
Grand Central, S.	"	.....	.....	1,358,820
*Hall-Anderson, G.	N. S.	.....	1,325	14,375
*Head Center, S.	Ariz.	.....	.....	145,636
*Hecla, G. S. L.	Mont.	.....	.....	77,945
*Homestake, G.	Dak.	.....	.....	1,114,568
Horn-Silver, S. L.	Utah	.....	204,500	3,539,516
*Hope, S.	Mont.	.....	25,685	329,752
Idaho, G.	Cal.	.....	.....	395,540
*Independence, S.	Nev.	.....	.....	152,527
*Indian Queen, S.	"	.....	.....	183,650
*Inyo Cons., G.	Cal.	.....	.....	59,421
Ingersoll, S.	Ariz.	.....	.....	90,000
Iron Silver, S.	Colo.	.....	.....	865,436
*Jocuistita, S.	Mex.	.....	.....	700,585
*Kentuck	Nev.	.....	.....	8,526
*†Leeds, S.	Utah	.....	.....	11,988
Lexington, S.	Mont.	.....	92.346	279,822
*Little Pittsburg, S. L.	Colo.	.....	5,860	140,328
Manhattan, S.	Nev.	.....	.....	64,300
Mack Morris, S.	Ariz.	.....	.....	281,024
*Marguerite, G.	Cal.	.....	15,800	95,490
Morning Star, S. L.	Colo.	.....	.....	478.676
Moulton, G. S.	Mont.	.....	.....	406,920
Mount Diablo, S.	Nev.	.....	.....	294,397
*Navajo, G. S.	"	.....	.....	364,193
New York Hill, G.	Cal.	.....	.....	105.136
Noonday & North Noonday, G.	"	.....	.....	231,000
Northern Belle, S.	Nev.	.....	.....	740,012
†Ontario, S. L.	Utah	.....	174,000	2,395,000
Ophir, G. S.	Nev.	.....	.....	39,472
*Oxford, G.	N. S.	.....	4,009	19,573
Pascoe, S.	Utah	.....	.....	4,575
*Pleasant Valley, G. S.	Cal.	.....	.....	46,360
Robert E. Lee, S.	Colo.	.....	.....	292,550
Russell, C. S.	Ariz.	.....	.....	266,686
*Satemo, G.	N. S.	.....	630	11,725
*Savage, S. G.	Nev.	.....	.....	33,281
Sierra Grande, S.	N. Mex.	.....	.....	735.260
*Silver Bow, G. S.	Mont.	.....	20,836	351,018
Silver King, S	Ariz.	.....	.....	815,000
*Spring Valley, G.	Cal.	.....	.....	212,000
Standard, G.	"	.....	92,023	1,258,057
Star, S.	Nev.	.....	4,515	61,716
Stonewall, S.	Ariz.	.....	.....	240,000
Stormont, S.	Utah	.....	19,690	283,934
*Sullivan, S.	Maine	.....	.....	4,903
Syndicate, G.	Cal.	.....	.....	75.458
Tintic M. & M. Co.	Utah	.....	10,576	76.231
*Tip Top, S.	Ariz.	.....	20,084	229,512
*Tombstone, G. S.	"	.....	550,988	1,440,894
*Union Con., S.	Nev.	.....	.....	318,291
*Vizina, S.	Ariz.	.....	.....	107,339
Total amount of shipments to date				$31,906,807

* Official. † Net. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

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DIVIDENDS.

HORN-SILVER MINING COMPANY.
Office, 44 Wall Street,

NEW YORK, Jan. 15, 1883.

DIVIDEND No. 8.

A quarterly dividend of $300,000 has been this day declared, being three per cent on the capital stock, payable to stockholders of record on the 15th day of February next, at the office of the company.

Transfer-books will be closed on February 7th, and reopened February 16th.

W. S. HOYT, Secretary.

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GOLD:

ITS OCCURRENCE AND EXTRACTION,

Embracing the Geographical and Geological Distribution and the Mineralogical Characters of Gold-Bearing Rocks.

BY

ALFRED G. LOCK, F.G.S.

EDITED BY

CHARLES G. WARNFORD LOCK, F.L.S.

Editor of Spons' Encyclopædia of Industrial Arts.

PRINCIPAL CONTENTS.

CHAPTER I.—Geographical Distribution. This chapter is broken up into five sections, representing the five great divisions of the world, each of which is illustrated with a double-page map showing the golden regions. Under each section, the several countries composing it are dealt with in alphabetic order; maps are given of the chief gold-fields, together with full accounts of the local geology, the character of the deposits, the fineness and impurities of the gold, the native and other modes of working, statistics of the yield, and every information having a direct or indirect influence on the commercial prospects of the gold industry.

CHAPTER II.—Geological Occurrence and Mineralogical Association. Here is included a synopsis of the various theories concerning the origin and *formation of auriferous* deposits and the growth of nuggets. The geological zones in which gold is found are described in sequence, with allusions to the particular localities. Some space is devoted to an examination of the various minerals with which gold is associated in nature, and a discussion of their influence (good or bad) on the richness of the ore.

CHAPTER III.—Shallow Placers and Live Rivers. This chapter is profusely illustrated with sections showing the manner in which shallow placers are formed, and where the gold should be sought for in them. A minute account (with diagrams) of the various apparatus in use for washing alluvial gold is supplemented by much absolutely new matter on the recovery of gold from running streams, now beginning to attract such wide attention.

CHAPTER IV.—Deep Leads or Dead Rivers. This very important subject is thoroughly exhausted on the same plan as Chapter III., the geological sections being of special interest.

CHAPTER V.—Hydraulicking. Proper details are given of the construction of all the apparatus employed in this branch, both for applying the water and saving the gold, with numerous examples of actual cost and profit, and many illustrations of operations in California and New Zealand.

CHAPTER VI.—Auriferous Veinstuff. Under this head are given many sketch-sections of quartz-veins, illustrating their peculiarities and variations. This is followed by a complete description of the construction of stamp-batteries in detail, with accounts of novel forms of reduction machinery. The appliances for arresting the gold liberated by the stamps occupy a large amount of space, and are exhaustively treated—several examples of complete mills, with their working results, being described and illustrated in full.

CHAPTER VII.—Auriferous Ores. This chapter deals with the complicated ores usually termed "pyrites." The nature of the association between the gold and the ores is analyzed with a view to lessening the loss now commonly incurred in their treatment, and several new processes are described with this object. On the whole, this is perhaps the most important part of the volume.

APPENDIX A.—Literature bearing upon the subject.

APPENDIX B.—Glossary of technical and foreign terms, and equivalents of foreign moneys, weights, and measures.

A Geographical Index and a General Index complete the work.

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THE ENGINEERING AND MINING JOURNAL

VOL. XXXV. No. 7.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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MR. J. TROWBRIDGE BAILEY leaves on the 20th of March for a trip through the mining districts of Arizona, Colorado, and New Mexico. Those desiring to communicate with him should address him at the office of Mr. E. O. READ, 73 Broadway, this city.

THE year 1882 has, as usual, been one of prosperity financially to the Patent-Office and one of misery to all who have dealings with that institution, because our enlightened legislators are unwilling or unable to understand that the Patent-Office was never intended to be a money-making concern, and has no right to be one. It is absurd that more than four hundred thousand dollars should be added in one year to a fund which has reached the respectable sum of over two million dollars, when every employé of the office is so crowded with work as to cause hurried performance and unnecessary delays, and to give occasion for the litigation which is making patents such uncertain property. A reasonable employment of the annual surplus in the payment of salaries to an additional force will do much toward reforming existing evils. Last year, the Patent-Office received 31,522 applications, and 20,518 patents were granted and certificates were issued.

THE tariff debate in both houses of Congress drags on wearily with little prospect of a settlement. The Senate has gone over its former work, and by a disgraceful system of log-rolling has again changed a number of very important rates, among which a series in the metal schedule are prominent. As a general thing, the amendments carried have provided for higher duties, the champions of the iron and steel interests leading in the fight for the good cause. The irrepressible iron ore men have once more appealed with characteristic modesty for $1 per ton, and when they could not get that, stood out bravely for 75 cents, which, also, was denied them. The pig-iron producers rejoice in a little victory, which, however, we fear, will not save them from the ruin that is staring them in the face. Nothing but a duty of $7 per ton can do that, and the $6.50 rate passed can only prolong the agony, which would have been brief if the former reckless decision of the Senate to reduce to $6 had been adhered to.

In the House of Representatives, the steel clause was amended so as to make the duty 45 per cent *ad valorem*. The wire cloth and netting duty was changed to two cents in addition to the rate paid for the wire of which it is made ; iron wire rope has a similar additional rate of one cent, and steel rope of two and a half cents. Nickel has received another blow, which will place Mr. JOSEPH WHARTON, of Philadelphia, according to his own statement before the Tariff Commission, in the disagreeable position of being forced to close down his poor mine and close his unremunerative works. The House makes the duty 15 cents per pound.

The proceedings of Congress are no longer watched with eager interest, because it now seems pretty well settled, as we have stated on previous occasions, that nothing will be done. The agitation has undoubtedly done much harm to the business interests of the country. But though it has stayed the current of trade, it can not check for a long time the very favorable influences now at work. There is every assurance now that our farmers will get very liberal prices for the remainder of the heavy crop of last year. Our exports are going on at an increasing rate, and when buyers in all branches have begun to replenish their exceptionally depleted stocks, the wheels of trade will move at a much more rapid rate than at present.

TAXATION OF MINES IN COLORADO.

We publish this week the text of a bill which has just passed the lower house of the Colorado Legislature, and is now pending in the Senate. It is the natural consequence of the failure of the local officers in Leadville to extort a tax on profits from the mining companies there two years ago. The mining companies united to resist this attempt, and the courts decided in their favor. The sovereign authority of the State in matters of taxation is, however, of course, competent to impose even an onerous, unjust, and impolitic tax ; and to this authority appeal has now been made in the supposed interest of the farmers and ranchmen, who would rather squeeze individuals and companies engaged in mining than pay taxes themselves. The former attempt to tax the profits of mines was pronounced illegal because the legislature had provided no definite method and means for the assessment and collection of such a tax. This deficiency the present bill supplies. It provides for annual returns to be made under oath, showing the gross product of each mine, the amount of ore reduced, and the actual cost of mining, hauling, and reduction ; and it declares the "net proceeds" to be subject to the usual assessment and collection of personal taxes, which are to be collected of the owner *or lessee*, and yet are to be, in default of payment, a lien on the mine itself—personal taxes, collectible on real estate !

The injustice of this tax consists in its character as an income-tax, levied on a single industry, while all others are exempt. Farmers, ranchmen, and merchants are not obliged to make annual exposure of their transactions, and to pay a tax on their profits. So far as taxes on personal property are concerned, this law would cause the same property to be twice taxed ; for the profits of a mining company, divided among its stockholders, would become their personal property, and as such liable to taxation.

The hardship of the proposed special tax, if it should be put into practice, would be found in the fact that it is to be assessed and collected by the county authorities. In the mining counties, the capital employed in mining would thus be exposed to plunder without protection. A uniform tax, levied by the State, would be infinitely less alarming. There is, under this bill, no limit to the amount which "rings," such as the one which a couple of years ago governed Lake County, might extort from helpless mine-owners under threat of confiscation.

The impolicy of such taxation is plain enough. To invite capital into a frontier region by every kind of glowing promise ; to encourage "permanent investments" of large sums, and then to treat the investor as "fair game" for the pot-hunters of politics, is a course which brings its own swift punishment. The mining industry of Colorado is not so prosperous that it can bear burdens not carried by any other. The new splendors of Denver bear witness to the profits realized by selling mines, not working them. And already it has become far less easy than formerly to sell Colorado mines, since Colorado juries have practically nullified the law which was intended to protect the rights of mine-owners. If the Legislature now joins in this short-sighted policy, there will be additional reason for capital to avoid that State and seek regions where the era of such oppression has not yet begun. The value of every mine, every

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town lot, every mile of railroad, every stock of goods, every business in the State, will be affected by a measure which strikes thus at the industry constituting the real foundation of the whole.

We trust that the Senate or the Governor will refuse to take part in such a cow-boys' raid. *

Since the above article was written, we have received news that the bill has passed the Senate; and our *informant* adds that it will doubtless be signed by the Governor. The leading journals of the State denounce it as unconstitutional (which may or may not be the case) and outrageous which is certainly the case). We only wish its effects could be confined to the unscrupulous demagogues who *contrived it.*

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Increase of Richness with Greater Depth.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In Overman's *Practical Mineralogy* I read of the Washington and other mines in North Carolina and Virginia as being veins of pyritous talcose slate, yielding from 12 to 60 ounces of silver, worth about $2 to the ton. Now, I know of similar veins here, situated in the heart of a rich mineral region, which are passed by and apparently despised by every prospector that comes along. Some of these have been worked to a depth of ten or fifteen feet, and abandoned because the assays do not exceed, at that depth, five or ten dollars. Overman says that this class of mines is really of more worth than those that assay much higher, and I am inclined to believe his conclusions are good. From what is known of such mines in the States mentioned, is it not probable that those here will increase in value at a greater depth; and if so, what would be the probable depth at which twenty-five ounces to the ton could be reached? Could not these mines be made to pay as they stand, starting say with five or ten dollars? A little light on this subject will much oblige yours respectfully, W. R. M.

NEPHI, JUAB CO., UTAH, Jan. 24.

We have been unable to find, in the work cited, the passage alluded to; but there is evidently an error, either in our correspondent's quotation or in the original, as from 12 to 60-ounce silver ore is worth more than $2 to the ton. We do not believe that our correspondent or any one else is safe in reasoning that, because ore has grown richer with greater depth in one district, it will probably do so in another. There are striking instances both of enrichment and of impoverishment in depth, and only actual development can serve as a guide in a new district.

American Companies in Sonora.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Your JOURNAL of December 30th contains a communication headed "Mining Matters in Sonora, Mexico," which needs a few words of correction. The Mulatos mine, requiring millions of dollars for its purchase and working on a grand scale, and also an intelligent, economical, and honest management, is not a mine for American capital to invest in. Let the Mulatos go to England, where they know how to work mines. I know the Mulatos mine well, and also its "beans and tortillas" eating proprietors.

As far as the *fiasco* of Santa Maria is concerned, I can state, that half of the foreigners here believe it a *fiasco*, while the other half think that it will come out all right. The truth will become known after the big mill, now building, has been at work for some time.

But why does your correspondent not mention the Delicias mining enterprise, it being the only American company in this State that is properly managed? Its sixty-stamp mill is in Guaymas, and when in operation will make the Delicias one of the best paying mines in Sonora.

The Subiate, now in bonanza, and sold for $250,000 to English capital, will turn out a pearl of a little mine. It was first sold to an American company; but as the parties sent out a manager who pronounced it "no mine" without going into it, the purchase was not completed, and the company lost $60,000. Was this the fault of Sonora?

The Prietas Company, now at work again, is making large shipments of gold bullion. During the litigation, the mine was opened to a very considerable extent, and it is certain that there must be ore enough in sight to run the mill for some time. As regards the third, 315-foot (deepest) level, some say that it is all in *borra*, while others say that with it they struck a big silver bonanza.

The San Antonio Company was got up by an irresponsible party, and was poorly managed. Is it the fault of Sonora that hundreds of thousands were sunk there? Certainly not, since in fifty—nay in a hundred—other mines the money could have been laid out to advantage.

The Juarez built up a mill before they knew whether or not they had any water to run it with. Was that the fault of Sonora?

The Felicidad was started with insufficient means, and, although warned on all sides, took Mexicans in as partners. A litigation was the consequence, and bad management did the rest. Was this the fault of Sonora, the mine being a good one? Certainly not.

The San Juan de Dios Company put up a twenty-ton smelter, for which the ore of the mine is not fit, it being milling not smelting ore. The mine has changed hands, and will be brought on the market as a paragon, which it is not. It may, however, turn out a good little mine. The management has so far been an exceptionally poor one.

The El Plomo, near Altar, is running, with what result I do not know.

In the Carbonera District, a carbonate mine was recently sold to New Yorkers for $36,000. It is worth that, if worth any thing at all.

It is rumored that a syndicate is forming to purchase and work the old mines belonging to Mr. Alsna.

Nine out of every ten American mining enterprises turn out *fiascos*, because they are got up by irresponsible parties and are poorly managed. Is Sonora, is Mexico, to blame for that?

Sonora has a hundred more mines which could be worked to advantage, if the mine-owners and the capital could be brought together, without the intermeddling of the leeches by whom the State is overrun. Change your mode of acquiring mines and working them, and you will obtain different results. Lay the blame where it belongs. J. J. M.

HERMOSILLO.

OFFICIAL STATEMENTS AND REPORTS.

HECLA CONSOLIDATED MINING COMPANY, GLENDALE, MONT.

Mr. H. Knippenberg, general manager, and the chiefs of departments of the Hecla Consolidated Mining Company, have made a clear, straightforward and full report on the affairs of the company, from which we gather the following facts: The gross profits for 1881 were $237,729.75, and for 1882, $239,564.98, a total of $477,294.74, which was applied as follows: $77,785.13 to the payment of a debt left by the former management, $180,000 in dividends, $20,307.72 for permanent improvements in 1881 and $75,621.21 in 1882, $20,800 for charcoal, $16,524.43 for wood, $3400 for iron ore, $13,014.74 for ores, $2000 for timber on hand, and $57,841.51 cash on hand over and above all indebtedness, not counting an account of the increased quantity of supplies on hand. The following is the statement of the cost of the concentrator which we described and illustrated in our issue of December 9th, 1882:

Labor	$11,387.16
Machinery, water-wheels, etc.	9,675.68
Water-pipes	5,018.13
Logs and lumber	2,208.83
Roofing	1,164.12
Nails	394.35
Sundries and services	1,005.51
	$30,853.78

Mr. Knippenberg speaks highly of the working of the plant, though as yet no figures could be submitted. Mr. James Parfet, the superintendent of the mines, reports that $85,186.72 were paid out for dead-work and permament improvements, of which $10,424.84 went toward the driving of the Lion Mountain tunnel and $20,493.44 for shafts and drifts on the Sheep Fissure, Atlantis, and Ariadne mines. He estimates that the reserves of second-class ore amount to 50,000 tons, sufficient to keep the concentrator running day and night for two years, and most of that required for one year is mined. The output in 1880 was 11,475 tons, at a cost of $14.50; in 1881, 9360 tons, costing $14.89; and in 1882, 12,192 tons, costing $13.45 per ton, including cut-off, concentrator, and construction.

Mr. George G. Earle, superintendent of the furnaces, reports that 11,345 tons of ore were reduced; and, as illustrating the importance of concentrating, he states that in this 4311 tons of silica had to be smelted. Mr. Earle furnishes an interesting table of the production and consumption of the furnaces during the year by months. The totals for the year are as follows:

PRODUCTION.

Lead, tons	2,492·00
Matte, tons	325·00
Silver in lead, ounces	512,791·90
" " matte "	34,962·25
Value of gold	$6,145·00
Pounds copper	229,708·00

CONSUMPTION.

Gross tons of ore	12,144
Net tons of ore	11,345
Iron ore	5,340
Limestone	5,328
Slag	4,782
Matte	1,164
Charcoal, bushels	685,323
Coke, tons	1,467

The quantity of fuel used was therefore 238 bushels of charcoal and 102 pounds of coke, the net ton of mixture costing $4.99, the charcoal costing 14 cents per bushel, and the coke $32.75 per ton. The average percentage of lead in the ore was 31 per cent, of silver 47·5 ounces, and of silica 38 per cent. The average assay of slags was 2·1 per cent of lead and 0·9 ounce of silver. The discrepancy in the yield of lead, apparently showing a loss of 29 per cent, is accounted for first all by loss in slag, and metal in matte, flue-dust, etc., on hand, which reduces it to 13 per cent, while there is an apparent gain in silver of 9867 ounces. The reason for this is that the principal ore smelted, that from the Cleopatra, comes in fines and lumps, the former carrying more lead and the latter more silver. In order to avoid the cost of crushing the lumps for sampling, only the fine ore was assayed, thus causing the apparent excessive loss of lead and the gain in silver. Mr. Earle also submits very interesting detailed records of the causes of stoppage of the two furnaces. According to it, during the year one furnace lost 10 days 15 hours by cleaning, 9 days 18 hours by repairs, 13½ hours by repairs to machinery, 21 days by want of fuel, and 5 hours by high water. The second furnace stopped 10 days 5 hours because it had to be cleaned, 3 days 17½ hours for repairs, 13½ hours for repairs to machinery, 9 days for want of fuel, 5 days for want of ore, and 5 hours for high water, making a total stoppage of 42 days 3½ hours for the first and 28 days 17 hours for the second.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Lode versus Placer Claims.—Secretary Teller has recently rendered the following decision:

I have considered the case of the War Dance claimants *vs.* the Church Placer claimants, Russell Mining District, Gilpin County, Colorado, on appeal from your decision, holding that the lode claimants are not entitled to lode or surface ground lying within the limits of the placer. The War Dance lode was located some fifteen months subsequent to the Church placer. A question of fact is presented as to whether the lode (Survey, No. 585) was known to exist within the boundaries of the placer claim at the time of the application for a patent for the placer claim. This question as to a knowledge of the existence of the lode arises upon the first official survey, made by Deputy Locke in 1876. A lode seemed to be indicated upon that plat. It was asserted subsequently, by the Deputy-Surveyor Rank, that what seemed to be a lode upon the plat of such survey, "running through the northeasterly part of the placer, appeared to be only a porphyry dike which had never been surveyed or claimed by any body." On the other hand, it was claimed that the

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so-called porphyry dike and the War Dance lode were identical. Such being the state of the question, November 22d, 1881, you directed the Surveyor-General "to make the proper examination and necessary inquiries to determine the question of identity." The result of such examination, contained in the report and plat made to the Surveyor-General, February 24th, 1882, by Benjamin H. Smith, examiner, establishes the fact that such formation, designated as a porphyry dike, is distinct from the War Dance lode, and is evidently, as stated in such report, what seemed to be "the lode mentioned in the original survey of the Church placer." As the proof stands, I think it is established that the lode claim known as the War Dance was not known until more than fifteen months subsequent to the date of the entry of the Church placer claim. But, however the foregoing question of fact may be found, it is insisted by the War Dance claimants, as the law of the case, that, if the existence of a lode becomes known at any time before patent is issued for the placer claim, then the lode and the surface ground pertaining thereto must be excluded from the patent. In the late case of Becker *et al. vs.* Sears, I considered the construction which I thought ought to be given to Section 2333, United States Revised Statutes, and held that such section "carves out from a patent to a placer claim all known lodes found therein at *date of application*, together with twenty-five feet of surface ground on both sides as incident thereto." The converse of that proposition necessarily follows, namely, that where the existence of a vein or lode in a placer claim is not known at the date of the application, then the "patent for the placer claim shall convey all valuable mineral and other deposits within the boundaries thereof." Your decision, therefore, to the effect that, "as the War Dance claim was not known until long after the date of entry of the placer claim, the lode claimant is entitled to neither lode nor surface ground, within the placer limits," is affirmed.

Alkali Lands.—The following letter has been addressed to the Commissioner of the General Land-Office:

I transmit herewith letters from Hon. John P. Jones, Senator from Nevada; Hon. W. S. Rosecrans, member of Congress from California; Messrs. Whittemore and McKee, attorneys-at-law, San Francisco, Cal.; and W. W. Morrow, Esq., of Washington, D. C.; all in relation to entries of public lands in the States of California and Nevada, containing valuable deposits of borax. My attention is called to the fact that these deposits, although valuable, are not of sufficient value to permit their being entered under the mining laws, if the recent circular approved by me September 22d, 1882, and its amendment of December 9th, 1882, are applicable to entries of land containing borax and other similar valuable deposits. It was early determined by the department that the act of May 10th, 1872, which described certain lands containing valuable mineral deposits, was applicable to lands containing deposits of borax, carbonate and nitrate of soda, sulphur, alum, and asphalt; and I believe that, from the passage of the law until the present time, "valuable mineral deposits" has been held to include the minerals and alkaline substances named. I understand that borate lands have been allowed under the provisions of the act of 1872, and the regulations made in accordance therewith. It is the desire of persons interested that the regulations which were in existence having special reference to the application for patent for placer claims, namely, the circular of October 31st, 1881, should be continued in force so far as they relate to deposits of borax, etc., as mentioned above. Believing that practical effect should be given to the mining laws of the United States, I am of the opinion that, to apply the new regulations to such entries would result in excluding such lands from sale, and depriving the people of the benefit of the use of these natural deposits. I therefore direct you to permit the entry of public lands containing valuable deposits of borax, the carbonate and nitrate of soda, sulphur, alum, and asphalt in the States of California and Nevada, and the territories of Arizona, Utah, and Wyoming—in which section of the country, I am informed, these deposits are present—under the regulations of October 31st, 1881.

In addition, however, an applicant for patent for public lands containing deposits of borax, etc., as above, must affirmatively show that the lands entered are not valuable for any other purpose than the one for which application is made. It will therefore follow that the circulars of September 22d and of December 9th, 1882, are not applicable to entries of the lands thus described and excepted. Very respectfully,

HENRY M. TELLER, Secretary.

The immediate cause of the above decision originated in an intended application—under the then existing regulations—for land in Southeastern California, known as Death Valley or "desert region," which was suspended because of the amended circular referred to; the applicants not deeming it a good business transaction to go to the heavy expenses incident to proceeding to patent a large number of locations in separate applications for patents. These lands form a vast desert plain, difficult and dangerous to traverse, owing to the absence of water and to intense heat. The public surveys were extended thereto as far back as 1858 or 1859, but no sales or disposals were ever made thereof, as the lands are not habitable, and no towns or villages within hundreds of miles. The tract is simply a dreary arid waste, the dazzling appearance of which is occasionally relieved by clumps of mesquite bushes. The places where these alkalies are found are much scattered, and have the appearance of beds of ancient lakes long since dried up. Pools of bitter water are still standing at some points, gradually undergoing the process of evaporation, leaving the alkali deposits incrusted on the sides or bottom. The construction of reduction-works, the making of roads, bringing the necessary water, and other improvements, involve an immense expense before any returns can be received. This decision is not only in accordance with former instructions—before the circulars named were issued—but also accords with the decision of the United States Supreme Court in the case of the St. Louis Smelting and Refining Company *vs.* Thomas. Simplified, the above decision is, that lands containing deposits of borax, carbonate or nitrate of soda, sulphur, alum, and asphalt, if not valuable for any other purpose, are not confined to entry under the mineral law, but are subject to disposal under the general laws governing the disposal of the public domain. It is not many years since nearly all of the salts of the kind now found in the great Western desert plateau were imported from distant foreign countries—notably Peru and Persia. The Duponts, powder manufacturers, were about the first, if not the first, to utilize these deposits by buying a large tract of land in Nevada, from the government, at the nominal sum of $1.25 per acre.

THE BILL FOR THE TAXATION OF MINES IN COLORADO.

A bill for an act to enable the county commissioners to assess and collect a tax upon the net proceeds of mines.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. All ore and mineral-bearing material of whatever character, when broken, not in the mine, vein, ledge, or deposit, or broken and raised to the surface, shall be assessed for the purpose of taxation in the manner following, to wit:

First. From the gross yield returned or value of all such ores or mineral-bearing material, of whatever character, there shall be deducted the actual cost of extracting such ores as mineral from the mine, the actual cost of transportation of such ores or mineral-bearing material to the place of reduction or sale, and the actual cost of such reduction or sale, and all other actual and necessary costs of mining, shipping, and all necessary expenses attendant upon the prospecting, working, and development of said mines, and reducing such ores or mineral-bearing material; and the remainder thereof shall be assessed and taxed as provided for in this act.

SEC. 2. It shall be the duty of the several county assessors within this State to compile and complete, on or before the 25th day of June in each year, a tax-list or assessment-roll of the proceeds of all mines in their counties, arranged in a book to be furnished by the board of county commissioners for that purpose, in which book shall be listed and assessed the proceeds of all mines in their respective counties, as provided for in this act. It shall also be the duty of the assessor of each county, on or before the first day of May in each year, to deliver to every person or firm, owner or lessee, superintendent, treasurer, managing director, or agent of any corporation, association, firm, or company, owning or operating any mine or mines in his county, a written or printed notice, requiring him to make out and return to the assessor, at a time and place therein specified, a statement or list of all ores or mineral-bearing material extracted from such mine or mines during the year ending on the said first day of May, and the number of tons of such ores or mineral-bearing material treated, reduced, or sold during the same period, together with the amount of the gross yield of such ores or mineral-bearing material, and the cost of breaking, raising, transportation, and reduction of the same; *provided*, that in the statements or lists of gold-bearing ores treated by the stamp-mill process, the return may be of the gross yield of all ores treated by such stamp-mill process, together with the cost of mining, transportation, and reduction of the same. The said assessor shall furnish to each of such parties as above mentioned a blank, upon which such statement or list may be made, which blank shall be provided by the county commissioners, and shall be in the following form, to wit:

Name of mine.	Description of location of mine.	Name of owner, company, etc.	No. of tons extracted for the year ending May 1.	No. of tons treated, reduced, or sold during same period	Amount of gross yield of such ores.	Cost of breaking and raising.	Cost of transportation.	Cost of reduction.	Net proceeds.

SEC. 3. It shall be the duty of the owner or owners of any mine or mines yielding or producing any ore or mineral-bearing material, whenever such ore or mineral-bearing material yielded or produced during the year ending on the 1st day of May next preceding shall amount to the sum of $50 or more, reckoned as in Section 1 of this act, to make out, sign, and swear to, and deliver to the assessor a report of the amount and assessable value of such ores or other mineral-bearing material, which report or list of such amount shall be in form as provided in Section 2 of this act. In all cases where mines are worked by incorporated companies, joint-stock associations, mining or other partnerships, the general manager, superintendent, or agent having the control of the operations of such mine, shall be held to be the person whose duty it is to make such annual reports.

SEC. 4. The lessees of any mine producing or yielding any ore or mineral-bearing material that may be liable to assessment under the provisions of this act shall be held and deemed the owners of such property for he purpose of making such annual returns of all such assessable material as shall be produced or yielded during the term of their lease, and shall be held liable the same as though they were the owners of such property.

SEC. 5. In case of the neglect or refusal of the person, or firm, owner, or lessee, president, superintendent, treasurer, managing director, or agent of any corporation, association, firm, or company to give, under oath or affirmation, the statement required in Section 2 of this act, on or before the 20th day of May, in each and every year, the assessor, or his deputy, may make an estimate, from the best sources within his reach, of the number of tons and the value per ton of all ores, quartz, or other mineral-bearing material extracted by such person, firm, owner, lessee, corporation, association, or company during the next preceding year, and assess the same to them, and such assessment shall be as binding, lawful, and effectual as if made upon a sworn or affirmed statement.

SEC. 6. Any person, or firm, owner, or lessee, superintendent, treasurer, managing director, or agent of any corporation, association, firm, or company owning or operating any mine or mines yielding or producing any ores or mineral-bearing material subject to taxation, and required by this act to list the same, as provided in Section 2, and with whom the assessor shall have left a notice requiring him to make out a

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statement of such property for taxation, who shall fail, neglect, or refuse to do so as herein required, or who shall return a statement known to be erroneous or defective, either as to the description or value of the ores or material listed therein, or who shall willfully make or fail to make in such list any statement whatever, whereby he shall avoid any assessment of taxes proper to be made against him, shall be subject to a penalty of not less than five hundred nor more than two thousand dollars, to be recovered by the county commissioners, for the use of the county, in any court of competent jurisdiction; and it shall be the duty of any assessor or treasurer having knowledge of a violation of the provisions of this section to report the same to the district-attorney.

SEC. 7. If any person shall willfully make or give under oath or affirmation to the assessor a false statement, either as to the description or value of the ores or material listed therein, or as to the net proceeds of the same, such person shall be deemed guilty of perjury, and, upon conviction thereof, shall be punished therefor as is by law provided for the punishment of perjury.

SEC. 8. Every tax levied under the authority or provision of this act on the proceeds of the mines is hereby made a lien on the mine or mining claim from which such ores or mineral-bearing material have been extracted, which lien shall attach on the first day of May of each year, and shall not be satisfied or relieved until the taxes levied on the proceeds of such mine are all paid, or the title of such mine or mining claim is absolutely vested in a purchaser under a sale for taxes levied on the proceeds of such mine or mining claim.

SEC. 9. The collection of the tax authorized to be levied under this act shall be enforced in the same manner in which the tax on personal property is enforced and collected under the acts relating to revenue now or hereafter in force; and in case no sufficient personal property can be found by the collector of taxes, out of which such taxes can be made, the same may be collected by the sale of the mine or mining claim upon which such tax may have become a lien, in the same manner provided for in the act relating to revenue for the collection of taxes due on real estate; and the purchaser at any sale of any such mine or mining claim so made shall be entitled to a deed for such property, or such portion as may have been sold at any tax sale, at the same time and on the same conditions as purchasers of other real property at tax sale.

SEC. 10. In all sales of any mine or mining claim for such taxes, such sale shall be held and deemed to be of the interest which the owner has therein, whether the same be in fee or the possession, right of occupation and enjoyment of such property, and shall not in any manner interfere with the right of the government of the United States to any property title to which remains in the government.

SEC. 11. The net proceeds of all mines shall be assessed and taxed in the county wherein the mine or mines are located.

SEC. 12. The assessment, levy, and collection of all taxes under this act shall be made in the same manner as all other taxes are assessed, levied, and collected under the laws now in force in this State, except as otherwise provided for in this act.

Emergency Clause—*Whereas*, In the opinion of the General Assembly an emergency exists, this act shall become law immediately upon its passage.

THE BOSS "CONTINUOUS SYSTEM" OF PAN AMALGAMATION.

In crushing wet, water is brought into contact with the ore during the act of pulverizing, which facilitates its discharge through the screen, and consequently crushing, when done by stamps, is less restricted. The finely-pulverized ore passes the screen in the form of muddy water, which by universal custom has been run into tanks or vats to settle. When a tank has settled full of sand, it is shoveled out, the sand or pulp being deposited in front of the row of pans. When a pan is ready for a charge, the sand is shoveled into it, adding water to obtain the desired consistency. At the proper time, quicksilver is added, to absorb the precious metals, or, in other words, to amalgamate them. The pan has a revolving muller which stirs and circulates the contents, producing contact among the particles of pulp and quicksilver. A charge is usually treated from four to six hours, when, by drawing a plug at the bottom of the pan, the entire contents are run into a settler. The latter in some respects resembles a pan, but is larger, and the revolving of the muller is slower. In this settler more water is added, the object being to precipitate all the quicksilver, but none of the sand. After running for a time, the quicksilver carrying the precious metals is drawn from the bottom of the settler, and the charge runs off through a plug-hole a few inches above the bottom. The shoveling of mud from the tanks, distributing it in front of the pans, and shoveling it again to charge the pans, involve much labor. The pans and settlers also require much attention. There is more or less wastage of ore from the tanks, mud being spread everywhere inside and outside the mill. In running off the settlers, more or less quicksilver is flooded away.

When crushing dry, the ore is first dried by heat, and the ore, when finely pulverized, passes the screen in the form of dust instead of mud. The dust passes the screen much more slowly than the wet ore, consequently the amount of work is much less. For this reason, dry crushing is generally confined to such base ores as require roasting. The pan treatment is similar in both cases; but less labor is involved in handling the dry ores than the wet.

Two years ago last May, Mr. P. Boss, a well-known milling engineer, of San Francisco, took up the plan of what he styles "continuous" working, at the Noonday mill, of Bodie, Cal. Referring to the illustration, he describes his "Continuous System" as follows:

The pulp, when wet-crushed, is run from the battery through a pipe to a receiving or sampling-bowl *a*. If the pulp is roasted, or dry, it is brought to this bowl by a screw or other conveyer. This bowl *a* is connected with and has a discharge into each of the first two pans, Nos. P' and P^2. Ordinarily the opening to No. 2 is plugged, and all the pulp runs into No. 1. When No. 1 is once filled, it overflows constantly into pan 2, through a pipe *b* connecting them. In the same manner, pan No. 2 overflows into No. 3, No. 3 into No. 4, etc., throughout the series. These connecting-pipes *b* are all about seven inches from the top of the pans. Each of the last two pans of the series has an overflow-pipe *c*, leading into the settler S^1, but ordinarily the last one only is used. The system is so arranged that any pan can be "hung up" or cut out of the system. In case No. 1 needs repairs, the pulp is run directly from the battery into No. 2. If the last of the series is disabled, the next preceding is made to overflow directly into the settler. Any intermediate pan may be cut out by using the steam siphon *n* to carry the pulp around. A quicksilver bowl *g* is attached to each pan, by which the quicksilver can be drawn at any time, which is done by pulling a plug to a pipe leading to the strainers. As soon as all is run out, fresh is let in from the charging-bowl *m*. This charging may be done as often as desired. The pulp flows through the settlers in a manner similar to the pans; but the connecting-pipes *e* are on an incline, and there are stationary pipes *f* to carry the pulp around when one is cut out. From the last settler the tailings flow away.

It will be perceived that, by this method, there is no handling of the pulp whatever; that the ore comes in contact with fresh quicksilver several times in its course; that all quicksilver that escapes must flow through all the settlers; and that there can be no flooding, there being a constant, easy current. It will also be seen that the actual principle of amalgamation is the same whether by charge or by the continuous system. In either case, the pan produces contact of pulp and quicksilver, the result of which is amalgamation. It is not claimed that its action inside the pan differs materially from the old charge system. They are virtually one and the same process, the "Continuous" having some advantage from its frequent change of quicksilver. A fault in the action of the pans or settlers which may not be glaring by the old way is ruinous by the new; for it is a fundamental principle that concentrations must not accumulate in either; also, that in the pan the quicksilver must circulate vigorously throughout. There is no ore so light but that a correct pan can circulate the quicksilver through it. There is no ore so heavy but that pan and settler can be made to circulate it without concentrating.

Some trouble was at first experienced in this direction in the Sierra Grande twenty-stamp mill, Lake Valley, New Mexico, where a twenty-stamp mill was built on the Boss plan. The mill was hurriedly finished, and low wages hired only poor and inexperienced hands. At first, the settlers would accumulate concentrations and stop; but this trouble was overcome, and a test made by Mr. E. D. Town, superintendent of the mill, against the old way, showed that a higher percentage of silver was obtained with good ore, that the loss of quicksilver was less, and that a smaller amount of water was used. On certain ores, the yield was not satisfactory; but this is, very probably, due to the high percentage of manganese in some of them. An analysis of the tailings for five months showed 39 per cent of oxide of iron, 27 per cent of oxide of manganese, 5 per cent of lead, 6 per cent of lime, and 23 per cent of silver.

It has been argued by some that, as with some ores, the pulp would carry only one half as much sand as in ordinary working, it would be necessary to have twice as many pans in order to subject the ore to the same number of hours of treatment. But experience so far shows that all the time is made up by the rapid currents of the thin pulp, and that the same number of pans, by the continuous system, will treat as much ore in a given time.

The Boss system has been thus far introduced at the Noonday, Bodie; the Harshaw, Arizona; the Lake Valley, New Mexico; and the Prietas, Sonora, mills.

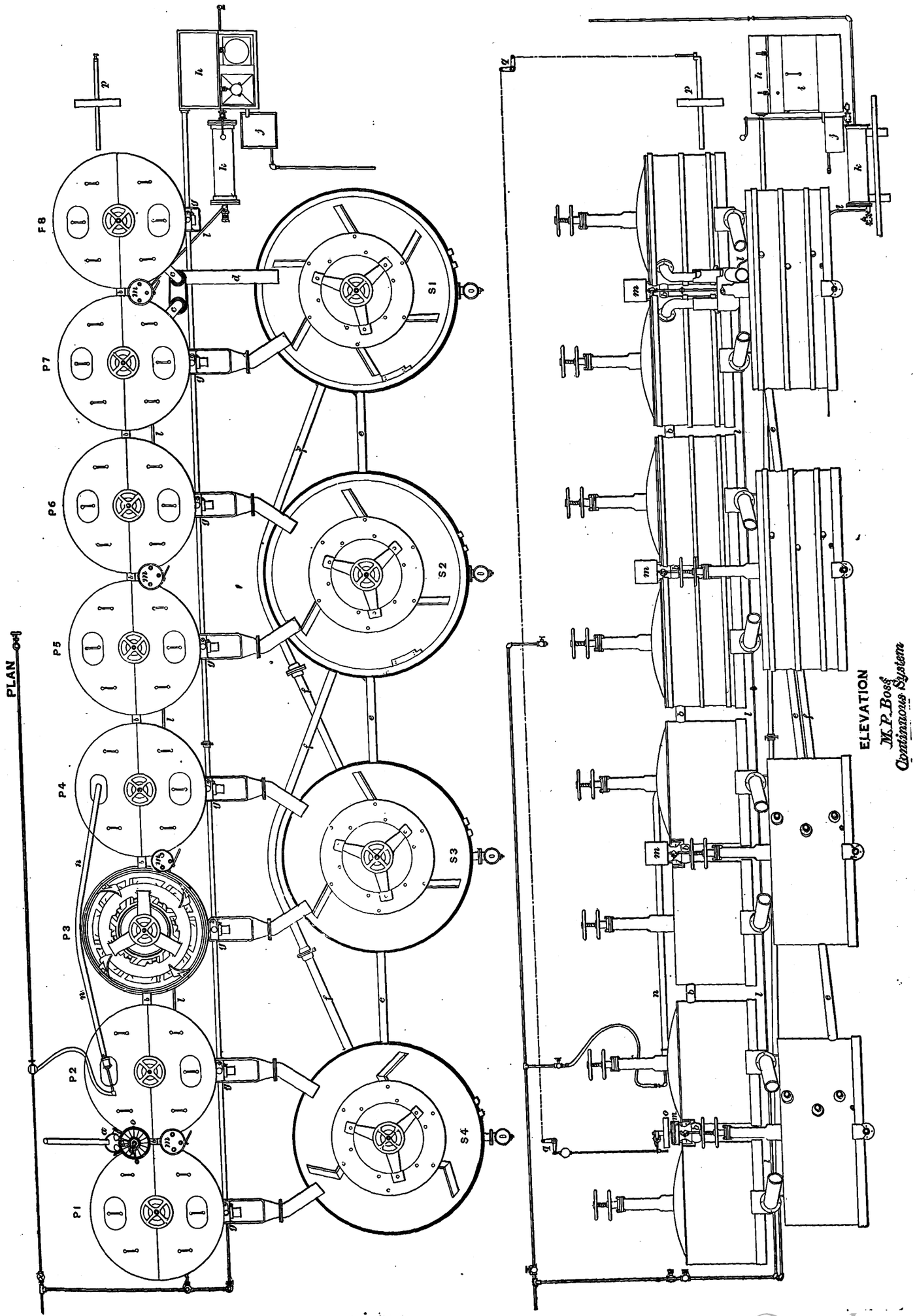
The Noonday was a thirty-stamp mill, afterward increased to forty stamps, and had twenty-four pans. The system has given complete satisfaction for more than two years and a half, giving a rather better percentage. The loss of quicksilver was reduced from an average of one and a quarter pounds to .67 of a pound per ton of ore. The pay-roll was reduced forty-four dollars per day. In the Harshaw mill, the capacity was increased and the percentage of yield improved by one and four tenths by assay average. At the Prietas forty-stamp mill, where the ores were very heavy, more than three fifths of the time the tailings showed merely a trace of gold, being too small to weigh. At the Noonday, the Harshaw, and the Lake Valley, severe tests were made, extending over a period of weeks, of the continuous against tanks, since when none of them has used tanks.

THE HOWE CULM GRATE.

The Scranton *Republican* has the following notice of the Howe patent grate for using culm, which has been in use at the Lackawanna Iron and Coal Company's works: It works with two levers, and in two minutes' time a laborer can clean all the ashes and clinkers from a furnace which, with the old process of using a poker, would take him half an hour to perform. It is a great fuel-saving invention, because, in furnaces where it is placed, culm can be burned instead of large coal. Culm will come into general use in course of time in consequence of this important invention. Mr. B. Niebell, engineer of the Lackawanna Iron and Coal Company, says that, as soon as the company puts the grate into all of the furnaces, it can do away with one boiler from each nest. Culm makes more steam than coal when used in furnaces having this patent grate, because neither time nor steam is lost in cleaning the furnaces of clinkers and slate. With this grate, the boilers are making steam constantly, and are not cooled off, as they were formerly, when the doors were opened to clean the fires. The device is very simple in its construction, and can be taken from the foundry and put into the furnace without any fitting. It acts somewhat on the principle of a pair of shears, the grate being one blade and the knife-edged oscillating bars the other blade. When the handles are pushed from the operator, the fires are loosened up; and when the handles are pulled back, the blades cut the clinkers.

THE Denver & Rio Grande Western Railroad has been carrying coal from the mines of the company at Pleasant Valley into Salt Lake City since the first of the year, and has entered into sharp competition with the Union Pacific Company, which has sold its coal from Knox Springs and Webber in Salt Lake City. The prices of coal under this competition were reduced from $8 to $5.25 per ton in car-load lots at Salt Lake City on January 15th. The Pleasant Valley coal is of superior quality, and is preferred by manufacturers to other coals obtainable.

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THE PRODUCTION OF PIG-IRON IN 1882.

Mr. James M. Swank, Secretary of the American Iron and Steel Association, announces the actual production of pig-iron in this country in 1882. In that year, our blast-furnaces produced 5,178,122 net tons, or 4,623,323 gross tons, of pig-iron. In 1881, the production was 4,641,564 net tons, or 4,144,254 gross tons. The increase in 1882 over 1881 was 536,558 net tons, or 479,069 gross tons, which is over 11 per cent. The following table gives the production of anthracite, charcoal, and bituminous pig-iron in 1882, compared with 1881 ·

Kinds of fuel.	Tons of 2000 pounds. 1882.	1881.
Bituminous	2,438,078	2,268,264
Anthracite	2,042,138	1,734,462
Charcoal	697,906	638,838
Total	5,178,122	4,641,564

The production of 1882 exceeded that of any previous year in every respect. More bituminous pig-iron, more anthracite pig-iron, or more charcoal pig-iron was made than was ever produced in any one year before.

The stock of unsold pig-iron in makers' ha ; at the close of 1882 was over twice as large as that at the close of 188.. The stock at both periods is shown in the following table :

Kinds of fuel.	Tons of 2000 pounds. 1882.	1881.
Bituminous	157,196	36,495
Anthracite	107,259	90,351
Charcoal	165,239	84,050
Total	429,694	210,896

The stock of both bituminous and anthracite pig-iron on hand at the close of 1882 is thus seen to have been light, but that of charcoal pig-iron was very heavy, amounting to almost one fourth of the production for the year of that kind of iron.

As our imports of foreign pig-iron in 1882 amounted to about 540,000 gross tons, and the producers of pig-iron had 188,300 gross tons on hand unsold at the beginning of 1882, as compared with 383,655 tons at the close of the year, our probable consumption of pig-iron in 1882 was about 4,967,968 gross tons, against a probable consumption of 4,982,565 tons in 1881.

The condition of the furnaces of the United States on January 1st of the present year is shown in the following table, as compared with their condition one year previous :

Date.	Completed furnaces.	In blast.	Out of blast.
January 1st, 1883	687	417	270
January 1st, 1882	701	446	255

THE COPPER DEPOSITS OF ADAMS COUNTY, PENNSYLVANIA.

Written for the Engineering and Mining Journal by J. Trowbridge Bailey, M.E.

The results arising from recent developments in the copper fields of Adams County, Pa., have caused such enterprise and interest to be manifested, as to induce considerable amount of capital to seek investments in this locality for purposes of investigation and exploration. I have quite recently had occasion to visit and examine the deposits in question, and some information regarding them I think likely to prove of interest. A number of companies have been organized for the purpose of developing and working the deposits, and the results of these undertakings have from time to time formed the topic of discussion in several local journals. Prominent among the enterprises of this nature are the Harrisburg Copper Mining and Smelting Company, the Headlight Copper Company, and the South Mountain Copper Mining Company. The two first mentioned are at present in active operation ; the work upon the latter company's property, however, has for some reason been discontinued.

The fact that copper has existed in quantities sufficient to prove commercially valuable in our Eastern sedimentary and primary formations has been known for many years. From Nova Scotia to Georgia, the deposits have been worked and remuneratively so in many sections of the Appalachian Mountains, both upon their eastern and western slopes. The deposits discussed below are located in that portion of the great Eastern mineral belt lying within the counties of Adams and Franklin in Pennsylvania and Frederick and Washington in Maryland, or more specifically, the mineralized zone is confined to the several ranges and spurs of South Mountain within a radius of twenty-five or thirty miles of the intersection of these county-lines with Mason & Dixon's line. South Mountain forms in Maryland the division line between Washington and Frederick counties. Crossing the State line at Blue Ridge station, on the Western Maryland Railroad, it passes into Pennsylvania following closely in a northeasterly direction the county-line between Franklin and Cumberland counties upon the north and Adams and York counties upon the south. Over this entire territory are more or less indications of copper, but the most active explorations have taken place in the localities more especially referred to above. The Western Maryland Railroad crosses the belt at Blue Ridge station upon its way to Baltimore toward the south, and toward Harrisburg northward. The mountains in all parts, but particularly in the vicinity of present developments, are ramified with roads and ways.

Geological Features.—It would be difficult to do justice to the geology of this section without first making a most careful and detailed examination of the country, accompanied with more extensive and well-directed developments. From my comparatively cursory examination, which extended over a territory probably fifteen miles in extent, and comprising all the developments of any moment which have thus far taken place, I comprehend the lithology as follows: Upon the west and north of South Mountain in the Cumberland Valley, we find a hard, compact crystalline limestone, lying in a comparatively undisturbed state. This valley lies between two upheavals; namely, the South Mountain upon the south, and the North Mountain upon the north. The underlying crystalline schists, composed of a coarse sandstone conglomerate, chloritic and metamorphic schists of all kinds, have been greatly dislocated and turned upward by the disturbances caused by the formation of South Mountain, and by denudation have been exposed to view upon both its slopes. Except where infiltration has taken place, however, the stratified formations are entirely devoid of copper-bearing minerals.

Breaking through the stratified formation and following in its strike the apex or general trend of the range, is a zone or dike of quartzitic epidote. This volcanic intruder contains the cupriferous minerals or deposits. In some localities, the line of demarkation or contact between the chlorite which apparently forms the country-rock and the epidote is very distinct, but in general the disturbance has been considerable, and the adjoining rocks are dislocated and ruptured. Present in all directions, and highly metamorphosed, are amphibole, chlorite, and the manifold decomposition products of epidote. The exact manner of the primary occurrence of the copper is to my mind as an accessory constituent of the volcanic epidote. It is present principally native, but in some degree as oxide and sulphide. The latter forms are undoubtedly, however, present through oxidation or changes from the former. Where aqueous and atmospheric agencies have had sway, of course the carbonates are present. Where opportunity presented itself, as in cracks, cleavage faces, cavities, or geodes, a segregating action has taken place, concentrating the metal into wonderfully rich accumulations, as is markedly the case at Mussulman Hill, the Headlight Company's properties, and in lesser degree at other localities. As a rule, any piece of epidote in this locality will be found more or less impregnated with copper, usually in very fine grains homogeneously distributed. There is little doubt in my mind that the metalliferous deposits or zone of impregnation do not extend beyond the truly volcanic formation, except where infiltration into the adjoining rocks has taken place. It is possible that the serpentine is present, filling a previously existing fissure in the crystalline schists. The only instances of a similar deposition that I know of occur at Monte Catini in Italy. Here the schistose or sedimentary strata are broken through and much metamorphosed by serpentine. The mineral is present in fissures formed in the serpentine, and increases qualitatively and quantitatively with depth. The ores occur scattered through the serpentine rock, and consist of sulphides and native copper. They form small nodular masses, or even large ones of several feet in extent and cubical contents, and increase in number with depth. Similar lodes occur at Rocca Tederighi, where the serpentine occurs between quartz-porphyry country-rock. The veins increase in richness with depth. Serpentine occurs in numerous localities, and appears to be generally a carrier of copper ores.*

The developments which have thus far been carried on upon the portion of the mineral belt are very meager, superficial, and mostly misdirected. Beginning at the southern portion of the district, we find considerable territory held by the Harrisburg Copper Mining and Smelting Company. Upon the George Warner tract, several shafts from ten to fifteen feet in depth have been sunk in the shales and schistose quartzite, evidently some distance from the serpentine deposit, which has not yet been definitely located. The schists contain copper in very small percentages, present as carbonate and only through infiltration. The laminæ strike north 45 degrees to 50 degrees east (mag.) and dip north and east at an angle of 75 degrees. The second development takes place at shaft No. 2 on the Brown tract about one mile north of the Warner tract. Here a shaft ten feet deep has been sunk in the chloritic country-rock, and affords naturally no indications of any moment of copper, being remote from the true deposit. Shaft No. 3 is one mile north of No. 2. It is down 50 feet in a mixture of epidote and chlorite, which appears to be very much disturbed. At 40 feet, a small vein of oxide and native copper was struck, dipping into the hill ; but instead of following this, the work was discontinued, and, at the time of my examination, the shaft was filled with water.

Several miles north of these developments is the Wagamon farm. No development has been prosecuted here, but excellent surface indications are present, of native copper and oxide of copper, plentifully disseminated in a fine quartzitic epidote. I took specimens from an area of four or five acres, and find them all to be highly impregnated with native metal. One boulder in particular attracted my attention. It weighed probably half a ton, and was completely peppered with native copper and oxide of copper. The country-rock is a chlorite. At any point between these developments, surface indications are present in a high degree.

The mineralized epidote or serpentine zone extends over Mason & Dixon's line, at Blue Ridge station, into Pennsylvania. The first developments of any account in this State have been prosecuted on the property of the Headlight Copper Company. Considerable excitement exists at present over the recent strikes in these workings. A tunnel has been driven in 70 or 80 feet at, or nearly at, right angles to the strike of the deposits. At a distance of about sixty feet, a region of impregnation was encountered. This chimney or chute was cut by the tunnel obliquely, and showed an area of probably 24 square feet. The manner of deposition of the copper was a uniform dissemination to the amount of from 10 per cent to 20 per cent for five feet, but dissipating itself gradually upon all sides into the epidotic rock. The latest advices give account of a second strike, farther on. This, in my opinion, is likely to be of more importance than the first one, being nearer the main body, of which abundant indications are present upon the surface.

Adjoining the Headlight Copper Company's property are, successively, the Pittinger, Gladhill, Shingledecker, Balsley, and Bingham tracts. Upon the latter is a shaft 40 feet deep, and the remains of an old furnace. The shaft is sunk in quartzite, but is at present filled with water. This work was done some fifty or sixty years ago, the furnace being operated to treat the ore taken from the shaft. Upon the dump of the old furnace are to be seen fine bodies of ore from these developments. There appear to be three distinct veins upon this hill, and float consisting of native copper to the amount of four or five tons has been shipped to Phœnixville.

A stretch of four or five miles separates this from the next point of development, which is located on the Russell tract, and belongs to the South Mountain Copper Company. A shaft 120 feet deep has been sunk. It was closed at the time of my visit, and I could ascertain but little regarding it. Several tons of low-grade copper ore were upon the dump. It is not unlikely that the work has been injudiciously placed.

At Culp Hill, several miles north of this, a shaft 22 feet deep has been sunk between two apparent chlorite walls ; some fine ore has been extracted. I have some magnificent specimens of native copper collected at this shaft. I am in great doubt whether the point selected is the

* Von Cotta's *Ore-Deposits.*

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proper one. The apparent walls are due to a slip or fault of the country chlorite, and copper has been deposited by precipitation from infiltration. It would be wise to direct developments in other portions of the hill, with a view to determine more definitely the location of the deposit.

The last and most important developments are located upon Mussulman Hill, one mile north of Culp Hill. Here a shaft is down 30 feet, and some of the finest ore I have ever seen has been extracted. In approaching the apex of the hill along the strike of the deposit, the surface of the ground is literally covered with wonderfully rich native float, pieces weighing a ton or more sticking full of native copper and oxide of copper being visible. One piece of native metal weighing 27 pounds was picked up by Dr. Snively, the former lessee of the property, within a few feet of the shaft. There are not less than fifty tons of good marketable ore lying in the vicinity of the shaft. Active work has been commenced since my visit to the property.

The zone of impregnation or eruption preserves a wonderfully uniform strike and degree of mineralization throughout Pennsylvania, and is confined, so far as my examination took place, to Adams County. The geology of Mussulman Hill is plainly visible in driving along its base. The mineral-bearing zone of eruptive rock is plainly marked along its strike by *detritus* consisting of large and small boulders of highly metamorphosed quartzitic epidote. Immediately upon the epidote lies the stratum of chlorite, inclined at an angle of about 35 degrees. Upon this follow successively strata of talcose schists, quartzite, and argillaceous shale, and this is the general lithological sequence, preserved with local variations along the entire belt.

So little well-directed and intelligent development has been prosecuted upon these deposits that it is impossible to form any definite idea of their true character and consequent value. The results of the present active operations have been much more satisfactory than any hitherto undertaken, and should their ultimate issue prove successful, it will not occasion me any surprise. The ore when encountered *en masse*, as at Mussulman Hill, is exceptionally rich, consisting almost entirely of native metal which can be treated at a mere nominal figure. It is almost impossible to obtain a reasonably accurate determination of the ore, owing to the presence of so much native copper. Assays from Mussulman Hill give a return of from 15 to 45 per cent of copper; from the Headlight property, from 2 to 20 per cent; and at different points along the belt, the float distributed over the surface assays from 1 to 10 per cent Cu. Where such enormous masses of rich surface float exist, it is reasonable to suppose that deposits of magnitude are present. Indications of this nature in other portions of the world would create great enterprise and solicit intelligent expenditures of moneys in demonstrating their worth and importance.

There is one very important point to be considered in relation to these deposits, which has a direct bearing upon their economic value; namely, their character, or the manner of occurrence in which we may expect to find the mineral in future explorations. It is an exceedingly difficult matter, considering the meager data at hand furnished by development, to know in what class of mineral deposits they may be placed. Although the locality has been frequently the subject of reports by a number of engineers, other than a mere casual reference has never been made to these geological characteristics. One prominent engineer is of the opinion that the mineral is deposited in fissure-veins. Especially did he consider that to be the case at Culp and Mussulman hills. At these two points the idea has probably been derived from the fact, already stated, that the developments, consisting of two shafts, have been made between two comparatively smooth chloritic walls. The character of the material inclosed between these two walls, however, precludes any possibility of its being a fissure in the generally accepted sense. The vein-matter is composed of a metamorphosed quartzitic chlorite, highly laminated, with the laminæ inclined at an angle of about 80 degrees to the walls, being cut abruptly by them without affording at the point of contact any signs of clayey decomposition or other features so characteristic of fissures. It presents all the appearances of being a fault or slip in the country chlorite. This dislocation has afforded opportunity in a limited degree for the more ready passage of waters containing in solution copper, lixiviated probably from the epidote. I have failed to observe in any locality in this immediate section any definite form of deposition. Certainly, no true fissure-veins are present. I am inclined to the opinion that the volcanic epidote is present, filling a previously existing fissure, or possibly the eruption causing the fissures and the matter contained in them are of the same age. By contraction in cooling, or through the action of waters, local cavities have been produced which have subsequently been mineralized by the percolation of fluids holding the copper in solution, and causing it to be concentrated into local segregation or deposits. The developments in the tunnel of the Headlight Company's property seem to substantiate such a view.

In the southern extensions of this mineral zone, the sedimentary formations of Maryland, Virginia, and North Carolina contain copper—not unlikely of the same primitive origin as that under discussion—filling cracks, fissures, or interstratified with the shales, sandstones, and limestones. I recall an instance of a true fissure in North Carolina, possessing a hanging-wall of precisely the same epidote as that found in Adams County, the foot-wall being composed of the schistose formations already spoken of. This vein was traceable for over three miles, and is excessively well mineralized, undoubtedly by its contiguity to the epidote, which, like that in Adams County, is homogeneously impregnated with native metal. The feature best calculated to insure desirable results, namely, the "permanency of the mineral," can of course only be established by possessing an accurate knowledge of its manner of deposition. If a secondary era of eruption has caused sub-fissures or veins to be formed either entirely in the serpentine or breaking through and across the mineral-bearing zone, similar to that cited in North Carolina, they will be found to possess great richness and permanency. Should, however, the changes be confined to the mere local causes already referred to, exploitations will be accompanied with great uncertainty of results. Until more extensive investigations have been carried on, this point is apt to remain a problematic one.

A NEW catalogue has been issued by the Morey & Sperry Mining Machinery Company, of 92 and 94 Liberty street, this city.

JOHN G. BUCHAN HEPBURN.

Recent telegraphic dispatches from Mexico bring the painful announcement of the death of John G. Buchan Hepburn, who was murdered by riotous miners at Pinos Altos, Chihuahua, on Sunday, February 4th. Only a few details of the lamentable occurrence have been received; but from these it appears that on Sunday afternoon a large party of troublesome and dissolute men made a violent attack upon the store of the Pinos Altos Company, in resisting which an employé of the company was killed. Mr. Hepburn, the principal owner and manager of the mine, went into the store to quiet the tumult, addressing the rioters in conciliatory language, but was himself shot and instantly killed.

The unfortunate victim of this deplorable ruffianism was a gentleman whose early and tragic death will be deeply mourned by many friends in this as well as in his native country. Mr. Hepburn was an Englishman, born in 1841, the son of Sir Thomas Buchan Hepburn, who was recently a member of Parliament for Haddingtonshire. Like many other young English gentlemen, Hepburn came to the United States, about eight or ten years ago, to seek in the far West a career in which the possibilities of acquiring fortune might be combined with those attractions of an outdoor life in a new country with which men sometimes like to vary the monotony of civilization. He first engaged in sheep-raising in Oregon or Northern California, but, not finding that profitable, soon turned his attention to gold quartz-mining, first near Hornitos, in Mariposa County, California, and subsequently at Black's, near the Yosemite Valley, both of which enterprises were failures. Disappointed but not disheartened, he went, in 1877, to Mexico to look for something new, and, after some months of searching, finally made a contract for the purchase of the Pinos Altos mine. To the development of the new enterprise he devoted himself with great industry and perseverance, and a very large amount of capital, some seven hundred thousand dollars, it is said, much of the latter being furnished by his family and friends at home, who had an abiding faith in his ultimate success. It was only within the past year or two that their hopes had begun to be realized. For some time past, the mine has been in bonanza, making a large monthly product and profit. Recent reports were, in effect, that the capital invested was being rapidly repaid; and it was Mr. Hepburn's expectation to return home during the coming year with his hopes and wishes fulfilled. It is indeed hard that after years of self-exile and persistent work he should, at last, have met such an unhappy end just as the success for which he had so long been striving was within his grasp. Mr. Hepburn was a man of peculiarly amiable disposition and attractive manner; and those who knew him here, though slightly, will long remember him with a tender regret and a deep sympathy for the family and friends who mourn his loss at home.

PROGRESS IN SCIENCE AND THE ARTS.

Premium for a Perfect Safety-Lamp.—Mr. Ellis Lever, Culcheth Hall, Bowdon, England, has agreed to hand over to the Central Board of the Miners' National Union the sum of £500, to be paid as a premium to any person, either in or out of the United Kingdom, who shall invent a portable electric or other safety-lamp, to be used in mines. The following are the conditions: (1.) The £500 to be invested in the names of three trustees, one of whom shall be Mr. Thomas Burt, M.P., the other two to be chosen by the Central Board of the Miners' National Union. (2.) The lamp to be a perfectly portable electric or other lamp, which the working miners can conveniently carry from place to place in the mine, and which will not, under any circumstances whatever, cause an explosion of gas. (3.) The efficiency of the lamps put in for competition to be submitted to five gentlemen composed as follows: Three scientists to be named hereafter, one to be selected by Mr. Lever, one by the Council of the Royal Society, and one by the Council of the Society of Arts; one person representing the mining engineers, chosen by themselves; and one person representing the workmen, chosen by the Central Board of the Miners' National Union. (4.) The adjudicators to meet in London after the allowed time has elapsed. (5.) The offer to remain open until the 31st day of December, 1883. If a lamp meeting the requirements herein stated has not been invented, the £500 to revert to Mr. Ellis Lever.

The Consumption of Charcoal by Swedish Blast-Furnaces.—Dr. Tamm has published in the *Jern Kontorets Annaler* an elaborate paper on the consumption of charcoal by 28 Swedish blast-furnaces. The averages of his tabulated statements are as follows: Hight to tunnel-head, 14·03 meters; hight to bosh, 4·37 meters; diameter of top, 1·65 meters; diameter of bosh, 2·65 meters; diameter of hearth, 1·10 meters; cubical contents, 64·22 cubic meters; pressure of blast, 54 millimeters quicksilver; temperature of blast, 210 degrees Celsius; daily consumption of charcoal, 74·89 cubic meters; percentage of oxygen in ore, on the basis of oxygen in pure peroxide of iron at 100, 93·44; percentage of carbonic acid in charge, 3·97 per cent; yield of iron in charge, 46·50 per cent; quantity of charge borne to one cubic meter of charcoal, 357 kilograms; weekly production of pig, 84,593 kilograms; weight of one cubic meter of charcoal, 159 kilograms; deducting moisture, 136 kilograms. One thousand kilograms of charcoal bore 2170 kilograms of burden. The carbon carried into the furnace by the fuel, ore, and limestone, per 1000 kilograms of pig produced, were as follows: 746 kilograms of pure carbon by the charcoal, 19·9 kilograms of carbon, distilled with the oxygen, by the charcoal; and 24·1 kilograms of carbon by the carbonic acid in the charge. The oxygen entering the gases amounted to 40 kilograms by the charcoal, 388 kilograms by the ore reduced, and 67 kilograms by the carbonic acid in the charge, a total of 492 kilograms to 1000 kilograms of pig. According to the analysis, the escaping gases held 11·9 per cent of volume of carbonic acid, and 25·9 per cent of carbonic oxide, and by computation on the basis that 26·96 volumes of oxygen are carried into the furnace with 100 volumes of nitrogen, the escaping gases contain 57 volumes of nitrogen and 5·2 volumes of hydrocarbons and hydrogen. The ratio of carbonic acid to carbonic oxide, by weight, in the gases, was 0·74. Assuming that 1000 kilograms of pig carry off 40 kilograms of carbon, then 611 kilograms of carbon are burnt to carbonic oxide before the tuyeres, and 95 kilograms, or 13 per cent of the carbon are consumed for the reduction of ore directly.

Rolling Nickel and Iron.—The process invented some years since by Dr. Fleitmann, of Iserlohn, Germany, of making nickel malleable, has

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attracted considerable attention, and it appears that it is now utilized on a large scale at Schwerte, where pure nickel sheets, sheet steel covered on one or both sides with 5, 10, or 12 per cent of nickel, nickel wire, steel wire plated with 20 per cent of nickel, wire made of an alloy of 25 per cent of nickel and 75 per cent of copper, and similar goods are manufactured. The nickel is made malleable by the addition of one tenth of one per cent of magnesium, the action of which appears to be to reduce occluded carbonic acid and carbonic oxide to carbon. The nickel thus treated is cast into plates, which are reheated and are rolled down to a thickness of 0·08 to 0·12 inch. These sheets are laid upon the steel plates to be coated on one or both sides as the case may be. The steel plates are cleared of cinder, etc., by being pickled or planed. They must be free from blow-holes, and the steel must be of the best, toughest quality. The pile of steel and nickel plates is then covered with thin sheet-iron, to protect it against the action of air, and is then put into a reheating furnace where it is carried to a red heat, and is afterward rolled down under high pressure by from 25 to 40-inch chilled cast-iron rolls, running at a speed of from 20 to 25 revolutions. The rolled piles are put into a pickling bath of dilute sulphuric acid, where they remain until the outer layer of sheet-iron has been entirely removed. The nickel-coated steel sheets are rolled cold in a three-high train in which the middle roll is driven, the other two being idlers Finally, a polish is given to the sheets. It is stated that the process of manufacture has been so well developed in its details that the waste of the original materials employed is only about 10 per cent. The sheets are stamped in manufacturing cooking utensils. One per cent of the goods are rejected on account of defects which are principally traceable to blow-holes in the steel, or other causes affecting the uniformity of the surface of the steel plates. In order to test the question whether nickel would be injurious to health if used for cooking utensils, a dog was fed daily with 0·5 gram of acetate of nickel until the total amounted to 10·5 grams of nickel. The animal remained healthy and gained two pounds in weight. Two liters of milk were kept in a nickel-plated dish for eight days and only absorbed 0·002 grams of the nickel in that time. Dr. Fleitmann has begun to manufacture iron thus plated with nickel, and has made pure nickel castings as heavy as 100 pounds. It is stated that he contemplates manufacturing nickel-plated boiler-plate, in order to prove its advantages for marine and mining purposes. From all accounts, the weld between the steel or iron and the nickel is very good, and this is the principal advantage of Dr. Fleitmann's expensive method over the ordinary method of nickel-plating by electricity.

An American Rival of the Gjers Soaking-Pit.—A recent issue of the *American Manufacturer* contains a very interesting account of the new works of the Bessemer plant of the Pittsburg Steel Casting Company, planned and built by Mr. William Hainsworth. The object of the plant is to produce rather a variety of different grades and sizes of steel castings and shapes than a large product of steel for one purpose, as the majority of existing Bessemer mills. The converter has only five tons capacity, and is built so that it has a deep pit and a slight fall to the mold, in order to insure quiet casting. The only distinctive feature of process proper is, that a rabble is introduced at the close of the blow, in order to insure thorough mixing of the spiegel and produce a uniform metal.

After the ingots have been cast, Mr. Hainsworth keeps them in an upright position until they are rolled, claiming that, until the ingot has thoroughly set, there is danger of having it show interior cavities if turned over on its side. The most interesting part of Mr. Hainsworth's plant is what he calls the "equalizer," the object of which is practically the same as that of the Gjers "soaking-pit," which has attracted so much well-merited attention during the last few months. These equalizers are described by the *American Manufacturer* as follows:

They consist of five square-shaped holes of fire-brick, about 6 feet deep and 3 feet 6 inches square at the bottom, tapering inward to 3 feet square at the top, and on each side of the row are a pair of Siemens regenerators for gas and air, which are supplied by two gas-producers located in the converter building. They are in appearance and construction very similar to a set of five holes for melting crucible steel by Siemens furnaces, such as are to be seen in the crucible department of the same works. In each of these holes four ingots, weighing from one to one and a quarter tons, are placed in a vertical position. The holes having been previously heated to a heat of approximately 2000° F., and filled with gas which forms a non-oxidizing atmosphere, and the ingots, when they are placed in the holes, being of a dark or medium red color on the outside but still fluid in the interior, it requires only a few minutes before the heat is equalized throughout the ingot, the outside becoming heated to a soft yellow heat, and the interior solidified and cooled to about the same heat, in which state the ingot is in the very best condition for rolling to a small billet or even to a flanged rail. Mr. Hainsworth believes that this system of equalizing the heat of ingots is the only one by which a large ingot may be rolled to a thin flanged rail without reheating, and without having the thin flange become too cold for successful rolling before the finishing pass.

When the works are running regularly, the amount of fuel used in the equalizers is almost nothing. The dampers may be shut down, the holes filled with gas, which prevents the ingots from wasting by oxidation, and the air-valve closed, so that the only fuel needed is that required to keep the holes full of gas. The expense of this fuel, on a large output, would be probably not over one cent per ton. As the five holes will contain twenty ingots, and as eight minutes is ample time for the first ingot of each cast to be left in the hole, it will be seen that the five holes are sufficient in capacity for the entire output of a large three-converter steel-works. In the plant of the Pittsburg Steel Casting Company, only three of the five holes are used, and two of them might be sufficient, and, in fact, one has been found sufficient for sixty net tons in eight hours.

Mr. Hainsworth wishes it to be stated that his model of the equalizers was made in 1881, and was shown by him, in the latter part of that year, to Capt. W. R. Jones and Mr. Rinard, of the Edgar Thomson Steel-Works, and, in January and February, 1882, to Mr. James Hemphill and Mr. William Clark, of the Pittsburg Bessemer Steel-Works; to Mr. John Fritz, of the Bethlehem Steel-Works; Mr. Smith, of the Joliet Steel-Works; Mr. Felton, of the Pennsylvania Steel-Works; and several other steel men, well known here and in Europe. The contract for building the "equalizers" was given to William Swindell, of Pittsburg, in January; work was begun upon them in February; and they were completed in May, 1882.

COMPRESSED AIR LOCOMOTIVES IN AN ENGLISH COLLIERY.—Machinery for underground use of a higher class than has been employed before is now in course of adoption in South Staffordshire. There has been introduced at the Cannock and Rugeley collieries, Hednesford, an air-locomotive that gives very satisfactory results. The *Colliery Guardian* reports that the engine is one of Lishman & Young's, and has been made by the Grange Iron Company, near Durham. It has a pair of 4½-inch cylinders, with 8-inch stroke, and is fitted with all the working parts of an ordinary steam locomotive. The receiver (the substitute for the boiler) is 6 feet 6 inches long by 3 feet 6 inches diameter, and is made of Siemens's steel plates. The engine is now working at a pressure of 300 pounds to the square inch, but will stand a pressure of 500 pounds. It is situated at a distance of 1200 yards from the bottom of the shaft. It goes into the stalls and brings the coal directly from the face of work, a distance of 250 yards, delivering it to a station at the bottom of a trough fault. At this, a hauling rope takes hold of the trains and draws them up to where the main hauling engine takes them to the shaft. This main engine is stationed on the surface. It has a 32-inch cylinder, and besides hauling it compresses the air necessary for the smaller air-locomotive. The air-cylinder of the main engine is 20-inch diameter, with 5-foot stroke, and the air is compressed to 65 pounds per square inch. The air at this density is conveyed down the shaft in large receivers, and is taken along the mine for a distance of 850 yards. Here a pair of 12-inch cylinder engines work a 5-inch compressor, and further compress the air up to 300 pounds per square inch. It is then led into a small receiver, and is taken to a point at which the air-locomotive can be charged—an operation that only occupies half a minute.

A PROFITABLE AFRICAN DIAMOND MINE.—It is often, says the London *Mining World*, that the pioneers of a new invention or industry exhaust and impoverish themselves in its development. The depression in the Kimberley and diamond district which now exists is due to this cause. It is stated that during the last two years many hundreds of thousands of pounds have been expended in this industry by local capitalists, and local resources are now at a stand. The business has also suffered from other causes, namely, high local rates, costly working, litigation, and also from a depreciation in the market value for the gems. In the Kimberley District, a great correction of these evils has been found in the amalgamation of various companies working in the same mine under a different title, thus effecting enormous saving in management and working. The success of the Kimberley Central, as it is called, is clearly shown in the fact that in its three years' existence it has paid on its capital of £576,000, dividends and bonuses to the amount of £426,996, or, including the sum carried forward, nearly the whole of its original capital. As an instance of the enormous productiveness of a diamond *mine* when well managed, the figures of this company's operations are at least startling. In less than three years during which it has been worked, it has produced 482,924 carats of diamonds, valued at £744,797. The working of last quarter, ended October 31st last, yielded a net profit of £174,931. Out of this sum, £48,184 was paid in rates, £20,000 carried to reserve, £33,415 brought forward, and the balance applied to a *quarterly* dividend of 12½ per cent.

FURNACE, MILL, AND FACTORY.

Graff, Bennett & Co. have commenced to drill for gas at their Millvale rolling-mill, which is situated a short distance above Alleghany.

The Graff-Bennett Iron-Works at Sharpsburg, Pa., are now operated double in nearly every department. The Danks puddling-furnace, which has been idle for some time, was lighted up last week.

The new furnace of the Cherry Valley Iron Company, at Leetonia, Ohio, is completed, and will be blown in at an early date. The new stack is 75 × 15, and will have a capacity of about 100 tons per day.

The wages of the puddlers at McIlvaine's plate mill, at Reading, Pa., have been reduced from $4.75 to $3.75 per ton for pig-iron. The heaters were reduced proportionately.

The basic process seems now to be making good headway in England. At the Eston works of Bolckow, Vaughan & Co., a new Bessemer converter is building for the purpose of making steel ingots by the basic process. Another converter has also been added, which, when, in operation, will give the works a capacity for producing 16,000 tons of basic steel monthly.

The work of removing the eighteen-inch train of rolls from the old rail-mill of the Cambria Iron Company, at Johnstown, preparatory to the substitution of a twenty-one-inch train, is now in progress, and will consume, together with other needed alterations and improvements, probably six weeks' time. By the change, the mill be enabled to roll heavy as well as light sections.

The hoist of the blast-furnace at East Conemaugh was burnt recently, and the engine was slightly damaged. Operations will be resumed in a few days, unless it should be deemed advisable to shut down for general repairs. The damage will amount to about $500. The furnace has been in blast for nearly seven years.

There seems to be much activity in adding to the plant for manufacturing nails in the West. At Wheeling, four firms are adding a total of 100 machines, and similar news comes from other quarters. This is somewhat strange, in view of the fact that the mills are forced to the policy of suspension so frequently in order to maintain prices; and if this goes on, the strength of the Western Association must ultimately give way. There seems to be even some uneasiness in regard to the growing competition of Eastern works, which are not bound to restrict, and who sell at Chicago and other Western points at from 10 to 15 cents below the $3.40 card rate.

Mushet steel for the knives and dies of nail-machines seems to be doing good work at the Laclede nail-works, Wheeling. It is reported that the knives last longer and produce a cleaner-cut nail.

The Oliphant furnace, located south of Uniontown, Pa., has been blown out for repairs. About three weeks will be required to overhaul the furnace.

The stockholders of the Bay State Iron Company of Boston, in liquidation, recently met, 8100 of the total 8480 shares being represented. Treasurer Richards presented a statement of the company's condition, which shows the total assets to be $1,877,466; liabilities, $581,400. Of the entire unsecured debts, those held in Boston are about $90,000, while those held in New York and elsewhere constitute the balance. It was voted that the assignment of all real and personal property of the corporation in the State of New York, and of all debts due to the corporation from persons or corporations in the State of New York, to be made to trustees for the benefit of its creditors, be approved, and that the directors be authorized to wind up the affairs of the company as soon as possible

The Pittsburg Steel Castings Company, of Pittsburg, appears to be doing goo

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work with its new Bessemer plant. It has made a casting of a spur-wheel 8 feet diameter, 20-inch face, 6½-inch pitch, which required 18,000 pounds of steel. It required two blows of the converter, the steel made in the first blow being held in the ladle while the second blow was made. The time from the tapping of the cast-iron into the converter for the first blow until the casting was successfully completed was 59 minutes. Another casting of 14,000 pounds, requiring two blows, was successful in 41 minutes from the time the pig metal of the first blow was tapped from the ladle. These feats are believed to be unequaled in the steel-casting business.

Another effort has been made to consolidate coal and iron companies in the Hocking Valley, this time under the name of the Columbus & Hocking Coal and Iron Company. The concerns mentioned are: the Akron Iron Company, at Buchtel; the Crafts Iron Company, at Glendale; the Thomas Iron Company, at Gore; the Winona furnace, at Winona; the Bessie furnace, of Moss & Marshall, New Straitsville; the Thomas Coal and Iron Company, of New Straitsville; and the Longstreth Coal Company, of Longstreth. The authorized capital of the combination is $5,000,000. We understand that there is considerable opposition to the scheme on the part of other companies in the valley.

M. M. Buck & Co., of St. Louis, have received an order for hoisting and other machinery for the mines of Gov. A. C. Hunt, at Laredo, Texas.

The new wire-mill of the Lambert & Bishop Wire Fence Company, of Joliet, will contain large benches of ripping, medium, and small-size wire machinery, and an extensive cleaning, bluing, and drying plant, also an improved annealing plant. Another department will be devoted to a system of galvanizing based on entirely new principles. The basement of the building will be occupied by extensive barb-wire machinery of all descriptions, and to the whole will be added the usual fitting and repairing-shops necessary to a large establishment. The plans have been prepared by Mr. G. M. Rose, late of Birmingham, England, who has been appointed superintendent of the works.

George D. W. Whitcomb, of Chicago, owner of the Harrison mining machine patents, has instituted suit in the United States Circuit Court for the Southern District of Illinois against Joseph, John, and Bernhard Yoch, who have lately begun the manufacture of the Yoch mining machine, the invention of Mr. Bernhard Yoch. The suit is brought on the Harrison reissued patents, Nos. 9408 of October 12th, 1880, and 9439 of November 2d, 1880; and the Whitcomb patents, Nos. 232 and 792 of September 28th, 1880, and 26,704 of November 7th, 1882, the plaintiff alleging an infringement of these patents by the defendants.

The Cleveland Furnace Company, operating the blast-furnace of the Steubenville Coal and Iron Company, has concluded an agreement with large creditors to settle by partial payments within the year, at the end of which a settlement in full is to be made.

It is probable that the new Vulcan furnace at Newberry, Mich., will be blown in early next month.

The Youngstown, Ohio, Steel Company will start at an early date.

At a public meeting of the citizens of Hubbard, Ohio, R. H. Jewell and George M. McKelvey were appointed a committee to solicit subscription for stock in the tin-plate mill. It was also decided at the meeting to erect the mill at a cost of not less than $10,000. The projector of the enterprise, Mr. Hutchins, agrees to put in $6000 in money to begin with, and to allow his salary of $2500 per year to be added for five years to the concern.

The Lidgerwood Manufacturing Company, 96 Liberty street, New York, has appointed J. H. Houghton, General Eastern Agent for the sale of the Lidgerwood engines. Mr. Houghton was for a number of years superintendent for Kendall & Roberts, Cambridgeport, Mass., which position he resigned to accept the one to which he has just been appointed. He will immediately open a store in Boston, where a full line of Lidgerwood engines will be kept in stock.

English papers print a comparison of the blast-furnaces built and at work last year, as compared with the year 1881. It would appear from the published returns that there were 963 furnaces in England last year, against 968 in 1881, while 575 were in blast in 1882, against 555 in the previous year. The greatest increase in the number of furnaces in blast was in Scotland, when 113 out of 148 built were in blast, against 105 at work in 1881, an increase of five furnaces. Cleveland shows an increase of four on the year, 100 being at work, against 96, but there was a decrease of three furnaces built last year, as compared with 1881. East Worcestershire had also an increase of four, 50 being in blast, against 46 in 1881; but there was a decrease of five furnaces built. In Glamorganshire, there was also an increase of four furnaces blowing, so that the districts named furnish the whole of the increase. The chief changes in other districts were a falling-off of four in the northeast and northwest of England. The returns of the furnaces built in some districts scarcely convey a correct idea. Some of the old furnaces, although in existence, will never be working again, as they can not now be worked at a profit in competition with new forms.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

There is nothing new to report from the mines in this district. Work progresses in the usual manner and the prospects remain the same.

GILA COUNTY.

LONG ISLAND.—This smelter is not running at present.

OLD DOMINION.—The smelters are running steadily.

TACOMA.—This company started smelting ore from its mines February 8th. Every thing is running smoothly. Two hundred tons of ore are at the smelter and 250 tons of coke. At the mine, a new strike has been made outside of any former workings. The old portion of the mine is showing splendidly. A tram way 400 feet long has been constructed.

PIMA COUNTY.

According to the Arizona *Citizen*, the group of copper mines in the Patagonia Mountains owned by Messrs. Baldwin, Best, and Cheatham, and known as the Joker, Telephone, Cliff, and Castle claims, are among the finest copper properties in that entire section. The three first named adjoin each other on the same lead; the latter two are distinct ledges that lie almost at right angles from the main lead against which the Cliff abuts. On the Joker is a 4×6 shaft 22 feet deep. It has been sunk in the center of the ledge and shows ore on all sides. As no cross-cutting has been done, the exact width of the ledge can not be ascertained; but as the croppings break boldly for twenty feet in width, it is hardly fair to suppose that the mineral between walls will measure less. All the material taken from the Joker shaft has an assay value in copper of 14 per cent. It also carries a small silver value, but not enough to justify its reduction for that metal alone. The Telegraph lies to the north of the Joker, and has been developed to the extent of an eight-foot shaft. No cross-cutting has been done. The average assay of ore taken from this shaft was 28 per cent. No work has been done on the Cliff, Castle, and Telephone mines.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—During the past week, 132 tons of ore were crushed; average assay value, $62 per ton, that of the sacked ore being $231 per ton. East cross-cut, 1000 level, was advanced 14 feet, and cut another faulting vein. The winze from the 780 level is down 66 feet, showing strong vein. The water is handled without difficulty, the pump working at the rate of 9½ strokes per minute.

BODIE TUNNEL.—The mill is running steadily.

BULWER.—A west cross-cut at a point 317 feet north of the main west cross-cut, 700 level, has been begun.

STANDARD CONSOLIDATED.—During the past week, the Standard milled 1446 tons of ore. The east cross-cut from south drift, 1000 level, is 260 feet long, and is without change. The south drift from east cross-cut, 700 level, is 398 feet long, and the vein in the face is 18 inches wide. The east cross-cut from north drift is in 25 feet. The upper levels continue to look well and yield large quantities of good ore.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—The Greenville *Bulletin* says: The rich vein of ore now worked 100 feet from the dividing-line between the Taylor-Plumas and the Crescent is pitching toward the Taylor-Plumas ground.

TAYLOR-PLUMAS.—All the indications tend to show that a large chimney of ore will soon be developed.

SAN BERNARDINO COUNTY—PROVIDENCE MINING DISTRICT.

BONANZA KING.—The January product, without clean-up, was $61,777.44. This was the result of ten stamps, dry crushing. It is reported that the mill is working entirely on second-class ore-screenings.

SIERRA COUNTY.

HARLEM MINING AND MILLING COMPANY.—From the company's prospectus we take the following: The company has been incorporated under the laws of the State of New York, with a capital stock of $1,000,000 in 200,000 shares of $5 each. The mine, known as the Kenton mine, is situated on Kanaka Creek, about thirty-five miles northeast of Nevada City. It is opened by two tunnels, one having been driven in 283 feet and the other 750 feet. The tunnels are connected by two uprises. The company is at present driving a third tunnel, which, when completed, will develop the mine to a depth of 520 feet below tunnel No. 2. The vein is said to be a strong ledge in a regular formation of slate, its course being north and south, and the dip 43 degrees to the east. The formation and walls are such that the ores are easily and cheaply mined, and the nature of the ores such that they are rapidly and economically reduced in the mill. The ores are transported to the mill from the mouth of tunnel No. 2 by a tramway 909 feet long. The eighty-stamp mill has a capacity of from 35 to 40 tons per day. The total cost of working the ores is estimated at $2.50 per ton while the average value of the ores as shown by yield in mill is from $7 to $8 per ton. The percentage of sulphurets in the ores is said to be considerably above the average of California gold mines, being about 5 per cent, at times going as high as 15 or 20 per cent. The sulphurets of this mine are peculiar from the large proportion of arsenical pyrites they contain, in many places in the veins passing into almost pure arsenical pyrites and in the latter case many are said to show a yield as high as $7000 or $10,000 per ton. The average yield of the sulphurets from the average ore is $100 per ton. The company proposes to add 12 stamps to the mill, 14 Frue vanners, and build chlorination-works for treating the sulphurets. The total cost of these improvements, including tunnel No. 3 is estimated at $40,000. The officers of the company are: John S. Lockwood, James R. Davies, James J. Kelso, William G. Lord, Henry P. Chapman. Mr. Charles S. Benham is the General Manager.

CENTRAL AMERICA.

NEW YORK & HONDURAS ROSARIO.—Dispatches recently received state that the new mill has started and is working splendidly. Delay was caused by alterations made by Mr. Keay, who, after convincing himself of the character of the mines and the quality and quantity of the ore, considered it necessary to build a larger pan-house for additional pans. Heavy blasting had to be done in hard rock, and the pan-house had to be finished before the mill could run. Official reports from the mines, received by the last mail, are the most favorable the company has yet had. Two additional great strikes are reported, one in the Rosario mine, between the fourth and fifth levels, very rich in gold, and one in the New York mine of the same character. The five mines belonging to this company, it is reported, are all fissure-veins containing valuable ore, and the dumping-grounds of the company are said to be filled with selected ore ready to be milled.

COLORADO.

CLEAR CREEK COUNTY.

SHENANDOAH VALLEY LODE.—A strike consisting of from four to eight inches of fine-grained galena—a sample of which milled 372 ounces of silver per ton—was recently made. The mine is opened by a tunnel 400 feet long. The drift has been driven along the side of the ore-vein. The ore has been uncovered for a distance of 60 feet, and holds out well in the breast.

GILPIN COUNTY.

PERIGO.—The mine is improving as development proceeds. The driving of the tunnel will be resumed shortly.

ROLLINS.—At the annual meeting, it was decided to build a fifty-stamp mill at Rollinsville. Work will be commenced early in the spring. The company decided to continue the work of developing its placer mines on South Boulder, below Rollinsville. Work will be resumed on the lower cross-cut tunnel, which is to be driven under Perigo Mountain, just as soon as the weather will permit, and will use power drills.

LAKE COUNTY.

Late Leadville exchanges contain the following:

The Thespian shaft, on Carbonate Hill, has now attained a depth of 590 feet. The shaft passed through forty feet of contact matter, and has now penetrated the underlying limestone to a depth of twenty feet. Drifting on the contact will begin to-day.

BIG PITTSBURG CONSOLIDATED.—Mr. Frank Buckley, the newly-appointed manager, has declared all the leases granted on this property by his predecessor, Mr. Joseph Vimont, void. Mr. Buckley is preparing to work the property for the company. Considerable opposition will be encountered from the lessees, who all claim to hold legal leases on the mines of the consolidation.

BUCKEYE.—Drifting is in progress at 127 and 168 feet from the surface. Both levels show iron and other encouraging indications.

MORNING AND EVENING STAR MINES.—On the first of the month, these companies commenced shipping their ore to Cummings & Finn's smelter.

SHIELDS.—This mine, located at the head of Little Frying Pan Gulch, is not meeting the expectation heretofore entertained of it. From reliable sources, it is learned that the mine is not making expenses, and unless more money is supplied with which to continue work, the property will doubtless soon revert to the management of the company.

SMUGGLER.—This mine is now shipping from twenty-five to forty tons daily.

OURAY COUNTY.

Mr. W. Weston, in a letter to the Denver *Republican*, writes that an increased prosperity is the decreased cost of turning our ore into dollars. In 1877, we paid $45 per ton for treatment of ores at local reduction-works, and from $20 to $35 per ton to get the ore there on pack animals. In 1880, our ore began to go to the Pueblo works of Mather & Geist, by wagon to Alamosa, the distance to the latter place being over 200 miles, and the cost of freight and treatment being $55 per ton. The cost of freight and treatment of our ore to the Pueblo Smelting and Refining Company is now $35 per ton. In addition to this, the cost of supplies is reduced at least 50 per cent, and the cost of packing the ore from the mines to Ouray at least $5 per ton, so that the average cost of producing the ore and getting it to the shipping point is at least $10 per ton less than in 1880. Therefore we save $20 per ton in freight and treatment to Pueblo, and $10 per ton in producing and getting the ore to Ouray, which makes us receive $30 per ton more for our ore now than we did in 1880. For all this, we are indebted to the Denver & Rio Grande Railroad, and, as the same figures will apply more or less to all the camps in the San Juan region, the incalculable benefit conferred on the State of Colorado by that rail-

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road may be partially appreciated, for its advent has made paying mines of a thousand prospects whose ores three years ago were as so much waste. If the Denver & Rio Grande Railroad builds a branch from its main line at Montrose to Ouray, the further reduction in freight of ore will not be very great—perhaps $5 per ton—but we shall be able to ship all the ore we can produce, whereas now we are dependent on such wagon freight as may be available. In addition to this, the reduction in prices of supplies and labor, and the building of wagon-roads to the mines, will reduce the cost of laying the ore down in Ouray at least $10 per ton more, which will give us $45 per ton more for our ore than we received in 1880; and it must be remembered, too, that this is reckoning on the ore going to Pueblo, a distance of 275 miles. It does seem to me that with extensive coal-beds in the Uncompahgre Valley, and the mining camps of the Dolores, San Miguel, Ophir, Sneffels, Uncompahgre, Red Mountain, and Poughkeepsie tributary to it, there should be a smelting center established in that valley some time in the near future. To give a notion of the decrease in prices, in 1877, I paid $1 per pound for giant powder that I now buy for 35 cents, and $12 per 100 pounds for flour that I now buy for $4.50. Hay has come down from $55 per ton to $25 per ton, and oats and corn from 10 cents per pound to 3 cents; potatoes from 5 cents per pound to 1½ cents, and other things in proportion. Another assurance of our permanent prosperity has been furnished in the fact that concentration, or getting rid of the waste rock in our ores by machinery, has been proved a success.

PARK COUNTY.

FANNY BARRET.—The superintendent says that the vein which they are following in the drift from No. 2 shaft is holding out finely. Shipments are steadily under way, and the mine last month paid a balance of $2000 above expenses.

MOOSE.—Reports are, that the leasers are doing splendidly on this once famous property. Ten or twelve tons of ore shipped within the past few days. The ore now taken out excels any that the mine has heretofore produced.

SUMMIT COUNTY.

CROWN POINT.—The mine is improving and in the 100-foot level a three-foot vein of high-grade ore has been struck.

GREER.—The concentrating-works have been running satisfactorily since they started up.

WHEEL OF FORTUNE.—The shipments of ore continue. The incline is continued and drifts are started at regular intervals.

DAKOTA.

The recent cold weather closed many of the water-ditches and flumes in the hills, greatly interfering with mining operations. The Sitting Bull smelter and mill are idle in consequence. The Homestake, Caledonia, Esmeralda, and Gustin mills are running at their full capacity.

An important discovery is reported from Fantail Gulch. A test of 100 tons of ore shows an average of $113 per ton.

BLUE LEAD.—This mine was recently purchased by a company of home capitalists, and a thirty-ton smelter has been ordered.

CALEDONIA.—The superintendent reports for week ended February 4th: Ore produced, 1025 tons. Bullion shipped, 582 ounces gold; value about $10,000. South header advanced 5½ feet; total, 50½ feet. Winze advanced 5 feet; total, 17 feet. No new developments in either place.

CASSELL.—This mill is running on Fairview and High Lode Extension ore, the latter averaging $16 per ton.

FATHER DE SMET.—The superintendent's report for the nine days ended February 1st shows: Ore extracted from first level, 1250 tons; second level, 1250 tons; third level, 450 tons. Ore milled, 2850 tons. Third level header in 119 feet; Italian winze down 33 feet.

SUMMIT.—This mill will shortly start upon Initial ore.

IDAHO.

EASTERN IDAHO MINING AND WATER COMPANY.—This company has secured the placer mines situated along Snake River, fourteen miles north of Blackfoot, at what is known as the Rapids or Cedar Point. It is the purpose to construct a ditch of sufficient size to carry water that will, besides furnishing all that is desired for mining purposes, irrigate a large tract of land. A ditch twenty-two miles long, twelve feet wide, and four feet deep is to be made, and as soon as this work is completed, the company will begin mining. From it lateral ditches will be cut to carry water to lands to be irrigated. The company has been organized under the laws of Idaho, with a capital stock of 50,000 shares of $10 each. The officers are: W. N. Shilling, President; W. Borland, Secretary; Lowell Holbrook, Treasurer; P. J. Anson, Manager. The chief place of business is Blackfoot.

MONTANA.

SILVER BAR COUNTY—SUMMIT VALLEY DISTRICT.

The Butte *Miner* says that, although, with one exception, the amounts involved in transfers of mining property during January were comparatively small, the large number of transactions indicates a very healthy condition of the market; and the fact that the deal was in every case between residents of the district, who are thoroughly familiar with the value of the properties, is a gratifying evidence of the confidence of our own citizens in the future of the Summit Valley District. There were twenty-six sales during the month, for which the total prices paid was $81,977. The largest sale was that of the Mountain View lode to Charles X. Larabie for $20,000.

MOULTON.—The three-foot vein uncovered recently by the 300-foot south crosscut is developing in fine shape and widening with the drift. The ore is freer milling than that of the upper levels. Assays run from 60 to 80 ounces, and some specimens have been taken out that were very fine, assaying up in the hundreds. The mill is making a steady run and producing its regular output.

SHONBAR.—The east drift of the 185-foot level has advanced 70 feet on the ledge. The character of the ore has steadily improved, and during the past week a fine body of gray and pink manganese rock has been uncovered which assays from 150 ounces upward.

NEVADA.

BELCHER.—At the annual meeting, held in San Francisco recently, the following directors were elected: James Newlands, President; A. K. P. Harmon, Vice-President; G. W. Beaver, J. H. Dobinson, J. P. Martin; John Crockett, Secretary; S. L. Jones, Superintendent. The secretary's report shows that the receipts aggregated $101,051.17, including $73,198.15 from assessments, $12,603.26 cash on hand, $8804.22 royalties, and $4435.12 air-shaft account. The disbursements include general expense account—city salaries, advertising, rent, etc., $10,669.90; Foreman shaft, $14,186.66; mine expenses, $7416.92; wood, $3750.75; labor, $9721.87; taxes, $1082.40; air-shaft account with mine, $14,851.18; Sutro Tunnel Company 22,610; cash on hand and in bank, $13,137.43; a total of $101,051.17. There have been extracted from the old stopes and fillings during the past year 17,608 tons of low-grade ore, which has yielded to the company a net profit of $8804.22.

NORTH CAROLINA.

CONRAD HILL.—This company produced for the first day's run of the new year, from its twenty-stamp battery, over $480 in gold and concentrates, 6500 pounds of copper from its furnaces, making the total value of the day's product over $1500.

SECREST.—It is reported that William Moller, this city, has bought a two-thirds interest in this mine, in York County.

UTAH.

DESERET.—It is stated that copper ore averaging 40 per cent is shipped to Chicago by this company.

MAMMOTH.—The mine is reported to be looking better than ever before. The building and works just completed, or in process of completion, will cost in the neighborhood of $200,000; they include fourteen furnaces, ifi operation or ready to fire up, and complete reduction and refining-works, for which Mr. Bowers is now in the East getting the machinery.

SAMPSON.—This mine, says the Salt Lake *Tribune*, has attracted much attention for some time past on account of the bodies of ore it is developing. A cut just completed through from the incline to the Van Prang shaft, a distance of 600 feet, passed through good ore a long distance. The snow is four feet deep around the mine, and it is impossible to make shipments.

TINTIC.—The best clean-up on record has just been made by this company. After a three months' run, its yield is close on $60,000, at a cost of $27,000. An additional depth of 140 feet has been sunk on the Northern Spy, which reveals a steady vein going into the depths.

SILVER REEF.

LEEDS.—It is reported that the new management intends to go to work on the fifty thousand tons of tailings on hand, which are expected to yield well and be easily worked.

STORMONT.—The mill crushes daily from thirty-five to forty tons of ore. The mines are looking better and richer as depth is attained, while development is kept moving in the various shafts, levels, and drifts as time and opportunity present.

WYOMING.

Genuine Leadville carbonates, says the Laramie *Boomerang*, have been discovered in the Seminole District, in mines in which several Laramites are interested, who predict a rush to that locality—as soon as the snow disappears—that will equal the charge made on the Carbonate Camp in its early days. The new discoveries of silver ore near Fort Fetterman, in the northern portion of this country, are attracting considerable attention also. But little has been done as yet, however, in the way of development. The districts hereinbefore mentioned are all tributary to Laramie, and draw their supplies from this point. Other districts are coming to the front. Sweetwater County has numerous paying mines within her borders, also Uinta and Carbon. The smelter at Hartville, north of Cheyenne, is turning out tons of copper matte daily, and there is already talk of enlarging. Wyoming has the mineral, and all we need is capital. When we get it, we shall make as good a showing as any mining region in the country—not excepting Colorado, Nevada, or California.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

Alexander McDonnell, Buffalo lode. Thomas Dunn *et al.*, Big Pedro and Little Pedro lodes.

CALIFORNIA.

THE BODIE DISTRICT.

Julius A. Bidwell, Lizzie Bullock No. 2 and Lizzie Bullock (original) lodes. A. W. Eibeshutz, Brown Monster gold and silver lode.

MARYSVILLE DISTRICT.

John Gindery, placer in Butte County, Spanish Bar Mining District.

SACRAMENTO CITY DISTRICT.

W. F. Walton, Kelly and the McKay and Love gold quartz mines. S. W. Lewis *et al.*, Ladies' Cañon placer, Sierra County. John Blair *et al.*, Pennsylvania Flat placer, Placer County. A. Walrath, placer embracing Peck No. 1, Peck No. 2, and Providence South Extension lodes.

STOCKTON DISTRICT.

Alvin Preston *et al.*, placer in Tuolumne County.

COLORADO.

CENTRAL CITY DISTRICT.

Thomas S. Old *et al.*, Hoc Age lode and mill-site. Hal Sayr, Dumas lode. Thomas C. Parish, trustee, Pride of the West lode. John Gray, *et al.*, Krigbaum lode. Harley B. Morse *et al.*, Parole lode. Daniel McGonigal, Jones lode. E. L. Dunbar, Chicago lode. Jonathan Bowman, White Swan lode. Luke Palmer, Daniel W. Voorhees lode. Starr Gold Mining Company of Colorado, Blithe lode. Charles Pitz *et al.*, Toledo and Hartford lodes. Jasper P. Sears, placer in Clear Creek County, Grass Valley, and Ohio Mining District. Frederick E. Rombauer, placers in Clear Creek County, Upper Union Mining District. William P. Farris, Broadway lode. Consolidated Bobtail Gold Mining Company, Lizzie lode. Sarah Foster, Canadian lode and mill-site. Charles T. Bellamy *et al.*, Wall street lode. John Turck, Aliunde lode No. 2. Charles Desmoineaux, East Half Kilbride lode. Edward Elisha Mack, Albany Placer mine, Clear Creek County, Spanish Bar Mining District. Homer F. Locke *et al.*, Cora H. lode.

DEL NORTE DISTRICT.

William P. Linn, Demming lode.

LAKE CITY DISTRICT.

Sioux City & San Juan Mining Company, Commonwealth lode. Robert L. Martin, Silver Plume lode. Robert L. Martin *et al.*, Eclipse lode. C. E. Schoellkopf, Monitor and Revenue Extension lodes. Midland Mining Company, R. Neigold, John Lee, Clifford Pemberton, O. Roedel, and Grace lodes. Chicago Enterprise Gold and Silver Mining Company, Emma N. lode. Cleveland Consolidated Mining Company of Colorado, Egipsey lode. Silver Chord Mining Company, Silver Chord Extension lode. John Guthrie *et al.*, Mary H. lode. West Consolidated Mining Company, Astor lode and mill-site.

LEADVILLE DISTRICT.

Ardine C. Fisk, Mary E. lode. James H. Hopkins, Silver Era lode. H. H. Hoffman, Monumental lode. A. R. Adair *et al.*, Stonewall and Stonewall No. 2 lodes. Leadville Water Company, placer in Lake County, California Mining District. Conrad Hanson, Katy lode. Samuel D. Harlan *et al.*, Grace lode. George O. Keeler *et al.*, X10U8 lode. Walter H. Jones *et al.*, Dump placer, Chaffee County, Hope Mining District. Luther M. Goddard *et al.*, Black Hawk lode. Lars Nelson, placer in Park County, Columbia Mining District.

PUEBLO COUNTY.

Darby Mine, Darby Extension lode.

DAKOTA.

DEADWOOD DISTRICT.

Alexander Cruickshank *et al.*, Flora McDonald lode.

MONTANA.

HELENA DISTRICT.

Frank J. Kelleher *et al.*, placer in Madison County. William A. Clark, Joseph lode. Silas F. King *et al.*, Hesperus lode. Erastus A. Nichols, Fashion lode. Richard S. Jones *et al.*, New Era lode. William H. Young, Corra lode. Marcus Daly, Anglo-Saxon lode. Isaac B. Cutler, placer in Jefferson County.

NEVADA.

CARSON CITY DISTRICT.

Columbia Mining Company, Columbia lode.

UTAH.

SALT LAKE CITY DISTRICT.

Robert C. Chambers, Mayflower Ledger Company lode and mill-site, Great Eastern, Freeland, Lexington, N. E., and Queen Dowager lodes. Louis Masier, Parvenue lode. Oquirrh Gold and Silver Mining and Milling Company, Pactolus lode. Arie Pinedo, Mercus lode.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb. 16.

The mining market has improved greatly this week, and business has been of a better and more general character. The dealings have not been confined to a few fancy stocks, but have been scattered generally over the whole list. There also seems to be a disposition on the part of speculators to let the non-dividend stocks alone, and to confine themselves chiefly to the dividend-paying stocks.

The chief thing in the market this week has been the strength shown by Alice, Bassick, Green Mountain, Navajo, Elko Consolidated, and Sonora Consolidated, while the weakness of Vizina, Alta-Montana, and the State Lines has also attracted attention. Such stocks as Hall-Anderson, Robinson, Sierra Grande, etc., have been very largely dealt in; but the price has been manipulated to suit the market, and has been strong one day and weak the next. We give a summary of the market below. The total number of shares sold at all the Exchanges this week aggregates 501,725, as against 591,075 last week.

The Comstock shares have been rather quiet at irregular prices. California has been largely dealt in at prices a little weak; it sold from 25@21c. Consolidated Virginia records an active business at irregular prices, selling from 56@60@52@57c. Sierra Nevada was quiet and weak at $4¼@$3¼. Union Consolidated, with a small business, was very irregular, selling from $4.85@$3.60@$4.15. Mexican was also irregular at $3.10@$3.38@3.15, with small transactions. Yellow Jacket sold at $1.25, and Best & Belcher at $4.25. Sutro Tunnel had an active business at irregular prices; it sold from 21@25@22c.

The Leadville stocks were quiet and a little weak. Amie was actively dealt in at steady prices, selling at 20@22@21c. Chrysolite, under a small business, was a little weak; it sold from $1.50@$1.40. Dunkin was dealt in to the extent of 500 shares at 31@30c. Hiberuia sold at 4@5c., with small transactions. Iron Silver records a small business at steady prices; it sold from $2.80@$2.75. Leadville was strong under a small business, and sold from 63@70c. Little Chief was quiet and a little weak at 43@40c. Little Pittsburg records transactions of 800 shares at 63@65c. Big Pittsburg was quiet and irregular, selling at 23@18@19c. Climax sold to the extent of 900 shares at 10@8@9c.

The Bodie stocks were quiet and a little weak. Bodie Consolidated, under a small business, declined from $1.50@$1.25. Bulwer had a fair business at steady prices, selling from 90c.@$1@98c. Standard was quiet and irregular; it sold from $5@$6 @$5½. Goodshaw sold at 7@8c.

The Tuscarora stocks were quiet and a little weak. Grand Prize sold from 80@75c. Belle Isle records a small business and has been weak; it sold from 81 @75c. Navajo has developed considerable strength under a small business; it sold from $5¼@$6⅛@$6¼. North Belle Isle was quiet and irregular at 60@66 @61c. Independence sold to the extent of 800 shares at 77@75c. Elko Consolidated was very largely dealt in and was quite strong; it sold from 10@17 @15c., with a business of 72,900 shares.

In the miscellaneous list, Alice had a fair business at strong prices, selling from $2.75@$2.95. Bassick was moderately dealt in and was quite strong; it sold from $8@$10@$9.25. The Western papers contain the news that suit has been begun in the United States Circuit Court in Colorado by Joseph L. Phillips against the Bassick Mining Company, and C. C. Perkins. He alleges that ore has been taken out of his claims, the Industry and Denver No. 1. This statement will be received with reserve until the other side has been heard from. Eureka Consolidated records a small business at strong prices, selling from $9.50@$10.50. The Green Mountain stocks showed considerable strength under an active business. Gold Stripe sold at 7@8c. Green Mountain was very active and strong, selling from 65@86@84c. Rising Sun sold at 6c., and Cherokee at 6c.

Reports from the Green Mountain mine are favorable. The grade of the ore is said to be improving, and the fact that the rock-drills now at work in the lowest tunnel are pushing that work rapidly encourages the hope that the neglected development-work will be more quickly completed. It is understood that $25,000 of the mortgage bonds have been placed, which puts the management in a better position.

Hall-Anderson was very active at very irregular prices; it declined in the beginning of the week from $1.50@$1.30, but grew stronger at the close and sold to $1.75, closing at $1.55 to-day. Horn-Silver was quiet and strong, selling from $5@$5⅞. Northern Belle records a small business at irregular prices, selling from $10⅛@$9⅝@$10. Ontario developed some strength during the week, but lost it to-day; it sold from $18@$30@$20. Robinson Consolidated was quite active at very irregular prices; it sold from $1.05@$1.20@$1.10. Sierra Grande has been very irregular under a large business; it sold from $2.60 @$2.95@$2.60@$2.75, with a business of 15,950 shares. Silver King was strong, selling from $11@ $11⅛@$11⅝.

Alta has been very actively dealt in, but has been weak; it sold from 15@10c. Bradshaw records a small business at irregular prices, selling from 32@36@34c. Decatur has been active and steady at 9@11c. Harlem M. and M. Company has developed a little strength, under a small business, and has sold from $1.10@ $1.15. Oriental & Miller has been quiet and steady; it sold at 15@13c. Sonora Consolidated records a large business, and has improved in price; it sold from 22@29@28c. South Pacific has been active and irregular at 9@7@8c. The State Line stocks were quiet and steady. Nos. 1 and 4 sold at 3@4c. and Nos. 2 and 3 at 8@7c. Taylor-Plumas has been active and irregular, selling from 19@17@18c.

English capitalists have acquired another mine, which, according to all accounts received thus far, is likely to make a good record. It is the Drum Lummon, situate at Marysville, Montana, which was sold to a newly formed London company, the Montana Company, Limited, by Thomas Cruse, through the agency of the London Mercantile Association, and the Joint Stock Association, Limited. According to the statement of the prospectus of the Montana Company, published in English newspapers, the price paid is £300,000 in cash, and £200,000 in 100,000 fully paid-up shares. Western telegraphic advices state the terms to be $250,000 cash down, and $1,380,000 in April and June. The Montana Company, Limited, has a capital of £600,000 in 300,000 £2 shares, the directors being N. Story Maskelyne, M.P., chairman, and Bernard Fitzpatrick, Wilmot Holland, and Thomas Pyke. Mr. John Darlington, M. E., and Stewart Pixley, both of London, have examined the property, the former giving the reserves at 150,000 tons at $40 per ton. It is proposed to set aside £100,000 for the purchase of machinery to work 100 tons a day, and the public is promised early profits at the rate of £140,000 per annum, on the basis of working 28,000 tons at a cost of £3 per ton.

MEETINGS.

Chestatee Gold Company, Room 81, 140 Nassau street, New York. Special meeting of stockholders, February 20th, at one P.M.

Iron Silver Mining Company, 12 Wall street, New York. Annual meeting of stockholders and election of trustees, March 7th, at twelve M.

Lehigh Coal and Navigation Company, Room Board of Trade, Mercantile Library Building, Tenth above Chestnut street, Philadelphia. Annual meeting of stockholders and election of trustees, February 27th, at eleven A.M.

Silver City Mining and Milling Company, office of Johnes & Wilcox, 120 Broadway, New York. Annual meeting of stockholders and election of trustees, February 24th, at two P.M.

Thorington Gold Mining Company, office of H. A. Vatable & Son, 89 Water street, New York. Annual meeting of stockholders and election of trustees, February 23d, from twelve M. to one P.M.

DIVIDENDS.

The Carbonate Hill Mining Company, of Colorado, has declared dividend No. 2 of five cents per share, payable March 1st. Transfer-books close February 20th, and reopen March 2d.

The Contention Consolidated Mining Company, of Arizona, has declared its regular monthly dividend (No. 13) of twenty-five cents per share, payable February 28th, at the office of the Farmers' Loan and Trust Company, on all stock registered in New York. Transfer-books close February 17th.

The Homestake Mining Company, of Dakota, announces its fifty-fourth dividend for January, amounting to $50,000, payable at the office of the transfer-agents, Messrs. Lounsbery & Haggin, No. 18 Wall street, on February 26th. The total dividends of this company to date amount to $1,862,500.

The Jocuistita Mining Company, of Mexico, has declared a quarterly dividend of $50,000, being fifty cents per share, payable on February 28th. Transfer-books close on the 23d.

The Silver King Mining Company, of Arizona, has declared a dividend of twenty-five cents per share.

UNLISTED QUOTATIONS.

Mr. Alexander C. Lassen, 61 Broadway, under date of February 16th, three P.M., reports the current quotations of unlisted stocks as follows:

	Bid.	Asked.		Bid.	Asked.
Bodie Tunnel,..	$0.25	$0.75	Little Rapids...	....	$1.00
Breece..... ...	.15	.16	London Cons...	.90	1.35
Buckeye Water.	.50	....	Mack Morris...	....	.75
Borva Copper..	....	2.00	Madre.....	.50	2.00
Batopilas Pref..	9.00	24.00	Moulton.....	....	4.00
Calif'rnia Wat'r	.25	....	Native Silver...	...	.30
Centennial	....	.20	Pelic'n & Dives	...	.50
Contention	3.00	8.00	Plata Verde....	....	.25
Dahlgren	.40	.85	Rico.....	....	.55
Denver City....	.18	.20	Hond. Rosario.	....	7.00
Empire Gold...	3.00	....	Santa Maria....	.20	1.00
Eureka Tunnel.	.60	.90	Silver State ...	....	1.10
Evening Star...	2.00	....	Stormont (New)	.20	.30
Fanny Barrett..	1.50	2.50	Sampson.....	.35	....
Grand Central..	1.50	....	Silver Cord.....	1.15	1.35
Highland Chief.	.20	....	Satemo.....	.35	.50
Hibernia Silver, (New)	...	.19	Sierra Apache..	.35	.39
Jocuistita.....	5.00	7.00	Sierra Bella. ...	.70	.75
			Terrible.	1.50	2.00

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, 55 Broadway, report as follows for the week ended February 15th:

On February 9th, prices opened $1.03¾, declined to 96⅝c. on the 13th, the lowest price, and closed on the 15th at 99⅝c. bid; opening Friday morning, February 16th, at $1, and sold up to $1.03⅛ by two o'clock P.M. The immediate cause of the decline from $1.03¾ Friday to 96⅜c. Tuesday of this week was the report that Grandin well No. 3, at Porcupine Run, had found oil. As there were three dry wells between this and the large producers in the Cooper tract, this discovery was supposed to indicate an extension of the Forest County oil belt. Added to this was the fact, as posted, that the United Pipe Line Company had increased its already large stock of oil 668,000 barrels during January. It was hard to reconcile this with the bull assertion that oil production was less than consumption. Moreover, a new well in Forest County, owned by the Forest County Oil Company, came in as a producer of about 200 barrels. These facts all indicated that an oil famine was not imminent, and the selling movement that followed no doubt caught a number of "stop orders." The weakness of Tuesday was followed by a rapid recovery and sharp advance Friday of this week. A considerable short interest was created; and in their rush to cover, prices have bounded up. It is probable that oil for a few weeks will oscillate about the dollar point, being a purchase under that figure and a sale from $1.04@$1.05. Intrinsically, it is worth $1, but carrying and storage charges are a heavy tax on bull speculation, and make occasional drops natural and frequent.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 10...	$1.03⅞	$1.04	$1.01	$1.02	548,000
12...	1.01⅞	1.01⅞	.98½	.98⅝	1,003,000
13...	.98	1.00¾	.96¾	1.00¼	723,000
14...	1.01	1.02	.98⅝	.99½	959,000
15...	.98	1.00	.97⅛	.99½	841,000
16...	1.02½	1.03	1.00¼	1.01⅜–⅝	1,063,000
Total sales.					5,137,000

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been active and steady. The Comstock shares have had a good portion of the business done, and have slightly improved in price. There is nothing of importance from the mines. The drift running east of the joint Union-Sierra winze on the 2900 level has just passed through 12 feet of low-grade ore. The Tuscarora stocks have been quiet and steady. All of the stock of Navajo offered on the market has been absorbed in checking the recent decline.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Feb. 15.

There is no improvement to note in the market for copper stocks. A general dullness pervades the whole list, and the decline in ingot copper serves to depress prices, while the orders to sell are largely in excess of the demand. Calumet & Hecla is the strongest stock on the list, all the sales the past week being at $243 t which figure it is in fair demand. Franklin de

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clined from $13⅛@$12¼ on forced sales. The expected dividend on this stock does not seem to be forthcoming, and holders are beginning to have some doubt about receiving it at a very early day. Pewabic sales were all at $8, although the stock is heavy and offered at $7¾, the best bid to-day being $7. Quincy has shown a little more firmness this week, although the dealings have been confined chiefly to small lots at $50½@$51, closing to-day at the lower rate. Osceola sold in small lots at $30½@$31. Atlantic sold at $14. Huron, at $1⅝. National, at $1⅛; and Allouez at $2@$2½.

In silver stocks, Bonanza was steady at $2¾@$2⅝. Catalpa and Crescent have been very dull this week; sales of the former at 90c., and of the latter at 42½@40c. Harshaw declined from $1@75c. San Pedro has been active, and advanced from 75@87½c., but closed lower at 80c.; sales aggregate about 10,000 shares. Silver Islet sold at $6. Sullivan, at 87½c. Napa Quicksilver, at $3½.

At the Boston Mining Exchange, Massachusetts & New Mexico has been very active at a further decline on large sales from 8@6c., but in the later dealings it was in better demand at 7c. Empire has further declined from 26@20c. Pipe line certificates declined from $1.04½@97⅝c.

3 P.M.—There was no special feature in the market this afternoon, except its extreme dullness. Calumet & Hecla declined to $242, sales and bid. Osceola sold at $31. San Pedro, 80c. Bonanza sold at $2⅝. The closing prices were: Allouez, $2½ bid. Atlantic, $11¼ bid, $14 asked. Antimony, $14 bid, $15 asked. Bonanza, $2⅝ bid, $2¾ asked. Catalpa, 90c. bid. Crescent, 32½c. bid, 40c. asked. Franklin, $12 bid, $13 asked. Harshaw, $1⅛ bid, $1 asked. Huron, $1½ bid. National, $1⅛ bid, $2 asked. Pewabic, $7 bid, $7½ asked. Quincy, $50½@$51. Silver Islet, $5@$7. Sullivan, $⅝@$1. San Pedro, 80c. bid.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Feb. 9.	Feb. 10.	Feb. 12.	Feb. 13.	Feb. 14.	Feb. 15.
Albion						
Alpha	11-16				1	
Alta	13-32	11-32		13-32	13-32	
Bechtel						
Belcher	1/2	9-16	9-16	9-16	19-32	
Belle Isle	11-16	11-16	¾	¾	11-16	
Best & Belcher	3⅝	3⅝	4¼	4⅛	4⅛	
Bodie	1⅛	1⅛	1¼	1⅛	1¼	
Bullion						
California	3-16	¼	¼	¼	¼	
Chollar						
Con. Virginia	9-16	9-16	19-32	9-16	9-16	
Crown Point	21-32		1			
Elko Cons	5-32			5 32	5-32	
Eureka Con	8¾					
Exchequer	¼	¼				
Gould & Curry	1⅝	2⅛	2¾	2⅛	2⅝	
Grand Prize	7-16	7-16	¾	¾	21-32	
Hale & Norcross	2¼	2⅝	3	2⅛	2⅝	
Independence	¾	¾	¾	11-16	11-16	
Martin White	2¼	2¼	2½	2¼	2¼	
Mexican	2¾	2½	3½	3	2⅞	
Mono		¼	3-16			
Mount Diablo						
Navajo	5½	5⅞	5⅞	5⅝	5¾	
Northern Belle	10		10	9⅝	9⅞	
North Belle Isle		19-32		11-16		
Ophir	3	2⅞	3⅜	2⅞	3	
Overman						
Potosi	1¼	1¼	1¼	1⅛	1⅛	
Savage						
Scorpion						
Sierra Nev	3¼	3¼	4⅛	3½	3½	
Silver King			11	11		
Tip Top						
Union Con	2⅝	3¼	4⅞	3¾	3⅞	
Wales Con	3-16		3-16			
Yellow Jacket	1⅝	1⅛	1⅛	1⅛	1⅛	

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 16.

The market has been without any feature worthy of note since our last week's postings, except that exchange on India is less favorable to silver.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Feb. 10	50 7-16	110	Feb. 14	50 7-16	110
12	50 7-16	110	15	50 7-16	110
13	50 7-16	110	16	50 7-16	110

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended February 16th, as compiled from various sources, amounted to $247,734.16, as against $151,295.02 reported for the previous week. The receipts from January 1st, 1883, to date are $2,070,907.67.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, reduced the bank's minimum rate for discount from 4 to 3½ per cent. During the week, the bank gained £210,000 bullion on balance, but the proportion of its reserve to its liabilities was reduced from 46⅛ to 44 15-16 per cent, against 37⅝ per cent at the same date last year. The weekly statement of the Bank of France shows an increase of 5,875,000 francs gold and 612,500 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13½ per cent, to arrive at actual value.

MINES.	States.	For the week.	Month of January.	Year from Jan. 1st, 1883.
Bodie, G. S.	Cal		$26,084	
Bodie Tunnel, G.	"		13,631	
Bonanza King, G.	"		32,523	
Christy, S.	Utah		8,987	
*Chrysolite, S. L.	Colo		26,312	
Contention, S.	Ariz		88,694	
*Custer, G. S.	Idaho		43,572	
*Deadwood-Terra, G.	Dak		45,696	
*Derbec Bl. Grav., G. S.	Cal		8,337	
*Father de Smet, G.	Dak		27,491	
*Homestake, G.	"		107,678	
Horn-Silver, S. L.	Utah		203,000	
*Harguerite, G.	Cal		10,300	
Martin White, S.	Nev		19,407	
Navajo, G. S.	"		80,000	
Northern Belle, S.	"		65,174	
*Ontario, S. L.	Utah		‡132,221	
*Oxford, G.	N. S.		2,865	
*Satemo, G.	"		1,800	
Standard, G.	Cal		82,959	
Star, S.	Nev		‡14,796	
Stormont, S.	Utah		19,130	
Syndicate, G.	Cal		9,217	
Tintic M. & M. Co.	Utah		7,632	
*Tip Top, S.	Ariz		7,976	
*Tombstone, G. S.	"		72,011	
Yellow Jacket, S.	Nev		14,252	
Total amount of shipments to date			$1,219,745	

* Official. ‡ Assay value. *G.* Gold. *S.* Silver. *L.* Lead.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended February 10th	$140,865
Corresponding week last year	935,500
Since January 1st, 1883	1,375,679
Corresponding period last year	5,747,020

Imports.

Week ended February 10th	$71,194
Corresponding week last year	78,270
Since January 1st, 1883	689,489
Corresponding period last year	483,132

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 16.

The iron and metal trades have lost in the Hon. William E. Dodge one who was for many years one of the most prominent men in the trade. Expressions of the high appreciation in which he was held have spontaneously come from many quarters.

American Pig.—The market is still in an unsettled and unsatisfactory condition, and those who are forced to realize must be willing to make concessions so far as all but choice foundry grades are concerned. These are still firm at $26, but prices on ordinary and standard are in buyer's favor. We quote $23.50@$25 for No. 1 and $22.50@$23.50 for No. 2. Recently, contracts were closed by one furnace firm for Forge Pig for delivery to founders of water-pipe, which makes the aggregate sales for that company of Forge since the beginning of the year 200,000 tons. We quote $20@$20.50 at tide-water for Gray Forge. Bessemer Pig is dull and lifeless, with values ranging between $22@$22.50. England cables 52@54c. 6d. for Hematite. Spiegeleisen is dull, 20 per cent offering freely at $33.

Mr. Swank's production and stock statistics, which we print elsewhere, are a surprise to the trade. The production is much heavier than was anticipated, and the stocks, notably of anthracite, are small in makers' hands. Those of charcoal pig are heavy, and fully account for the very low prices at which these grades are selling in the West.

With makers' stocks not heavy and the consumers who have pursued a hand-to-mouth policy so long practically without any stocks, and 417 furnaces blowing, against 446 last year, and diminished imports, the statistical position is decidedly good.

Still, it is likely that the trade is doomed to some weeks of inactivity, as the yearly contracts, generally well entered into in other years at this season, will be pending until Congress has adjourned.

Scotch Pig.—There is a little better feeling, due to more inquiry and a rise of ocean freights from Glasgow from 5s. to 6s. 6d. @7s. 6d. Sales aggregate 1000 tons of various brands, while arrivals are light and have partially gone into store. We quote Coltness, $24.50@$25; Summerlee, $24@$24.50; Dalmellington, $22; Glengarnock, $22@$22.50; and Eglinton, $21@$21.50. The Wall Street Exchange has received the following Glasgow quotations by cable to-day: Carnbroe, 55s. 3d.; Gartsherrie and Summerlee, 62s.; Coltness, 65s.; Langloan, 65s. 6d.; Glengarnock, 55s. 3d.; and Eglinton, 49s. 9d.; Warrants are 47s. 9d., a slight rise.

Steel Rails.—There is very little business doing, and there seems to be a weakness and some irregularity. Rails for summer delivery are quoted $40 at tide-water, and $38@$39 at mill. England cables £5@£5 5s.

Old Rails.—Nothing of any account has been done. We quote Ts $24.50@$25.

Scrap.—We have no business to report. No. 1 is quoted $24.50@$25 ex ship.

Philadelphia. Feb. 16.

Iron and steel manufacturing interests are heartily wearied of the long contest as to what tariff duties shall be, and look with much interest to the promised early termination of the contest. The trade has already very largely discounted the reductions. Just what the actual results will be, however, can not be safely stated. Careful canvassing as to the probable demand during March and April leads experienced iron men to the belief that the demand will be large and the entire output promptly placed. Consumers have been held in check for a long time by uncertainties as to legislation, and they are waiting for an end, in order that they may place their pressing requirements. The decline in quotations will afford encouragment to them, and manufacturers are confident of a large business. To-day's quotations for mill irons are $21. Sales are made on both sides of this limit. No. 2 iron is selling at $22.50@$23.50, although the bulk of transactions which have come to notice since last report have been made nearer the minimum limit than the maximum. The foundries are doing much less work than usual, and are not buying, hence No. 1 is weak, and stocks are accumulating at several furnaces. Schuylkill and Lehigh valleys are duller than they have been for months, and shipments are restricted to absolute requirements.

Manufactured Iron.—The movements of finished iron are any thing but encouraging, and consumers are waiting for a winding up of the tariff legislation. It is said by leading manufacturers that business is to be had, but they are extremely solicitous for the passage of a tariff law. The card rates are 2·40c., but for two weeks past this figure has not been insisted upon excepting in occasional instances for small lots. All the new business that has been placed has been taken at about 2·25@2·35c. Common iron has been booked down as low as 2c. Country mills are ready for business at 2·10c., and the competition has tended to weaken city quotations. Western mills are taking business at 1·80@2c., and even these low prices do not bring in much business. The entire finished iron market is in an unsettled condition, and will remain so until the trade can feel it is on solid ground.

Wrought Pipes and Tubes.—Discounts are 65 to 67½ off for wrought pipe, and boiler tubes are 55. There has been a fair amount of business closed this week which has been hanging fire for a long time. Business in cast pipe is of moderate dimensions and has been closed at 35@37½, according to size of pipe and weight.

Shaped Iron is not very active, though inquiries have been received for considerable lots, and quotations have been made at low rates. Angles are 2·50. @2c.; Channels, 3¾c.; Beams, 3½c. The dullness has led to considerable shading of prices, and it is not possible to see what inside prices are.

Plate and Tank Iron.—The larger manufacturers have had a few inquiries for spring delivery, and some business is likely to be closed in a few days, but

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Feb. 10.		Feb. 12.		Feb. 13.		Feb. 14.		Feb. 15.		Feb. 16		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.75	....	2.85	2.75	2.85	2.80	2.85	2.75	2.90	2.80	2.95	....	4,500
Amie Con., Co.	.21	.20	.21	.20	.22	.21	.22	.21	.22	.21	.22	.21	25,750
Argenta, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bar & Walker, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bassick, Co.	8.25	8.00	9.75	....	8.50	....	9.00	....	9.87	....	10.00	9.25	1,375
Belle Isle, Ne.	.75	....	.77	....	.81	.80	.80	....	.75	....	....	....	1,300
Bodie Cons., Ca.	1.50	....	1.50	....	1.45	....	....	....	1.40	1.35	1.50	....	710
Breece, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer, Ca.	1.00	.90	.98	....	....	....	1.00	....	1.00	....	1.00	.90	3,741
California, Ne.	.24	.22	.25	.23	.25	.23	.25	.22	.24	.22	.23	.21	10,500
Cal. & Hecla, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Caribou Con., Co.	.20	....	....	....	....	....	....	....	....	....	....	....	50
Chrysolite, Co.	1.50	....	1.45	....	1.50	1.45	1.50	1.45	1.45	1.40	1.40	....	4,600
Climax, Co.	....	....	....	....	.10	....	.09	.08	.09	....	.09	....	900
Cons. Va., Ne.	.58	.56	.58	.54	.60	.56	.60	.56	.55	.53	.59	.53	17,400
Deadwood-Terra, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Co.	....	....	....	....	.30	....	.31	....	.30	....	.30	....	500
Eureka Cons., Ne.	9.50	....	....	....	10.50	....	10.25	....	10.25	....	10.50	....	500
Excelsior, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Father de Smet, Dk.	....	....	4.87	....	....	....	....	....	....	....	....	....	100
Findley, Ga.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Stripe, Ca.	....	....	.08	.07	.08	.07	.08	.07	.08	....	.08	....	6,100
Gould & Curry, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Ne.	....	....	....	....	....	....	.90	....	....	....	.75	....	400
Great Eastern, Dk.	.03	....	....	....	....	....	.03	....	....	....	....	....	3,800
Green Mountain, Ca.	.72	.65	.76	.74	.78	.75	.81	....	.86	.81	.86	.80	17,300
Hale & Norcross, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hall-Anderson, N. S.	1.50	....	1.45	1.35	1.35	1.30	1.75	1.45	1.75	1.60	1.60	1.55	29,100
Hibernia, Co.	....	....	....	....	.05	.04	.05	....	....	....	....	....	500
Homestake, Dk.	....	....	....	....	....	....	....	....	....	....	17.50	....	44
Horn-Silver, Ut.	5.12	5.00	5.00	....	5.00	....	5.12	5.00	....	....	5.87	....	2,805
Hukill, Co.	.18	.17	....	....	....	....	.16	....	.18	.17	.17	.16	3,400
Independence, Ne.	.77	.75	....	....	....	....	....	....	....	....	....	....	800
Iron Silver, Co.	2.75	....	2.80	....	....	....	2.75	....	2.75	....	....	....	1,500
La Plata, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C., Co.	....	....	.65	....	.67	.63	.66	....	.70	....	....	....	2,325
Little Chief, Co.	....	....	....	....	.43	.41	.42	....	.42	....	.41	.40	1,400
Little Pittsburg, Co.	....	....	.64	.63	....	....	....	....	.64	....	.65	....	800
Martin White, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Moose, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Ne.	6.00	5.25	5.75	....	6.00	5.87	....	....	6.50	....	6.25	....	2,400
Northern Belle, Ne.	10.12	....	10.12	....	10.12	10.00	10.00	9.75	10.00	....	....	....	270
North Belle Isle, Ne.	....	....	.64	....	.65	.64	.64	....	.66	....	.61	....	1,6 0
Ontario, Ut.	20.25	18 00	....	....	....	....	30.00	21.50	30.00	....	28.00	20.00	1,230
Opair, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Plumas, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Prussian, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Quicksilver Pref., Ca.	....	....	....	....	....	....	....	....	41.00	....	....	....	100
" Com., Ca	....	....	....	....	....	....	....	....	8.25	....	....	....	100
Rising Sun, Ca.	....	....	....	....	....	....	....	....	....	....	.06	....	400
Robinson Cons., Co.	1.10	1.05	1.15	1.10	1.20	1.15	1.20	1.10	1.10	1.05	1.10	....	28,070
Savage, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Grande, N. M.	2.65	2.60	2 95	2 65	2.80	....	2.95	2.75	2.95	2.70	2.75	2.60	15,950
Sierra Nevada, Ne.	....	....	3.40	....	4.25	4.00	3.60	....	3.50	3.25	....	....	845
Silver King, Ar.	11.00	....	....	....	11 50	....	11.50	....	11.50	....	11.37	....	700
Spring Valley, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Ca.	5.50	5.00	....	....	5.50	....	6.00	5.37	....	....	5.50	....	510
Stormont, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tip Top, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina, Ar.	....	....	....	....	....	....	....	....	1.00	.95	.95	.75	1,000
Yellow Jacket	....	....	....	....	....	....	....	....	1.25	....	1.25	....	200
....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Feb. 10.		Feb. 12.		Feb 13.		Feb. 14.		Feb. 15.		Feb. 16.		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion, s. L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Alta-Montana, G.	.15	.14	.14	.12	.13	.12	.13	.12	.13	.10	.10	....	27,500
Am. Flag, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Barcelona, G.	.23	.22	.22	....	.22	.21	....	....	.21	....	.21	....	2,400
Bear Creek	.26	....	.26	....	....	....	....	....	....	....	....	....	400
Becittel Con., G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & B'icher, G. S.	....	....	....	....	....	....	....	....	....	....	....	....	10
Big Pittsburg, S. L.	.23	.22	....	....	.20	....	.21	.18	.20	....	.19	....	2,100
Bradshaw, S.	.33	....	.35	.32	.32	.34	.34	....	.34	....	....	....	1,800
Buckeye	....	....	....	....	....	....	....	....	....	....	....	....	....
" pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bull-Domingo, S.L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bye and Bye.	....	....	....	....	....	....	....	....	....	....	....	....	....
Calaveras, G	....	....	.02	....	....	....	....	....	....	....	....	....	400
C'lav'r's W. & M. Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal., B. H., G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Carbonate Hill, S L.	....	....	....	....	....	....	....	....	....	1.00	....	....	400
Central Ariz'na, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chapparal.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherokee, G.	....	....	....	....	....	....	.06	....	....	....	....	....	100
Cons. Imp'ri'l, G. S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Pacific, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Crowell, G.	.04	....	....	....	....	....	.04	....	....	....	....	....	600
Dahlonega, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur	.10	....	.09	....	....	....	.11	....	.11	....	.11	....	11,700
Durango, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Elko Cons.	.14	.13	.14	.12	.13	.10	.15	.13	.17	.14	.17	.15	72,900
Empire, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Enterprise.	.50	....	.52	.50	.52	.50	.52	.50	.53	.50	.55	.52	6,100
Fannie Barret	2.25	2.20	2 25	2.20	2.25	....	2.25	....	2.25	2.20	2.20	....	1,600
Gold Placer, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Goodshaw, G.	....	....	....	....	....	....	.07	....	.08	....	....	....	300
Granville, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Harlem M. & M. Co.	1.10	....	1.10	....	1 10	....	....	....	1.15	1.10	....	....	4,700
Hortense, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Lacrosse, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mariposa Pref., G	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., G	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, G. S.	....	....	....	....	3.10	....	3 37	3.15	....	....	....	....	330
Mono	.33	.25	.30	.25	....	....	.25	....	.23	....	....	....	700
North Standard, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
N. Horn-Silv'r, S L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ori'nt'l & Miller, S.	.14	....	.14	....	.15	.14	.15	.14	.15	.14	.14	.13	7,000
Quartz Creek.	....	....	....	....	....	....	....	....	....	....	....	....	....
Rappahannock, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Red Elephant, S.	....	....	....	....	.08	....	.08	....	....	.09	....	....	400
Ruby, of Arizona.	.56	.55	.56	....	.55	.54	.55	....	.55	....	.56	....	2,300
Silver Cliff, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con.	.22	....	.26	.22	.26	....	.27	.26	.29	.26	.29	.28	87,300
South Bodie, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Bulwer, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Hite.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Pacific.	.09	.08	.09	....	.08	.07	.08	.07	.08	....	.08	....	11,200
State Line	....	....	....	....	....	....	....	....	....	....	....	....	....
" Nos. 1 & 4, s.	.13	....	.03	....	.03	....	.03	....	.03	....	.04	....	1,600
" Nos. 2 & 3, s.	....	....	.08	.07	.08	.21	.07	....	.07	....	.07	....	1,200
Sutro Tunnel.	.21	....	.21	....	.22	....	.25	.21	.23	....	.23	.22	38,200
Taylor-Plumas	....	....	.19	....	.18	....	.18	....	.17	....	.18	....	18,100
Tioga, G.	....	....	....	....	....	....	....	....	....	.21	....	....	....
Tuscarora, S	....	....	....	....	....	....	....	....	....	....	....	....	....
Unadilla, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Cons, G. S.	....	....	....	....	4.85	....	3.85	....	4.00	3.60	4.15	....	510
Vandewater.	....	....	.80	.29	.29	....	....	....	.29	....	....	....	4,200
Washington.	....	....	....	....	....	....	....	....	....	....	....	....	....

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 195,375. Non-dividend shares sold, 306,350.

PHILADELPHIA MINING STOCKS.

	Feb. 9.		Feb. 10.		Feb. 12.		Feb. 13.		Feb. 14.		Feb. 15.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American.	....	....	....	....	....	....	....	....	....	....	....	....	....
Argent.	.30	....	.30	....	.27½	....	.27½	.24	.27½	.25	.27½	....	28,725
Arizona So.	....	....	....	....	.25	....	....	....	....	....	....	....	200
Aztec	....	....	....	....	....	....	....	....	....	....	....	....	....
Battle Mt.	.02	....	.02	....	.02	....	....	....	....	....	....	....	8,500
Black Sul.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bodie M.	....	....	....	....	....	....	....	....	....	....	....	....	....
Buena.	.06	.05	.07	....	.07	.06	.06	....	.06	....	.06	....	77,850
California.	....	....	....	....	....	....	....	....	....	....	....	....	....
Calista.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cincinnati.	....	....	....	....	....	....	....	....	....	....	....	....	....
Comprom'e	.35	....	.35	....	.30	....	.25	....	....	....	.25	....	4,400
Dauntless.	.03	....	....	....	....	....	....	....	....	....	....	....	4,000
Del Monte.	....	....	....	....	.04	.03	.05	....	.06	....	.06	....	16,000
Denver City	.19	....	.18	....	.18	....	.19	....	.19	....	.19	....	14,2 0
Fairview.	....	....	.01	....	.01	....	....	....	....	....	....	....	4,1 0
Eureka.	....	....	....	....	....	....	....	....	....	....	....	....	....
Girard.	.18	.17	.18	....	....	....	.18	....	.18	....	.17	....	5,100
Golconda.	....	....	....	....	....	....	....	....	....	....	....	....	....
Golden Age.	....	....	....	....	....	....	....	....	....	....	....	....	....
Governor.	.09	....	.09	....	.09	....	.08	....	.09	....	.09	....	19,900
Grand Uni'n	.16	....	.17	....	.18	.17	.18	.16	.19	....	.18	....	26,410
Gunnison.	.75	....	.70	....	.75	....	.70	....	.75	....	.72½	....	5,200
Hancock.	....	....	....	....	....	....	....	....	....	....	....	....	....
Intervener	....	....	....	....	....	....	....	....	....	....	....	....	....
Iowa Gulch.	.12	....	.12	....	.13	....	.12	....	.11	....	.12	.11	41,600
King Bul'on	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Dia'd.	....	....	....	....	....	....	.05	....	....	....	....	....	5,000
Little Maud	....	....	.07	....	....	....	.07	....	.07	....	.07	....	14,500
L'g & D'y Hl	....	....	....	....	....	....	....	....	....	....	....	....	....
McCullough	....	....	....	....	....	....	....	....	....	....	....	....	....
Magnolia.	....	....	.01	....	....	....	.01	....	....	....	....	....	16,400
Montana.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mt. Lincoln.	....	....	....	....	....	....	.02	....	....	....	....	....	1,000
Mt. Sheridan	.04	....	.04	....	.04	....	.04	....	.05	....	....	....	10,800
National.	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion.	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion Pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Palmetto E.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pembina.	.20	....	....	....	.19	....	.19	....	.19	....	.19	....	10,700
Penn-Breck.	.12	.11	.11	....	.12	....	.11	....	.11	....	.11	....	24,600
Permanent.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pizarro.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pizarro Ex.	....	....	....	....	.02	....	....	....	....	....	....	....	200
Potosi.	....	....	....	....	....	....	....	....	....	....	....	....	....
Rara Avis.	....	....	....	....	.57½	....	....	....	....	....	....	....	100
Rara Avis E.	....	....	....	....	....	....	....	....	....	....	....	....	200
Record	.12	.11	.12	....	.12	....	....	....	....	....	....	....	5,700
Rico Pion'r.	....	....	....	....	....	....	....	....	....	....	....	....	....
San Pedro.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra G'nde	2.60	2.55	2.70	2.65	2.70	2.65	2.80	2.77½	2.90	2.75	2.90	2.77½	5,240
Silver Cord.	....	....	1.25	....	....	....	....	....	....	....	....	....	500
Silv'r Plume	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Rock	....	....	....	....	.02	....	....	....	....	....	....	....	3,000
Sovereign.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sultana.	.06	....	.05	....	....	....	....	....	.05	....	.04	....	6,300
Sutro Tun'l.	.23	....	.22	....	....	....	....	....	.24	....	.22	....	2,300
Tombstone.	.85	....	.82½	....	.85	....	.82½	....	....	....	.82½	....	8,700
Tranquilli'y	....	....	....	....	....	....	....	....	....	....	....	....	....
Tyrone.	....	....	....	....	....	....	....	....	....	....	....	....	....
Victor.	....	....	....	....	....	....	....	....	....	....	....	....	....
Yale Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....

BOSTON MINING STOCKS.

	Feb. 9.		Feb. 10.		Feb. 12.		Feb. 13.		Feb. 14.		Feb. 15.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.	....	....	....	....	....	....	2.12½	....	2.00	....	2.50	....	320
Atlantic.	....	....	....	....	14.00	....	....	....	....	....	14.00	....	12
Aztec.	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & Bel.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bodie Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bonanza D.	2.75	....	2.75	....	2.75	....	2.75	....	2.75	....	2.62½	....	1,900
Bruns. Ant.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer.	....	....	....	....	....	....	....	....	....	....	....	....	....
California.	....	....	....	....	....	....	.25	....	.24	....	....	....	700
Cal. & Hec.	....	....	243	....	243	....	243	....	243	....	243	242	71
Carbon. Hill	....	....	....	....	....	....	....	....	....	....	....	....	....
Catalpa.	.98	.96	.92½	.90	....	....	....	....	....	....	.95	.92½	1,200
Central Ariz	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherryfield.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite.	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. V'ginia	....	....	....	....	....	....	....	....	.60	....	....	....	300
Copp'r Falls	....	....	....	....	....	....	....	....	....	....	....	....	....
Crescent.	....	....	.40	.38	.42½	.38	....	....	.40	.38	....	....	1,100
Cumberl'd.	....	....	....	....	....	....	....	....	....	....	....	....	....
Deer Isle.	....	....	....	....	....	....	....	....	.12	.11	....	....	1,000
Denver City	....	....	....	....	....	....	....	....	....	....	....	....	....
Douglas.	....	....	....	....	....	....	....	....	....	....	....	....	....
Duncan.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin.	....	....	....	....	....	....	....	....	....	....	....	....	....
Empire	.26	.25	.26	....	.25	.24	.24	.23	.23	.22	.20	....	6,200
Eureka Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Franklin.	13.00	....	13.00	....	13.00	....	12.87	12.75	12.25	....	12.75	....	870
Gila County	....	....	....	....	....	....	....	....	....	....	....	....	....
Hancock G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hasbaw.	....	....	.87½	....	....	....	.75	....	....	....	....	....	150
Horn-Silver.	....	....	....	....	....	....	....	....	....	....	....	....	....
Huron.	....	....	1.75	....	....	....	....	....	....	....	....	....	100
Independ'ce	....	....	....	....	....	....	....	....	....	....	....	....	....
Indian Q'n.	....	....	....	....	....	....	....	....	....	....	....	....	....
Madison.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mammoth	....	....	....	....	....	....	....	....	....	....	....	....	....
Mass. & N.M.	.10	.09	.09	....	.09	.07	.07	.06	.08	.07	.07	....	64,365
Milton.	....	....	....	....	....	....	....	....	....	....	....	....	....
Napa.	3.50	....	....	....	....	....	....	....	....	....	....	....	1,000
National.	....	....	....	....	1.50	....	....	....	....	....	....	....	200
North. Belle	....	....	....	....	....	....	....	....	....	....	....	....	....
Osceola.	30.50	30.00	31.00	....	31.00	....	31.00	....	....	....	31.00	....	62
Penn-Breck.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pewabic.	....	....	8.00	....	8.00	....	....	....	....	....	....	....	475
Pine Tree.	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth.	.22	....	....	....	....	....	.23	....	.23	....	....	....	600
Quincy.	....	....	51.00	....	51.00	50.50	51.00	50.50	50.50	....	50.50	....	200
Ridge.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson.	....	....	....	....	....	....	....	....	....	....	....	....	....
San Pedro.	.75	.72½	.85	.75	.87½	.85	.85	.84	.85	.83½	.83½	.80	12,000
S'ra Nevada	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Islet.	....	....	....	....	6.00	....	6.00	....	....	....	....	....	60
Silver King.	....	....	....	....	....	....	....	....	....	....	....	....	....
Simpson Gd	....	....	....	....	....	....	....	....	.06	.04	.08	.06	12,200
So. Pacific.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard.	....	....	....	....	....	....	....	....	....	....	....	....	....
State Line.	....	....	....	....	....	....	....	....	....	....	....	....	....
Nos. 2 & 3.	....	....	....	....	.87½	....	.75	....	....	....	....	....	300
Sullivan.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tun.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sycamore.	....	....	....	....	....	....	....	....	....	....	....	....	....
Twin Lead.	.20	....	....	....	.19	....	.14	....	.13	....	.12½	....	5,100
Vizina.	....	....	....	....	....	....	....	....	....	....	....	....	....

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prices are not down. Tank Iron has been quoted at 2½c., but better terms can be had. Shell, 3½c.; Flange, 4¼c.; Fire-Box, 5¼c. Several small shipments have been made from Eastern Pennsylvania mills, but the general business is trifling, and all sides are waiting for definite results. Sheet-iron is weaker, and card rates run from 4@4½c., according to gauge. Galvanized is 35 per cent off, and a fair amount of business was transacted.

Steel Rails.—Quotations run from $39@$40. The reduction in duties has given rise to some correspondence between projectors and manufacturers, and possibly the quotations may be revised in a few days, which will lead to the placing of a few large orders which can be secured. The tendency is downward, and buyers expect to obtain better terms than those now quoted. The market is unsettled.

Old Material.—Quotations are $25@$26 for Tees, according to location; $27.50 for Double-Heads. American are quoted at $27@$28, according to where they are. Scrap-iron sold at $25.50 for No. 2. Four or five small lots of selected brought from $27@$27.50. The supply of selected is not very large, but medium and lower grades are abundant. Machinery cast is quoted at $19@$20.

Metals.—The movement in metals is sluggish.

Louisville. Feb. 13.

[Specially reported by GEORGE H. HULL & Co.]

The market for hot-blast iron is quiet. Most buyers not already stocked are pursuing the hand-to-mouth policy. Few if any large sales are making. Quotations for cold-blast iron are still nominal. We quote, for cash, in round lots, as below:

FOUNDRY IRON.

No. 1, Hanging Rock Charcoal	$26.00@$27.00
" 1, Southern Charcoal	22.50@ 23.00
" 1, Hanging Rock Stone-Coal and Coke	22.00@ 22.50
" 1, Southern, Stone-Coal and Coke	22.00@ 22.50
" 2, Southern, Stone-Coal and Coke	21.00@ 21.50
" American Scotch"	21.00@ 22.00
Open Silver Gray	20.00@ 20.50
Close Silver Gray	19.00@ 19.50

MILL-IRONS.

No. 1, Charcoal	$21.00@$21 50
" 1, Stone-Coal and Coke, Neutral	19.50@ 20.50
" 2, Stone-Coal and Coke, Neutral	19.00@ 19.50
" 1, Stone-Coal and Coke, Cold-Short	18.50@ 19.00
" 2, Stone Coal and Coke, Cold-Short	18.50@ 19.00
White and Mottled, Cold Short and Neutral	17.50@ 18.00

CAR-WHEEL IRONS.

Hanging Rock, Cold-Blast	$30.00@$32.00
Hanging Rock, Warm-Blast	25.00@ 27.00
Alabama and Georgia, Warm and Cold-Blast	26.00@ 28.00
Central Kentucky, Cold-Blast	26.00@ 28.00

METALS.

NEW YORK, Friday Evening, Feb. 16.

Copper.—The market has been very unsettled, Western copper selling to the extent of about 250,000 pounds at 15⅝c., with rumors of transactions at lower figures. It is difficult to understand the motive for this slaughtering of the metal, especially when Anchor and Arizona Baltimore are firmly held at 17⅛c., and are selling in small parcels at that figure. The difference between the price of Western copper and Lake has become so large that there must be much temptation to manufacturers of copper who hold Lake to part with some of it and buy Western for a mixture. Holders of Lake insist upon 18c., but can find no buyers to take hold.

It is a noteworthy fact that the exports of copper material are assuming a larger scale.

London cables £65 10s.@£65 15s. for Chili Bars and £72@£72 5s. for Best Selected.

Tin.—This metal appears to be in a strong position temporarily, with quotations for large lines at 21c. cash for Straits, 21⅛c. for Malacca, and 21¼ for Australian. Sales during the week aggregate 150 tons. England cables to-day £93 5s.@£93 10s.

Lead.—There has been absolutely no business, buyers declining to enter the market, while holders have not as yet changed their views. We quote nominally 4·50c. for Common and 4·60c. for Refined, but it is doubtful whether that figure could be realized if the metal were forced on the market.

Nevada journals announce that the Richmond Company has made a contract to ship 10,000 tons of lead here by way of Palisades, via the Central Pacific to Lathrop, Cal., thence by the Southern Pacific to New Orleans. This is, of course, for a longer period. The Richmond Company's stock as yet is not greater than 6000 or 7000 tons, which is still held at 4·90c. Its presence, of course, checks any speculative move. England cables £13 10s.@£13 15s. for Common.

Spelter.—This metal is as dull as ever, being freely offered at 4⅝c., while it is probably procurable at 4·50c.

Antimony.—There has been no change since our last, and we quote 10@10½c. for Hallett's, and 11@11½c. for Cookson's.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 16.

Anthracite.

In some quarters, the local anthracite trade is reported a trifle better in tone, the ruling f. o. b. prices being about $3.75@$3.80 for broken, $3.85@$3.90 for egg, and $4.30@4.35 for stove and chestnut. The market is decidedly in buyers' favor, but there was comparatively little disposition to take hold.

The most interesting fact which has come out during the week is, that two of the large companies have reduced their prices for Eastern shipments, the f. o. b. prices being made $3.65 for broken, $3.75 for egg, and $4.20 for stove and chestnut. The other companies have followed suit, and there is a possibility of a fight.

The production for the week ended February 10th, 1883, was 658,041 tons, against 338,466 tons for the corresponding week in 1882. The total for 1883 up to February 10th was 2,774,285 tons, against 2,439,637 tons in the same period last year, an increase in 1883 of 334,598 tons.

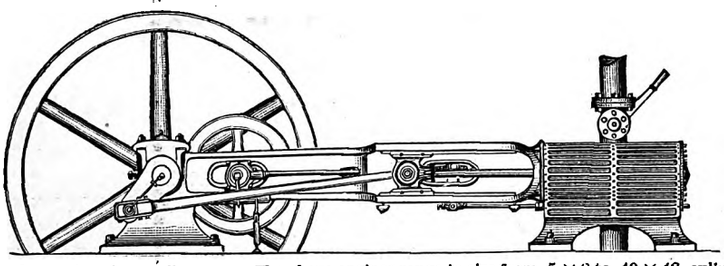
Bituminous.

The most important feature in the bituminous coal trade during the week is the announcement that the Baltimore & Ohio and the Pennsylvania railroads have reached an understanding in the matter of coal freights from the Cumberland and the Clearfield bituminous region. It is stated that this is the outgrowth of threats by the Baltimore & Ohio Railroad to cut rates. The figure which has been mentioned to us by a very reliable authority as the newly established rate from the Clearfield region to South Amboy is excessively high, and would make it impossible to lay down coal here below $4.75 or $4.85.

The market is very dull, which is chiefly owing to the fact that the great majority of foreign steamers come in light and carry enough coal to take them back. In a number of cases, Scotch and some Welsh coals are even sold here at low prices, $3.40@$3.50 alongside of vessel.

We hear of occasional sales of Clearfield coal, off lots, at prices lower than $4.50, which is, however, the ruling quotation. Cumberland is still quoted $4.40@$4.80; but good buyers would probably succeed in getting coal at somewhat lower figures.

THE CUMMER ENGINE

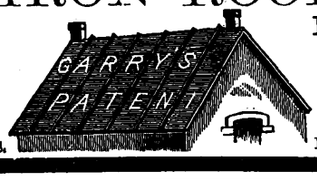


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For Nervousness.

Dr. H. N. D. Parker, Chicago, says: "I have thoroughly tested it in nervous diseases, dyspepsia, and general debility, and in every case could see great benefit from its use."

DIVIDENDS.

NEW YORK, Feb. 12, 1883.

THE CONTENTION CONSOLIDATED MINING COMPANY this day declared its regular monthly Dividend, No. 13, of

TWENTY-FIVE CENTS PER SHARE,

payable February 28th, 1882, at the office of the Farmers' Loan and Trust Company, No. 26 Exchange Place, on all stock registered in New York.

Transfer-books close on February 17th.

W. HART SMITH, Vice-President.

OFFICE OF THE JOCUISTITA MINING COMPANY, No. 18 Wall Street,
NEW YORK, Feb. 14, 1883.

DIVIDEND NO. 7.

The JOCUISTITA MINING COMPANY has this day declared a quarterly dividend of Fifty Thousand Dollars, being FIFTY CENTS (50c.) per share, payable at the office of Lounsbery & Haggin, No. 18 Wall Street, on the 28th inst.

Transfer-books close on the 23d inst.

R. P. LOUNSBERY, President.

OFFICE OF THE HOMESTAKE MINING COMPANY, No. 18 Wall Street,
NEW YORK, Feb. 12, 1883.

DIVIDEND NO. 54.

The regular monthly dividend of FORTY CENTS per share has been declared for January, payable at the office of the transfer-agents, Lounsbery & Haggin, No. 18 Wall Street, on the 26th inst.

Transfer-books close on the 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

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THE ENGINEERING AND MINING JOURNAL

VOL. XXXV. No. 8.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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Mr. J. Viennot, 150 South Fourth street, Philadelphia, is our accredited representative for Philadelphia.

Mr. A. H. Taylor, 159 Lake street, Chicago, is our accredited representative for Chicago and the Northwest.

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THE text of the commercial treaty upon which the United States and Mexico have agreed has been published. The schedule of articles of American manufacture which the Mexican government will admit free of duty includes almost all the materials, machinery, and supplies needed in mining and metallurgical operations, for farming and the railroads.

THE Senate has passed its little tariff bill without materially changing the duties provided in its schedules as first adopted, and the country is now in a gentle state of excitement to know what the result of the dickering of the various factions in the House will be. The principal difficulty now seems to be to get the bill before a conference committee.

OWING to an unfortunate mutilation in the printer's hands of the manuscript of our article on the Boss continuous system, the tailings from the Sierra Grande mill were made a little too rich to be allowed to be neglected, and we unnecessarily exaggerated a trouble that has been puzzling the engineers connected with that company. Even they can not afford to have 23 per cent of silver in the tailings. It ought to have read *silica*.

WE print elsewhere a full report of the proceedings of the Boston Meeting of the American Institute of Mining Engineers, including all but the final session. The attendance was large, and the papers presented were of considerable interest. The excursions were very well planned throughout, and were very well attended, the other attractions of a city like Boston causing less scattering than is occasionally noticed at the winter meetings.

MR. J. S. JEANS, Secretary of the British Iron Trade Association, has just issued a statement of the statistics of production of pig-iron and the stocks in Great Britain. According to his figures, the output reached the enormous total of 8,493,287 gross tons, the Cleveland District leading with 2,688,650 tons, Scotland following with 1,126,000 tons, and the West Cumberland hematite district with 1,001,181 tons. Restriction in the Cleveland and Scotch districts reduced the stocks during the year in those sections by 215,991 tons ; but an increased make in a large number of other districts made up for part of the decrease, bringing the stocks at the close of last year up to 1,576,894 tons, against 1,736,262 tons on the 31st December, 1881.

THE rapid succession of failures and embarrassments in the iron trade and the general apathy in that great industry have caused an erroneous impression to go abroad. It is believed by many that the business is on an unsound basis, and that the troubles referred to are only the forerunners of general and widespread financial disaster. While we fully acknowledge that iron-masters are in some cases only holding their own, and in many others are reaping only small profits, compared with former years, we must very energetically protest against any such pessimistic views as those to which we have alluded. It would be tedious to go into details, but it can, we believe, be shown that the embarrassments of the last month are due to special causes, aggravated, of course, by the prevailing dullness of trade. Over-speculation, mismanagement, unfavorable location, etc., have been the principal causes of these local failures. They are not characteristic of the iron trade. They can not be considered as a deep-rooted disease, of which the happenings of the past few months are only the outgrowth. The stagnation in the trade is largely artificial and temporary. For fully a year, buyers have been sailing closely to the wind, and when the tariff agitation was intensified by the interminable and ill-directed discussion in Congress, they were positively frightened out of the market. On the other hand, the production, which otherwise would have been very great, was checked by labor troubles in many sections in the country, and stocks are consequently low in the hands of producers, middlemen, and consumers. Any impetus to trade which the generally favorable situation of business in the country would easily furnish would therefore have an exceptionally powerful influence under the circumstances, and there are those who feel warranted in dreading an undue activity that might lead to a repetition on a smaller scale of the unfortunate boom period.

THE Census Bureau has published a summary of what promises to become one of the most interesting monographs in the series. The statistics of the traffic and fiscal operations of the railroads of the United States have never been so fully collected and so clearly presented. Much of the success of the Census Bureau in accomplishing this work is of course due to its exceptional facilitities, the absence of which no industry or enterprise on the part of those who have attempted to present similar figures could outweigh. But even with such advantages, the work has required a high degree of diligence and of thorough familiarity with the subject. According to the data submitted, there were at the close of the census year ended June 30th, 1880, 87,891·35 miles of finished railroad in the United States, the construction of which cost $4,112,367,276. The equipment cost $418,045,458, the value of the lands was $103,319,845, the value of telegraph lines and miscellaneous improvements was $204,918,196, while the stock and bonds issued by other lines held by railroads was $343,800,131, making the total of permanent investments $5,182,445,806. In addition to these, the railroads had cash assets footing up to $353,973,981, and profit and loss to credit of $110,697,228, the total assets being $5,536,419,787. The total capital paid in and borrowed is $5,425,722,560, including $2,613,606,264 capital stock paid in, $2,390,915,402 funded debt and $421,200,894 unfunded debt, the latter including $68,750,288 interest unpaid and $13,059,983 dividends. From total transportation earnings of $580,450,594, swelled to $661,295,392 by income from other sources, expenditures of all kinds footing up to $541,950,795, including $352,800,121 for transportation, must be deducted, leaving a net profit of $119,344,597, out of which $70,550,342 of dividends were declared. The general average earnings upon the stock of all the companies were only 4·566 per cent, and only 2·699 per cent of dividends were paid ; 623 companies, representing 80 per cent of the aggregate stock of the country, were operated at an average profit of 6·23 per cent. A part of the rest made a deficit, and another part was still under construction.

The itemized statement of the transportation expenses of the railroads is particularly interesting, because it gives some idea how valuable customers they are to many industries. Among the heaviest expenses we find the following : Repairs of road-bed and track, $39,603,076, or 11·23 per cent of the total ; renewal of rails, $17,243,950, or 4·89 per cent ; renewal of ties, $10,741,577, or 3·04 per cent ; repairs of bridges, $9,009,097, or 2·55 per cent ; repairs of locomotives, $21,880,963, or 6·19 per cent ; repairs of passenger and baggage-cars, $10,558,824, or 2·99 per cent ; and repairs of freight-cars, $22,595,533, or 6·40 per cent—the aggregate of the cost of maintaining road and rolling stock being nearly one

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half of the whole transportation expenses. One of the heaviest items of the operating and miscellaneous expenses is the fuel for locomotives, being $32,836,470, or 9·31 per cent.

The railroads of the United States transported 290,897,895 tons of freight, hauling it on an average 112 miles, at a cost of 0·76 cent per ton per mile, while they carried 269,583,340 passengers, on an average of 23 miles, at a cost of 1·71 cents.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Report of the California State Mineralogist.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reply to correspondence forwarded to me by you, I will state that the report is for gratuitous distribution, and that all applications for it have been honored, without favor. Out of 2000 copies, less than 100 remain, all of which will be disposed of before you receive this. There is a bill before the State Legislature to reprint 5000 copies; but I have but little hope of its passage, owing to the short term and unusual press of bills. Should, however, the appropriation be made, certain crudities, noticed in your review, will be corrected, and the work carefully revised.

Very respectfully, HENRY G. HANKS, State Mineralogist.

SAN FRANCISCO, CAL., Feb. 15, 1883.

Assaying in Our Mining Schools.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I note in your issue of January 20th an article entitled "Suggestions to Young Assayers," signed by E. D. Peters, Jr., who makes some statements which, although in the main true, will not hold good in all cases. He speaks of students making two or three scorifications during the day, and being found wanting when they enter practical life, and of making "sixty assays" before dinner. He does not state how many furnaces are needed for this, but I assume that he means only one. For accurate work, such an output is impossible. I speak whereof I know, having been student and instructor in assaying, and also manager of various mines, with young graduates under me. In the best mining schools in this country, students are required to build their own fires, make their own cupels, and brasque their own crucibles; and last, but not least, no student leaves a reputable school of mines with a diploma, ignorant of the adjustments of his balance.

Mr. Peters also refers to the "crucible assay" as something new or unusual. Let me ask him to step into the assay laboratory of almost any of our mining schools, and he will find that operation in full blast.

He speaks of the assayer granulating his own lead. This is well enough if he chooses to do so, but I prefer to buy. I have a very unpleasant remembrance of this operation in Idaho territory a few years ago.

I can indorse his statement as to recent graduates to a certain extent; they, like new employés in other lines, have to learn the ways of their superiors; but my experience, extending through some years, has taught me that the recent graduate, though perhaps slow, is more accurate in his work than the older one. He often strains at a gnat and gives birth to a camel.

Mr. Peters is evidently not familiar with American mining schools, else he would not write as he does. He has probably been led into the not uncommon error of judging our graduates by the host of self-constituted assayers that abound in our Western territories.

NELSON W. PERRY, E.M.,
Supt. and Eng. N. Y. M. M. Co.

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THE BOSTON MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

The annual meeting of the American Institute of Mining Engineers was opened with a session on Tuesday evening, February 20th, in one of the parlors of the Brunswick Hotel, Boston, a large number of members, among them the following gentlemen, being present. During the course of the meeting and the excursions, many others joined the party with their ladies:

Prof. Alexander Agassiz, John S. Alexander, W. Lawrence Austin, Richard D. Baker, James C. Bayles, William F. Biddle, Prof. W. P. Blake, George W. Bramwell, William Burnham, F. von A. Cabeen, R. C. Canby, S. H. Chauvenet, Townsend V. Church, Charles E. Coffin, C. Constable, Frederick H. Daniels, Dr. Thomas M. Drown, S. F. Emmons, W. E. C. Eustis, J. W. Farquhar, E. L. Ford, Robert Forsyth, Dr. Persifor Frazer, John Fritz, Albert F. Hill, Henry M. Howe, Robert W. Hunt, Dr. T. Sterry Hunt, Charles Kirchhoff, Jr., Wheaton B. Kunhardt, L. G. Laureau, E. D. Leavitt, Jr., Samuel W. Lewis, Walter McDermott, W. F. Mattes, George W. Maynard, Philip W. Moen, J. H. Paddock, R. W. Raymond, Ellen H. Richards, Prof. R. H. Richards, J. H. Ricketson, Percival Roberts, Jr., R. P. Rothwell, Henry H. Sawyer, Oliver P. Scaife, S. P. Sharples, John M. Sherrerd, Porter W. Shimer, J. William Smith, Herbert G. Torrey, S. T. Wellman, William H. Wiley.

THE FIRST SESSION.

The proceedings began with a thoughtful address of welcome by Mr. Edward Atkinson, who is the acknowledged leader and representative of large manufacturing interests in the Eastern States. Mr. Atkinson, after briefly touching upon the relations of agriculture and mining and metallurgical interests, dwelt upon the fact, that while Massachusetts was once the seat of an important iron industry, it now occupied a very low rank in the list of producing States. He referred to the manufacture of iron from bog ores at Saugus and Braintree, those being among the first efforts made in America toward the utilization of her mineral deposits. He alluded to the fact that the dies for coining the pine-tree shillings were made at home, and pointed out that the descendants of Revere, the coppersmith, whose deeds historians have recorded, built up a great copper industry until what he called the destructive interference of the statute laws of the country deprived them of their supplies and closed their works in Boston harbor. He urged with much enthusiasm and ingenuity that, with all the advantages which this country possessed in natural resources, extensive and valuable beds of coal, great and accessible deposits of pure ores, it was being steadily placed at a greater disadvantage. The high duties on crude and finished materials were placing New England at a greater disadvantage when compared with other sections, and were protecting the machine shops and ship-yards of Great Britain against a formidable rival. The achievements of our engineers, the enterprise, skill, and ingenuity which they have displayed, prove that they have nothing to fear from the rivalry of those of other countries; and the superior intelligence, skill, and industry of our labor places it in a position where it need not dread the competition of "pauper" labor. He spoke earnestly against the false fundamental assumption that pauper labor is cheap labor. Mr. Atkinson's free-trade argument was listened to with the closest attention, though probably few in his audience shared his convictions. It was an earnest and eloquent speech by a gentleman whose opinions are entitled to respect, not alone for his individual work, but also because he is the representative of important interests.

Mr. Atkinson was followed by Mr. Thomas Doane, President of the Boston Society of Civil Engineers, who, in a humorous speech, frequently interrupted by applause, welcomed the Institute. After a brief response by the President, Mr. R. P. Rothwell, the business of the meeting was formally opened, Mr. James C. Bayles, editor of the *Iron Age*, reading an elaborate paper on the Microscopic Analysis of the Structure of Iron and Steel. Speaking of the importance of this line of investigation, now beginning to attract the attention which it deserves, Mr. Bayles says that, with only the laboratory and the testing-machine, the investigation of the structure and properties of steel moves in parallel lines, leaving between them unexplored fields. In them must probably be sought the information which shall connect the results of chemical and physical tests, and give to both a practical value which neither has yet been found to possess.

Among the recent contributors to the literature of the microscopical study of the structure of iron and steel is Herr A. Martens, of Berlin, whose results are recorded in a paper printed in the transactions of the *Verein zur Befoerderung des Gewerbfleisses*. Herr Martens claims to be confident that microscopical analysis will find a place as a rival of chemical analysis, though he acknowledges that, so far, he has not been able to obtain results which he would consider conclusive. He has used a microscope of special construction, and has devoted much attention to the preparation of specimens, the surfaces having been ground and finely polished, and then treated with acids so as to clearly develop the crystals and fibers in the metal. This preparation is said to require no great degree of skill. Martens, in the course of his investigations, found that the fractured surfaces of bars which broke under repeated use exhibited distinct features, clearly-defined portions of ellipses in some steels, and within each portion of them streaks, the prolongation of which beyond the ellipses ran in directions normal to the bounding surfaces of the broken pieces. He thinks that conclusions as to the use to which pig-iron and steel may be put may, in a great number of instances, be based upon examinations of this kind, and that the method will very often be found sufficiently trustworthy for all practical purposes.

Another valuable contribution to the literature of this subject was recently made by Dr. H. C. Sorby, of Sheffield, who prepared his specimens with weak acid. Dr. Sorby found that some of the constituents of the specimens are not acted upon at all by the acid, and others in varying degree. Thus some show the outlines of individual crystals very perfectly, while others develop a very close grooved structure, giving colors of varying brilliancy. The thorough determination of the exact nature of all the constituents seen in the various specimens would involve many years of careful chemical and microscopical investigation, since, though many of them differ very greatly in microscopical and physical character, their size is so small that it would be difficult or impossible to separate them in such a manner as to determine their chemical constitution. It would consequently be requisite to ascertain their true nature by careful induction from facts observed under special circumstances. Dr. Sorby has found various kinds of iron and steel to contain at least seven well-marked constituents, and has examined a large number of specimens with very interesting results.

Mr. Bayles then elaborately reviewed the conditions of success in the employment of the microscope in the examination of iron and steel. It requires a careful and thorough training of the eye, the proper preparation of the specimens, a correct choice of instruments and an inexhaustible fund of patience.

Dr. T. Sterry Hunt was then called upon for his paper on Coal and Iron in Alabama. Dr. Hunt described some of the more remarkable points in the geology of the coal region of Central Alabama, and showed the intimate and peculiar relations, both of the geology and geography of the region, to its economic interests. Dr. Hunt holds that the development in Central Alabama not only of a great coal trade, but of a vast iron industry, is certain in the near future, and has already begun. Dr. Hunt's general review of the geographical position of Alabama, and its mineral wealth, is of so much interest that we hope to give his paper in full in an early issue. The paper was briefly discussed by Mr. Rothwell, to whose earlier work in the same field Dr. Hunt repeatedly referred. Mr. Rothwell, in closing his remarks, called the attention of the Institute to the great services which the pioneer of that section of the country, Mr. Joseph Squire, of Helena, had rendered in studying and developing its mineral deposits.

After the election of a large number of members and associates, proving how much the Institute continues to thrive, the meeting adjourned.

THE SECOND SESSION.

The second session of the Institute was held in one of the rooms of the Massachusetts Institute of Technology, and was opened with a paper by Professor Richards, on the peculiarities of a block of tin obtained by smelting the residuum after distilling the amalgam. The block tin, after remaining quiet for a time, changed its surface entirely, crystalline spots appearing upon it. The tin held from 2·62 to 2·72 per cent of mercury. Dr. Hunt, during the discussion, referred to the molecular changes due to excessive cold, independent of impurities.

This was followed by Mr. H. W. Howe on a Suggested Cure for Blast-Furnace Chills."

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Quite a lively discussion sprang up upon the subject presented; Messrs. Mattes, of Scranton, Constable, Rothwell, and Raymond taking part.

Prof. W. P. Blake, of New Haven, presented a summary of a paper on the metallurgy of nickel, in which he reviewed the history of the metal and its employment in the arts, the nature of the deposits in this country and abroad. He then went in detail into the manufacture and use of malleable nickel, referring at length to the work of Dr. Fleitman, and calling attention to the fact that Mr. Joseph Wharton, of Philadelphia, had for a number of years achieved a great deal in this way, and was now further developing it. Professor Blake had with him a very interesting series of specimens of sheets, bars, hollow ware, etc.

Mr. G. W. Maynard then introduced Mr. A. S. Bower, C.E., of St. Noets, England, who read the following paper:

THE BOWER-BARFF PROCESS.

Any process which has for its object the preservation of iron and steel from rust, and which will make these metals more applicable than they now are to the requirements of mankind, will be sure to meet with attention from members of this Institute, and from all those who are either engaged in the extraction of the ore, its reduction to metal, or the subsequent application of the metal itself.

It is, perhaps, not too much to say that, with iron and steel rendered secure against corrosion and decay, they will be used to an indefinitely greater extent than they now are. The whole realm of science has therefore been explored in the attempt to discover some method by which the formed article may be preserved, leaving its strength undiminished by the destructive action of rust. Paints, oils, varnishes, glazes, enamels, galvanizing, electro-depositing, and what is called "inoxidizing" are among the many systems now in vogue to effect the preservation of iron and steel from the corrosive action of air and water. The object of this paper is to show what may be done in protecting iron and steel from rust by forming upon their surface a film of magnetic oxide by an inexpensive process. It is no new thing to be told that magnetic oxide of iron is unaffected by exposure to the atmosphere or to salt water for any length of time. The black sand of Taranaki in New Zealand is a sufficiently good example of this. Dr. Percy has pointed out that the reason why Russian sheet-iron is less affected by exposure than ordinary sheet-iron is because of a coating of magnetic oxide; but this was not known until Dr. Percy discovered it. That such a coating is produced is quite certain, but it is only an accident of manufacture. To Professor Barff is due the credit of being the first to deliberately undertake to coat iron and steel with magnetic oxide, produced designedly for the purpose of protecting their surfaces from rust. Some sixteen or seventeen years ago, my father was making a series of experiments in the production of heating gases, one set of them being the decomposition of water by passing superheated steam through masses of red-hot iron. He noticed that the iron became less and less active until it ceased to decompose at all, when, on examining it, he saw that it was coated with a kind of enamel. It at once occurred to him, on seeing this, that the process in question might be used to obtain such a coating; but he found, after a few days' exposure of the iron to the atmosphere, that the coating shelled off, and he pursued the matter no farther. The iron employed in this case was rusty; but if it had been new, my father would in all human probability have been the accidental author of the process which Professor Barff discovered ten years afterward. I only mention this to show how advisable it is to investigate the causes of unexpected effects. Professor Barff's process consists in subjecting iron or steel articles to the action of superheated steam; and when they are at a temperature sufficiently high, three equivalents of iron combine with four of oxygen, forming one equivalent of magnetic oxide and setting eight of hydrogen free, or symbolically (1), $Fe_3+4(H_2O)=Fe_3O_4+8H$. Upon reading a description of the Barff process in the London *Times*, it occurred to my father that what the professor could effect with steam, he might also effect with air, and several experiments were made to this end, which, however, were very varied in character, as also were they in the results obtained. The first was made with cast-iron by placing the articles to be treated in a cast-iron retort heated externally, and then passing superheated air over them, and it was successful, while nearly all others afterward were quite the reverse, as sesquioxide was copiously produced as well as the magnetic. Another experiment was made by placing a bar of polished cast-iron in the main duct of superheated air to a blast-furnace, and this, though covered with a red sesquioxide powder and easily brushed off, had a thin but very firm and tenacious coating of magnetic oxide in contact with the iron. This bar has been exposed to the weather ever since, or over four years, without the slightest appearance of rust. Ultimately, when thinking over the fact that air is oxygen and nitrogen in mechanical combination only, I came to the conclusion that, to form the lower or magnetic oxide, the quantity of free oxygen and so of the air employed, must bear some proportion to the surface of the articles exposed to its action, more especially when a comparatively low heat is employed. This is so, and it has been proved that the quantity of air passed through the retort during most of the unsuccessful experiments was three or four hundred times more than was actually necessary. The reasons also why the first experiment was successful were, that a great number of articles were in the muffle, that a very high heat was employed, and that the retort had been previously used for coal-gas making, and had a deposit of carbon in it, which to a great extent neutralized the effect of the large excess of air.

All the unsuccessfully treated articles were red with sesquioxide outside; but there was nevertheless a coating of magnetic oxide in close proximity with the iron, due to the reducing influence of the metal in contact with the sesquioxide at an elevated temperature. The general appearance, however, of iron so treated was disagreeable, to say the least of it. The mode of action I then adopted was to admit a few cubic feet of air into the retort at the commencement of every half-hour, and then to leave the iron and air to their own devices, the retort of course being tightly closed. During each half-hour, a coating of magnetic oxide was formed, and the operation was repeated as often as was considered necessary.

Effective as this was for cast-iron, the cost of producing the coating was as great as by the Barff process; for both of them required that the chamber should be heated externally, and this, with large furnaces, is very expensive. Another plan that I adopted was to first find out approximately the extent of the surface of the goods to be treated, by first dipping them all into a tank of water of known area, lifting them out, and noticing the amount of water taken out of the tank by the wetted surface, and regulating accordingly a slow continuous air supply by meter, of course keeping the temperature of the muffle as nearly constant as possible. This, too, was successful; but the same objections applied to that mode of procedure as to the other.

There was commenced a series of experiments with carbonic acid, chemically produced by the decomposition of chalk, the idea being that three equivalents of iron would unite with four of carbonic acid, forming one equivalent of magnetic oxide, and four of carbonic oxide, if the heat were sufficiently high. This reaction is expressed symbolically thus: (2) $3Fe+4(CO_2)=Fe_3O_4+4(CO)$. This is the simplest action that could take place; but it was evident, from the results, that something quite different was obtained, inasmuch as the coating was very light in color, pleasing to the eye, but easily removed, and in that sense entirely differing from the articles you see before you. This coating, from effects exactly similar and designedly produced by a studied manipulation in the furnaces in successful operation in England, France, and here, proves pretty conclusively that carbonic acid, practically pure, produces upon iron, at an elevated temperature, a film which is, in composition, a mixture of FeO and Fe_3O_4, or, at all events, it is nearer the metallic state than is magnetic oxide. But even supposing that the results obtained by the carbonic acid had been successful as then carried out, the objections referred to concerning the air process would still exist, as external heat and a closed iron muffle would always be necessary. I therefore proposed to use a fuel-gas producer, similar in principle to the Siemens generator, but altered practically to suit other requirements, to burn the combustible gases thus produced with a slight excess of air over and above that actually required for perfect combustion, and to heat and oxidize the iron articles placed in a suitable brick chamber by these products of combustion. I also arranged a continuous regenerator of fire-clay tubes underneath the furnace, so that the products of combustion leaving the oxidizing-chamber passed outside the tubes, imparting a portion of the waste heat to them, which was taken up by the ingoing cold air passing through their interior on its way to the combustion-chamber. I had hoped in this way to be able to so regulate the excess of air over that required for complete combustion as to be able to produce magnetic oxide directly, instead of the lower and useless oxide or combination of oxides produced by carbonic acid alone. I obtained some beautiful results, and some again were unaccountably bad, and I soon found that it was as difficult to regulate the precise amount of oxidation as it first was in the Bessemer process, and I was fortunate enough to hit upon an almost parallel remedy, that is to say, I increased the quantity of free oxygen mixed with the products of combustion, and oxidized the iron articles to excess during a fixed period of generally forty minutes, when magnetic oxide was formed close to the iron and sesquioxide over all. Then for twenty minutes I closed the air inlet entirely, leaving the gas-valve open, and so reduced the outside coating of sesquioxide to magnetic oxide by the reducing action of the combustible gases alone. The excess of oxygen in the first instance produces Fe_2O_3 or sesquioxide of iron; and the under surface of this, being in contact with metallic iron, undergoes reduction to magnetic oxide in the following manner: four equivalents of sesquioxide unite with one of metallic iron, forming three equivalents of magnetic oxide, or symbolically (3) $4(Fe_2O_3)+Fe=3(Fe_3O_4)$.

When deoxidizing by combustible gases, consisting mainly of carbonic oxide, three equivalents of sesquioxide unite with one of carbonic oxide and form two equivalents of magnetic oxide and one of carbonic acid and symbolically (4) $3(Fe_2O_3)+CO=2(Fe_3O_4+CO_2$. Another method of reduction is by carbon itself, when the formula stands thus: (5) $3(Fe_2O_3)+C=2(Fe_3O_4)+CO$.

Formula (4) is also the reaction when rusty iron is reduced by producer gases, which consists largely of carbonic oxide, and by the specimens exhibited it will be seen that articles completely pitted with rust may have their surfaces rendered rustless. In this case, the periods of oxidizing and deoxidizing are reversed, that is to say, the latter occupies forty and the former twenty minutes. No oxidizing is theoretically necessary, but practically a certain amount is requisite to keep up the heat in the chamber, which of course could not be done unless combustion took place some time or other. I only mention the reduction by carbon as exemplified by formula No. 5 because, while experimenting with a furnace, I was asked by the proprietors of a valuable red oxide deposit which was found in so finely divided a state as to be capable of being used at once as a paint, whether I could reduce it to a magnetic oxide. I tried to do so by carbonic oxide; but I found that only the surface of it was affected, and that even this, when taken out of the furnace, speedily returned to its original red color by the combined actions of the unconverted material underneath and the air above. It will be found from formula (5) that 2¼ pounds of carbon are required to reduce 100 pounds of red oxide. This I mixed intimately in the shape of powder with the red oxide, brought the mixture to a red heat, and the result was black magnetic oxide. Not only this, but by adding more carbon I could make the color lighter and lighter until it was almost identical with the coating produced in my previous experiments with carbonic acid, and by reducing the quantity of carbon below 2¼ per cent, various shades of purple were obtained, the red appearing more and more prominent as the quantity of carbon was diminished. It will be as well, before I make any comparison between Professor Barff's process and those patented by my father and myself, to state that the whole of the professor's patents, wherever existing, have been purchased by my father, so that in this case, at least, I hope you will not say that "comparisons are odious." Professor Barff's process is better than ours for wrought-iron and perhaps for polished work of all kinds, as iron commences to decompose steam at a very low temperature, in fact, much below visible redness. Only the other day, at the annual meeting of the Association of American Stove Manufacturers, held in New York, I was asked whether stove patterns might not be made of cast-iron, polished, and then oxidized. Here is one among many instances where the steam process is almost invaluable. For ordinary cast iron, and especially that quality which contains much carbon, the Barff process is much too slow in its action, and some specimens that I have treated in England have taken as much as thirty-six hours to coat effectually, which could readily have been finished off in five hours by the Bower process. The main distinction between the two is

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that the Bower is much more energetic in its action than the Barff process. The carbon in cast-iron impedes oxidation, and so, while cast is far more readily treated in the Bower furnace, wrought-iron is apt to scale unless it is rusted beforehand. The rust then eats into the metallic surface under the influence of heat, and forms a tenacious combination with it. The objection to the use of a closed muffle externally heated in the Barff process has been almost entirely overcome by simply putting wrought-iron into a Bower furnace, previously well heated, then shutting off both the gas and air supplies, and admitting steam into the regenerator tubes. The steam thus passes through the red-hot tubes, then through the combination-chamber and its contingent passages already highly heated, over the articles in the oxidizing-chamber, heating and oxidizing them, and thence over the outside of the regenerator tubes, depositing a great portion of its heat there before passing to the chimney, and which is again picked up by the in-going fresh, cool steam. In this way, the heat in the chamber is highest shortly after the commencement of the operation, and gets gradually lower during the time of exposure, which varies according to the class of goods from five to ten hours. At the close of the operation, just before the articles are taken out, every thing is moderately cool, and this for steam is the perfection of action, as stated by Professor Barff himself. Steel, I consider, can be equally well treated by both processes, and, indeed, it is natural to expect this, steel being, so far as the quantity of carbon it contains is concerned, between cast and wrought-iron. Polished steel, however, is better treated in a low temperature Barff furnace. With regard to the quality of fuel burnt in the gas-producers, a non-coking gas-coal is the best, and Virginian splint has suited very well in this country, and of this about one ton every three days is required for a furnace with an oxidizing-chamber 13 feet long, four feet three inches wide, and four feet three inches high. When a gas-coal is employed, it should be fed through the charging-hoppers just before each deoxidizing operation, when a smoky flame is of great advantage. I have, however, discovered that anthracite can be used as well as a gas-coal by simply allowing petroleum to drop at the rate of one gallon per hour upon the red-hot surface of the coal in one of the gas-producers. This method has been exclusively used in the coating of the articles exhibited in this room at the works of Messrs. Poulson & Eger, architectural engineers, at North Eleventh and Third streets, Brooklyn, E. D., N. Y., to whom I am much indebted, not only for these beautiful castings, but for the constant courtesy and energy they have always exhibited during the erection of their furnaces. At present, they have two erected, one a Bower furnace, of the size before mentioned, and the other a small Barff furnace for the treatment of very delicate or polished articles. These magnetic oxide processes not only protect from rust, but the coating is of such a beautiful color as to render articles ready for the market as soon as they are out of the furnace and cooled. One remarkable feature of them is, that there is no more cost (except in the labor of handling them) in treating 2240 articles, each weighing a pound, than there is in coating a cube of metal weighing a ton; and so penetrating is the process that, no matter how intricate the pattern may be, every crevice—which it would be almost impossible to get at with a paint-brush—is as effectively coated as the plainest surfaces, as will be observed by examining the specimens exhibited in this room. For art purposes, the French gray color, with shades approaching to black, might not always be suitable; but if it should be necessary to use paint on the iron so coated, there is the absolute certainty that it will remain on in the same way as it does on wood or stone, and thus iron may be used for constructive work in a thousand directions in which it has not, up to the present time, been possible on account of its liability to rust, no matter what the coating used to protect it has been. I can give an instructive instance of this. A company in Paris had expended a very large sum over Dodé's inoxidizing process, which process consists in the depositing of a layer of borate of lead on iron or steel, and then gilding, platinizing, or bronzing them, and certainly the articles so treated were exceedingly beautiful to look at; but the iron ultimately rebelled and threw off the coating, so that the shareholders were in a fair way of losing all their capital, when it was suggested to the directors that, if their compositions could be deposited directly upon magnetic oxide, they would conquer the difficulty. They then applied to my father for specimens of coated iron to experiment upon, and they were so satisfied with the result that the company purchased all our European patents except for England, and is carrying on the combined processes on a large scale. It has, besides its furnaces for the Dodé process, 4 large Bower ones, two being 36 feet long by about 6 feet 6 inches wide and 6 feet high, and a Bower-Barff furnace, also of large size. Others, however, are in course of erection. Engineers and manufacturers appear far more ready to apply the processes here and on the continent of Europe than up to the present time they have been in England; but perhaps the reason has been that, so far as Professor Barff's process is concerned, it has only just been shown how large masses can be dealt with, namely, by the use of the Bower furnace; and I can show that for the treatment of underground pipes, wrought-iron sleepers, roofing, and the like, the process can be readily applied, and at a cost much less than that of galvanizing, and it will at the same time be infinitely more durable; while for ornamental cast and wrought-iron, it is scarcely possible to imagine any thing more artistic in color than some of the articles after they have been treated. For ordinary hollow ware for kitchen use, whether of cast or wrought-iron, this process is admirably adapted; and though I have been told that the gray or black color will probably be objectionable, yet I imagine, if it can be shown, as we can do, that the magnetic oxide is more durable, more easily cleaned, and much cheaper than even the common tinted article, a market will soon be created. Any how, the new combined processes are so far developed, and they have been so thoroughly examined by scientific and practical men both here and in Europe (whose testimony to the value and efficacy of them is voluminous), that they have passed from the region of theoretical investigation into that of practical application, and means have been taken for establishing works in different centers in Europe, as will also be done here, for the purpose of coating iron and steel as a trade operation. One firm alone in Scotland, Messrs. Walter Macfarlane & Co., have adopted the process, their output of ornamental castings per *day* exceeding 100 tons! It is intended to apply the processs to cast-iron gas and water-pipes; and as the former have comparatively no pressure to bear, they may be made much lighter than they now are, if rendered incorrodible; while for water, it will be a great advantage to have both the main and service-pipes rendered safe from rust, which not only discolors the water, but forms the nucleus of very troublesome deposits. There is no reason now why wrought-iron or mild steel pipes should not be used for the same purposes, especially for the interior towns of distant countries, where the first cost of the pipes is but small as compared with the cost of carriage. My father has himself used gas and water-pipes where the cost on arrival at their destination has been five times greater than their first cost in England. If, then, light wrought-iron or steel pipes could be used, not weighing one third of those made of cast-iron, and rendered practically indestructible, what an enormous saving will be effected! Again, in the case of railroad sleepers in iron and steel, which are now almost wholly used in Germany, the process is likely to prove of much advantage, so at least I am told by engineers, both in Belgium and in Germany; and if there, why not here? For fountains, railings, and all architectural work, the process is invaluable, and iron may now be used in many instances instead of bronze. It will naturally be asked, what is the cost of the process? I can not do better than answer the question by quoting from the report of Professor Flamache, the engineer-in-chief of the state railroads in Belgium, who was sent over specially to England to report on the process by the Public Works Department of that country. His estimate of cost, after a very careful examination and testing of the process, was 7½ francs per 1000 kilos, or nearly two dollars per ton—at, of course, the Belgian rate of expenses. He also gives the cost of coating a certain extent of surface, but this I consider to be completely valueless, as, for example, I have had a furnace full of 56-pound weights and another time I have had it full of gas-governor tops, the surface in the latter case being perhaps one hundred times more in extent than in the former, while the actual cost of oxidizing would be the same in both cases. He also says that this cost may be reduced, as instead, of one workman attending to one furnace, he can attend to three or four; also by a better system of taking the articles out than existed in the experimental furnace that he saw. Sir Joseph Whitworth, feeling much interest in Professor Barff's process, sent to him some steel to be oxidized, so that he might ascertain whether it did or did not lose in strength by the operation; and the result of Sir Joseph's testing was, that there had been no alteration whatever. Theoretically, one would rather expect that iron and steel would be somewhat toughened, as the tendency of the process is to anneal, and would, no doubt, if continued long enough, render some classes of cast-iron malleable. A very thin article, if excessively coated, might probably be weakened, due to the fact that the coat of magnetic oxide would form an appreciable percentage of the bulk of the article; but this, of course, is a very extreme case, and one which is not likely ever to occur in practice. The development of these processes has been a very long and tedious business, and one requiring much faith and patience in the midst of most disheartening failures for months together; but to gentlemen connected with the iron and steel industries and who know well that results are only obtained by patient and well-directed toil, I need not dwell on this, as almost every man who has had to reduce theory to practice has had abundant experience of the same kind.

THE LEAVITT SEWAGE PUMPING ENGINES.

In the afternoon, an excursion was made to the sewage pumping engines, designed by Mr. E. D. Leavitt, Jr., one of the two engines now in place being run, pumping sea-water, for the special benefit of the members of the Institute. They are compound vertical engines, having the steam-cylinders placed above the two pumps, the connecting-rods of the engines being attached to a walking-beam, which is connected with the fly-wheel. The high-pressure cylinder is 25½ inches in diameter, and has a nine-foot stroke, while the diameter of the low-pressure engine is 52 inches. The steam is carried to the high-pressure cylinder by a ten-inch supply-pipe, the engine being designed to work with an initial pressure of 100 pounds, cutting off at about 22 per cent of the stroke. In passing from the high pressure to the low-pressure engines, the steam flows by 960 five eighths inch brass tubes, through which live steam circulates. By this means, which Mr. Leavitt has also used in the famous "Superior" engine at the Calumet & Hecla mine, any moisture in the steam caused by the expansion in the high-pressure cylinder is removed and the steam is dried. It enters the low-pressure cylinder at a pressure ranging between 20 and 25 pounds, and is cut off at about one half of the stroke. The automatic governor, which is of a design patented by Mr. Leavitt, is controlled by a governor which can be run at any speed. The fly-wheel is 36 feet in diameter and weighs 36 tons. The pumps have 48-inch plungers and specially designed rubber valves with metal backing, having a high lift in order to allow the passage of large substances that are liable to get into the sewage. The bottom of the sewer is 14 feet below low water, and the maximum lift is 43 feet. It is not expected, however, that the average lift will exceed 37 feet. The nominal speed of the engines is eleven revolutions per minute, and at that speed delivers 25,000,000 gallons. At the time of the visit of the Institute, the one engine was running at 16 revolutions and was delivering at the rate of 36,000,000 gallons. The engine had not, since put up, run more than 24 hours all told, and was not at its best. They were built by the Quintard Iron-Works, of this city.

Steam is to be supplied by four steel boilers rated at 250 horse-power each, built by Kendall & Roberts. Every steel plate used was tested, the specifications being an elastic limit of 37,000 pounds, and ultimate strength not more than 65,000 pounds nor less than 60,000 pounds, and an elongation of not more than 20 per cent, nor less than 10 per cent. The boilers are 80 inches in diameter, of $\frac{7}{16}$-inch double riveted steel, the fire-box being made of $\frac{5}{16}$-inch steel. They have 132 three-inch tubes 15 feet long. The feed water is heated by the waste gases in a heater containing 1000 feet of 2-inch brass pipe, the average temperature of the feed being carried up to 180 degrees Fahr. The boilers, of which there are four, are covered with a mixture of one part plaster of Paris and two parts of sawdust held in place by straps.

THE NORWAY IRON-WORKS.

At the Norway Iron-Works, one of the most interesting subjects studied was the use of petroleum as a fuel in various furnaces in the iron-works, the device used being that developed and introduced by the Vapor Fuel Company, of Washington. We are informed that for several years the managers of the Norway Iron-Works have been experimenting in this direction, and believe that now, after numerous changes in plant and detail, they have succeeded in so simplifying and cheapening it that it is

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preferable to the usual system of heating with gaseous or solid fuel. The petroleum is forced by a small pump into a cast-iron tank, which contains a receptacle to which a large surface has been given by alternate contraction and swelling of the section, by deep corrugation. Upon the surface of this interior receptacle, the petroleum drops in a small stream. Through the interior of the corrugated receptacle passes live steam, which issues from an orifice in the bottom in a superheated condition, mixing with the vaporized oil. The entire cylindrical tank is heated by a special fire-place, and the mixture of superheated steam and vaporized petroleum is directly carried by pipes to the furnaces where it is used. It is stated that no trouble is experienced by the formation of the solid, firm coke which has wrecked so many kindred devices.

Oil as a fuel has just been introduced to run a scrap-heating furnace, in which the two-ton charges are put through in twenty-five or thirty minutes. This heating furnace has regenerators at both ends, and the work it does, so far as can be gathered from its short run, is pronounced satisfactory. Near this reheating is a double puddling-furnace, also heated with oil, it having a capacity of from 12,000 to 15,000 pounds of pig, from four to five heats being got out of the furnace per ten-hour shift, or more than two single ordinary puddling-furnaces near by with a capacity of from 475 to 500 pounds of pig each. It should be stated that all of these furnaces are worked more for high quality than large production. A third furnace heated with oil is used for reheating open-hearth steel ingots. It is not provided with regenerators, the heat being utilized for making steam in a boiler overhead. For this purpose, too, the oil heating appears to give satisfaction.

The steel-mill of the Norway Iron-Works contains what is said to be one of the most successful open-hearth plants in the country, each of the three ten-ton furnaces averaging from 20 to 22 heats per week. Much attention appears to be paid to the careful preheating of the scrap used, a small heating furnace serving the line of three steel furnaces. Another feature of interest in connection with them is the casting arrangement. The steel is run into a ladle mounted on a swinging crane; and in order to do the casting as rapidly as possible and yet as quietly as practicable, the ingots, placed in a small pot, are grouped in nests of four and six. On top of each of the nests is placed a tank into which the steel is, passed, and from which it flows simultaneously into all of the ingots through four and six orifices respectively in the bottom of the tanks. The bulk of the steel made appears to be used for boiler plate. The ingots are rolled down to slabs in twelve passes in a two-high train, the slabs going to the Bay State Iron Company for further working. For various shapes, the steel is rolled in a three-high train down to 6-inch square. The mill has besides two trains for wire rods and small shapes, one train for carriage springs, one 10-inch train for shapes, a 13-inch train for spring steel of various shapes, three 18-inch trains for shapes and steel billets, and a sheet mill.

A very interesting, though small, department of the mill, is that in which the cold drawing process, patented by Mr. G. H. Billings, is carried out. Steel of various sizes and shapes is drawn cold through a die, the bars being afterward straightened. There are two machines, one with a 16-inch cylinder, and a smaller one with a 7-inch cylinder, both being capable of handling 24-foot bars and rods. We shall refer to this process and its results at greater length in a future issue. Suffice it to state now that a large variety of small and large sizes are made, which are largely used by machine builders in New England. The process has been quietly and steadily developed, and need only be more widely known to be appreciated.

After a brief visit had been paid to the Carson sewer excavating apparatus, which has for a considerable time been in practical operation in Boston, the party returned to headquarters.

THE THIRD SESSION.

The evening session was opened with a paper by Prof. W. C. Kerr, on the Geological Relations of the Topography of the South Appalachian Plateau, followed by a summary of what we learn is a very elaborate paper by Dr. T. Egleston, of the Columbia School of Mines, on the Collection of Flue-Dust at Ems. We have in our issue of July 1st, 1882, given a summary of the results at that time gathered at Ems. Since then they have been confirmed in later runs, and some additional details of interest have been developed. Prof. R. H. Richards, of the Massachusetts Institute of Technology, then exhibited some interesting experiments showing the lines of weakness in cylinders. This was followed by a valuable and elaborate paper by Mr. A. F. Hill, on the Shop Treatment of Steel. We can not do justice to it in a hurried abstract, and shall present Mr. Hill's experiments and the deductions he makes from them in a more extensive form in an early issue. The paper was discussed by Mr. R. W. Hunt, of Troy, who called attention to the use of the step punch.

On Thursday morning, the members were driven to Watertown in two parties, where the wonderful testing-machine built by Mr. A. H. Emery was fully described by Mr. Howard, who has charge of the work. We regret that, pending the issue of foreign patents, we can not, as we were prepared to do, print an illustration and a detailed description of the machine. After witnessing the testing of a steel bar made at the Norway iron-works, the party drove to Cambridge, where a few hours were spent in visiting Harvard Hall, the College Library, Hemenway Gymnasium, the Physical Laboratory of the Lawrence Scientific School, the Museum of Comparative Zoölogy, Memorial Hall, Boylston Hall, the Chemical Laboratory, and the Mineral Collection, a lunch was partaken of in Memorial Hall.

THE FOURTH SESSION.

A brief session was held in Boylston Hall, Prof. S. P. Sharples reading a paper on the Strength of American Woods, in which he presented the result of a large series of tests and experiments made under the auspices of the Census Bureau, and partly published by it in bulletins Nos. 18 and 22.

Before the close of the session, Professor Cook, of Harvard University, showed in a beautiful manner the "critical point" observed in heated liquid carbonic acid at a blood temperature. The carbonic acid was seen to expand rapidly as heat was applied, the surface of the liquid gradually becoming indistinct and nebulous and finally being impossible to trace.

In the evening, nearly two hundred ladies and gentlemen sat down to the subscription-dinner at the Brunswick Hotel.

THE QUALIFICATIONS OF BLAST-FURNACE COKE.

Mr. John Fulton, mining engineer of the Cambria Iron Company, a gentleman who has closely studied the question of the qualifications of coke as a blast-furnace fuel, has recently written as follows to the Connellsville *Keystone Courier*:

My attention has been called to a friendly controversy now pending between the editors of the *Keystone Courier*, of Connellsville, Pennsylvania, and *The Virginias*, of Staunton, Virginia, on the important industrial question of the relative merits of Connellsville and West Virginia coke, for blast-furnace use, in the manufacture of Bessemer pig-iron.

I understand the grounds taken by the parties in this discussion rest upon the evidence of chemical analyses, especial emphasis having been laid on the relative volumes of *phosphorus*, the *Courier* asserting that the Virginia coke holds a larger percentage of this dangerous element than the Connellsville.

On the other side, *The Virginias* denies this, and submits analyses by Prof. A. S. McCreath, Chemist of the Second Geological Survey of Pennsylvania, showing less phosphorus in the West Virginia coke. Neither party questions the accuracy of the chemical analysis of these cokes, but there are objections to the manner of quoting the results. *The Virginias* submits Professor McCreath's analyses in Report MM, page 127, as showing 0·0344 per centum of phosphorus in Connellsville coke—the same authority finding only 0·008 per cent of phosphorus in the New River, West Virginia coke.

It will be noted that Professor McCreath does not say that the twenty-four coals examined by him from the Pittsburg coal-bed were all from the Connellsville region. This large Pittsburg bed covers an extensive corner of the State on its southwest side. The inquiry now is confined to the Connellsville coal and coke region—not designed to embrace all Southwestern Pennsylvania. Now in Report MM, in coke from the large establishments of Messrs. Dravo, Frick & Company, which afford prominent types of Connellsville coke, the phosphorus is given at 0·014 per cent.

A recent and exhaustive test for phosphorus has been made from a large sampling of the coke made at the extensive works of the Cambria Iron Company, near Connellsville, selected by John McFadyen, superintendent of coke department, by Prof. T. T. Morrell, chemist, showing only 0·01 per cent of phosphorus. J. Blodget Britton, chemist, Iron Masters' Laboratory, Philadelphia, in his analysis of the coke quoted by *The Virginias*, shows 0·027 per cent of phosphorus.

We have, therefore, two determinations by different chemists of Connellsville and West Virginia cokes, as follows:

	Connellsville.	West Virginia.
A. S. McCreath	0·014	0·008
T. T. Morrell	0·010	.....
J. Blodget Britton	.....	0·027

Showing an average of phosphorus in Connellsville coke of 0·012, and in West Virginia 0·0175. Both these cokes are low in phosphorus, and the slight difference in favor of Connellsville should not alone afford evidence of its superiority.

The following analyses of these cokes will show their relative composition:

	Connellsville.	West Virginia.
Moisture	0·030	0·110
Volatile matter	0·460	0·350
Fixed carbon	89·576	92·181
Sulphur	0·821	0·618
Phosphorus	0·014	0·027
Ash	9·113	6·680

From the above, it will be readily seen that there are no large differences except in the ash, which is somewhat greater in Connellsville. This difference would not afford grounds for a claim in favor of West Virginia coke; for it will be shown that, while purity is one of the prime factors in superior coke, yet there are other vital considerations that decide the value of this fuel for metallurgical purposes. The inquiry is here pertinent: What constitutes superiority in coke for blast-furnace use in producing Bessemer pig-iron?

In the preparation of coke for blast-furnace use, four conditions are regarded as essentials:

1. Hardness of body. 2. Well-developed cell structure. 3. Purity. 4. Uniform quality of coke.

I. HARDNESS OF BODY.—The best coke must possess hardness of body or cell-walls—not density, for dense cokes are frequently soft or punky, while hard cokes generally afford a well-developed cell structure. These two physical properties, hardness and full cellular spaces, are correlated, just as softness and density are associated.

The prime requirement of hardness of the body of coke will be evident, when the conditions of its combustion in a blast-furnace are considered. In its movement down the furnace, from the charging-plates to a short distance above the tuyeres, it is enveloped in a current of hot carbonic acid gas. This gas possesses the power of dissolving carbon or coke, and is especially destructive to the soft variety. Every pound of coke dissolved by this gas in the upper section of the furnace is a double loss, by the reduction of temperature where the action takes place, and in the loss of a pound of fuel, which should have been burnt near the tuyeres. I. Lowthian Bell has shown by direct experiment that all forms of carbon are not equally easily affected by carbonic acid; that hard coke is capable of resisting its solvent action much more than soft coke; the latter suffering by dissolution, during a test of thirty minutes, six times the loss of the former. (Bell's *Iron Smelting*, pages 413, 414.)

The value of a coke in a condition of hardness in which it is least susceptible of being oxidized in the region of the furnace where its combustion proves a double loss needs no further emphasis.

II. WELL-DEVELOPED CELL STRUCTURE.—Next to hardness of body in coke, a well-developed cell structure is second only in importance. This arises from the fact that, other things being equal, the calorific energy of a fuel is in proportion to the surface exposed to the oxygen of the blast in the region of the tuyeres. Hardness with density of physical structure as found in anthracite, which is a natural coke produced under great pressure, illustrates this position conclusively by the actual work. The following records illustrate this difference in density, with corresponding results in blast-furnaces running on Connellsville coke and anthracite coal:

Connellsville Coke.

The run of the Carnegie Brothers & Co.'s Edgar Thomson E furnace,

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at Pittsburg, for the three weeks ending November 11th, was 1465 tons, 1629 tons, and 1540 tons respectively. This output was on 54 per cent ore, and was made on one pound of coke to one pound of iron. Their D furnace has made 299 tons in one day, 1840 tons in seven, and 7332 tons in 31 consecutive days. The ton used is 2268 pounds.

Anthracite Coal.

The yield of pig-iron at Colebrook furnaces during the week closing Saturday, December 16th, was 577 tons at No. 1 furnace and 575 tons at No. 2 furnace. The total yield for the week from both stacks was 1152 tons. No. 1 furnace has been in blast fourteen weeks, and has produced in that time 6446 tons of pig-iron, averaging 460 tons per week. No. 2 furnace has been in blast five weeks, and produced in that time 2389 tons, averaging 478 tons of pig-iron per week. Cornwall ore was used exclusively; the fuel used was anthracite. These are the two new furnaces of Robert H. Coleman, at Lebanon, Pa. No: 1 is 55 feet high by 14½ feet in diameter; No. 2 is 80 feet high and of the same diameter as its mate. The ton used contains 2250 pounds. (*Iron and Steel Bulletin.*)

Without insisting on the very large product of these coke-furnaces, it is submitted that, other conditions being equal, the average energy of these fuels would be represented as follows:

Coke, furnace, 800 tons of pig-iron per week.
Anthracite, furnace, 500 tons pig-iron per week.

This exhibits a relation of Connellsville coke to anthracite coal of 8 to 5. A careful test of two cokes differing in density, made at Conemaugh furnace, showed a loss of 11 per cent in product arising from the denser coke alone.

The following table will illustrate the physical properties of Connellsville, West Virginia, and other cokes for general comparison:

Physical Properties of Cokes.

Locality.	Grams in one Cubic Inch.		Pounds in one Cubic Foot.		Per-centage.		Compressive strength per cubic inch (¼) ultimate strength.	Hight of furnace charge, supported without crushing.	Order in cellular space.	Hardness.	Specific gravity.
	Dry.	Wet.	Dry.	Wet.	Coke.	Cells.					
Connellsville	12·46	20·25	47·47	77·15	61·53	38·47	284	114	1½	3·50	1·500
West Virginia	13·76	21·19	52·44	81·56	64·32	35·67	258	103	1	3·15	.....
Broad Top	11·76	20·18	44·81	76·88	58·27	41·73	240	96	1	3·35	1·342
Clearfield	14·79	19·86	56·35	76·69	74·43	25·57	315	128	1	3·60	1·560
Cumberland	12·76	21·63	48·61	82·41	58·99	41·01	215	86	1½	3·00	1·750
Alabama	13·30	18·29	50·70	69·01	73·17	26·23	225	87	1	3·50	1·493
Illinois	11·06	17·09	42·02	65·09	63·79	36·21	180	70	1	3·20	1·215

Chemical Analyses of Cokes.

Locality.	Fixed carbon.	Moisture.	Ash.	Sulphur.	Phosphorus.	Volatile matter.	Remarks.
Connellsville	89·57	0·30	9·11	·820	·014	·460	Chem. analysis, Prof. A. S. McCreath.
West Virginia	92·18	0·11	6·68	·618	·027	·350	Chem. analysis, J. B. Britton.
Broad Top	89·28	.....	8·66	1·060	.....	.....	" " T. T. Morrell.
Clearfield	89·86	0·54	9·41	.....	·667	.....	" " Booth, Garret & Blair.
Illinois	89·77	0·12	9·58	0·930	·033	.....	Good coke, T. T. Morrell.

From a careful inspection of this table, which affords a wide range of typical cokes, it will be seen that, while some approximate very closely to Connellsville in certain physical and chemical properties, yet no one inherits so many essential requisites in equal degree with it.

III. PURITY.—It has not come under the writer's observation that any comprehensive law has been eliminated, from reliable determinations, locating the greatest volumes of sulphur or phosphorus in any special zone of the Appalachian coal-field. Sulphur, free or combined with iron, is mainly found in the coal slates. In some instances, these slates are interleaved in very thin plates with the coal, so as to render washing unsatisfactory. In other coals, the pyrites are found in lenticular pieces, which are readily removed by crushing and washing. Hence it follows, in a general way, but not always, the more slate the more sulphur. Mr. McCreath has shown that twenty-five coals examined, containing an average of 2·138 per cent sulphur, yielded cokes containing an average of 1·912 per cent of sulphur.

Phosphorus is a more difficult element to locate. The inquiry as to its relative volumes in the coal and its slates will probably be answered when Prof. J. P. Leslie arranges the valuable data now collecting in the Second Geological Survey of Pennsylvania. Mr. Britton found in two samples of anthracite coal for furnace use, ash, 10·43; phosphorus, 0·049: and ash, 5·29; phosphorus, ·0354. In examining two semi-bituminous coals, he found in one, ash 5·03; phosphorus, ·0085: and in the other, ash 4·94, and phosphorus only a trace. (American Institute of Mining Engineers, Vol. I., page 298.) In a recent series of tests for phosphorus in brown hematite iron ore, an average of ·099 was found in clean ore, ·068 in the clay in the ore, and ·012 in the rock matter associated with the ore.

One general principle may be safely deduced from the foregoing data: That, other things being equal, the less ash in the coke, the less risk of sulphur or phosphorus in dangerous volumes in the resultant pig-iron from the furnace. In many cases, there is danger of injuring the physical condition of coke by the operation of washing the coal to reduce its slate. The washing of some coals improves the coke; in others, it injures it.

In the discussion of this matter at the Hazleton meeting of the Institute of American Mining Engineers, in 1874, "Mr. Bell further remarked, as to the relative value of coke made from washed and unwashed coal, he was of the opinion that coke made from coal that did not require washing was superior to that made from washed coal." (Vol. III., p. 182.) Washing coal carries out in the operation valuable hydrogenous matter which aids in developing cell structure. The coke made from it would be more dense; in other words, in many cases, the loss in calorific energy by the density in the coke for washed coal would more than overtop the advantage of a reduction of ash, except in cases where ash is excessive.

IV. UNIFORMITY OF QUALITY IN COKE.—This is one of the essential requirements, in view of the destructive action of carbonic acid gas on soft coke. The "black-ends," which are sometimes made in coking, are worse than useless in a blast-furnace, and, if reckoned in the fuel charge, must produce bad results. Hence, a carefully prepared coke, alike all through, is most desirable for regular work in blast-furnaces. This result can be best obtained from coal similar to the Connellsville, inheriting a liberal ratio of hydrogenous matter to assure full oven heat and thorough coking in every part of the charge. This is one of the distinguishing features of Connellsville coke.

The Connellsville coal region is a separate prong of the Upper Coal Measures resting along and near the western foot of Chestnut Ridge. It is two or three miles broad and sixty miles long. The coal-bed is from eight to ten feet thick, affording a bright, soft coal in thin-sliced vertical plates. The "Pittsburg bed," as it is pursued east to Salisbury and Cumberland, affords a coal lower in hydrogenous matter and yields a coke inferior to Connellsville. Westward, the excess of pitchy matter in the coal leads to an inflated physical structure in coke.

It is thus evident that the Connellsville coal embraces in a larger degree than any other at present developed the properties that make excellent coke. Its coal requires no washing and no special arrangements for coking. Its coke has grown in the confidence of furnace managers until it has now attained the distinguished position in America which the celebrated Durham coke enjoys in England.

ACCIDENTS IN ANTHRACITE COLLERIES.

A correspondent of the New York *Sun* has been gathering the statistics of accidents in anthracite collieries, and his report is of interest as showing what conclusions an intelligent outsider reaches. We are far from indorsing all he says; but his opinions are worthy of being put on record:

It is somewhat startling to think that during the last year no less than 300 persons were killed and more than 1000 injured in various ways at the peaceful calling of mining anthracite coal in Pennsylvania. Yet this is the thrilling record. There are six anthracite mine inspectors in Pennsylvania, provided for by law and paid from the State treasury, to see that the provisions of the Mine Ventilation act, which was brought forth by the Avondale horror, are enforced. These inspectors are stationed in various parts of the State, and to their courtesy I am indebted for the figures which I have quoted. Only one of the reports given below is unofficial, namely, that of Inspector Ryan of the Shamokin District. The following is the frightful record of the anthracite region for 1882:

	Killed.	Injured.
Inspector Williams, of Wilkes-Barre, reports	73	185
Inspector Broderick, of Hazleton, reports	40	130
Inspector Gay, of Pottsville, reports	20	94
Inspector Mauchline, of Shenandoah District, reports	40	167
Inspector Blewitt, of Scranton District, reports	77	288
Inspector Ryan, of Shamokin (estimated)	50	150
Totals	300	1,014

Of the accidents reported by Inspector Williams, of Wilkes-Barre, 10 persons were killed and 49 injured by explosions of gas, 22 were killed and 49 injured by falls of roof and coal, 4 were killed by falling down the shaft, 16 were killed and 39 injured by mine cars, 8 were killed and 12 injured by explosions of powder, 8 were killed and 18 injured by "miscellaneous causes," and 5 were killed and 17 injured by accidents of various kinds outside the mines. Of the 94 persons injured in the Pottsville District, 11 had legs or arms broken, and a large proportion of the others met with serious wounds. In the Shenandoah District, Mr. Robert Mauchline reports that 15 persons were killed by fall of roof, 7 by the cars, 7 by explosions of gas, 2 by powder, 3 on the slopes, and the others in various ways. In the Scranton District, of which Mine Inspector Blewitt has charge, most of the serious casualties of the year are due to falls of roofs in the mines, which is often the result of inadequate propping. Many of the men who were killed leave large and helpless families, and the condition of those little homes in which men are sadly maimed is almost as pitiful.

As an illustration of the class of accidents coming under the heading of "serious injuries," I will cite a case of a miner with whom I am personally familiar. Six months ago, there was a fall of roof in the chamber of the mine in which he worked. He was badly crushed under a great mass of rock and coal; but when he was extricated, it seemed as though he would recover soon. But he was injured internally, and, after a most tedious and costly experience, he is now able to walk about, the mere shadow of his former self. His nervous system is shattered. He will not remain in a room alone because of the sensation of the great fear that the roof will fall upon him, and he rarely walks any distance from his door unless somebody accompanies him. This man has a wife and several little ones, and the prospects of his ever being able to work for them again are not bright. There are many cases of this kind among those injured, and some are even worse. Of the 288 reported injured by Mr. Blewitt of this district, 88 are seriously hurt and permanently disabled.

Of course, it is impossible to avert some of the disasters which result in death in the mines; but it is possible, by observing proper caution and complying rigidly with the provisions of the Mine Ventilation law, to lessen the misery which sends a surge of sorrow annually along the coal valleys of Pennsylvania. Falls of roof might be greatly lessened by using sufficient timber in propping, explosions of gas could be averted by a careful use of the safety-lamp, and the deaths occurring from explosions of powder are almost inexcusable. A more uniform system of working the mines on the part of the companies would also reduce the death record of the region. It is either a headlong rush to supply the demand or a suspension to create one. When the mines are worked, every thing is strained to the very highest tension, and the wonder is, that there are not more accidents. Working more regularly, taking time to keep the mines

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in proper condition as their development progresses, and paying some heed to the lives of the industrious and courageous population that gives life and energy to the most important industry in the State, would accomplish the same results in the market, and leave fewer broken hearts in the track of the anthracite trade.

There is every evidence that the present Legislature of Pennsylvania intends to do something in the way of reforming, by the enactment of needed laws, many evils that now exist in the anthracite regions of the State. In the House, Mr. Hines, of Luzerne County, representing a mining constituency, has already signaled his intentions; while in the Senate, Mr. King, of Schuylkill, will soon introduce a bill creating a commission to make inquiry into the ventilation law, and report by bill or otherwise what amendments are necessary to carry out its purpose—the protection of the lives and limbs of those who work in the dark chambers of the collieries. It is proposed to make up this commission of the six mine inspectors, six practical coal miners, and six operators to be selected by the governor.

The present ventilation law was the outcome of the terrible calamity at Avondale in 1869, where scores of miners lost their lives. Up to that time, none of the collieries was provided with any means of escape from a fire at the top. The men went down the main shaft and came out of the mine the same way. There were no safety openings. At Avondale, the giant breaker which stood directly over the deep shaft took fire, and, as a natural sequence, drew every breath of air out of the chambers below, where more than one hundred men were at work. They were all suffocated. That calamity occurred nearly fourteen years ago. The frightful lesson had its effect upon the succeeding legislature, and what is known as the ventilation law was passed. That compelled the coal companies to construct openings through which the miners might escape if shut off from passing up the main shaft by any disaster. Since these openings were made, however, there is not a colliery anywhere that has not extended its workings far beyond what were the boundaries a dozen years ago, in some instances running over a mile ahead of them. If it is supposed that the companies have made new openings from time to time as they were needed, the idea is a great mistake. They have done no such thing. The ancient opening stands, although in the great majority of instances of no practical value whatever, and there can be no prosecution of any violation of the law.

There are dozens of big mines in this locality where the breakers are built just as the Avondale breaker was, directly over the main shaft. If any one of them should happen to take fire while the men are down below, the results would be horrible enough. The old safety opening, instead of being a help in time of danger, would only add to the difficulties by creating a draught through which the smoke would be drawn into the chambers in suffocating volumes. But, aside from this, the mines with the passage of time become more gaseous. To illustrate: Twelve years ago, when the present ventilation law was passed, there were only 8000 persons employed in the collieries of this, the middle district of the Wyoming region, and only two or three mines at that time generated explosive gases. Now there are 16,000 men employed in the same district, and over three fourths of the collieries are generating explosive gases in large quantities. Years ago, the miners could work with the provision of 10,000 or 12,000 cubic feet of fresh air per minute. Now, in most of the collieries, it requires over 250,000 cubic feet per minute to dilute the gases and make working safe. The reason why more air is needed now than formerly is because the workings have gone down to the solid and deeper bases, Unquestionably, there is need of fresh legislation in the important matter of mine ventilation.

Mr. Williams, the Inspector for this middle district of the Wyoming region, has figured out the losses, and they are appalling enough. No less than 73 men were killed in the mines of the district last year, and 185 injured, half of the latter seriously, incapacitating most of them for doing any work in the future. There were 35 widows and 91 orphans made by these accidents in the middle district last year. It is unquestionably true that a large number of mishaps might be avoided if the companies cared to correct certain evils that exist. But they do not do that, and, therefore, to the carelessness of the men must be added the culpability of the corporation when we come to estimate the causes that produced the sorry results of the year.

For some time past, the Hungarians, who have been flocking in dirty battalions to the coal-fields for over a year, have been the greatest sufferers by mine disasters. As a general thing, they have been employed as laborers in the collieries, their duty being simply to fill the cars after the miner has finished knocking down his coal for the day. Each miner employs a laborer, whose work he pays for himself. Labor has been so scarce in the coal-fields for a year past that the Hungarian has found no difficulty in obtaining work as soon as he got among the mines. But his ignorance and lack of knowledge of the English language have been sources of great annoyance to the mine bosses, who are charged with instructing mine workers in the dangers that threaten at all times. By signs alone are the Hungarians made partly to understand the dangers of their employment, and even these are frequently of no avail. They daily persist in going into all sorts of danger, and fully three fourths of the gas explosions occurring last year in the mines of this district are traceable to the ignorance of the Hungarian laborers.

THE CARVÉ COKING SYSTEM.

Dr. Angus Smith, her majesty's inspector under the alkali acts, says in one of his yearly reports that "the present method of making coke in England has all the appearance of roughness and savagery which extravagance always produces." A final change in this direction seems now generally to be creeping in after the several abortive attempts of former years. The paper read in London by Mr. H. Simon, of Manchester, in 1880, before the Iron and Steel Institute, was mainly instrumental in bringing the question again before those most interested in it. According to English journals, Messrs. Pease and Partners, of Darlington, were the pioneers in taking up the system recommended, and patented by Mr. Simon in England. The success of the process had previously been fully demonstrated in France. The Messrs. Pease proceeded to build a battery of twenty-five ovens, which have now been at work for a considerable time. The firm appears to have done full justice to the invention, and has spared neither trouble nor expense to make it a success. All the figures and statements given by Mr. Simon in his paper as to the results obtained in France seem to have been completely confirmed, and in some respects surpassed. Above all, it has now been practically proved that the coke obtained in these ovens is excellent, and leaves nothing to be desired as furnace coke. It is of great hardness, and is said to contain less sulphur. The latter circumstance is easily understood, if it is considered that the gas evolved during the process is in this system continually sucked or pumped away, including, of course, a good percentage of sulphur in gaseous form. The quantity of coke is increased to fully 75 per cent (after deducting moisture) of the coal charged. This, in itself, and comparing it with the ordinarily obtained percentage of from 62 to 65 per cent of coke, is a gain of 10 per cent in coke, or equal to, say, 1s. per ton of coke made. The by-products, in the shape of tar and ammonia-water, amount in value to between 5s. and 6s. per ton of coke made, assuming tar to be worth 3d. per gallon, and ammonia-water 1d. per gallon.

Each of the coking-chambers built at Crook, at the Pease's West Collieries, produces about one ton in the twenty-four hours. The total possible extra profit realized over and above the previous ordinary profit in coke-making would, therefore, appear to be about 1s. for extra quantity of coke, and from 5s. to 6s. for by-products, or from 6s. to 7s. per ton of coke. Against this should be set a possible slightly increased expense in the working of the ovens. It seems that the expenditure under this head amounts to about 1s. 6d. per ton, as against nine to twelve pence under the old system. It is stated on the authority of one of the best known chemical manufacturers in the North of England, who has analyzed and used the tar made according to the Simon-Carvé system at Messrs. Pease's works, that its quality is even superior to the best average tar obtained from gas-works. It is possible that the value of the by-products would by an over-production be reduced to some extent; but it is said that, as far as tar is concerned, the value of this product has been increasing considerably of late, on account of its increasing importance for the manufacture of aniline dyes. With regard to the ammonia-water, it is believed that, if the price were to fall a little, an almost unlimited inquiry for its use as artificial manure in agriculture would be sure to spring up, the only reason why it is less used at present being that the cost is still somewhat too high.

Within certain limits, it may be considered to be a drawback to this system that the establishment of the coke-ovens and apparatus seems to be rather expensive. In view, however, of the extraordinary returns which would make it appear that the whole cost of the establishment would be refunded by the returns of less than two years' working, this question can not be considered of very great importance, at least not for any of the many wealthy firms in that particular trade.

CANADIAN APATITE.

Written for the Engineering and Mining Journal.

The numerous openings made by prospectors and miners in the phosphate regions of the provinces of Ontario and Quebec have afforded excellent opportunities for the study of the Laurentian minerals and their mode of occurrence. The crystalline limestones of the Laurentian series are remarkable for their great extent and for the variety of crystalline minerals which they contain. They are interstratified with beds of dolomite, which sometimes contain a portion of carbonate of iron, and inclose serpentine, tremolite, quartzite, and a little white mica, but are generally less abounding in foreign minerals than the pure limestones. Several mineral species might be mentioned as marking bands in the stratification. Among these, there are apatite, chondrodite, pyroxene, magnesian mica, and graphite. Apatite or phosphate of lime is one of the principal features of the limestones of the Laurentian series. It is found in a variety of colors and shapes, sometimes in rare crystals disseminated throughout the veins; at others, in solid masses, in veins of great width. Sometimes, it is in the form of prisms. These are generally rough, but often terminated, and always have their angles rounded. Apatite is generally associated with pyroxene, which has also been found in large crystals. It is sometimes found with phlogopite. In a crystal of the latter, about four inches in diameter, a crystal of apatite about a quarter of an inch thick and two inches long was found imbedded, the axis of the prism being parallel with the cleavage of the mica. Rounded masses of calcite are often inclosed in the apatite, which in its turn is frequently in rounded pale-green crystalline masses imbedded in the coarse-grained limestone.

Apatite is used in the arts for the manufacture of phosphoric acid and phosphorus, and enters largely into the composition of certain porcelains. It is, besides, very extensively used as fertilizer of the soil. Phosphates are among the minerals most essential to vegetation, and are removed from the earth in large quantities by growing crops. The importance of a supply of phosphates to the soil is made very evident by the fact that the mineral constituent of the bones of animals is for the greater part phosphate of lime. This material, whether in the form of bones, coprolites, or apatite, is seldom applied to the soil in its insoluble state, as it is then comparatively unavailable for the nutrition of plants. To render it fit for agricultural purposes, it is converted into a soluble salt, which is known as a superphosphate of lime. The process of conversion is as follows: In the insoluble mineral or bone phosphate, one equivalent, or 71 parts, of phosphoric acid, is united to 3 equivalents of 28 parts each of lime, making the equivalent weight of the ordinary phosphate of lime 155. In order to reduce this to the soluble superphosphate, which contains one equivalent of phosphoric acid and one of lime, it is necessary to remove two thirds of the lime, or two equivalents. This is effected by adding two equivalents, or 98 parts of sulphuric acid, which form with this lime 136 parts of sulphate. One hundred parts of ordinary phosphate of lime, therefore, require 63·2 parts of sulphuric acid to convert them into the soluble superphosphate with one equivalent of base. In this process, however, regard must be had to the foreign matters which accompany the phosphate, and which may also require sulphuric acid for their decomposition. Of these, the principal are fluoride of calcium and carbonate of lime. The former is always present in small quantities in bones and in still larger amounts in many of the mineral phosphates, and requires for decomposition of 100 parts, 125 of sulphuric acid

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while carbonate of lime, as an impurity, requires 98 parts of acid to decompose 100 parts.

Of late years, the increasing demand for phosphates as fertilizers has drawn attention to the use of the crystalline mineral phosphate of lime, or apatite, of which large quantities have been imported from Norway into England, and attention has recently been turned to the abundant supplies of this substance found in Canada, and large importations have recently been made from the Canadian phosphate regions into England. The present price for apatite in England is one shilling and five pence per unit, or about $30 per ton, for a first-class grade. Capital is slowly investing in the phosphate lands of Canada. Railroad enterprise is moving for the purpose of transportation, and the time is drawing near when the mining or quarrying of phosphates will be one of the largest and best-paying industries in Canada. The cost of production being small, but very little capital is necessary, and the large and continued demand fixes the price for which the mineral can be sold at such a figure that, as a profitable undertaking, not a doubt remains.

THE MANGANESE DEPOSITS OF SOUTHERN RUSSIA.

A few years ago, two Russian engineers, Batsevitch and Simonovitch, in preparing a geological map of the Caucasus, in Southern Russia, were struck with the occurrence of a large and continuous deposit of pyrolusite cropping out on the banks of the Kvirila, a tributary of the Reon River, which empties into the Black Sea at Poti, near Batoum. These deposits are extremely interesting geologically; but however great an excitement they created at one time, they appear to be of comparatively little consequence so far as the markets of manganese are concerned. It is estimated by a writer in the *Génie Civil* that the consumption of manganese ore in the world is not more than 100,000 tons, of which only a quarter is used in the chemical industries, the rest being used in blast-furnaces for the manufacture of ferro-manganese and spiegeleisen. The principal reasons why the Russian deposits, though extensive, are not likely to affect the markets much are, that they can not compete with the newly-found deposits in Central Spain, the freights to the sea-board being excessive, and the irregularity of their contents of phosphorus, which ranges from two thousandths of one per cent in the solid varieties to one per cent in the earthy ores. With care in picking, the latter trouble may be overcome.

The pyrolusite is found as a horizontal bed in Miocene fine-grained sandstones resting upon Cretaceous limestones. Parts of the bed have been removed by erosion, so that it crops out on both banks of the Kvirila River and its tributaries, the deposit being traced near Perevisse, Choukroutis, and Itkvissa on the left, and near Tchiatoura, Rgani, and Tsirkvali on the right bank. The Kvirila Valley has been opened by a railroad connecting Tiflis with Poti on the Black Sea, which is, however, a poor port. The bed of manganese ore, the first pyrolusite thus found, has a total thickness ranging from 6 to 9 feet, and consists of alternate layers of compact and oolithic pyrolusite of shales and sandstone, the thickness of the individual layers varying. The aggregate thickness of compact shipping ore, low in phosphorus, is from 24 to 28 inches.

SOME SWEDISH EXPERIMENTS WITH THE BESSEMER PROCESS.

Mr. C. G. Dahlems has reported to the Swedish Iron Board the results of a series of analyses of samples of metal and cinder taken at different stages of the Bessemer process, at the Langshyttan, Nykroppa, Bangbro, and Westanfors steel-works. Ferro-manganese was added at the close at the first three works, the quantity of pig charged and ferro-manganese added being as follows: Langshyttan, 60 cwts. of pig and 0·4 of ferro-manganese; Nykroppa, 71 and 0·3 cwts.; Bangbro, 53 and 0·5 cwts. respectively; and Westanfors, 63 cwts. of pig and no ferro-manganese. The following are the analyses, tabulated:

	Langshyttan.	Nykroppa.	Bangbro.	Westanfors.
Pig-iron:				
Carbon	3·94	4·35	4·00	4·22
Silicon	1·14	0·88	1·02	1·06
Manganese	0·64	1·15	1 83	5·12
Metal:				
First sample. Time	2 m. 15 s.	2 m. 30 s.	3 m.	4 m. 15 s.
Carbon	4·02	4·01	4·03	4·02
Silicon	0·04	1.10	0·03	0·43
Manganese	0·12	0·15	0·22	3·26
Second sample. Time.	4 m. 30 s.	5 m. 30 s.	4 m. 45 s.	8 m. 35 s.
Carbon	1·10	1·00	0·90	1·30
Silicon	0·03	0·05	0·03	0·12
Manganese	0·12	0·15	0·12	0·85
Third sample. Time.	5 m. 30 s.	6 m. 30 s.	5 m. 45 s.	9 m. 20 s.
Carbon	0·05	0·08	0·10	0·55
Silicon	0·01	0·04	0·03	0·07
Manganese	0·06	0·08	0·09	0·43
Cinder:				
First sample. Same time.				
Oxide of iron	34·72	13·50	14·20	4·20
Oxide of manganese	13·95	29·76	26·31	46·38
Magnesia	0·24	0·23	0·22	0·54
Lime	2·60	0·42	0·62	1·26
Alumina	0·78	2·28	2·86	3·08
Silica	48·76	53·26	55·26	45·87
Second sample.				
Oxide of iron	21·08	9·34	18·52	6·24
Oxide of manganese	13·48	23·70	31·01	52·26
Magnesia	0·30	0·28	0·14	0·29
Lime	3·25	0·60	0·38	0·70
Alumina	0·98	3·90	2·70	2·49
Silica	59·82	62·34	47·20	39·07
Third sample.				
Oxide of iron	35·82	30·60	31·19	9·45
Oxide of manganese	12·29	21·39	25·43	48·92
Magnesia	0·21	0·21	0·11	0·46
Lime	2·35	0·38	0·32	1·00
Alumina	0·72	2·14	2·24	2·94
Silica	48·48	44·54	40·50	37·63

On examining this table, it will be found that the result of the Bessemer process is chiefly dependent on the quantity of manganese in the pig; if the contents of manganese are small, as, for instance, at Langshyttan, the oxidation of nearly all the silicon and manganese takes place at the beginning of the blowing, before any carbon is as yet eliminated, while the silica and oxide of manganese, as well as a small quantity of oxide of iron formed, constitute the slag. The elimination of the carbon begins first at this point, which, however, as the process proceeds, becomes so rapid that the tuyeres can not supply the oxygen which the carbon requires, and some is also taken from the oxide of iron in the cinder; but as iron is also eliminated from the cinder, the latter decreases in quantity, by which the percentage of the other constituents increases. This is just the case with the cinder taken after decarbonization at Langshyttan and Nykroppa, where pig-iron containing less manganese was employed. It is, however, possible that the percentage of silica and alumina have been somewhat increased in these cinders by fire-clay loosened from the walls of the furnace. This seems, at all events, to have been the case at Nykroppa, where not only the percentage of oxide of iron, but also of oxide of manganese has been reduced, while the other constituents have been increased.

THE PRODUCTION OF RAILS IN 1882.

Reports have now been received by the American Iron and Steel Association from the owners of all the mills in the United States that rolled iron and steel railroad bars in 1882. These reports show that the total production of iron and steel rails in this country last year was 1,688.794 net tons, or 1,507,851 gross tons. As the production in 1881 was 1,844,100 net tons, or 1,646,518 gross tons, there was a falling off in 1882, as compared with 1881, of 155,306 net tons, or 138,667 gross tons, which is equivalent to a decrease of 8 per cent. There was a decrease in every State but six—Vermont, Massachusetts, Missouri, Colorado, Wyoming, and California.

No rails were made in 1882 in New Jersey, Virginia, and Georgia, in all of which States rails had been made in 1881. The number of rail-making States, therefore, fell to 18 in 1882, against 21 in 1881. The following table shows the production of the various kinds of rails in 1882, as compared with 1881, in net tons:

Kinds of steel.	1881.	1882.
Bessemer steel	1,330,302	1,438,155
Iron	488.581	227,874
Open-hearth steel	25,217	22,765
Total	1,844,100	1,688,794

This table shows that the quantity of Bessemer steel rails made in 1882 exceeded the quantity made in 1881, while the production of iron rails fell off heavily and that of the open-hearth steel rails fell off slightly.

The five leading rail-making States are Pennsylvania, Illinois, Ohio, New York, and Missouri. Their production of iron and steel rails in 1882, as compared with 1881, was as follows, in net tons:

States.	1881.	1882.
Pennsylvania	891,179	850,908
Illinois	433,420	362,250
Ohio	153,596	113,806
New York	109,283	105,021
Missouri	64,226	85,528
Total	1,651,704	1,517,513

PROGRESS IN SCIENCE AND THE ARTS.

The Manufacture of Magnesia.—The manufacture of magnesia for a variety of purposes is beginning to assume proportions abroad that render it a subject of interest. Sorel, as early as 1867, called attention to the fact that pure caustic magnesia, mixed with a solution of chloride of magnesium, becomes a solid mass, which has the hydraulic qualities of cement. He established works in Paris, which still make a very white cement, capable of being colored and used for a variety of purposes. Sorel uses magnesite from the island of Eubœa as a raw material, because it is exceptionally pure and free from quartz. A year later, Caron published experiments proving how refractory magnesia is. He found that magnesite calcined at the highest temperature was not sufficiently plastic alone, and he therefore mixed it with from 5 to 10 per cent of slightly calcined magnesia, and this mixture is recommended in manufacturing refractory materials from magnesia obtained by any process, because the bricks and crucibles made shrunk but little. His results did not attract much attention until the importance of the basic dephosphorizing process was admitted, and then German chemists suggested the final liquors obtained in the manufacture of potash salts at Stassfurt and Leopoldshall as a raw material. The bulk of these liquors was wasted, although they contain from 27 to 30 per cent of chloride of magnesium. It is estimated that when 70,000 cwts. of carnallite are daily treated, the final liquors hold from 16,000 to 18,000 cwts. of anhydrous chloride of magnesium, from which 5000 cwts. of magnesia could be manufactured daily. Herr Ramdohr some time since, at a meeting of the Society of Engineers, described the method of manufacture adopted. The plan of precipitating the magnesia with burnt lime has never been practically adopted, because the magnesia precipitated is very voluminous, and can not readily be rid of the chloride of calcium adhering to it; nor has the Closson system of substituting dolomite for lime been introduced. The system actually in use by Messrs. Ramdohr, Blumenthal & Co. for about a year, after almost two years of experimental work, is to decompose the chloride of magnesium by heating it. It has been known for a long time that chloride of magnesium is partially decomposed by being subjected to an elevated temperature, magnesia and hydrochloric acid being formed. But from 9 to 10 per cent of chlorine remain in the solid residue when heating is simply resorted to. By using an oxidizing flame and highly superheated steam, no trouble has been found in obtaining nearly chemically pure magnesia and hydrochloric acid of 21 degrees Beaumé, and besides gathering the bromine in the solution. The magnesia thus made is fine white powder, which absorbs carbonic acid and moisture from the air if dried at from 180° to 200° Celsius; but it loses this property to a great extent when calcined at a white heat. Magnesia dried at a low temperature is pronounced a superior material for cement, five parts of it being mixed with four parts by weight of a solution of chloride of magnesium of from 25 to 30 Beaumé. It is stated that this cement will bear a very large admixture of sand—as high as twenty times its weight. Magnesia is

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now also used as a basic lining. Messrs. Ramdohr, Blumenthal & Co. ship their magnesia to Messrs. Vygen & Co., of Duisburg, who make magnesia bricks which are said to be very hard, sharp, and refractory, and have a density of from 2·9 to 3. No sintering material is necessary for these bricks when burnt at a white heat.

THE GERMAN PIG-IRON PRODUCTION IN 1882.—The following return, showing (in units of 1000 kilos.) the production of the German blast-furnaces for 1882, has been compiled by the German Association of Iron and Steel Manufacturers, and published in the *Stahl und Eisen:*

	Forge pig.	Spiegel.	Bessemer pig.	Foundry pig.	Estimated work.	Total of pig-iron.
January.....	159,451	12,080	68,327	26,859	18,500	285,217
February.....	148,155	11,599	58,109	19,237	4,500	241,600
March.....	164,624	10,707	57,024	18,582	5,500	256,437
April.....	146,409	12,108	57,634	19,939	5,800	241,890
May.....	152,383	12,805	57,737	17,676	2,700	243,301
June.....	150,084	15,725	56,078	20,148	4,700	246,735
July.....	178,723	9,649	57,382	19,279	2,100	267,133
August.....	175,480	12,412	61,791	19,663	2,100	271,446
September	172,145	12,448	62,145	22,891	3,100	272,729
October.....	187,427	10,180	62,152	21,691	2,500	283,950
November.....	175,809	8,420	64,694	23,238	4,600	276,761
December.....	170,286	11,381	70,592	29,399	2,100	283,758
Total	1,980,976	139,514	733,665	258,602	58,200	3,170,957

PILE-DRIVING BY DYNAMITE.—In the course of executing some municipal works at Buda-Pesth, the piles already driven were required to stand a greater load than had been originally contemplated. It was, therefore, necessary to test them, and drive still deeper those that yielded. On account of the expense of bringing a pile-driving machine successively over each pile for so little work, it was determined to try the effect of dynamite; and the city engineers applied to Colonel Prodanovic, of the Second Regiment of Austrian engineers, to carry out the experiments. According to the *Wochenschrift des Oesterreichischen Ingenieur and Architekten Vereins*, the piles were cut square, and a wrought-iron plate 15 inches in diameter and 4⅜ inches thick was placed on the top of each. On its center, and immediately over that of the pile, was placed a charge of No. 2 dynamite, in the form of a cake, 6 inches in diameter and ¾ inch thick, and weighing 17½ ounces avoirdupois. This was wrapped in parchment-paper, covered with clay, and fired. The effect produced was found on an average to be equal to five blows from a 14¾ cwt. monkey falling from a hight of 9 feet 10 inches. The iron plates stood from twenty to twenty-four explosions. The system is not considered applicable to a pile standing considerably out of the ground, but saves a great expense when piles already driven have to be sunk deeper. In this country, gunpowder has been used for many years, particularly in Philadelphia, for pile-driving, though employed generally to drive the monkey upward.

AN AUSTRIAN WIRE ROPE TRAMWAY.—A description has recently been given in the German technical press of a wire tramway in connection with the coal-mining industry established near the Hersteigg, the products of which it brings to the main line belonging to the Southern Railroad of Austria. In its alternating rise and fall during its distance of 3000 yards, there is a useful excess of incline of about 142 yards, which, it is said, suffices to keep the line in self-acting working, after it has been started by means of the twelve horse-power engine provided for that purpose. When there is no return load to be sent to the mine, the speed of the line can be regulated by a brake. Under these circumstances, the cost of working the line is estimated at about 4½ cents per ton of coal. In its general arrangement, the tramway forms a straight line, and consists of two drawing ropes and the train rope. The line which is used for conveying the coal to the station is 1·10 inches thick, and is composed of 19 steel wires, each ·18 of an inch in diameter. The line on which the coal buckets are returned to the mine is only ·66 of an inch thick, the 19 steel wires of which it is composed being only ·13 of an inch thick. Both ropes consist of wires about 765 yards long, coupled to each other, and for the ropes a breaking strength of 73 tons per square inch section is guaranteed. At the ends of the ropes, weights of 5 and 3 tons are applied in the usual way for obtaining the proper tension. The distance between the seventeen supports varies from 60 to 400 yards. The train rope is ·6 of an inch thick, and consists of twelve soft steel wires of ·07 of an inch diameter, and runs at a speed of about 1⅞ yards per second. The buckets which convey the coal follow each other at a distance of about 83 yards; thus thirty-six are always on the way to and the same number coming from the station. Each bucket contains about 10 bushels, or about a quarter of a ton of lignite, the total quantity carried per hour being about 17½ tons. The cost of the line was about $14,000.

FURNACE, MILL, AND FACTORY.

The Vulcan iron-works, in Carondelet, opened February 19th, after having been closed for some months. The managers have been quietly securing non-union men, and this morning had engaged a sufficient number to begin work again.

The blast-furnace and rolling-mill of the New York & Ohio Iron and Steel Company, at Ironton, Ohio, are advertised for sale at public auction, March 1st, 1883, unless previously sold. A minimum price of $62,500 has been set on each mill.

The Ashland furnace has been compelled to cease operations for the present, on account of high water.

The Falcon furnace, Youngstown, Ohio, has been blown in, the repairs having been completed.

The Ohio Powder Company is making 250 kegs of powder per day and running the machinery day and night to keep up with its orders.

The Forsyth scale-works have received an order for a forty-ton extension track scale for the Jacobs & Hazleton Coal Company, and a similar order from the Clark & Price Coal Company.

The rolling-mill of the Reading Iron-Works has started up again on both night and day turns, thus giving employment to about 300 men. The sheet-mill of the Reading Iron-Works has indefinitely suspended work, throwing 300 men out of employment. Dullness in trade is assigned as the cause. The wages of puddlers and heaters in the neighboring mill have been reduced a dollar a ton.

A company with a capital of $35,000 has been established at Lynn, Mass., to manufacture sheet-copper, iron, and tin ware.

The Junction Iron Company, situated at Mingo Junction, Jefferson County, Ohio, has recently enlarged its plant, which at present consists of two blast-furnaces and one nail-mill. Furnace No. 1 has been in blast, averaging 80 tons of iron per day, but was blown out last week. The nail-mill has resumed work.

It is reported that Furbush's iron foundry, Camden, N. J., will soon resume operations.

Starr's iron-works, Camden, N. J., which shut down previous to their sale, will resume work, the sale having been postponed. The works have a capacity of 1000 hands.

The Laclede rolling-mills, of St. Louis, have shut down on account of dullness of trade, throwing 600 men out of employment.

Fayette Brown, of Cleveland, Ohio, has been appointed receiver of Brown, Bonnell & Co., on the application of the Jackson and Lake Superior Iron and Mining companies and the Negaunee Concentration Company. They have claims amounting to $30,000. Mr. Brown said he expected that the Youngstown works would be shut down and an inventory taken, after which it would be managed so as to make the most out of the property. The company represents that it has a large quantity of stock on hand and good contracts, and that its assets are largely in excess of its liabilities.

J. V. Ayres's Sons, dealers in iron and steel, Chicago, have suspended. The liabilities of the firm are reported to amount to more than $1,500,000. This firm held a large interest in the iron-works of Brown, Bonnell & Co., at Youngstown, Ohio.

The Excelsior iron-works, of Chicago, Ill., under the direction of the Pacific Iron-Works, of San Francisco, are building a 30-ton copper-smelting plant for the H. O. W. Copper Mining Company, of Deadwood, Dakota.

New foundations for the recently destroyed plant of the Chicago Smelting and Refining Company are laying. The buildings will be 120×220, with blast-furnace 60×60. Some new machinery will be added, and it is expected that the works will be ready to receive and refine bullion May 1st.

The Quinnimont furnace and property were recently sold for $150,000.

A Northern company has purchased the iron bed near Rome, Georgia, and another blast-furnace is to be erected.

The reported failure of the Chicago & Carp River Iron Company of Marquette, Mich., and the statement that it had given every thing up to creditors in general assignment, are authoritatively denied. Mr. Charles H. Himrod, agent for the company, states that the company had difficulty, but will come out all right. The situation had been complicated by the failure of the Union Fuel Company, of Marquette, in which it was interested, and this had given rise to the report.

It is reported that the Fox River Iron Company of Greenbay, Wis., has assigned. Capital, $200,000; assets, $90,000; liabilities, over $65,000.

A dispatch says that the furnace of the Wampum Iron Company, at Wampum, Penn., was closed February 21st by the sheriff on a confessed judgment of $20,000. The failure was brought about by the recent financial difficulties of Kloman Brothers, Pittsburg.

The Pittston stove-works started work February 21st with new men. This gives employment to a large number of men and boys. The molders here have been on a strike since January 1st.

The Colebrook furnaces, at Lebanon, Pa., during the week ended on the 10th instant, largely exceeded their former best record. The daily product of these furnaces for the week was as follows, in tons of 2250 pounds:

February.....	4	5	6	7	8	9	10	Total.
No. 1 furnace.....	85	85	84	91	94	94	93	626 tons.
No. 2 furnace.....	82	72	86	83	86	75	97	581 "
Total								1,207 tons.

The fuel used per ton of pig-iron made at No. 1 furnace was 924 pounds of anthracite coal and 1582 pounds of coke; total, 2506 pounds. The fuel used at No. 2 furnace was 802 pounds of anthracite coal and 1605 pounds of coke; total, 2407 pounds.

GENERAL MINING NEWS.

ARIZONA.

The Peabody mine, at Russellville, has been sold to the owners of the Clifton mines, a Scotch company, for about $300,000.

COCHISE COUNTY—TOMBSTONE DISTRICT.

Late dispatches state that the Ingersoll hoisting-works started up three days ago, and the Stonewall hoisting-works started up yesterday. Both work admirably. The suit of the Town-Site Company against the Vizina, for surface ground, is now in progress at the District Court. The blackmailing suit against the Grand Central Company is reported to have been compromised for $3000. The Contention 300 level is looking better than ever before. There is enough ore in sight to supply the mill for ten months. Assays average $90 per ton. Strata of ore have been struck in the Big Pedro mine which assay $1800 per ton. A suit for one half of the Last Chance mine is in progress in the District Court.

GRAHAM COUNTY—CLIFTON DISTRICT.

COPPER QUEEN.—Reports state that a suit has been brought by O. Bear against this company to recover one ninth of the mine and its product. The suit involves several million dollars.

CALIFORNIA.

AMADOR COUNTY.

BUNKER HILL.—This company, after running through the supposed foot-wall of its mine, struck a ledge of good ore 5 feet wide.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—During the week ended February 15th, 126 tons of ore were crushed; average assay value, $36 per ton. The east cross-cut, 1000 level, is in 269 feet. The rich vein in the north drift, 780 level, has split up, and the drift has been stopped at a distance of 48 feet from the cross-cut.

STANDARD CONSOLIDATED.—During the past week, 1406 tons of ore were crushed. The east cross-cut from south drift, 1000 level, is in 285 feet. South drift from east cross-cut, 700 level, is 416 feet long, and the vein in the face is 2½ feet wide. The vein in the stopes from the upper levels is from 7 to 12 feet wide. At the annual meeting of stockholders, the following officers and directors were elected for the coming year: President, Thomas Bell; Vice-President, W. S. Wood; Treasurer, the Nevada Bank; Secretary, William Willis; Superintendent, William Irwin; Directors, Thomas Bell, Thomas Brown, William Willis, R. H. Laimbeer, M. R. Cook, and John H. Boyd.

PLUMAS COUNTY—GREENVILLE DISTRICT.

The Greenville *Bulletin* reports as follows:

CRESCENT.—The work of prospecting is going on with much vigor, and a very large amount of ore is brought in sight in the different ledges. When spring opens, there will be enough in sight to supply the full milling capacity for a long time.

TAYLOR-PLUMAS.—About fifty tons of ore were crushed in the new mill, and from this a partial clean-up was made of bullion to the amount of seven hundred dollars; the ore crushed was a miscellaneous mixture, taken from all parts of the mine. In the mine, the winze is now down about fifty feet; the many stringers have all run into the main ledge, which is now about five feet wide, and looks very well; at this depth, a drift will be started east to develop the ledge, and should its present appearance be maintained there, a shaft will be sunk close to the mill through which the ore will be hoisted and run directly to the battery.

CANADA.

NEW BRUNSWICK.

QUEEN MANGANESE MINE.—A shipment of 212 tons of ore, valued at $3392,

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was recently made from these mines, at Markhamville. It is reported that the mines produce almost all grades of ore, from that worth $16 a ton to ore worth $100.

COLORADO.

CHAFFEE COUNTY.

CALUMET.—The incline sunk on the original discovery is now down about 319 feet, pitching at an angle of about thirty degrees. From this incline, levels have been run at 100 and 200 feet both ways. At the 100-foot level, the vein shows a body of very fine iron ore, over thirty feet wide. The ore is magnetic iron, similar to that found in the Lake Superior region. The company began operations two years ago, and for about half of that time have been engaged exclusively in development-work. A force of about fifty men is at present engaged working two shifts, only a small proportion of which are stoping, yet the daily output of the mine is 100 tons. At the 100-foot level, the northeast stope is a huge chamber, the walls and bottoms of which are almost solid ore. The heading is advanced about 100 feet from the incline, and ore has been stoped the whole width of the vein, over thirty feet, and taken out overhead to a hight of over twenty feet. The 100-foot level shows the finest body of ore, and is at present the main source of supply for shipping. All the timbers required for the mine are let down the incline to the two levels, and the ore is dropped from the 100-foot level to the 200-foot or tunnel level by means of a chute, thus avoiding all expensive hoisting machinery. The 200-foot level connects with the surface by a cross-cut tunnel. At a point about 200 feet from the mouth, the vein is cut and lateral drifts have been started in the shape of a Y, for the purpose of developing the main ore-body. The ore appears to be somewhat scattered in the 200-foot level, though the impression is, that it will be found solid in the north drift.

CLEAR CREEK COUNTY.

MINT.—The contract has been let to drive a 200-foot adit on the company's property, on McClellan Mountain. The property consists of a net-work of half a dozen lodes, all of which can be worked through the adit now driving. A great deal of rich float-ore has been found on this mountain, and it is the general belief that the company has property in which will be tapped the original source of some of this float.

GILPIN COUNTY.

A correspondent of the Central City *Register-Call*, in speaking of the mines on Quartz Hill, says: On the westerly boundary-line of developed veins, the Forks was worked, the depth of the main shaft being over 900 feet. The ore raised does not differ materially in its appearance from that taken out of the Hidden Treasure, which in its lower workings—1300 feet—has been developed into pay. The Kansas-Monmouth formerly—now operated by the Denver Company, Limited—employs forty stamps on Kansas and Kent County ore, with profitable results. Working out in a southeasterly direction, the Phœnix-Burroughs and Mackey-Burroughs were reached. Work continues at the workings of these properties, both on the same vein. At the Roderick Dhu, sinking the main shaft is continued below a depth of 600 feet. At the Illinois, sinking is going on without any material change. South of the Illinois, the main shaft of the Ingalls is in proper shape for deeper workings. A new shaft has been erected which incloses a stationary engine and boiler of about 25 horse-power capacity. At the Egyptian, development-work is progressing. The output of the California mine furnishes the mill ore for fifty stamps, enough now remaining on the stulls to keep fifty more stamps running. On the summit of Quartz Hill, the Pyrenees shows gold-bearing ore—milling and smelting—although the latter quality is of a galenous character. The Aurora Company, on the southerly slope of Quartz Hill, outside of timbering the main shaft over the Charter Oak lode, and the erection of a shaft building, has accomplished but little, it being late in the season when it began operations. Sinking is continued.

BARKER.—Work has been commenced on this lode, situated west of the Kent County mine. A shaft 80 feet in depth has been cleaned out and timbered up wherever needed, and sinking resumed. The east and west levels are driving through a good body of ore. The crevice-matter in the bottom of the shaft is of uniform width, and as depth is attained it improves.

GUNNELL.—The production for the month of January was as follows: Smelting ore sold, $10,029.70; mill gold, $2229.15; tailings, $147.55; total product, $12,406.40.

HINSDALE COUNTY.

CROOKE MILLING AND SMELTING COMPANY.—The west drift of the 7th level of the Ulé is under cover 15 feet and the east drift 18 feet. Ore-body heavy and rich. The winze in east of drift on 6th level is down 56 feet in same body of ore as found in shaft. The concentrator is running on the dumps and doing splendid work.

MICHIGAN.—Shaft 7½ feet at the end of a 55-foot drift. On the hanging-wall there are 20 inches of gray copper, much of which is crystallized pyrites of iron and copper. There is a foot of vein-matter following this mineral, and then 12 inches of gray copper streak. The vein is larger and better defined than heretofore.

LAKE COUNTY.

Late Leadville exchanges contain the following:

DUNCAN.—Shipments will soon be begun. Drifts are driven to open up undeveloped territory and otherwise thoroughly explore the remaining portion of the ground.

IRON SILVER.—The Mayor shaft has attained a depth of 186 feet. The water increased to such an extent during the past few days that a suspension of work followed, and the shaft is now idle until large pumping machinery can be provided.

LEE BASIN.—The shaft-house, recently destroyed by fire, is to be rebuilt immediately.

LITTLE SLIVER.—The mine has now an output of ten tons per day, yielding a net value of about $1000. The ore in the Sliver is principally a flint, the pores and cleavages of which are filled with a chloride of silver. To all appearances, it is the same character of mineral found in the Robert E. Lee mine, and in some instances it is fully as rich in chloride of silver.

MAGNOLIA.—This property, adjoining the Henriett, worked under a lease, is showing up well at present. An eight-foot body of carbonates and iron ore is opening. Shipments will begin shortly.

ROBERT E. LEE.—In the suit of Mrs. Seymour Rogers against the Robert E. Lee Mining Company, a compromise was effected this week, the terms of which have not been made public. The case has excited much interest in this State, having been in the courts since April, 1880. Lately the decisions have been in favor of the company, and the compromise may doubtless be attributed to this fact.

PUEBLO COUNTY.

MADONNA.—The location for this company's smelter at Pueblo has not yet been definitely arranged; negotiations for land are now pending. The smelter will be supplied with four large furnaces, and will be under the management of Mr. Anton Eilers, formerly of the Arkansas Valley smelter, of Leadville.

SUMMIT COUNTY.

ROBINSON.—All work, says the Denver *Tribune*, has been resumed at the mine, and a full force of men is engaged. Guards are retained over the works, and care is taken that none of the persons opposed to the present management is admitted.

DAKOTA.

FATHER DE SMET.—The report of the superintendent from February 1st to February 8th shows ore extracted from first, second, and third levels, 1730 tons. Ore milled, 1680 tons. Water short from 3d to 7th inst. Third level, header advanced 9 feet. Header in 128 feet. Italian winze advanced 8 feet. Winze down 41 feet. We have resumed work on North End tunnel, commencing at a point about 25 feet back from face, and 790 feet from mouth of tunnel, turning and following the vein in a southeasterly direction. It has advanced 15 feet. Tunnel in 805 feet.

H. O. W. COPPER COMPANY.—This property is reported to be the only copper mine opened in the territory. The ore-body is said to be enormous, the uncovered portions of the veins being upward of sixty feet wide, averaging 16 per cent of copper. By assorting the ore, the present smelter of 30 tons daily capacity can be kept in constant blast on 30 per cent ore. The ores are mostly carbonates and oxides, entirely free from sulphur.

GEORGIA.

The Dahlonega *Signal* says:

BARLOW.—The formation is very soft at this mine, and caving is constantly going on, which keeps the cut full of ore and the mill well supplied without any extra efforts.

COLUMBIA.—The mine is shut down, but will doubtless resume operations shortly.

CONSOLIDATED GOLD MINING COMPANY.—The twenty-stamp mill is crushing ore from the Ivey cut. Work on the new sixty-stamp mill will be resumed before a great while. The cut at the Bast mine is widening and extending northeastward. The quartz leads lying back of the sandstone, quartz, and conglomerate ores are prospecting, with satisfactory results.

SINGLETON GOLD MINING COMPANY.—The twenty-stamp water-power mill at the Lockhart mine will soon be ready for operation. The little mill is making very good time on ore from the stope on the seven-foot vein.

IDAHO.

BANNER.—A correspondent of the Idaho *Statesman* states that while driving the tunnel two ledges were struck. The first ledge is the one on which the shaft was sunk to the depth of 104 feet last winter; the second is the one the uprise is making on this winter. The rise is now up about 50 feet; it will have to be extended 20 feet farther up, and then there will have to be a drift run north to intersect the shaft. The assays made give good results.

EMPIRE STATE.—This mine is now worked by Chinamen. At present, a drift is running on the vein, to connect with the old shaft and winze. The miners have run to within 48 feet of the winze and have encountered very rich ore in the face of the drift. Two hundred and twenty-eight feet more are to be run before the old shaft is struck. Good ore was found in the shaft as deep as it was sunk, and fine ore is to be found in the bottom of the winze, which is 82 feet deep. The distance from the old shaft to the north winze is 180 feet, and rich ore is known to exist between these two points for the entire distance. When the drift reaches the shaft, there will be a pay-chute 228 feet long by 82 feet high. As soon as the drift reaches the winze, stoping will be commenced.

FAR WEST AND DAVITT MINES.—These mines, situated on Deer Creek, were recently sold for $40,000.

MAYFLOWER.—The Wood River *Times* states that the lower level, which is in 270 feet, continued so long in porphyry that the superintendent started miners at work 70 feet from the breast, toward the mouth, at cross-cutting, and recently the ore-body was cut as rich as in the upper workings.

MAINE.

SULLIVAN.—Good progress at the mine is reported. The perpendicular shaft is nearly 400 feet in depth, and is going down at the rate of eight feet per week.

MINNESOTA.

Messrs. S. P. Ely, of Marquette, and George H. Ely, of Cleveland, have united in the purchase of an interest in the Minnesota Iron Company's mines, Vermilion Lake District. According to the Marquette *Mining Journal*, this purchase was made after a visit of inspection to the mines by the first-named gentleman last month, which fact is a high indorsement of all that has been said concerning this new iron field. Analyses of Vermilion Lake ore, made from a hundred samples taken from the Minnesota Iron Company's three mines, gave 67·70, 68·51, and 69·30 per cent of metallic iron, and from ·030 to ·078 of phosphorus. That ore will pass inspection anywhere.

MONTANA.

LEXINGTON.—In a communication to the Salt Lake *Tribune*, Mr. Medhurst, general manager, says that the shipments of bullion from the Lexington Mining Company for the month of January amounted to $89,049.66. The new mill having been shut down in the beginning of the month about thirty-six hours, in order to make repairs, necessary by a continuous run of over one hundred days, caused the output for January to run about $4000 under the average output of the previous three months. The average chlorination for January was 86 per cent, and the average amalgamation for the same month was 97·7 per cent, from which figures you will perceive that the Stetefeldt furnaces continue to work most satisfactorily.

NEW MEXICO.

The copper furnace in the Hubbs smelter is up and ready for work. The Albuquerque *Journal* says that owners of copper ore are requested to correspond with C. L. Hubbs. He will pay the highest cash value for copper ore on delivery at the smelter.

TREASURER.—This mine has a tunnel 20 feet in length, and the vein is 12 feet in width. The ore is pyrites of copper, and will average about 15 per cent, 12 feet from the surface.

NEVADA.

ALEXANDRIA.—Work is actively pushed. The new hoisting-works are completed on the Diligence shaft, and the engine is in its place. A force of men is engaged retimbering the shaft preparatory to sinking.

EUREKA CONSOLIDATED.—The Ruby Hill *Mining News* says that the prospects for a body of ore are very flattering at the old Wintzel works. A favorable formation has been passed through, consisting of soft lime with large boulders of hard lime at every few feet. The drift is now in broken limestone, with large crevices in the face, from which a current of air is issuing.

TUSCARORA.

NORTH BELLE.—The shaft has reached a depth of nearly 300 feet.

UTAH.

A dispatch from Salt Lake City says that a new company has been organized in London to work the famous Emma mine, which is now said to promise well. The articles of association have been filed with the secretary of the territory. The capital is £700,000 in £10 shares.

GERMANIA.—According to the *Tribune*, the operations in manufacturing lead have already made a material difference in the shipments of lead, and this difference will become more and more apparent to the great advantage of the country. These lead-works are now in full tide of successful operation.

MAMMOTH.—Capt. John W. Plummer has assumed entire control for Mr. Butler Johnston, as manager of all the property of this company, which includes the Mammoth mines (recently purchased), the smelting-works, etc.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb. 23.

The mining market this week has been rather quiet; but this is due, in a great measure, to the holiday. Considerable strength has been shown by the better class of stocks, and the general market may be said to have been steady, with a tendency to stronger prices.

The chief interest in the market has been the stock of Horn-Silver, which has grown very strong. Reports from the mine state that it is now looking better than for a long time past. Sierra Grande has also shown considerable strength, but evidently under manipulation. The Comstocks show little change in prices, while the Leadville stocks have been steady throughout. The Tuscaroras show a slight decline, especially Navajo. Sonora Consolidated continues to occupy most of the attention of the market, and continues to grow stronger, under manipulation. We give a summary of the market below. The total number of shares sold at all the Exchanges aggregates 404,410, as against 501,725 last week.

The Comstock shares have been quiet at irregular prices. California had a small business at irregular prices, selling from 26@21@23c. Consolidated Virginia was irregular, with a moderate business, and sold from 63@53@58c. Sierra Nevada was quiet and weak at $4.25@$3.55. Union Consolidated had a moderate business at irregular prices, but closed strong; it sold from $4@$5. Ophir sold to the extent of 400 shares, at $3.25@$2.90. Best & Belcher records a small business; it sold from $4.75@$4.38. Sutro Tunnel was active and steady selling from 21@25@22c.

The Leadville stocks had a fair business and have been steady. Amie sold from 21@22c. under a very active business. News from the mine states that the lessees of No. 3 shaft are shipping about 100 tons of ore per day, averaging from 50 to 75 ounces of silver to the ton, that there is more ore in sight than can be extracted before the lease expires, and that no development-work has been done by the lessees for some time past. Chrysolite has been very quiet and steady, selling from $1.40@$1.45. Hibernia sold from 3@5c. under a small business. Iron Silver was strong, and had a fair business; it sold from $2.80@$2.85. Leadville records but one transaction, and that at 70c. Little Chief was quiet and steady, selling at 42@40c. Little Pittsburg was also quiet and steady; it sold from 63@66c. Big Pittsburg sold at 20@19c.; this company has been reorganized. Climax had a fair business at steady prices, selling at 8@9c.

The Bodie stocks were very quiet and showed signs of weakness. Bodie Consolidated sold from $1.80@$1.70, with a small business. Standard was quiet and steady; it sold from $5⅝@$6, with a business of 385 shares. Bulwer had a fair business, and was a little weak; it sold from $1.05@97c.

The Tuscarora stocks were quiet and steady. Grand Prize was quiet and steady at 60@62c. Navajo declined from $6⅜@$5½ under a business of 1600 shares. Independence sold at 70c. North Belle Isle records a small business at steady prices, selling at 55@63c. Elko Consolidated continues active, but has declined from its recent strong prices; it sold from 9@13@12c.

In the miscellaneous list, Alice has had a moderate business at strong prices, and has sold from $2.90 @$3.55. Bassick has declined from its strong prices of last week, selling from $9@$8¼@$8⅛ under a small business. The Green Mountain stocks have been quiet and weak. Gold Stripe sold at 8c. Green Mountain declined from 80@69@70c. under a small business. Rising Sun sold at 8c. and Cherokee at 6c. Hall-Anderson has had a fair business, but has been weak; it sold from $1.75@$1.55@$1.60. Horn-Silver has been very strong, with a fair business, selling from $5⅝@ $7⅝@$6⅛@$7⅛. Ontario has been quiet and very irregular, selling from $25@$20@$24⅛. Robinson Consolidated has been very active at irregular prices; it sold from $1.05@$1.25@$1.10. Sierra Grande has gained considerable strength under a very active business; it sold from $2.65 @$3.50, closing at $3.25. It is reported that the mine is now producing from 6000 to 10,000 ounces of silver, and that the total output for six months from July 21st, 1882, to January 5th, 1883, was $869,138.88. Silver King has been quiet and irregular, selling from $11¼@$10⅝@$11⅛.

Alta-Montana records an active business at irregular prices, selling from 9@11@15c. Bradshaw was quiet and irregular at 34@31@32c. Decatur records a very active business, and has been steady; it sold from 12@10c. Harlem M. & M. Co. had a fair business at steady prices, selling from $1.15@$1.20. Oriental & Miller was active and steady, selling at 15 @13@14c. Red Elephant records a moderate business at steady prices, selling from 7@8c. Silver Cliff was irregular, under a small business, and sold from 37@42@39c. Sonora Consolidated was very active, and has grown stronger; it sold from 28@34c. South Pacific was active and a little weak at 8@6c. The State Line stocks have been moderately active at weak prices; Nos. 1 and 4 sold from 4@3c., and Nos. 2 and 3 from 8@7c. Taylor-Plumas has been active and irregular, selling from 18@16@17c.

It now looks as if the days of the American Mining Stock Exchange were numbered. The Mutual Trust Company, which acts as financial manager and cashier of the Exchange, recently informed the members that they would be required to pay dues to the amount of $100 by the 1st of March or lose their seats. This notice has caused widespread consternation and alarm. There has been little or no business done at the Exchange for a long time past, but the sales of the day appeared (on paper) as large, and sometimes larger than that of its opponent, the New York Board. It will no doubt help speculation in mining stocks to have the business centred in one exchange, and the quicker it is placed in that one exchange, and in good, reliable hands, the better.

The Big Pittsburg Mining Company has been reorganized and a new company formed, under the name of the New Pittsburg Mining Company. The capitalization has been fixed at 200,000 shares of the par value of $10, and the shareholders of the old company can exchange their stock for that of the new by surrendering their stock and an additional payment of twenty-five cents per share. The gentlemen forming the new company are W. Van Norden, who is the President, Walter S. Gurnee, R. H. Laimbeer, George R. Blanchard, Joseph S. Decker, William N. Cromwell, and J. F. Alexander. The new company has purchased the property of the Big Pittsburg, and it is going to start work immediately. It states that it believes it is a good mining property, but has never been properly worked; that it remains to be seen what there is in it; but it has strong hopes that the results will justify the outlay.

The Board of Directors of the Tombstone Mill and Mining Company, at their meeting in Philadelphia, on the 20th inst., directed the payment of another installment of twenty-five thousand dollars ($25,000) on their funded debt, being from the proceeds of their tailings. The officers were also directed to prepare reports for the approaching stockholders' meeting.

MEETINGS.

Crooke Mining and Smelting Company, No. 234 Broadway, Room 34 New York. Annual meeting and election of trustees, March 6th, at eleven o'clock A.M.

North Star Mining and Smelting Company, No. 234 Broadway, Room 34, New York. Annual meeting and election of trustees, March 6th, at one o'clock P.M.

Robinson Consolidated Mining Company, No. 54 William street, New York. Annual meeting and election of trustees, March 6th.

DIVIDENDS.

The Father de Smet Consolidated Gold Mining Company, of Dakota, has declared dividend No. 26, of twenty cents a share, payable at the office of Laidlaw & Co., No. 14 Wall street, New York, on February 28th. Transfer-books will close on February 21st.

The Sierra Grande Mining Company, of New Mexico, has declared a dividend (No. 5) of $100,000, or twenty-five cents per share, payable March 3d. Transfer-books close February 24th, and reopen March 5th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson furnish the following *résumé* of the petroleum market for the week:

There has been no special feature to speculation during the week, and the volume has been light and fluctuations small. It is said that the oil certificates are scarce in Oil City, but they are plenty in the New York market. The only inference from this would be, that the New York public believe in higher prices and are absorbing the certificates, and that Oil City speculators have sold short on the late spurts. Many of the most successful traders "buy on slumps and sell on jumps." There have been several small wells opened in the Forest County tract, but the territory there is so spotted and irregular that no great hopes are entertained of finding large and permanent producers. We said last week that prices for a few weeks would probably hover about the dollar mark. We believe that the best informed traders as a rule are buying rather than selling at to-day's prices, say, $1.00¼, but the market is dull. A movement looking to the consolidation of the Petroleum Exchange and Mining Stock Exchange is in progress, and if this can be accomplished, New York will certainly control speculation in oil within a few months.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 17...	$1.01⅜	$1.01¾	$1.00⅝	$1.01	368,000
19...	1.01½	1.01⅝	.99⅞	1.00⅝	309,000
20...	1.00	1.01½	1.00	1.00½	383,000
21...	1.01	1.01	1.00¼	1.00⅞	199,000
22...	.....	.....	.....	.....	.....
23...	1.00⅛	1.00⅞	.99	.98⅞-99	380,000
Total sales.					1,729,000

UNLISTED QUOTATIONS.

Mr. Alexander C. Lassen, 61 Broadway, under date of February 23d, three P.M., reports the current quotations of unlisted stocks as follows:

	Bid.	Asked.		Bid.	Asked.
Bodie Tunnel..	$0.25	$0.75	Mack Morris...	...	$0.75
Breece.....	.17	.19	Madre.....	$0.50	2.00
Batopilas Pref..	9.00	24.00	Moulton.....	....	4.00
Calif'rnia Wat'r	.25	....	Native Silver...	...	.30
Contention	3.00	8.00	Pelic'n & Dives	...	.50
Dahlgren	.40	.85	Plata Verde....	....	.25
Denver City....	.18	.20	Rico.....	....	.55
Empire Gold...	3.00	....	Hond.....	....	7.00
Eureka Tunnel.	.60	.90	Santa Maria....	.20	1.00
Evening Star...	2.00	....	Silver State ...	....	1.10
Gold Cup..	.10	.14	Stormont (New)	.20	.30
Grand Central..	1.50	....	Sampson.....	.35	....
Highland Chief.	.10	.25	Silver Cord.....	1.15	1.35
Hibernia Silver, (New)	...	.19	Satemo.....	.35	.70
Jocuistita.....	5.00	7.00	Sierra Apache..	.30	.32
London Cons...	.90	1.35	Sierra Bella. ...	.70	.75
			Terrible.	1.50	2.00

REVIEW OF THE SAN FRANCISCO MARKET.

There is no news of special interest from the San Francisco market. Business has been dull, but prices have been firm. The north-end Comstocks have been in good demand at strong prices. The Tuscaroras remain steady.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Feb. 16.	Feb. 17.	Feb. 19.	Feb. 20.	Feb. 21.	Feb. 22.
Albion.....	.....	.....	.....	.....	.....	.....
Alpna.....	1	.....	1¼	.....	1⅛	.....
Alta.....	.....	.....	11-32	13-32	13-32	.....
Bechtel...	.....	.....	.....	.....	.....	.....
Belcher....	.....	.....	½	.....	.....	.....
Belle Isle.....	21-32	.....	21-32	19-32	19-3	.....
Best & Belcher..	4⅜	.....	4⅛	4⅛	4¼	.....
Bodie.....	1⅝	.....	1¾	1¾	1⅝	.....
Bullion.....	.....	.....	.....	.....	.....	.....
California.....	3-16	.....	¼	3-16	3-16	.....
Chollar.....	.....	.....	.....	.....	.....	.....
Con. Virginia....	9-16	.....	9-16	½	19-32	.....
Crown Point.....	.....	.....	27-32	13-16	.....	.....
Elko Cons.....	.....	.....	5-32	3-16	.....	.....
Eureka Con.....	9	.....	.....	.....	9	.....
Exchequer.....	¼	.....	¼	¼	¼	.....
Gould & Curry....	2⅞	.....	2⅞	2¾	3	.....
Grand Prize.....	9-16	.....	9-16	19-32	21-32	.....
Hale & Norcross.	2¾	.....	2¾	2¾	2¾	.....
Independence. ..	.....	.....	¾	11-16	11-16	.....
Martin White....	2	.....	1¾	1½	1¼	.....
Mexican.....	3	.....	2⅞	2¾	3	.....
Mono.....	.....	.....	.....	¼	¼	.....
Mount Diablo ..	.....	.....	.....	.....	3¾	.....
Navajo.	5¼	.....	5⅝	5⅛	5½	.....
Northern Belle. ..	9	.....	9⅝	9½	9⅝	.....
North Belle Isle..	.....	.....	9-16	.....	.....	.....
Ophir	3⅛	.....	3	2¾	3	.....
Overman.....	.....	.....	.....	.....	.....	.....
Potosi.....	1⅛	.....	1¼	1¼	1⅛	.....
Savage...	.....	.....	.....	.....	.....	.....
Scorpion.....	.....	.....	.....	.....	.....	.....
Sierra Nev.....	3⅞	.....	3¾	3¾	4	.....
Silver King.....	.....	.....	11	.....	10	.....
Tip Top.....	.....	.....	.....	.....	.....	.....
Union Con.	4¾	.....	4⅛	4⅛	4¾	.....
Wales Con.....	¼	.....	¼	.....	5-16	.....
Yellow Jacket...	1½	.....	1½	1½	1½	.....

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Feb. 21.

There has been a little more activity in the market the past week, but it has been wholly confined to the four or five principal copper stocks. Prices, however, have been fairly sustained, with, in one instance, quite an advance over last week's quotations. Calumet & Hecla holds steady at $243, all the lots offered being taken at that price. Franklin opened at a decline from $123¼@$123¼, but subsequently advanced to $13, and closed quite strong at $123¾ bid. Pewabic has again come to the front and become quite

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active, opening at $7\frac{1}{8}$, and advancing rapidly, with but few sales between, to $9\frac{1}{8}$@$10; closing sale to-day at $9\frac{3}{4}$. We hear no reason assigned for the advance other than that it was too low, and the low price tempted buyers. Quincy ruled steady at $50\frac{1}{8}$ @$50\frac{3}{4}$ in the early dealings, but on free offerings the price was forced down to $50, with a sale of 50 shares at $49, seller 4 months. Osceola, firm at $31@$30\frac{7}{8}$. Sales of Allouez at $2\frac{1}{8}$. The above comprise all the copper stocks dealt in the past week. The speculative list continues dull and inactive, and there is no indication of a boom in this class in the near future.

In the silver stocks, business has been unusually light. Only 20 shares of Bonanza reported at $2\frac{1}{8}$. Catalpa and Crescent, dull; the former sold at 85@ 80c., and the latter sold at $37\frac{1}{2}$c. Sullivan declined to 75c. San Pedro, quiet at 75@80c.

At the Boston Mining Exchange, Massachusetts & New Mexico advanced to 10c., with large sales; but the price was not sustained, and it again receded to 7@8c., closing 8c. bid. Empire is in better demand, and advanced from 20@24c. Pipe-line Certificates ruled from 99¼c.@1.02\frac{1}{4}$, with quite an active business in them.

3 P.M.—There was no feature to the market this afternoon. Business, as usual the day preceding a holiday, was generally neglected, and consequently sales were light all round. Quincy sold at $50; Harshaw, 75c.; Catalpa, 77½c.; Osceola, $31. Closing prices as follows: Allouez, 2\frac{1}{8}$ bid. Atlantic, $14 asked. Antimony, $13 bid. Bonanza, $2¾ asked. Catalpa, 75c. bid, 77½c. asked. Crescent, 40c. asked. Harshaw, 75c. bid. Huron, $1¼ asked. National, $1 bid, $1½ asked. Osceola, $30¾ bid, $31 asked. Pewabic, 9\frac{1}{2}$ asked. Quincy, $49¾ bid, $50 asked. Silver Islet, $5 bid. Sullivan, 75c. bid, $1 asked.

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 23.

The advanced rate at which the Indian Council bills were awarded on Thursday in London has strengthened the silver market, as our rates in the accompanying table set forth; but at to-day's figures, the market abroad and here is somewhat unsettled.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Feb. 17 ...	50⅛	110	Feb. 21.....	*	‡
19....	50 9-16	109⅞	22.	.....	†
20....	50 9-16	110	23.....	51	110⅞

* 50⅝@50¾. † Holiday. ‡ 110¼@110⅜.

BULLION PRODUCTION FOR 1883.

MINES.	States.	For the week.	Month of January.	Year from Jan. 1st, 1883.
Bodie, G. S.....	Cal	.....	$26,084	.....
Bodie Tunnel, G.....	"	.....	13,631	.....
Bonanza King, G..	" ...	.....	61,777	.....
*Central Arizona, S...	Ariz..	.....	15,627	.....
Christy, S.....	Utah...	.....	8,987	.....
*Chrysolite, S. L.....	Colo....	.....	26,312	.....
Contention, S.....	Ariz..	.....	88,694	.....
Crescent, G.....	Cal....	.....	13,000	.....
*Custer, G. S...	Idaho..	.....	43,572	.....
*Deadwood-Terra, G..	Dak..	.....	45,696	.....
*Derbec Bl. Grav., G.S.	Cal	.....	8,337	.....
*Father de Smet, G...	Dak....	.....	27,491	.....
*FriscoM.&S.Co..G.S.L.	Utah...	.....	22,671	.....
*Homestake, G.....	Dak. ..	.....	107,678	.....
Horn-Silver, S. L.....	Utah...	.....	203,000	.....
Lexington, S....	Mont...	.....	89,050	.....
*Little Pittsburg, S. L.	Colo....	.....	5,107	.....
*Marguerite, G.....	Cal	.....	10,300	.....
Martin White, S	Nev....	.....	19,407	.....
Moultos, G. S.....	Mont...	.....	41,005	.....
Navajo, G. S....	Nev	.....	80,000	.....
Northern Belle, S.....	"	.....	65,174	.....
*Ontario, S. L.....	Utah...	.....	‡182,221	.....
*Oxford, G.....	N. S....	.....	2,865	.....
*Satemo, G.....	"	.....	1,800	.....
Standard, G.....	Cal	.....	82,959	.....
Star, S.....	Nev....	.....	14,796	.....
Stormont, S.....	Utah...	.....	19,130	.....
Syndicate, G.....	Cal	.....	9,217	.....
Tintic M. & M. Co....	Utah...	.....	7,032	.....
*Tip Top, S.....	Ariz....	.....	7,976	.....
*Tombstone, G. S.....	"	.....	72,011	.....
Yellow Jacket, S.	Nev....	.....	14,252	.....

Total amount of shipments to date.. $1,435,459

* Official. ‡ Assay value. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended February 23d, as compiled from various sources, amounted to $209,130.38, as against $247,784.16 reported for the previous week. The receipts from January 1st, 1883, to date are $2,280,088.05.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended February 17th.....	$242,575
Corresponding week last year.....	1,326,157
Since January 1st, 1883.....	1,618,254
Corresponding period last year.....	7,083,177

Imports.

Week ended February 17th.....	$76,332
Corresponding week last year.....	27,129
Since January 1st, 1883.....	765,821
Corresponding period last year	510,261

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 23.

American Pig.—Makers of standard and choice brands still stubbornly resist any effort to depress prices, and the dead-lock continues with no prospect of changing until matters in Washington have assumed a more satisfactory shape. Meanwhile, small lots of outside brands of pig-iron, chiefly from Pennsylvania, are coming into the market, and are sold for what they can bring, demoralizing the little current trade there is. It is conceded that stocks in the hands of makers are now somewhat greater than they were a year ago; but this is not, under the present exceptional circumstances, a very alarming or disquieting state of affairs. We quote $23.50@$25 for ordinary to standard No. 1 Foundry, and $22@$23 for No. 2, Gray Forge remaining unchanged at $20@ $20.50, all at tide-water. Bessemer pig is dull and unchanged, both here and in England. Nothing has been done in spiegeleisen, which is nominally $32.50 @$33 for 20 per cent; $26@$27, for 10 to 12 per cent.

Scotch Pig.—Importers maintain a firmer attitude, chiefly, it seems, because of the upward tendency of freights, which are now 6s. 6d. from Glasgow to this port. We are unable to note, however, that buyers are at all shaken out of their expectant attitude, and business consequently is dull and lifeless. We quote Coltness, $24.75@$25.25; Glengarnock, $22@$22.50; Langloan, $24.50@$25; and Eglinton, $21@$21.50. The Wall Street Exchange has received the following Glasgow quotations by wire to-day: Carnbroe, 55s. 3d.; Gartsherrie, 61s. 9d.; Summerlee, 62s.; Coltness, 64s. 9d.; Langloan, 65s.; Glengarnock, 55s. 3d.; and Eglinton, 49s. 6d. Warrants were 47s. 4d.

Rails.—With the exception of small sales aggregating about 5000 tons, at figures varying according to place of delivery, but equivalent to about $39 at mill, nothing has been done. Buyers appear to expect a further decline. England cables £5@£5 5s. Mr. James M. Swank's production statistics will be found elsewhere.

Old Rails.—We hear of no business worthy of special mention, and quote Old Ts, $24.50@$25; and D. Hs., $27.25@$27.50.

Scrap.—Nothing has been done. Quotations are, nominally, $25 ex ship.

Philadelphia. Feb. 23.

The iron situation in Pennsylvania has not materially changed from that detailed last week. The cause of the quietness and dullness is chiefly the pending legislation and the growing uncertainty in the minds of consumers as to the probable effects of the long agitation upon the general trade interests. The strong companies of both crude and finished iron are resting easily on their oars; but the weaker makers in both branches are full of apprehension, and very anxious that a conclusion be reached promptly. Competition has not depressed prices much during the past week, as they have already reached bottom limits at present cost of production. It is the purpose of those in charge of iron interests at Washington to throw the legislation into the next Congress, unless certain results can be accomplished in this. They feel themselves able to do this. During the past week, a large number of small transactions in Foundry iron were closed at prices varying from $24.50, delivered, to as high as $26, though the general price is under $25. The furnace companies are not over-anxious to press stocks of good iron on the market, because they believe that the accumulation in Eastern Pennsylvania is not sufficient to demand concessions, in view of the probable expansion of demand as soon as buyers can venture out. It is true, according to careful investigation, that consumption has been restricted much of late, but this has been due to a cautious policy rather than to any actual necessity. All sides have drawn in as much as possible, in order to protect themselves, and the undercurrent of opinion is, that demand will assume normal proportions just as soon as the tariff bill is placed. Correspondence from both East and West exhibits this feeling, and it is confidentially asserted in iron circles. The consumption of Mill iron has fallen to a minimum, and prices are steady at about $20.50@$21.50, although, where special brands are sold, a little higher figure has been obtained. The furnaces in the West have more iron than those in the East. Muck Bars are moving in small lots at $37. Charcoal and Anthracite blooms are selling in small lots at steady figures. Agents report the average production, which is taken up. Merchant Bars: All the mills are creeping along on their hands and knees waiting for something to happen which will induce buyers to place orders for spring requirements. Selling prices run from 2·20@ 2·30c. A few manufacturers have endeavored to find buyers for large lots at about 2·30c., but have failed. Ordinary irons are to be had as low as 2c. in country mills, but the average is 2·10@2·15c. Western iron has been delivered in Middle Pennsylvania at 2c., and this fact has led to the reduction in the East. It is impossible to speak with much encouragement of the immediate outlook, but the expected early termination of tariff legislation leads both manufacturers and buyers to hope that whatever activity there is hidden behind the present lull will soon manifest itself. The stocks in consumers' hands are, of course, low, and manufacturers are not willing to stock up. Inquiries for car-load lots of nails have been made, and several lots shipped West. Quotations are $3.30@$3.40, but sales have been made at less, and this fact has given rise to some complaints among Western makers of the action of Eastern men. The restrictive policy will be maintained from time to time. The Western mills began work last Monday morning for three weeks, and will then be idle two. Inquiries from consumers, both East and West, indicate an active demand for nails, and a desire to place orders at present figures before the upward tendency hardens prices. The nailmen are in good humor, and expect to do a large business. Wrought pipes and tubes are moving freely, but in small lots, at about 65@70 per cent off, and boiler tubes are in fair demand at 55 off. Manufacturers of cast pipes have received large orders in different portions of the country, and there are inquiries coming to hand for additional supplies. Bessemer pig-iron is quoted at $22.50. There are inquiries in hand for supplies, but buyers are not satisfied with terms. Bridge plate and boiler plate are purchased in small lots at concessions. Galvanized and thin sheet are in demand for early delivery, and makers are turning out enough to meet requirements. Stocks are not large. Plate irons of all kinds are dull, although the inquiries since last Monday show a slight improvement. Buyers are able to obtain concessions, and this is leading to a little more business. The undertone feeling among consumers is, that the settlement of the tariff question will stimulate trade, and those who have present requirements are now endeavoring to cover them at the low prices prevailing. The movements in the hardware trade are not of special interest, though the shipments for the past week show a little improvement over last in season goods. Steel rails are without any activity except in small lots at about $40. Rumors have prevailed of larger transactions at concessions, and it is not improbable that transactions of this kind will be brought to a close in a short time; but so far as can be ascertained, makers are not anxious to depress the market. It is said that large orders could be placed at $38@$39, though none have been heard of at this figure, and $40 is claimed to be a fair quotation. Some complaint emanates from Western railmakers as to business; and owing to the uncertainties as to foreign supplies reaching tide-water markets, they do not feel certain of an active spring trade. Double-heads are not in the market, but are quoted at $27.50. American are selling in a small way at interior points at $27@$28, according to location. Scrap is without any activity.

Cleveland. Feb. 21.

The iron and ore markets here are in a very unsatisfactory condition, from a number of causes. Overproduction in all branches has been going on for some time, and mills have been running at a loss. The uncertainty of the tariff question causes consumers to put off buying, or to purchase only in a hand

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Feb. 17.		Feb. 19.		Feb. 20.		Feb. 21.		Feb. 22.		Feb. 23		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	3.00	2.90	3.05	2.95	3.50	3.10	3.50	3.40			3.55	3.50	5,200
Amie Con., Co.	.22	.21	.22	.21	.22	.21	.21				.23	.21	19,000
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.	9.00										8.50	8.25	300
Belle Isle, Ne.													
Bodie Cons., Ca.			1.75		1.80	1.75					1.75	1.70	510
Breece, Co.													
Bulwer, Ca.	1.05	.99	1.05	.97	.98		.97						8,630
California, Ne.	.26	.21					.24	.21			.24	.23	5,500
Cal. & Hecla, Mich.													
Caribou Con., Co.			.20	.18	.20		.22				.23		2,900
Chrysolite, Co.	1.40		1.45	1.40			1.45						800
Climax, Co.	.09	.08	.09										4,400
Cons. Va., Ne.	.59	.55	.68	.55			.56	.53			.58	.56	6,540
Deadwood-Terra, Dk.													
Dunkin, Co.											.26		500
Eureka Cons., Ne.	10.00						9.50						120
Excelsior, Ca.													
Father de Smet, Dk.			5.00										300
Findley, Ga.													
Gold Stripe, Ca.	.08		.08										1,800
Gould & Curry, Ne.													
Grand Prize, Ne.	.60						.62						
Great Eastern, Dk.			.03										1,100
Green Mountain, Ca.	.78		.80	.78			.76				.70	.69	1,800
Hale & Norcross, Ne.													
Hall-Anderson, N. S	1.55		1.75	1.70	1.70		1.60				1.60	1.55	5,500
Hibernia, Co.	.04	.03	.05	.03	.04		.05						4,800
Homestake, Dk.											16.50		200
Horn-Silver, Ut.	5.75	5.37	5.50		5 50		7.50	5.50			7.62	6.87	6,215
Hukill, Co.	.16	.15	.16	.15			.16						2,000
Independence, Ne.					.70								300
Iron Silver, Co.			2.80		2.80						2.85		1,625
La Plata, Co.													
Leadville C. Co.											.70		100
Little Chief, Co.	.42	.40	.41	.40			.40						2,700
Little Pittsburg, Co.	.64	.63	.65		.66								800
Martin White, Ne.							1.75						300
Moose, Co.													
Navajo, Ne.	6.37	6.25	6.25	5.87	6.12	5.75	5.62	5.50					1,600
Northern Belle, Ne.			9.75				9.75				10.12		170
North Belle Isle, Ne.	.55		.63										800
Ontario, Ut.			25.00	23.00	24.62	20.00	24.25	24.12					740
Ophir, Ne.	3.25	3.15					2.90						400
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.											41.75	41.50	200
" Com., Ca.							8.00						400
Rising Sun, Ca.	.08		.08										1,100
Robinson Cons., Co.	1.10	1.05	1.25	1.05	1.20	1.15	1.20	1.15			1.17	1.10	48,650
Savage, Ne.													
Sierra Grande, N. M.	2.75	2.65	2.95		3.00	2.95	3.25	3.00			3.50	3.00	23,850
Sierra Nevada, Ne.	3.60		4.25	4.13			3.63	3.55					1,195
Silver King, Ar.	11.25	10.75	10.87		11.12								630
Spring Valley, Ca.													
Standard, Ca.	5.50	5.38			6.00		5.50				6.00		385
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.		.80	.73	.81									400
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Feb. 17.		Feb. 19.		Feb. 20.		Feb. 21.		Feb. 22.		Feb. 23.		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance			.03										100
Albion, s. L.													
Alta-Montana, G.	.10	.09	.11	.10			.10				.10		16,500
Am. Flag, s.													
Barcelona, G.	.21	19					.18				.18		6,700
Bear Creek													
Bechtel Con., G.													
Best & B'icher, G. S.			4.75				4.50	4.38					135
Big Pittsburg, S. L.	.20		.19		.20	.19							5,900
Bradshaw, S.	.34	.31	.34	.31	.31		.31				.32		1,300
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G.	.02		.02										1,200
C'lav'r's W.&M.Co.			.05										200
Cal., B. H., G.							.35						100
Carbonate Hill, S L.													
Catskill	.25												100
Central Ariz'na, S.												.35	600
Chapparal													
Cherokee, G.	.06		.06										1,800
Cons. Imp'ri'l, G.S.	.07												100
Con. Pacific, G.													
Crowell, G.							.03					.04	200
Dahlonega, G.													
Decatur	.12	.11	.12	.11	.12	.11	.12	.11				.12	.10	28,400
Durango, G.	.09		.07										1,600
Elko Cons.	.12	.09	.12	.11	.12		.13					.12		17,400
Enterprise	.56	.53	.60	.55	.61	.58	.58	.56				.56	.55	11,800
Fannie Barret			2 20		2.20								300
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.15		1.15		1.15		1.15					1.20	1.15	4,800
Hortenus, S												.12		100
Lacrosse, G.													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.													
Mono												.25		100
North Standard, G.													
N. Horn-Silv'r, S L.													
Ori'nt'l & Miller, S.	.14		.15	.14	.13		.14	.13				.14		9,700
Quartz Creek													
Rappahannock, G.													
Red Elephant, S.	.08	.07	.08	.07	.08	.07						.03		5,300
Ruby, of Arizona	.57		.56		.56	.55	.56					.57		1,800
Silver Cliff, S.	.40	.37	.41	.40	.42							.39		3,100
Sonora Con.	.30	.28	.32	.30	.33	.32	.34	.32				.34		57,300
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific	.08	.07	.08	.07	.08	.07	.07	.06				.07	.06	10,600
State Line													
" Nos. 1 & 4, S.	.04		.04		.03		.03					.03		1,500
" Nos. 2 & 5, S.	.07		.08	.07	.08	.07	.08					.07		12,000
Sutro Tunnel	.23	.21	.23	.22	.23	.22	.23	.21				.25	.22	17,600
Taylor-Plumas	.18	.17	.17		.17	.16	.17	.16				.17		13,800
Tuscarora, S													
Unadilla, S.							.03					.03		500
Union Cons., G. S.	4.12	4.00	4.50		4.25							5.00		615
Vandewater			.28											1,000
Washington					.08		.10	.08						5,100

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 165,060. Non-dividend shares sold, 239,350.

BOSTON MINING STOCKS.

	Feb. 16.		Feb. 17.		Feb. 19.		Feb. 20.		Feb. 21.		Feb. 22.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez					2.50				2.50				300
Atlantic													
Aztec													
Best & Bel													
Bodie Con.													
Bonanza D.	2.87½				2.75				2.75				220
Bruns. Ant.													
Bulwer													
California	.23				.23		.24						1,100
Cal. & Hec.	243		243		242½								60
Carbon. Hill													
Catalpa					.35		.32½						200
Central Ariz													
Cherryfield													
Chrysolite													
Con. V'ginia	.52		.57				.57						1,100
Copp'r Falls													
Crescent			.40	.37½					.32½				400
Cumberl'd													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin			.29	.28	.30								300
Empire	.21	.20			.22		.24	.23	.25	.24			4,400
Eureka Con.													
Franklin			12.37	12.25	12.62	12.50	12.62		12.75				430
Gila County													
Hancock G.													
Harshaw													
Horn-Silver													
Huron	1.75												100
Independ'ce													
Indian Q'n.													
Madison													
Mammoth													
Mass. & N.M.	.08	.07	.09		.10	.07	.09	.08	.08	.07			31,980
Milton													
Napa													
National													
North. Belle													
Osceola	31.00	30.87	31.00		31.00				30.75				77
Penn-Breck.													
Pewabic			8.00	7.50	9.75	9.50	10.00						550
Pine Tree													
Plymouth					.24								200
Quincy	51.00	50.75	50.75	50.50	50.50	50.00	50.00		50.00				439
Ridge													
Robinson													
San Pedro	.75		.77½	.72½	.80								2,900
S'ra Nevada													
Silver Islet													75
Silver King	11.50				11.00								14,100
Simpson Gd	.05		.07	.05	.07	.06	.07	.06	.06				
So. Pacific													
Standard													
State Line, Nos. 2 & 3													
Sullivan	.75						.90	.85					1,230
Sutro Tun.	.22		.22		.22								800
Sycamore													
Twin Lead.	.12		.11	.10	.11	.10	.11		.10				4,800
Vizina													

PHILADELPHIA MINING STOCKS.

	Feb. 16.		Feb. 17.		Feb. 19.		Feb. 20.		Feb. 21.		Feb. 22.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American													
Argent	.27½		.27½		.30								13,400
Arizona So.													
Aztec													
Battle Mt.													
Black Sul.													
Bodie													
Buena	.06		.06		.07	.05							16,000
California													
Calista													
Cincinnati					.10								300
Comprom'e.	.27½	.25	.27½		.30								4,800
Dauntless	.2				.05								1,000
Del Monte													1,000
Denver City	.17		.18	.16									4,400
Fairview													
Eureka													
Girard	.18		.18										2,000
Golconda													
Golden Age													
Governor	.09		.09		.09								15,500
Grand Uni'n	.19				.19								3,300
Gunnison			.75		.70								800
Hancock													
Iowa Gulch													
King Bul'on	.12		.12		.11								15,200
Ledger Con.			.01										1,000
Little Dia'd.													
Little Maud	.07		.07		.06								11,500
L'g & D'y Hl													
McCullough													
Magnolia	.01		.01										11,700
Montana			.05										100
Mt. Lincoln			.01										500
Mt. Sheridan	.05		.05		.05								6,000
National													
Orion	.07		.06		.06								1,700
Orion Pref.													
Palmetto E.													
Pembina			.18										700
Penn-Breck.	.11		.11										600
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis													2,100
Rara Avis E.			.06		.07								
Record													
Rico Pion'r.													
San Pedro													
Sierra G'nde	2.75	2.68¾	2.68¾	2.62½	3.02½	2.85							4,210
Silver Cord													
Silv'r Plume													
Silver Rock													
Sovereign													
Standard													7,600
Sultana	.04		.04		.04								
Sutro Tun'l.													3,100
Tombstone	.82½		.85		.80								
Tranquilli'y													
Tyrone													
Victor													1,400
Yale Mt.	.11	.09	.07										

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to-mouth way. The large failures of late cause a feeling of distrust in the trade and a tightening of credits among the banks. We think the general foundry trade to be in good, fair condition, with prospects of plenty of work for the year, but at low prices.

The mills are not so well off, and without a large reduction in the cost of manufacture or much better prices for finished iron, the outlook is dark. There have been no large sales made for some time. Trade in foundry irons in small lots is very good, and should more confidence be established and consumers purchase ordinary stocks, there would be a slight stiffening of prices, as stocks in furnace hands of good iron are small.

There is nothing doing in the ore trade. The present year's prices have not been made and probably will not be made known until stocks on docks here are disposed of. We quote :

No. 1, Bessemer	$23.50@$24.00
" 1, Foundry, all ore	22.50@ 23.00
" 1, " cinder mixture	22.00@ 22.50
" 1, Soft Foundry	21.50@ 23.00
" 1, Open silvery	20.00@ 22.00
Mill Irons	19.00@ 21.50
Nos. 1 and 2 Charcoal	25.50@ 26.00
" 3, 4, 5 and 6 "	26.00@ 27.00
Hanging Rock Charcoal	23.50@ 26.00
Strictly Cold Blast	27.50@ 29.00

FOUR MONTHS, F. O. B. CARS CLEVELAND.

Bessemer ores	$8.00@$10.00
Hematite ores	6.00@ 7.50

METALS.

NEW YORK, Friday Evening, Feb. 23.

Copper.—The market has somewhat recovered, and we hear of no sales at the extremely low prices spoken of in our last. Much thought has been given to the position of the metal of late by those interested in it; and from what we have been able togather, the feeling is by no means as gloomy as some would make it. The possibility of a more liberal export of black copper from Arizona and New Mexico, by way of New Orleans and Galveston, to English markets, is beginning seriously to engage attention, and there are those who predict that a pool of producers of Western copper will be attempted with a view to follow the tactics so long and so successfully followed by the Lake companies. It can not be denied that there are very serious obstacles in the way of such a scheme, but that something must be done is pretty generally felt. Well established brands of copper have some support against such fluctuations in the market as we have been experiencing; but even they are unfavorably influenced, and it is better that, if the foreign market will stand it, we should get rid of a surplus there at present rates than force all the metal here down toward the export figure. Lake is weak at 17¾@17⅞c., with very little offered and very little demand. Baltimore is quoted 16¼@16½c.; outside brands, 16c.; and Arizona, 16¾c. London cables £65 10s. for Chili Bars, and £72@£72 5s. for Best Selected.

Tin.—Tin has weakened somewhat in sympathy with the general decline of the entire metal trade. Sales have aggregated from 200 to 300 tons, and quotations now are 20⅞c. for Straits, 21c. for Malacca, and 21⅛c. cash for Australian.

Lead.—The dead-lock still continues. Holders ask 4·60c. for Common, and the majority of buyers decline to touch lead at more than 4·50c., only one buyer offering to take a 100-ton lot at 4·55c. Refined lead is vainly offered at 4·60c.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day :

The market remains about the same; if any thing, a shade weaker. Sales will not aggregate 270 tons of Refined lead at 4·22½c., and 170 tons of Hard lead at 4·15@4·19c.

St. Louis is, therefore, slightly better than this market.

Spelter.—The market here is dull, and business is restricted to occasional car-lots at special figures. Ordinary Western is still offered here at 4·57c. Some of the producers decline to sell at these figures. It is maintained by some that the signs of an early change for the better are becoming visible.

Antimony.—Very little has been done, the metal weakening further. We quote nominally, 10c. for Hallett's, and 11c. for Cookson's.

Quicksilver.—We remark an active export demand, which is consuming all the local product and the old stock of 2000 flasks held by one house for two years or more. The spot price is 34½@34¾c.—*San Francisco Commercial Herald.*

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 23.

Anthracite.

The anthracite coal trade is dull and lifeless and is decidedly in buyers' favor. There is very little of interest to report, except that one company found it necessary, in order to move coal afloat, the bulk of it being stove and egg, to make a concession on the price. This, we understand, was, however, only temporary, and is not now, so far as we can learn, continued.

Mr. John H. Jones, official accountant, has issued the following statement of the anthracite coal tonnage for the month of January, 1883, compared with the same period last year :

	January, 1883.	January, 1882.	Differ'ce.
Philadelphia & Reading RR.	465,510	408,367	+57,143
Lehigh Valley RR	*431,577	359,216	+72,361
Central RR. of N. J.	304,483	264,291	+40,191
Del., Lack. & W. RR.	338,260	291,514	+46,746
Del. & Hud. Canal Co.	†247,725	222,400	+25,324
Pennsylvania RR.	161,858	165,992	− 4,134
Penna. Coal Co.	102,753	96,185	+ 6,567
N. Y., L. E. & W. RR	23,573	25,942	− 2,369
Total.	2,075,741	1,833,910	+241,831

*This amount includes the production of the mines of the State Line and Sullivan RR. Co., amounting to 7,318 17 tons.

†In addition there were 33,261 tons transported from mines by the D. & H. C. Co., which is included in tonnage other interests.

The stock of coal on hand at tide-water shipping points, January 31st, 1883, was 616,759 tons; on December 31st, 1882, 562,116 tons; increase, 54,643 tons.

Bituminous.

For current business, the trade is exceedingly dull and quiet, and what movement there is is confined to deliveries on old contracts. We understand that the first contract of the season, 75,000 tons to the Eastern Railroad, has practically been closed at a low figure. This is doubted in some quarters, because complications have arisen between the Baltimore & Ohio Railroad and the Pennsylvania Railroad, in regard to the freight rates from the Cumberland and Clearfield regions. It seems that by some misapprehension the Baltimore & Ohio rates were computed on the distance from Piedmont instead of from Cumberland, thus giving shippers of Cumberland coal over the Baltimore & Ohio Railroad an advantage of 23 cents over their competitors shipping Cumberland coal via the Pennsylvania system and the shippers of Clearfield coal. It is understood that the matter is under investigation now. We quote for current business unchanged, $4.50 @$4.60 alongside for Clearfield; and $4.55@$4.75 for Cumberland.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended February 17th, and year from January 1st :

TONS OF 2240 LBS.	1883.		1882.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co..	42,395	408,573	46,718	373,360
D. L. & W. RR. Co.	71,814	520,083	63,380	470,048
Penna. Coal Co.	20,301	145,518	14,096	111,555
L. V. RR. Co.	10,840	117,164	12,910	125,484
P. & N. Y. RR. Co..	2,637	22,815	3,117	21,159
C. RR. of N. J.	45,521	265,856	53,042	253,394
North & West Br. RR.	11,703	63,171	.....	.....
	205,211	1,543,180	193,272	1,355,000
Lehigh Region.				
L. V. RR. Co.	53,137	527,292	63,617	455,316
C. RR. of N. J.	39,445	238,720	29,236	215,513
L. H. & W. B. RR.	.....	2,475	.....	1,223
	92,582	768,487	92,853	672,052
Schuylkill Region.				
P. & R. RR. Co	85,569	719,077	96,384	638,200
Shamokin & Lykens Val.	24,548	146,102	19,029	151,032
	110,117	865,179	115,413	809,232
Sullivan Region.				
State Line&Sul.RR.Co.	831	8,181	1,382	6,274
Total	408,741	3,185,027	402,920	2,842,558
Increase	.....	342,469	.....	.....
Decrease	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878	2,819,392 tons.
" " " " 1879	2,562,750 "
" " " " 1880	2,620,529 "
" " " " 1881	3,014,453 "

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 74,816 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended February 17th :

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	....	125	.....
Coal for shipment at South Amboy	13,895	98,129	86,819
Coal for distribution	15,114	104,555	83,344
Coal for company's use	3,340	19,207	18,159
Total	32,349	222,016	188,322
Increase	.....	33,694	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended February 17th was as follows :

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	40,060	222,051
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	4,993	48,588
Broad Top Region, Pa.		
Huntingdon & Broad Top RR	6,855	33,893
East Broad Top	328	8,106
Clearfield Region, Pa.		
Snow Shoe	5,470	39,296
Tyrone and Clearfield	57,576	349,389
Alleghany Region, Pa.		
Pennsylvania RR.	8,702	90,457
Pittsburg Region, Pa.		
West Penn RR.	11,217	68,790
Southwest Penn. RR.	2,852	18,787
Penn & Westmoreland gas-coal, Pa. RR	36,760	189,938
Pennsylvania RR.	10,366	69,343
Total	185,569	1,138,638

The Transportation of Coke over the Pennsylvania Railroad for the week ended February 17th and year from January 1st :

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	2,149	15,948
West Penn. RR.	3,025	14,407
Southwest Penn. RR	33,963	262,576
Penn. & Westmoreland Region, Pa. RR	2,474	35,048
Pittsburg, Penn. RR.	71	151
Snow Shoe (Clearfield Region)	255	1,150
Total	41,937	329,280

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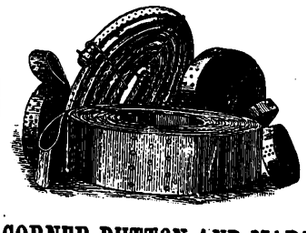
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THE ENGINEERING AND MINING JOURNAL

VOL. XXXV. No. 9.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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THE Philadelphia & Reading Railroad and Coal and Iron companies have passed out of the hands of the receiver, and the long, brilliant financial struggle of its president, FRANKLIN B. GOWEN, is at an end.

SENATOR JACOBS has introduced in the Senate of this State a bill in which he proposes, with a view to ending the existence of fictitious mining companies, organized under the laws of the State, that every company shall report its condition annually to the Superintendent of the Banking Department. This officer is to be empowered to investigate the condition of every company which he may consider unsound, and, if he finds it bankrupt, to authorize the Attorney-General to bring a suit for the abrogation of the charter.

A MOVEMENT has been started among the friends of the late FRIEDRICH WOEHLER, the great Göttingen chemist, to erect a monument, we presume in the university with which he was connected for so many years. With Heidelberg, Göttingen shared the preference of American students, many of whom will ever remember the famous instructor at whose feet they sat. American chemists, we trust, will heartily co-operate in offering this tribute to the memory of the famous scientist. So far as we know, no organization has been as yet perfected.

THE Grand Jury has fully recognized the great differences in plan and execution between the New York and American steam heating companies upon which we have always insisted. It exonerates the former company from all blame in connection with the nuisance which has for months aroused the indignation of the citizens of New York, and refrains from indicting the latter company only because it has promised to remedy its system. How far it will be possible to counteract the radical defects to which we have alluded in the past remains to be seen.

MR. PAUL JOHNSSON, in a communication printed elsewhere, suggests an improvement in copper smelting, which we believe is worthy of the careful consideration of metallurgists. We have had occasion to present at some length the methods of Mr. HOLLWAY, and later the modification of it by M. MANHÈS, and have had valuable expressions of opinion *pro* and *con* by experienced copper smelters in this country. Mr. JOHNSSON aims at the same object, but advocates the use of the open hearth in preference to the converter. There is much force in the argument presented in behalf of Mr. JOHNSSON'S plan, which, so far as we know, is new.

MR. EDWARD ASHMEAD has compiled a series of figures showing the amount of dividends paid by public mining companies formed in England, from which it appears that 26 British mines returned, on a called-up capital of £1,033,626, dividends amounting to £161,802 in 1882, making the total to date £3,319,131; while 26 foreign mines yielded, on an allotted capital of £9,656,007, profits of £1,334,822, carrying the total dividends up to £9,304,555. The heaviest amounts are to the credit of copper mines, the low-grade pyrites ores of the Peninsula leading. Rio Tinto has a record of £455,000; Tharsis, of £284,165; Mason & Barry, in Portugal, £231,455. These properties, however, are heavily capitalized, the figures for the three companies being respectively £3,250,000, £1,136,660, and £1,851,640, the aggregate returns thus far standing £882,500, £2,686,844, and £724,849. Among the other copper companies, Cape Copper, of the Cape of Good Hope, stands far ahead in productiveness, having yielded since 1863, on a capital of £160,000, dividends footing up to £978,125, the last one being £120,000. Of the Chilian mines, Copiapo distributed £26,152 this year, making the total since 1830, on a £166,425 capital, £119,328; while Planulcillo, which appears to be getting into good shape, gave its holders £25,000 last year, on an investment of £200,000. The three Spanish lead mines, Fortuna, Alamillos, and Linares, did not do much, the returns being only £3542, £2250, and £7292. Richmond Consolidated stands forth with £54,000 on £270,000 capital, the aggregate dividends being £754,517. The two leading California gold mines, Sierra Buttes and Plumas-Eureka, kept up their record with £15,312 and £35,156 dividends, making the total £256,785 and £295,311 respectively, on a capital of £245,000 and £281,250. Birdseye Creek paid £4500, in addition to £13,500 previously, on £60,000 capital. The old St. John del Rey, Brazil, yielded only 5 per cent, while its younger neighbor, the Santa Barbara, gave double that amount. None of the vaunted Indian mines makes any returns, and from present prospects will not figure prominently for years to come.

THE BOSTON MEETING.

The success of the Boston meeting needs no advertisement. It trumpets itself. The present generation recognizes it; and the record of it on our part would be superfluous but for posterity, which we profoundly pity, because, however often it may enjoy itself, even in Boston, it can never have precisely that good time which was granted to its ancestors at the February meeting of the Institute in 1883.

It should never be forgotten that, under all the social and professional pleasures of these reunions, the essential strength and prosperity of the Institute rests upon the *Transactions*. Out of some 1200 members, not more than 100 or 200 attend any meeting; and those who stay at home have nothing to show in return for their support of the Institute but the consciousness of virtue and the value of the papers which they receive. Now, the consciousness of virtue is a good thing, no doubt; but we prefer to rely on the value of the papers. It might easily occur, for instance, to the mind of a distant member, to obtain his consciousness of virtue by supporting some other good enterprise, such as an orphan asylum, instead of the Institute.

The abundance, variety, and interest of the *Transactions* hitherto has been admitted abroad as well as at home. The tenth volume, just published, presents in its 52 papers no exception to the rule. But there was some reason for apprehension as to Volume XI., because the Colorado meeting in August last took the place of the two meetings ordinarily held in May and October, and was, moreover, rather less fruitful than usual in papers. This, by the way, is a sufficient answer to those who occasionally rise to remark that the Institute meets too frequently, and that two meetings a year would be enough. The Council has, under the present rule, authority to postpone or omit any meeting except the annual one in February. But experience shows that the number of papers presented diminishes with the number of meetings; and while this continues to be the case, we do not doubt that, with obviously advisable exceptions, the Council will continue to call three meetings annually.

The Boston meeting has nobly made up the deficiency of papers for the

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year, and we may now look forward with assured satisfaction to our next volume. Of the importance of the Boston papers, we need not speak at present. Perhaps the most important, practically, was that presented by Messrs. MAYNARD and BOWER, describing the BOWER-BARFF process for the preservative treatment of cast and wrought-iron surfaces. This can not be called an entirely new subject, since the process is in wide use in Great Britain and Europe, though it has but just been introduced here. But we do not remember any description of it so full, clear, and satisfactory as this paper contains. Of the commercial importance of the subject there can not be two opinions.

Another paper which we heartily welcome is that of Professor BLAKE, describing the American metallurgy of nickel, as developed by Mr. JOSEPH WHARTON, whose merits in this connection did not for years receive the praise they deserved, but are now generally recognized on both sides of the ocean.

The interesting excursions (more numerous and more agreeable than a Massachusetts February is wont to permit), and the graceful and bountiful hospitalities enjoyed by the Institute, have been already chronicled in our columns. As for the Subscription-Dinner, we may confidently say it was as successful as it could be—without HOLLEY. He it was who initiated the delightful practice, and, by a series of splendid successes, made it an unwritten custom, from which we are loth to depart, although, after each brilliant banquet, we say to ourselves that it were better to have no more than to run the risk of breaking the charm by one failure. He it was who delighted in all the burdensome preparations; who interviewed the caterer and the cook; settled the *menu* and the toasts; determined the invitations and the seating of the guests; and, after all these herculean labors, came to the feast the most *debonair*, witty, eloquent, and happy of the whole company. The committee-men who tried at Boston to manage these difficult details as HOLLEY would have done it had many an occasion to long for his inspiring and helpful presence.

The proceedings at these banquets are, as a rule, not reported. For this course, there are many good reasons, among them this: That the people who are present invariably tell such tales of the beauty and brilliancy of the occasion as should not be brought into contact with cold type. Moreover, the true after-dinner speech should be an elegant and ephemeral trifle. It is the one form of oratory left which is not addressed to that nuisance of modern times, "a wider audience." Preachers preach for the newspapers; lawyers plead for public effect; Congressmen address "the deestrict" over the Speaker's head: let the after-dinner orator at least talk to those who hear him, and no others. In this graceful art, the members of the Institute have won no little reputation. Once print their speeches, and we fear both the art and the reputation would be gone!

But an exception may be made now and then, especially in the case of verses, like those which we reprint elsewhere, and in which Mr. BAYLES, cleverly doing for *Iolanthe* what he once did for *The Pirates*, has given us a companion-piece to "The Modern Mining Engineer." When we add that he worked these verses into a speech on the memory of Washington and the Victories of Peace, we give a new hint of the flexible style and comprehensive scope of true post-prandial rhetoric. *

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Question of Time in "Continuous" Pan Amalgamation.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The absolute minimum of water that can be used in crushing wet by stamps, without decreasing results, is very far below the almost universal notion entertained by mill-men. A rule of mine is, to regulate ten stamps to fill a five-foot pan forty inches deep in twenty-five minutes. This rule was observed at Harshaw, where we crushed five tons to the stamp.

It will be seen that, in amalgamating in six pans, the time for amalgamation will be two and a half hours; and every additional pan adds twenty-five minutes to this. When well regulated, a "continuous pan" has about one half as much sand in it as is ordinarily contained in a "charged pan;" hence there is one half of pulp particles and one half the amount of precious metal to be operated upon by a pan capacity, and an amount of quicksilver alike in both cases. M. P. BOSS.

TOTAL WRECK, ARIZ., Feb. 13.

The Geology and the Copper Deposits of Adams County, Pennsylvania.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My absence at the Boston meeting of the American Institute of Mining Engineers prevented me from noticing in your last issue the communication of Mr. J. Trowbridge Bailey in the number for February 17th. This latter is of a character to call for some comment. I do not propose to seek to elucidate the obscurities of some of his terms, such as, for instance, the apposition of "our Eastern sedimentary and primary formations;" the scope which he assigns to "the great Eastern mineral belt," etc.; but there are enough serious errors of fact in the body of the article to occupy all the space you may be disposed to give me.

The first of these, and one of the greatest, is found near the beginning of the part called "Geological Features" (of that portion of the South Mountain lying in Pennsylvania between Adams and York counties on the southeast, and Franklin and Cumberland counties on the northwest). Those of us who know this region are amazed to learn that "upon the west and north of the South Mountain in the Cumberland Valley we find a hard, compact, crystalline limestone lying *in a comparatively undisturbed state* . . . between two upheavals, namely, the South Mountain and the North Mountain." It is quite clear that no one familiar with Prof. H. D. Rogers's sections V., VI., VII., VIII., and IX., published with his final report over twenty-six years ago; or with the descriptions and sections of the present survey; or with the many papers on the subjects connected with the "Great" or "Cumberland Valley;" or, finally, with the valley itself, could employ such an expression to describe the structure of its limestone. Not only is the limestone throughout its entire extent in Franklin and Cumberland plicated in the most confusing manner, but it is in all probability divided longitudinally into two parts which represent entirely different horizons in the Lower Silurian. Nor can any but the merest fragmentary areas of limestone (very likely belonging to an older system than that of the great valley) be called hard or crystalline; nor are the mountains between which the valley limestone lies at all likely to be mountains of upheaval.

We learn that the underlying crystalline schists . . . . have been greatly dislocated and turned upward by the disturbances caused by the formation of the South Mountain," etc.; and "except where infiltration has taken place, the stratified formations are devoid of copper-bearing minerals." A "quartzitic epidote" is described as "breaking through the stratified formation;" for which misdemeanor it is called a "dike" and a "volcanic intruder." "Present in all directions, and *highly metamorphosed*, are amphibole, chlorite, and the many decomposition products of epidote." It may assist in the assimilation of the above wealth of geological description to pause and inquire whether a basic mineral like epidote can be justly called quartzitic; whether a quartzitic epidote, or, in fact, any other kind of epidote, was ever observed as a volcanic intruder; what is the present state of metamorphosed amphibole and chlorite and "the manifold decomposition products of epidote;" also, whether here, as elsewhere, the epidote be not itself a decomposition product. Farther on, we are impelled to ask what kind of metamorphosis is that due to serpentine, and how this mineral is supposed to have "broken through" the schistose or sedimentary "strata." While on this subject, and neglecting much more original matter in the same strain, it would be advantageous to know what are the characteristics of a "mineralized epidote or serpentine zone."

The region is remarkable for producing pieces of native metal weighing 27 pounds. If the writer's memory may be trusted, this was the precise weight of a hand specimen which was given to him to examine six years ago. He was unable to discover another piece of this size; and though there were found near the contact-planes of the epidotic rock and the orthofelsite many places where the rocks were filled with minute spangles of native copper, a number of analyses showed that the percentage of this copper to the mass was about 3·6 (3·36 per cent reckoned as pure copper), while the copper in combination varied from 4·35 to 4·7 per cent. On this account, it does not accurately describe the ore to speak of it as "exceptionally rich." Of course, the writer speaks of what was visible three years and more ago, and in no wise refers to developments which may have been made since. If there be such, it would be interesting to know them.

Before leaving the geological for the bibliographical treasures of this essay, it is worth while to quote one more paragraph: "The vein-matter is composed of a metamorphosed quartzitic chlorite . . without affording at the point of contact" (with the walls) "any signs of clayey decomposition or other features so characteristic of fissures. It presents *all the appearance of being a fault or slip* in the country chlorite." The problem here is, how could a fault or slip exist without a fissure? and how could vein-matter be a fault or slip?

As to the bibliography, this very refreshing sentence comprises it all. "Although the locality has been frequently the subject of reports by a number of engineers, other than a mere casual reference has never been made to these geological characteristics."

Interpreting this language literally, it is quite true; and it would not be too hazardous to prophesy that no engineer, if he have a small foundation of geological theory and practice, is likely in the future to make other than a casual reference to the geological characteristics of which the preceding quotations are examples. But this is quite clearly not what Mr. Bailey means to say. He supposes that no one has properly noticed the structural and lithological geology of this region but himself. In this, it is quite easy to prove to him that he is mistaken.

In 1876, Dr. T. Sterry Hunt (after spending some weeks in 1875 with the writer in this region) published his views of these rocks. The writer's two volumes C and CC, containing the reports of progress for 1874 and 1875, treat of the relations of the series of rocks involved in the phenomena of the copper belt. In 1877, the writer printed in the *Polytechnic Review* (April 21st and 28th), an article on the Copper Ores of Pennsylvania, in which special prominence is given to the geology of this region. In 1878, Dr. Hunt published Report E, containing his views on the origin and genesis of these horizons of the South Mountain chain *in extenso*. At the Baltimore meeting of the American Institute of Mining Engineers, February, 1879, Mr. Blandy presented a paper on this region, which was discussed by Dr. Hunt and the writer, especially in its geological features. [Transactions of the American Institute of Mining Engineers, Vol. VII., p. 337.] Finally, in Volume CCC, Second Geological Survey of Pennsylvania, 1880, Appendixes 1 and 2 are chiefly given up to the study of this very region. It is true that all of us who have toiled along in darkness as best we might before the advent of Mr. Bailey may be quite wrong; but if we "don't know," we at least should be accorded the meed of justice that Dick Deadeye allows the Admiral in *Pinafore*—we "mean well," and really ought not to be so cruelly neglected; for it is not every one who can approach a difficult geological problem like that of the copper region of Adams County with a mind as freed from the prejudice due to numerous and conflicting previous experiences as is that of Mr. Bailey.

PERSIFOR FRAZER.

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THE BOSTON MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

THE FIFTH SESSION.

The final session of the Institute was held on the morning of Friday, the secretary submitting a report showing that the finances of the Institute were in a flourishing condition, and that its membership had been increased to 1213. The election of officers was announced as follows: *President*—Robert W. Hunt, Troy, N. Y. *Vice-Presidents*—S. F. Emmons, Denver, Colo.; W. C. Kerr, Washington, D. C.; S. F. Wellman, Cleveland, O. *Managers*—John Birkinbine, Philadelphia, Pa.; Stuart M. Buck, Coalburg, West Va.; E. S. Moffatt, Scranton, Pa. *Treasurer*—Theodore D. Rand, Philadelphia, Pa. *Secretary*—Thomas M. Drown, Easton, Pa.

Professor Dr. Persifor Frazer then read an elaborate paper entitled the Eozoic and Lower Paleozoic in South Wales, and their Comparison with the Appalachian Analogues. As many members desired to leave by an early train, the time at Professor Dr. Persifor Frazer's disposal was necessarily limited. Dr. T. Sterry Hunt, however, as briefly as possible outlined the points which led him to accept opinions contrary to those of Mr. Frazer, but necessarily justice was not done to the subject under the circumstances.

After the transaction of routine business, the meeting adjourned. Later, a party of about sixty members of the Institute took a train courteously furnished by the Boston & Lowell Railroad, and under the guidance of Professor Richards and Messrs. Eustis and Leavitt, went to Lowell, where they were received by Mr. J. B. Francis, by whose invitation the visit was made. He took charge of the excursionists, conducting them in carriages to his residence, where lunch was served. Mr. Francis, the foremost of living American hydraulic engineers, planned the present elaborate system of utilizing the water-power at Lowell, and is conspicuously identified with similar work in other sections of the country. The Lawrence, Lowell carpet, and Merrimac mills, together with the water-power, dam, and canals, were in turn visited, and, returning to Boston, the party scattered to their homes.

SAID I TO MYSELF.

Lines read by Mr. J. C. BAYLES at the Subscription-Dinner, given by members of the American Institute of Mining Engineers at the Hotel Brunswick, Boston, February 22d, 1883.

When I was a nascent professional man,
Said I to myself, said I,
An Institute member I'll be if I can,
Said I to myself, said I.
For membership there is an honor indeed;
To the meetings I'll go with long papers to read,
And I'll do what I can when it comes to a feed.
Said I to myself, said I.

I'll never throw dust in a stockholder's eyes,
Said I to myself, said I;
Nor hoodwink an expert who's not overwise,
Said I to myself, said I.
If I'm working a mine and the ore "peters out."
Or its future is somewhat a matter of doubt,
I'll tell every body they'd better keep out,
Said I to myself, said I.

If I'm running a blast-furnace, little or big,
Said I to myself, said I,
I'll not count my cinder as Bessemer pig,
Said I to myself, said I.
My worthy profession I'll never disgrace,
By claiming of phosphorus only a trace,
When analysis shows that it isn't the case,
Said I to myself, said I.

If I work as a chemist in iron and steel,
Said I to myself, said I,
I'll never deceive, by a very great deal,
Said I to myself, said I.
I won't say that silicon vainly I've sought;
That sulphur, if present, declines to be caught,
Nor put down for manganese decimal naught,
Said I to myself, said I.

If as a geologist fortune I seek,
Said I to myself, said I,
I'll try to avoid being bashful and meek,
Said I to myself, said I;
For many geologists fail of success
Because they lack courage their views to confess,
And fear to offend if their thoughts they express,
Said I to myself, said I.

If some well-endowed college of science and art,
Said I to myself, said I,
As a learned professor should give me a start,
Said I to myself, said I,
I'll try to know something of what I'm to do;
I'll read up on subjects relating thereto,
And besides teaching science, I'll study it, too,
Said I to myself, said I.

In other professions in which men succeed,
Said I to myself, said I,
Of "cheek" and assurance they often have need,
Said I to myself, said I.
Professional modesty's pushed to excess;
The value of confidence all must confess,
And even E. Ms. need a little, I guess,
Said I to myself, said I.

COAL AND IRON IN ALABAMA.*

By T. Sterry Hunt, LL.D., F.R.S.

Coal was mined to a small extent near Tuscaloosa in Alabama, and even carried by boats to Mobile, half a century since. Professor Porter, and later Prof. R. T. Brumby, occupied themselves with the geology of the region, and it attracted the attention of Sir Charles Lyell, who visited the region. It is, however, to the two reports of Professor Tuomey, Geologist to the State, published in 1850 and 1858, that we owe our first clear notions of the geology of the Alabama coal-field. His work has since 1873 been continued by Prof. Eugene A. Smith, of the University of Alabama, whose valuable reports, extending and completing the work of his predecessor, are indispensable guides to the geological inquirer in this region. Mention should also be made of the investigations of Mr. R. P. Rothwell, who, after three years of studies in parts of the Alabama coal-fields, read before the American Institute of Mining Engineers in October, 1873,† a brief but important paper calling attention to the great deposits of coal and iron ore found therein, and their economic importance. Having myself during the past year had an opportunity of visiting parts of this region, I have thought that it might be well to bring before the Institute some facts and considerations as to its geological and geographical characteristics and the value of its mineral resources.

It is well known that the great Appalachian coal-basin, stretching southwestward through Eastern Tennessee and the northwestern corner of Georgia, terminates in Northern Alabama in what is called the Warrior coal-field, which there covers an area of about 5000 square miles. Lying along the southeast border of this, but separated by a narrow belt of older rocks, is the Cahaba coal-field, having an area of about 230 square miles; while to the northeast of this, and near it, is the Coosa field, a still smaller and little known area covering about 100 square miles. These smaller fields were evidently at one time continuous with the greater one to the west, and belong to the great Appalachian basin, from which they have been separated by folding, faulting, and erosion. They are narrow and elongated in a northeast and southwest direction.

Along the southeastern border of these coal-fields in Alabama extends a broad valley drained by the Coosa River, of which it bears the name. This is the southwestern extremity of the great Appalachian Valley, which stretches continuously from the Hudson, through Pennsylvania, Virginia, Tennessee, and Georgia. The ancient crystalline rocks of the Atlantic belt—seen in New England, the Highlands of the Hudson, the South Mountain of Pennsylvania, and the Blue Ridge—which form the southeastern border of the great valley, are still found in their place limiting the Coosa Valley until we reach the center of Alabama. The northwestern border of this valley is here defined by the eastern edges of the Coosa, Cahaba, and Warrior coal-fields, and appears in Lookout Mountain, near Chattanooga. The valley thus limited has a breadth varying from fifteen to thirty miles or more, and is furrowed by many subordinate parallel ridges.

In Central Alabama, the crystalline rocks on the one side and the coal measures on the other alike sink down and disappear beneath the transverse belt of quaternary deposits known as the Port Hudson group, which conceals the contact between the older rocks and the overlying Cretaceous strata lying to the southward.

It is instructive to one acquainted with the great geognostical and geographical divisions of the Middle States to follow these southward till they are lost in the manner just described beneath the broad plain of the Gulf States. The great Appalachian coal-basin in Pennsylvania, Ohio, West Virginia, and Kentucky is, as is well known, tributary to the Ohio, through which its waters pass by the Mississippi into the Gulf of Mexico. It has for this reason been not inappropriately called the Ohio coal-basin. Along its eastern border stretches the double mountain-line of the Alleghanies and the Blue Ridge or Atlantic belt, which separate the coal and iron from the tidal waters of the Atlantic coast. But in Alabama, we reach the southern extremity of these mountain ranges; we find the barrier broken down, and the southern part of the vast Ohio basin drained by navigable rivers flowing through a great plain to the Gulf of Mexico.

The detached coal-fields along the eastern border of the great basin, which are seen from Pennsylvania to Alabama, are often designated as outliers, and Professor Smith has aptly described the valleys with lower rocks, limiting these subordinate coal-fields, as outliers of the Coosa Valley. These, which have the northeast and southwest direction of the latter, are, first, the Cahaba Valley, separating the Coosa and Cahaba fields; and second, the Long Valley, as it is called, which separates the Cahabas from the Warrior field, and extends from below Tuscaloosa northward to Village Springs, beyond which it bifurcates, the western branch running to Sand Mountain, which terminates the valley, and the other running northeast into Georgia and Tennessee.

It is along this valley that the Alabama Great Southern Railroad passes from Chattanooga to Birmingham, and thence nearly to the southwestern end of the valley, where the railroad turns westward to Tuscaloosa, at the southeastern extremity of the Warrior coal-field. It will further aid us in forming a notion of the geography of this region if we bear in mind that the Selma, Rome & Dalton Railroad, nearly parallel with the last, runs, from the crossing of the Coosa River, northward within the Coosa Valley, and from eight to ten miles to the westward of the crystalline range which forms the eastern boundary of this valley.

There remains to be noticed a third outlying valley farther west than those already mentioned, and known as Brown's Valley. This, which is a prolongation of the great Sequatchee Valley of Tennessee, does not extend far southward, but dies out at Blount's Springs, in the Warrior coal-field. The uplift connected with this anticlinal valley, however, continues southward, and affects the strata of the coal-field.

The rocks of the region before us may, for the purposes of our present inquiry, be conveniently considered in four divisions, which are as follows, in ascending order:

I. The ancient crystalline rocks of the Atlantic belt along the southeast side of the Coosa Valley, containing occasional deposits of magnetic iron ore.

II. The various subdivisions between these and the base of the Chazy

* Read at the Boston Meeting of the American Institute of Mining Engineers.
† Transactions American Institute of Mining Engineers, Vol. II., pp. 144-157.

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limestone, included by Smith under the heads of the Ocoee slates and conglomerates, the Chilhowee sandstones, and the rocks of the Knox group, in which latter slate and limestone predominate and are associated with great deposits of limonite and of oxide of manganese. These rocks appear in the Coosa and the outlying valleys.

III. The rocks lying between the last and the base of the coal measures, including representatives of the Chazy and Trenton limestones, the Nashville or Cincinnati group; the succeeding Silurian, represented chiefly by the Clinton group, with its great beds of red hematite or fossil ore; a small thickness of black shale, representing the Devonian; and a considerable mass of strata, chiefly limestones, belonging to the Lower Carboniferous.

IV. The Coal Measures.—Of the first or crystalline division it is not necessary here to speak, except to say that it consists for the most part probably of rocks of Montalban age, as I have shown to be the case in the continuation of the same belt farther to the northeast in Georgia. Elsewhere, as in North Carolina, they are underlain by Laurentian gneisses, which here include the magnetites of Roan Mountain. Magnetic and specular ores of iron are, however, found in all the great subdivisions of the Eozoic rocks. A deposit of the former is said to be found in Clay County, Alabama.

As regards the second division, which is economically important from the presence of great deposits of brown hematite or hydrous iron ore (limonite, etc.), as well as manganese ore—various geological questions arise which can only be mentioned here. The same ore-bearing belt is traced continuously with constant characters from the Coosa throughout the Appalachian Valley, and is the Primal and Auroral of Rogers and the Lower Taconic of Emmons. It is quite distinct from the series called Upper Taconic by the latter, which is the Quebec group of Logan, although the two were for a time confounded. Safford, in Tennessee, gave the name of the Knox group to the older or Lower Taconic series, with which he included some limestones occasionally found in the valley of East Tennessee, containing a fauna which belongs to the horizon of the Calciferous and thus represents the so-called Quebec group. Professor Smith, following Dana, has, in his classification of the rocks of Alabama, described as belonging to the Quebec group the whole of the Knox group or Lower Taconic, measuring in East Tennessee, according to Safford, not less than 7000 feet, and consisting of sandstones with shales and limestones, including limonite. The Chilhowee sandstones and Ocoee shales and conglomerates, which occur chiefly as ridges in the Coosa Valley, and which are, in part at least, probably older than the Knox group, and correspond to the lower part of the Primal of Rogers, are by Smith referred to the Acadian and Potsdam epochs of Dana. At the summit of the Knox group in Alabama, as in Tennessee, is found a fossiliferous limestone with *Maclurea*, marking the Chazy subdivision, to which succeeds the Trenton limestone. Inasmuch as there is reason to conclude, from many observations elsewhere, that there is at this horizon a great stratigraphical break separating the limonite-bearing rocks from those above them, I have placed the Chazy with the Trenton in the third division.

The rocks included in this third division embrace representatives of all the great groups of Paleozoic rocks from the Chazy to the base of the coal measures; Ordovian (Lower Silurian or Siluro-Cambrian); Silurian (Upper Silurian); Devonian or Erian; and Lower Carboniferous. The united thickness of all these is, however, very small when compared with that of the same groups farther north in the same great Paleozoic basin. In Pennsylvania, if we take Ashburner's measured section in Huntingdon County, we have, from the base of the coal measures to the summit of the Trenton, not less than 17,640 feet, making, with the addition of the latter, more than 18,000 feet. With this measurement, other sections in the same succession in Pennsylvania agree pretty closely. It is unnecessary to recall the fact that this great thickness of rocks consists in large part of sandstones and other coarse mechanical sediments, the foldings of which give rise to the belt of mountainous country separating, in Pennsylvania and Virginia, the coal measures from the iron-bearing rocks of the great valley and its outlets.

Prominent among the ridges of the Alleghany Mountain region are those of the Oneida sandstone, the first or lowest in the intervening series of these great masses, with a thickness of 2000 feet or more, which forms what is called the North Mountain along the northwest side of the great valley, and is repeated by anticlinal folds farther west. Directly overlying this sandstone is the Clinton or red fossil ore, which extends continuously from New York to Alabama.

If now we turn from Pennsylvania to Alabama, we find that this great series of strata, which we have included in our third division, is reduced in thickness from 18,000 feet to 1000 or in places 1600 feet, consisting moreover, in great part of soft and calcareous rocks. As a result of this, the limonites, the fossil ore, and the coal, instead of being separated from each other by great belts of mountain-forming strata, are brought side by side in a comparatively level country, and are thus presented under conditions extraordinarily favorable for mining, manufacturing, and transportation.

The coal measures themselves, which constitute our fourth division, have suffered no apparent diminution in thickness. They are estimated in round numbers at 3000 feet in Pennsylvania, and are probably not less in Alabama, where one section, hereafter to be noticed, measures, according to Professor Smith, not less than 2600 feet.

The outlying valleys already mentioned are eroded anticlinals, often accompanied with dislocations of the strata, and in them are exposed the fossil ores and still lower limonites. The Long Valley, which extends from below Tuscaloosa by Birmingham northward, and in its lower and middle portions is known as Roup's and Jones's valleys, respectively, divides, as we have seen, the Warrior coal-field from the Cahaba outlier on the east, the distance between the two coal-fields being rarely over six or eight miles. In the upper part of the course of this anticlinal uplift, the strata of the third division are seen dipping regularly beneath the coal measures on each side; but toward the southwest, the beds have been sharply folded and pushed over to the northwest side, producing a real inversion, so that all the strata appear dipping to the southeast. The Lower Carboniferous limestones on the western side of the valley thus lie below the Chazy and Trenton limestones, and these again below the still older rocks of the Knox group, the whole series being overturned and folded upon itself. The structure is further complicated in parts by faults, bringing up, on the east side, the older rocks against the Lower Carboniferous limestones.

As a consequence of these accidents, so well described by Professor Smith, some of the beds are in part concealed, and others are duplicated. Conspicuous among these are cherty ridges belonging to the second division and associated with the limonites. Still more marked are the rocks of the Clinton group, known in Tennessee as the Dyestone and in Alabama as the Red Mountain group, from the beds of red hematite or fossil ore seen everywhere seen along its outcrop.

A remarkable dislocation of the strata occurs to the southeast of the Cahaba field, where white limestones of the Knox or Taconic series are brought, by a great upthrow, on a level with the highest of the coal measures, here sharply cut off and upturned. This great fault was estimated by Rothwell at not less than 10,000 feet, and his interpretation of the structure, though questioned at the time, has since been confirmed by the observations of Professor Smith and myself.

To the northward, where the coal measures still cover the anticlinal arch which divides the Cahaba from the Warrior field, it rises into a ridge or hill; but farther southward, where denudation has done its work in removing the higher strata, the eroded valley is bordered on each side by a rim of the basal sandstones of the coal measures, the tilted edges of which are still higher than the undisturbed beds of the coal-fields on each side. The result of this is the singular one that the waters of the valley break through the ridges on each side, and find their way into the Cahaba and Warrior rivers, the valley being really higher than the plains on each side of it. As a consequence of this peculiar drainage, we find that the limonite ores along the valley, instead of being buried in clay, as elsewhere is usually the case, are often laid bare, and form hillocks and ridges scarcely covered with soil.

The Warrior coal-field is divided by Smith into the plateau or table-land region on the north and the Warrior basin proper lying to the south. The southward extension of the anticlinal, which in its eroded portion farther north gives rise to Brown's Valley, traverses the field as a low ridge, and divides the basin into two unequal troughs. Of these, the one to the eastward—which is the narrowest, and is drained by the Locust Fork or Little Warrior River—is the best known, lying as it does between the anticlinal just mentioned and that of Long Valley. A section between this valley and Locust Fork, described in detail by Professor Smith in his report for 1877–78, shows above the Lower Carboniferous limestone about 2600 feet of coal measures, including a conglomerate at the base. This, from its proximity to the valley and to the railroad, is the part of the field which has been best explored, There are found in this section twelve seams of coal of from two and a half to seven feet, and having an aggregate thickness of fifty feet. Of these, five seams have been extensively mined. The strata are nearly horizontal and affected only by slight undulations. The Pratt seam—the highest in the section—which is now extensively mined about six miles west from Birmingham, yields four and a half feet of coal, with one shale parting. As mined at the time of my visit in February, 1882, from two stopes and a shaft of 250 feet deep, it was yielding from 1200 to 1500 tons of coal daily, a considerable portion of which was coked at the mines. According to more recently published statements, the production at the Pratt mine has since been much increased. Several other productive mines are opened in adjacent parts of the same field.

To the west of the division just described, the development of coal in the region drained by the Big Warrior River is not less considerable, the later surveys of Smith and others showing the existence of many excellent seams of good quality, measuring from three to six feet in thickness.

In its southern part, where the Cahaba field attains its maximum breadth of twelve miles, the measures are regular, and have a dip of from six to ten degrees along the western border, gradually increasing to twelve or fifteen degrees near Lily Shoals, on the river, and to forty-five degrees or more near to its eastern edge, where the strata along the great fault are sometimes nearly vertical. Farther northward, about thirty miles from its southern extremity, where the Cahaba field is reduced to a breadth of six miles, the strata are somewhat crushed, and the upper measures, which appear farther south, near Monte Vallo, are wanting. The field is here crossed obliquely by the Alabama North and South Railroad, along the line of which, according to Rothwell, are found nine workable beds of coal, measuring from two to four feet in thickness, and giving an aggregate of over twenty-eight feet. In the wider and less disturbed parts of the field, farther south, the coal seams are thicker. On Four-Mile Creek, the same observer found eight seams with an aggregate thickness of thirty-eight feet, besides four higher seams in the Monte Vallo beds, equal to twelve feet. Along the eastern border of the field, however, the lower coals will be too deep for profitable mining.

Besides the analyses of coals from this field given by Rothwell, an extended table of analyses of others from the Warrior basin is given by Smith in his report for 1879–1880, and it may be said, in general terms, that the coals from both these fields are equal to those from the more northern portions of the Appalachian basin. They present the usual varieties in quality and composition, some of them being dry-burning coals, others coking coals, with as much as 65 per cent of carbon, while others contain much more volatile matter.

The iron ores of the region, as already mentioned, belong to two classes, the red hematite or so-called fossil ore of the Clinton beds, and the brown hematite below. The former is almost everywhere in its place at the outcrop of the rocks of the third division throughout the Long Valley. The ore has been traced, according to Professor Smith, with very little interruption, from Pratt's Ferry, on the Cahaba above Centerville, nearly to the Georgia line, sometimes very pure, and at other times too siliceous for use. Near Birmingham, where it is mined for the Oxmoor furnace, there are seen in a thickness of thirty feet twenty-five feet of ore with interposed shaly bands. Numerous analyses of the ore mined at different points in the valley, where their thickness is from ten to twenty feet, give from 42 to 55 per cent. They are generally smelted with an admixture of the brown hematite of the region.

As regards these brown hematites, I can only say, after comparing them with similar deposits of these ores from Massachusetts southward to Virginia along the great valley, that they are of wonderful extent and richness, and, so far as my observations go, are unsurpassed. These hydrous ores have been generated, as has been shown by myself and

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hers, by the alteration *in situ* of interstratified masses and layers, in me cases of carbonate of iron and in others of pyrites, included in the ore or less argillaceous strata now changed to clays.* As already plained, the washing away of a great portion of these clays, where they e exposed along the lines of uplift, has left behind a correspondingly rge amount of their included ore. From this, it results that over many uare miles along the outcrop of these lower rocks, both in the west d east sides of the Cahaba coal-field, we find a succession of hillocks mposed in great part of masses or fragments of brown hematite; while their vicinity, excavations show the same ore still imbedded in the ratified and often highly inclined clayey beds resulting from the decay of e original rocks. In some cases, the same ore, of unusual purity, is und imbedded in large irregular masses in a quartzoze rock which longs to the same geological series as the slates. It appears, from merous analyses of these ores, that they are sometimes less hydrated an limonite and approach to turgite in composition. They have long en mined and smelted with charcoal along the Coosa Valley, where they e not less extensively developed than in the outlying valley west of the ahaba field, in which district they are now mined for the furnaces of irmingham and its vicinity.

It would be foreign to my present plan to enter into details as to any rticular portion of the region before us. Its value as a whole consists the fact that it possesses coal abundant in quantity, excellent in qual-y, and situated in proximity to the waters of the Gulf of Mexico, with hich it can be readily connected by improvements of the rivers drain-g the coal-fields. From Tuscaloosa, which is on the southeastern edge the Warrior field, there is navigation throughout the year to Mobile, distance of 355 miles. As appears from a report of U. S. Engineers the War Department, submitted to Congress in 1880, there is tween Tuscaloosa and Sipsey Fork, in the Warrior basin, in a distance 92¼ miles, a rise of about 16 feet. A system of dams and locks, with ambers 145×30 feet, would suffice to establish water communication om this point, in the heart of the coal-field, to Mobile throughout the ar, for an estimated cost of $400,000. Barges laden with cotton, coal, d lumber have, it is said, for many years been sent down this way ring seasons of high water.

The Alabama River is navigable from Selma to Mobile, and the Cahaba iver, which drains the Cahaba field and falls into the Alabama a little ove Selma, can in like manner, according to official report, be made vigable at a cost of $500,000.

The present lines of railroad have done little for the development of is mineral region. Two great north and south lines, as already pointed it, the Alabama & Chattanooga Railroad and the Selma, Rome Dalton Railroad, pass down the valleys west and east of ne Cahaba field. The South & North Alabama Railroad, how-ver, a continuation of the Louisville & Nashville Railroad, which its course from Decatur to Montgomery intersects the first these roads at Birmingham, and the second at Calera, osses a small part of the Warrior field near Birmngham, and lso the narrow portion of the Cahaba field. The Georgia Pacific from tlanta, passing through Birmingham, will traverse the breadth of the arrior field. During the last years of the civil war, a line was sur-eyed and in part graded for the purpose of opening the lower part of ne Cahaba field, starting from Ashley, a little below Calera, and running orthwest and then northeast into the heart of the coal-field. It has tely been proposed to complete this work, and other projects are under onsideration for the development of the Cahaba field, where very little as been done since the close of the war, during which coal was here xtensively mined. My own observations at the old openings satisfied e of the correctness of Rothwell's observations, and showed that we ave in this field a region which, as regards the supply of coal, the prox-nity of iron ore, and facilities for mining, smelting, and transporta-on, are unsurpassed.

As regards the iron resources of the region, we may note, in the first lace, the proximity of the ore to the coal. With the limited exception f deposits of ore in the coal measures in the northwestern portions of the reat basin, it is well known that the ore and coal in the United States re generally widely separated. Not to speak of the crystalline ores of the lder rocks, the great supplies of limonite upon which the iron industry f Pennsylvania and Virginia are largely based present similar conditions. suffices to look at a geological map of these States to see what a broad elt of mountainous country separates the limonite-bearing rocks of the reat valley from the coal measures, while a very considerable interval lso divides these from the fossil ores. Owing, as already explained, to the inning out of the intervening rocks, which are reduced to less than one nth of their thickness, and to the fact that those that persist are, for ne most part, soft and crumbling, we have seen how the ores and coal widely separated elsewhere are in Alabama brought into close prox-nity. Thus, in Long Valley, a distance of six or eight miles only parates the coal-fields from each other, while abundant deposits both of ne red and the brown hematite are found in the interval between them. is not therefore surprising that this valley is rapidly becoming an portant center of iron production, where coke-made iron can be pro-uced more cheaply than anywhere else on this continent.

The remarkable dislocation and upthrow, already noticed as occurring on ne southeast side of the Cahaba field, bring about a still closer approxi-nation of iron-producing materials by lifting up the lower ore-bearing ocks side by side with the coal measures. Here, on the banks of the ahaba River, deposits of limonite of great abundance and purity are ound extending over many hundreds of acres of the surface within two iles of opened beds of coking coal, while cliffs of a pure white limestone, ell fitted for flux, are seen within the same distance. It is impossible to ok upon all the developments of coal and rich iron ores, elsewhere so idely separated and here brought into close proximity, without feeling at these Alabama coal-fields are destined at no distant time to be the eat of an immense mining and manufacturing industry.

It is true that this region is now somewhat removed from our great enters of population and consumption; but with the improvements in ater transportation now projected, iron could be carried to Mobile and hence by sea to American and foreign ports more easily than from any ther iron-producing region in the Union. Nor should we forget in this onnection what a vast future awaits the South with its newly-awakened activity in agriculture and in manufacturing industries; a region offering such advantages of soil and climate as can not fail in the next few years to attract a very large immigration. If we look to the census returns of 1880, we shall find that the eight coastal Southern States, from North Carolina to Texas, with a population of about nine and a quarter millions, showed an increase over that of 1870 of 41·6 per cent, while the increase for the Union, taken as a whole, was but little over 30 per cent. To Alabama, as the great coal and iron-producing State of the South, the chief part of this vast region may be made to a large extent tributary.

Already in 1875, the great natural advantages of Alabama for the manufacture of iron attracted the attention of Isaac Lowthian Bell, who, in a communication to the British Iron and Steel Institute, declared that the region "presents advantageous conditions for the economical production of the metal rarely met with even in Great Britain;" elsewhere asserting that it would "prove a match for any part of the world in the production of cheap iron." Not less striking is the language of Abram S. Hewitt, who says of Alabama: "It is the only place upon the North American continent where it is possible to make iron in competition with the cheap iron of England, as measured not by the wages paid, but by the number of days' labor which enter into its production. The cheapest place on the globe until now for the manufacture of iron is the Cleveland District, in Yorkshire, England. The distance of the coal and iron from the furnaces there averages about twenty miles. Now, in Alabama, the coal and the ore are in many places within half a mile of each other. This region, so exhaustless in supplies, so admirably furnished with coal, so conveniently communicating with the gulf, will be of infinitely more consequence to us for its iron than it has ever been for its cotton. The ore is the foundation of an industry and a prosperity which no curse of slavery, nor rebellion, nor interference with economic laws can ever overturn. I think this will be a region of coke-made iron on a scale grander than has ever been witnessed on the habitable globe."

I have sought on this occasion to call the attention of the members of the Institute of Mining Engineers to some of the more remarkable points in the geology of the coal region of Central Alabama, especially as compared with that of the more northern portions of the same great coal-basin, and to show the intimate and peculiar relations both of the geology and the geography of the region to its economic interests. I have also wished to record the strong impressions made upon me by what I saw there during a late visit of a week. The development in Central Alabama, not only of a great coal trade, but of a vast iron industry, is certain in the near future, and indeed has already begun. I leave for another time and place the discussion of details respecting the region. Meanwhile, it must be said that the geographical position of Alabama, its mineral wealth, its fertile soil, and its favorable climate are destined to give it a pre-eminent place among the Southern States of our Union.

* Second Geological Survey of Pennsylvania, Report E, Azoic Rocks, pp. 202-204.

NEW PUBLICATIONS.

United States Mineral Lands; *Laws Governing their Occupancy and Disposal; Decisions of Federal and State Courts in Cases Arising thereunder; and Regulations and Rulings of the Land Department in Connection therewith, with Miscellaneous Matter. By* Henry N. Copp. Second Edition. 1882. Published by the Author, Washington, D. C. Octavo, 649 pages. (*Index.*)

The disaster by which the larger part of the first edition of this book was burned up has been converted into a blessing by the enterprising author, who has availed himself of the opportunity to bring the second edition down to date, introducing into it decisions and other matter obtained since the publication of the first. In its present form, the work is admirably complete and convenient, and constitutes the best manual for study or reference with which we are acquainted. The mining part of Dr. Raymond's *Glossary of Mining and Metallurgical Terms*, published in the first edition, is retained in this.

The Storage of Electricity. *By* Henry Greer. New York: N. Y. Agent College of Electrical Engineering. 8vo, 40 pages.

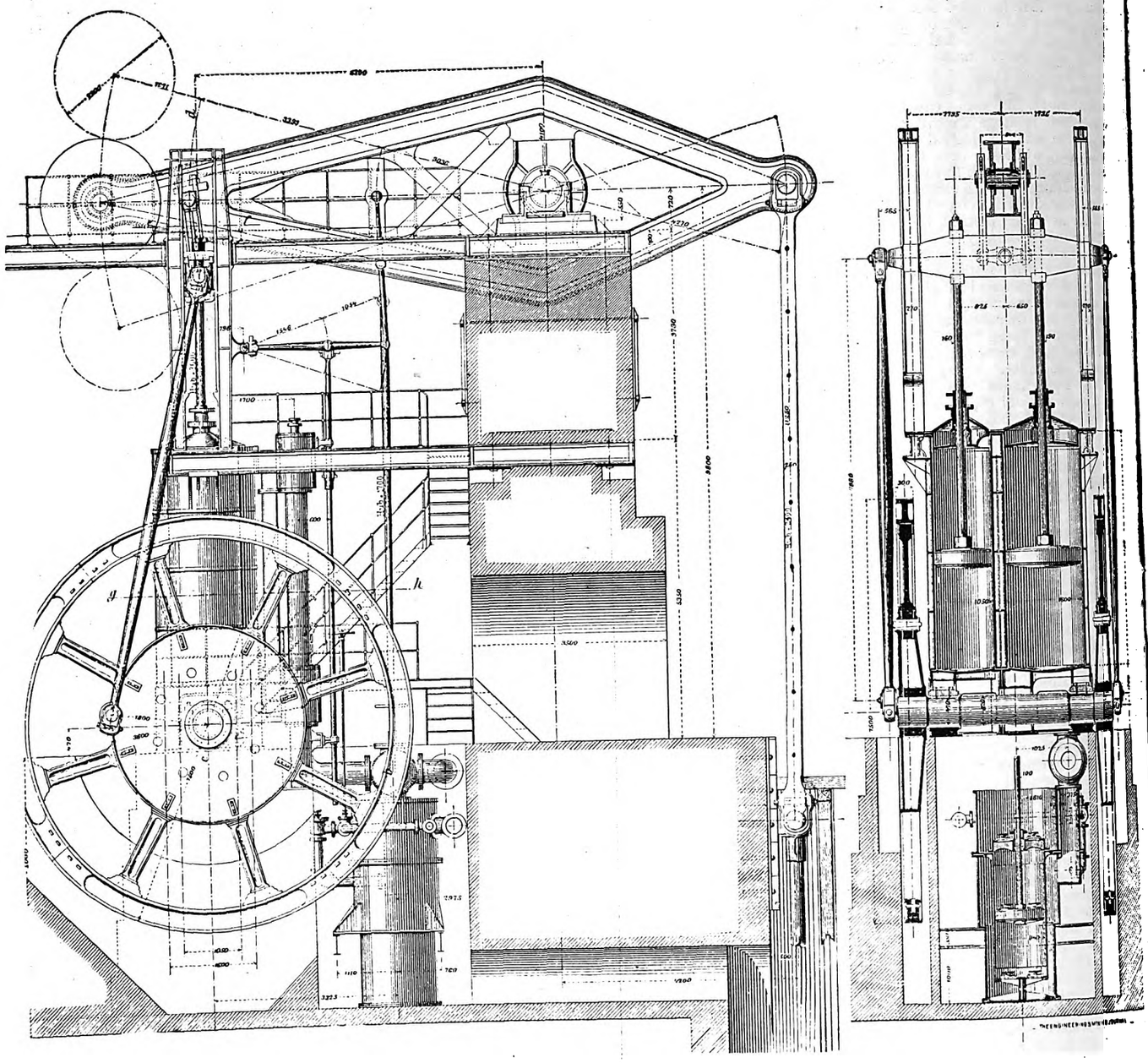
Among the latest developments calculated largely to extend the application of electricity to the arts, none has attracted as much attention and none is as little understood as the "storage" of electricity. The little pamphlet before us, containing as it does popular illustrated accounts of the many various rival systems now struggling for recognition, will, therefore, be welcomed as a timely contribution to the literature on the subject. Mr. Greer appears to have followed progress closely. He devotes special attention to the Brush system of secondary batteries, the latest form of which has ribbed or corrugated plates. We understand that the Brush Electric Light Company is erecting very large works to manufacture the new storage battery.

The Materials of Engineering. *In Three Parts. Part I. Non-Metallic Materials: Stone; Timber; Fuels; Lubricants; etc. By* Robert H. Thurston, *A.M., C.E.* New York: John Wiley & Sons. 1883. 8vo, 364 pages, 77 Illustrations. (*Index.*)

Professor Thurston, of the Stevens Institute of Technology, is so widely known as an authority on the strength and quality of materials that any thing coming from his pen is sure to attract attention and appreciation. In the first volume of his work, recently issued, he treats of subjects which he has perhaps, with the exception of lubricants, dealt with less as an original investigator than he has with alloys, metals, iron, and steel. For this reason, possibly, the later volumes will be looked forward to with more expectation. The plan, so far as Part I. reveals it, is simple, and will commend itself alike to those mechanical engineers who take up the topics treated for the first time and to those who propose to use it as a book of reference.

Professor Thurston deals with the materials of engineering one by one, beginning with stones and cements. He sketches their origin, the localities where found, and then goes into a more elaborate discussion of their power of resisting strains and decay. His chapters on timber are, as they naturally should be, very elaborate and thorough. There are numerous well-executed illustrations of American forest-trees, a thorough chapter on the strength of timber, on jointing, the holding power of screws and nails, varnishes and oils, and timber-preserving processes. Fuels are treated in a manner commensurate with the importance of the subject to the mechanical engineer, who, if he desires it, can refer to more elaborate special text-books on the subject. The fifth chapter is that on lubricants, and in it we find frequently the evidences of Professor Thurston's thorough researches on the subject. An appendix contains a handy series of conversion tables.

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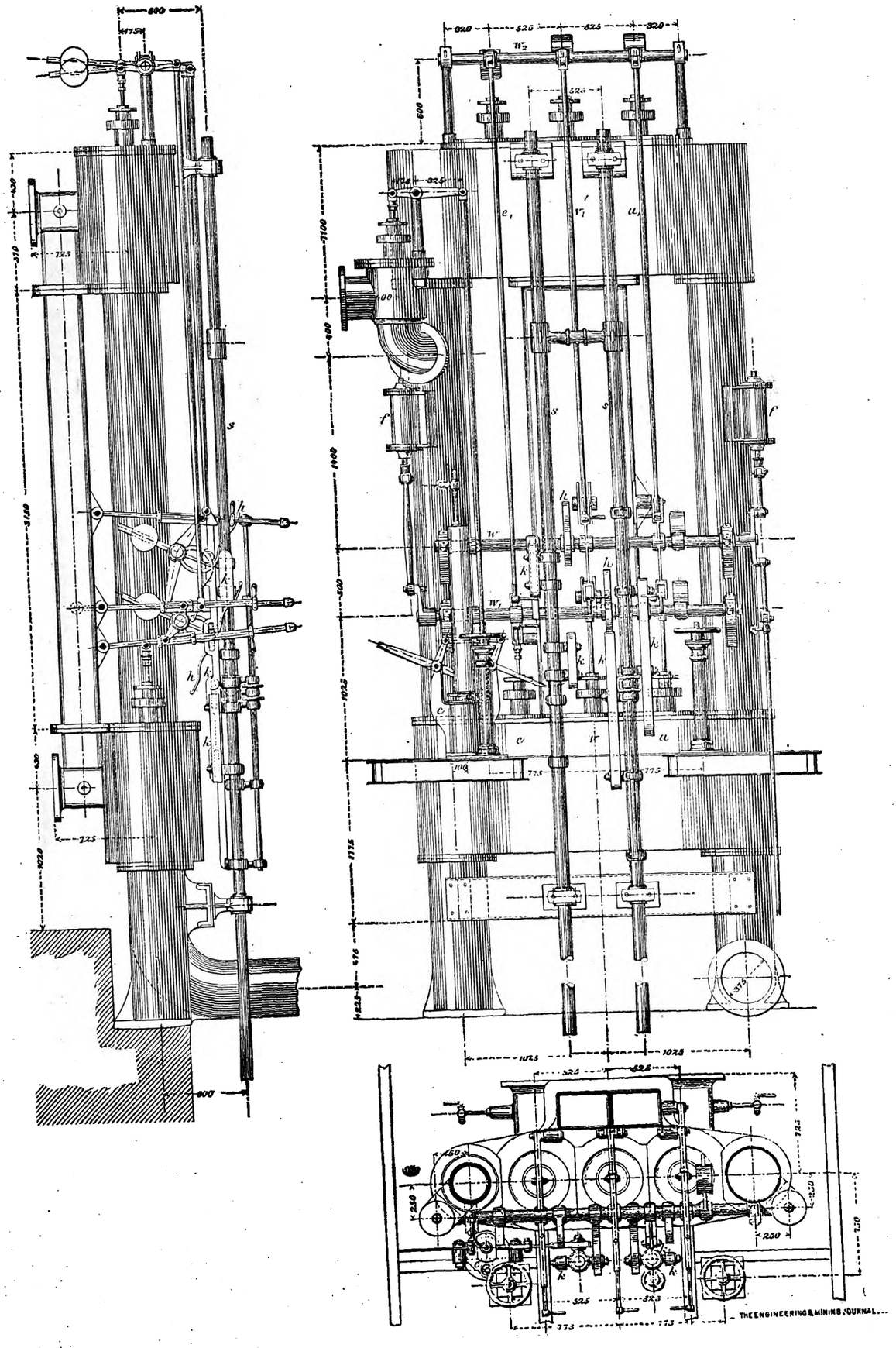


THE KLEY PUMPING ENGINE.

In Belgium and Germany, the Kley engine for pumping has been gaining favor very rapidly during the last decade for handling the water in coal and metalliferous mines. It is prized particularly because it admits of wide variations in speed to accommodate differences in the flow of water into the mine without affecting the economy of the engines. The Cornish engines, which held sway for so many years for pumping, have the disadvantage that they can not work with expansion, and besides they are liable to breaks, entailing very serious costs for repairs. Ordinary fly-wheel engines will not work at a speed less than four revolutions per minute, so that often, when the flow of water is temporarily small, an extra engine must be provided to handle it, the supply not being great enough to keep the larger engine at work steadily. Herr Kley, of Bonn, Germany, has endeavored to unite the advantages of both types of engines, while avoiding their defects; and from the accounts printed during the last four years in the technical journals of the continent and from records of work submitted, he seems to have succeeded very well. The Kley engine is a beam fly-wheel engine with cataract. It is capable, like the cataract engines, of working with pauses between the strokes; and when a greater speed is required, the cataract is thrown out of gear, though even this has not proved necessary in practice. The fly-wheel is a light one, its function being to regulate the course of the piston, and the mass is so chosen that the momentum stored in it during the beginning of the stroke suffices only to the end, so that the engine comes to a full stop after the crank has passed the dead-center until the cataract mechanism has again caused the admission of steam to the cylinder. These pauses or stops may of course be made as long or as short as necessary, the minimum of strokes depending only upon the maintenance of a vacuum and the heat of the cylinder. It does not make any difference whether the crank comes to a stop before or after the dead-center, the fly-wheel simply moving in the opposite direction. The masses rotating are much smaller than ordinary fly-wheel engines, and those built according to the Kley system are claimed to be more substantial and safer. In the case of a breaking of the pump-rod or the draining of the sump, the cataract does not open the steam-valve, so that breaks are impossible.

As a recent example of the Kley system, we illustrate in the accompanying cuts a compound pumping-engine built for the Rheinpreussen colliery by the Gutehoffnungshuette at Oberhausen, and described by Herr Th. Lempe in the *Zeitschrift des Vereins Deutscher Ingenieure*. As will be seen, the engine has a 1050 millimeter (41·33 inches) high-pressure and a 1600 millimeter (62·99 inches) low-pressure steam-jacketed cylinder placed side by side with a 3600 millimeter (141·73 inches) stroke. The stroke of the pump-rods is 2400 millimeters (94·49 inches), the length of the walking-beam from the center of the pump-rod bearings to the center of the counterweight being 12·73 meters (41·77 feet). The diameter of the two fly-wheels is 7·5 meters (24·61 feet) and the weight of the rim of each 13 tons, the total weight of the engine, exclusive of counterweights, being 243 tons. Steam enters the cylinders through the valves e and e', v and v' being the valves connecting the high and low pressure cylinders, and a and a' being the exhaust-valves. They are actuated by the shafts w and w', the former for the inlet and the latter for the exhaust-valves. The tappets k, attached to s, by means of the

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levers *h* bring the shafts *w* and *w'* into their normal position, when all the valves are closed. When moved in one direction, the lower, and when moved in the other, the upper, valves are opened. The movement downward is brought about by the cataract *c*, while the upward movement is effected by the tappets *k'*. Then springs compressed in the box *f*, compressed by the closing movement effected by the tappets *k*, rapidly bring the shafts in the position corresponding to a full opening of the valves. By an adjustment of the cataract and the different tappets *k* and *k'* it is easy to bring the engine to rest after one revolution of the fly-wheel at a point in advance of or beyond the dead-center. In the former case, the crank-shaft will simply oscillate; in the latter, it will revolve with pauses near the dead-center; these stoppages, however, becoming less in amount when the engine is running fast.

The engine illustrated was built for a maximum duty when running at a speed of 10 revolutions per minute of forcing 2·8 cubic meters (740 gallons) of water per minute from a depth of 800 meters (2625 feet) corresponding to 500 horse-power. Upward of 25 engines of the Kley type have been built during the past few years, ranging from 30 to 560 horse-power and working at a speed varying from one revolution every two minutes to 18 revolutions per minute, some being direct-acting, the majority, however, being compound beam engines, cutting off at one-quarter to one eighth of the stroke, the greater number being condensing.

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THE SODA INDUSTRY ABROAD.

Before the young but vigorous Society of Chemical Industry recently formed in Great Britain, Mr. Walter Weldon, whose name is so closely identified with progress in that branch during the last decades, read a paper on the present condition and the prospects of the soda industry abroad. His statements, it will be noticed, are full of interest to American miners and chemical manufacturers. The manufacturers of soda by the Leblanc process have fallen upon evil times. For some time past, their profits have been steadily declining, until now they have disappeared and have been replaced in many cases by actual loss. Of twenty-five alkali works which were in operation in the neighborhood of Newcastle-on-Tyne a very few years ago, twelve have been closed, and of these no fewer than eight actually dismantled in despair of it ever again being possible to manufacture soda in them by the Leblanc process, except at a loss. The alkali-making districts of Lancashire have advantages over the Newcastle District in respect of the price of salt, of facilities for supplying the American market, and of nearness to some of the centers of soda consumption; but even in Lancashire seven or eight of the alkali-works are standing idle, and but few of the others are working to their full capacity. In Belgium, the production of Leblanc soda has died out, while in France, Germany, and Austria it is only maintained by the aid of import duties and the large demand for the by-product, hydrochloric acid.

This deplorable condition of the trade is mainly due to the great increase of the output of soda manufactured by the ammonia process, an increase which, though rapid in the past, bids fair to proceed by leaps and bounds in the immediate future. Whether the new process will entirely supersede the old one is a momentous question to those that have invested their money in the latter, and a question not easily answered. Mr. Weldon has set forth the facts which lead him to hope that, although the Leblanc manufacturers have probably not seen the worst, yet that a time may come when they may be able to hold their own against the manufacturers by the ammonia method. At present, he estimates the total annual soda production of the world expressed in terms of pure Na_2CO_3 at 708,725 tons, of which 432,000 tons are manufactured in Great Britain. Twelve per cent of British soda, and 23 per cent of the total soda of the world, are produced by the ammonia method, which was first put into commercial operation in 1866 by Mr. Ernest Solvay, of Brussels. There are now eighteen ammonia soda-works at work in Europe and one in the United States, and seven more are approaching completion.

But serious as this competition is, there is another about to commence that will further tend to aggravate the congestion of the trade, and this is the manufacture of soda combined with the extraction of copper from Spanish pyrites. As is well known, the sulphuric acid used in the Leblanc process is invariably manufactured from the sulphur of pyrites, and the pyrites used in this country is now almost exclusively obtained from Spain or Portugal, and contains from two to three per cent of copper, besides small quantities of silver and gold. After the sulphur has been burnt off, the metals are extracted by the wet process, and what remains is an almost pure oxide of iron that finds a ready sale at fairly remunerative prices. The supply of pyrites is in the hands of three large companies, one of which also sends large quantities to Germany, but up to the present neither has been able to sell any in France. This results from the fact that there are two large deposits of non-cupreous pyrites in France, one in the North and one in the South, both belonging to soda makers, who supply the other manufacturers under contracts of fifteen years' duration, which have yet a considerable time to run. The residual burnt ore, or pyrites cinders, in France has little value, as it is contaminated with sulphur and phosphorus which can not be profitably removed, as there is no copper to be gained at the same time. English cinder contains more sulphur, but this is removed in the extraction of the copper, and the product is pure purple ore that would be of considerable value in France, where the import duty upon cast-iron is greater than the present price of Glasgow pig. To find a market in France for these Spanish ores, the Rio Tinto Company has promoted a subsidiary company, La Compagnie d'Exploitation des Minérals de Rio Tinto, which is to make Leblanc soda in France and elsewhere from Rio Tinto pyrites, relying for its profits neither on soda nor on chlorine, but on copper and oxide of iron. For this company soda and chlorine will be by-products, which it will be glad to sell at a profit if that may be, but which, if not, it will be content to sell for the bare cost of manufacture, thus combining what are now two separate businesses in England, one of which is not without profit, even when pursued without the protection of import duties. It has a works already commenced at Marseilles, and there is a rumor of five others in France; in addition to these, it proposes to erect works at Antwerp and in the United States.

When the ammonia process was introduced, the Leblanc manufacturers anticipated that the demand for ammonia would raise its price very considerably, and thus increase the expense of the process. But the expectation has not been realized, and the price of ammonia is now falling before the increased sources of supply. This is brought about by the Carvé and the Jameson system of extracting ammonia from the gaseous products of coke-ovens, and now tar and ammonia are regularly collected from two of the sixteen blast-furnaces at the Gartsherrie Iron-Works, Scotland. The quantity of ammonia at present obtained corresponds to about 18 cwt. of ammonium sulphate per day, being at the rate of 20 pounds of ammonium sulphate per ton of coal consumed. There are 120 blast-furnaces in Scotland, each consuming, on an average, 50 tons of coal per twenty-four hours. The total amount of coal burnt in them per annum is therefore 2,190,000 tons, which would produce, were it collected, an amount of ammonia equivalent to 20,000 tons of ammonium sulphate, worth at present prices £400,000.

Now, as there seems no likelihood of the ammonia process languishing for want of material, the only hope of the Leblanc manufacturers would seem to lie in cheapening their own process until they can contend with their rivals upon equal terms. Already much has been done, and a large saving effected by means of rigid economy; but this only touches the fringe of the cost; and if the difference of 20s. a ton or thereabouts, that divides the two processes, is to be bridged over, it must be by something more radical than economy in details. The consideration of the direction in which relief is to be sought, and the means to be adopted in accomplishing it, was the primary object of Mr. Weldon's paper. After throwing out a hint that a new field for the utilization of hydrochloric acid, other than the manufacture of chlorine, will shortly appear, the first alleviation that Mr. Weldon insists upon is cheaper pyrites. The present price of 6d. per unit is due to a combination between the vendors, which will expire at the end of next year, when a reduction of 50 per cent may be expected. As to make a ton of actual sodium carbonate by the Leblanc process does not require more than about 13·5 cwt. of pyrites, this reduction in price would only amount to about 7s. 9d. per ton, a little more than a third of the twenty shillings necessary to effect a commercial equilibrium between the processes. But there are still two more resources to make up the balance of the 20s. The first is sulphur recovery, that is, as free sulphur. There has lately arisen a hope that the whole of the sulphur of the calcium sulphide contained in the waste may be recovered in a free state. The actual cost of Sicilian sulphur delivered at Marseilles in bulk is £5 per ton; therefore, to become masters of the sulphur market, and at the same time to gain by the recovered sulphur sufficient to cover their loss, English soda-makers must be able to effect the recovery at a cost not exceeding £2 per ton. They will hardly be able to do this at first, but eventually they may, and then, if the chlorine products should again command a reasonable price, the Leblanc process will be able to hold its own.

The suggestion of the third course comes from Newcastle, and is of much importance to almost every other industry, besides soda-making. It is, that the manufacturer should entirely cease to use raw coal as fuel, but should convert it all into coke, collecting for sale the oil and ammonia evolved during the conversion, and himself using for heating purposes the gases distilled during the coking operation. It is believed that, in the Newcastle District, at any rate, by this mode of proceeding the soda-maker would obtain his fuel virtually for nothing. In that district, there are produced per annum some two millions of tons of very small coal or "duff," which is almost a waste product, and which, singularly enough, yields more oil than the more costly kinds of Newcastle coal, while at the same time yielding a very fair coke, sufficiently good, at any rate, for use in the furnaces of chemical works, especially when its combustion is assisted by that of the gases from the ovens in which the coke is produced; and the value of the oil and ammonia obtained when this "duff" is coked in ovens to which the Jameson system is applied is greater than the cost of the "duff," *plus* the cost of coking it. And it is probable that improved condensing arrangements will render the yield, if not of oil, at any rate of ammonia, so much greater than the yield hitherto actually realized as to enable the same result to be obtained in the case of ordinary steam coal, not only in the Newcastle District, but in the Lancashire District also. If so, the cost of producing Leblanc soda in both districts will be diminished by almost the total amount of the present cost of Leblanc soda for fuel. Mr. Weldon says "almost," because, so far as one can see, the use of raw coal for "mixing" in the black-ash process must still be continued. He believes that this idea can not but be as applicable to almost all other industries as to the soda industry; while the result to the material well-being of mankind of its general application it is utterly beyond the power of any imagination adequately to conceive. This idea means, among other things, cheaper fuel for all purposes, an enormously increased supply of agricultural produce, and the entire suppression of smoke even in the busiest centers of industry. He thinks that the same idea might be applied even to the fuel required for domestic purposes, rendering cities absolutely free from smoke. He holds that the time will come when gas-works will be replaced, at least to a large extent, by establishments in which coal will be treated for the production of coke, illuminating oils, ammonia, and heating gases: the coke to be burnt in domestic fire-places, the oils to be used for lighting the interiors of houses, the ammonia to be employed in agriculture, to cheapen and render more abundant supplies of food, and the gases to be burnt for raising steam for driving dynamos for lighting streets by the electric arc.

AN IMPROVEMENT IN COPPER SMELTING.

Written for the Engineering and Mining Journal by Paul Johnson, Mining Engineer and Metallurgist, Worcester, Mass.

I propose the following modified copper smelting for large works where different ores are to be dealt with, consisting principally of sulphureted copper ores containing iron.

Four fifths of all copper produced in the world is made from sulphureted copper ores containing a considerable quantity of iron combined with sulphur. The general principle followed for making marketable copper in the dry way (for which either only reverberatory furnaces, or a combination of reverberatory and shaft-furnaces are employed) is, first, to carry all the earthy matters into the slag and concentrate the copper in a matte, by mixing roasted or oxidized ores with raw ores, and smelting down. The aim is to obtain a matte containing generally from 30 to 40 per cent copper, about 26 per cent sulphur, and the rest principally iron.

The next step is to get rid of most of the iron and part of the sulphur, in order to obtain a product approaching Cu_2S. This is done by one or more fusions of the first calcined matte, generally mixed with rich oxidized ores or rich slags from succeeding processes. This fusion is generally carried out in a reverberatory furnace. The number of concentrations depends on the purity of the ores, or whether they contain gold or silver, which is to be extracted. If the ores are pure and hold no gold or silver, the matte first obtained is calcined to such a point, and the addition of rich ores made in such a way, that, by the first fusion, white or pimpled metal is obtained.

This product is now exposed to an oxidizing smelting, called roasting, in a reverberatory furnace, to get rid of the sulphur and the greatest part of the other remaining impurities. Cu_2S is oxidized to CuO which, acting on Cu_2S, reduces Cu, which, in consequence of its higher specific gravity, goes to the bottom and there collects. The process is carried on until all the copper is reduced and the absorbed sulphuric acid has worked off, when the product is tapped as blister copper.

This blister copper is now refined by scorifying through oxidation the remaining impurities, skimming them away with the slag, and reducing by poling the cupreous oxide dissolved in the copper, thus obtaining copper in a tough state.

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I propose to substitute for this method another requiring less time and cost. The principle is based on the known fact that, when copper matte in a sufficiently heated molten state is exposed to the action of strong blast, the iron and sulphur are oxidized, generating heat before it acts on the copper. I will give a general sketch of the process, afterward dealing with the details.

By running down the ores in a shaft-furnace, I get rid of the gangue, and have the copper concentrated in a matte holding about 35 per cent copper. This matte, mixed with rich oxidized ores and refinery slags, is smelted down with an oxidizing flame in a Siemens furnace; the heated molten mass is exposed to the action of hot blast, through inclined tuyeres, thus oxidizing the iron and sulphur. When a proper quantity of iron is scorified, the blast is shut off and the slag skimmed. This done, the blast is put on, and this is repeated until the iron and sulphur are oxidized, and the product obtained is blister copper. This is refined in the usual way, preferably in large charges in a Siemens refining furnace.

As for the concentration of the copper in a matte containing about 35 per cent copper, this may be done cheapest, quickest, and best in a shaft-furnace of large capacity, say from 100 to 150 tons per twenty-four hours, either in a Raschette or, still better, in a round Pilz-Mansfeld furnace with from 6 to 8 tuyeres, and wider at the top than at the bottom, thus allowing greater hight to the furnace, and consequently economizing fuel, but at the same time preventing the reducing effect of the furnace from increasing to disadvantage. By making up the charge in a proper way and careful feeding, these furnaces give far better results than others. Experience has proved that the least copper is lost in the slag when a matte is obtained from the charge containing about 35 per cent copper and 26 per cent sulphur, and the slag is rich in iron between bisilicate and monosilicate. The loss of copper in this smelting is caused only by shots of matte suspended in the slag. It is, therefore, desirable to get a slag, which, at a temperature not too high, is sufficiently liquid, and the specific gravity of which at the same time is low, allowing the shots of metal to pass easily through.

This matte is now to be treated in a Siemens furnace, which ought to have a sufficient length of hearth in order to utilize the flame, and a deep and a strong bed, in order longer to resist the corroding action of the oxidized iron, and to be able to hold a charge of at least 10 tons of matte. Below the fire-bridge, and between the hearth and regenerators, there ought to be an air-space, in order to cool off the sides of the hearth. The roof should consist of two arches, the lower of fire-brick, the upper of common brick, in order to let the blast pass through the space between them and be heated at the same time that the lower vault is cooled off, in order better to resist the heat of the flame. In the middle of each of the sides of the furnace, and opposite each other, are two working and charging doors. Through one of these, the furnace-man pulls out the slag, the helper at the same time pushing it toward him with the rabble through the other, thus allowing the slag to be skimmed off quickly, completely, and in a practical way. On each of the sides of the furnace, are four or five tuyere-holes, so arranged that, if tuyeres are put in and the blast let on, this will strike the surface of the molten metal at an angle of from 35 to 40 degrees at a distance of from 1½ to 2 feet from the side. These tuyere-holes are arranged at the same distance from each other between the ends of the hearth, directed at right angles to the length of the furnace. The tuyeres ought to allow a strong concentrated jet of air to strike the surface, and should be arranged so as to be capable of being pulled out when the blast is shut off, in order that the tuyere-holes may be closed up, thus preventing cold air from entering and cooling off the furnace. The matte from the cupola-furnace is mixed with rich oxidized ores and refinery slags, and a charge of about 10 tons put in the furnace. The charge is smelted down with an oxidizing flame, the slag is stirred with the rabble, and some siliceous flux is put in if necessary. The charge may always be made up beforehand in such a way that this is not necessary at the first skimming. The tuyere-holes are now closed up with clay or in any other way, and a good heat given for a quarter of an hour or twenty minutes, in order to get the slag fully liquid, so that a good separation of the shots of metal from the slag may take place, and that the sulphide of iron may surrender its sulphur to the cupreous oxide and take the place of the latter as FeO, if cupreous oxide should occur in the slag. The slag being liquid enough, is skimmed off; some siliceous flux is put in, in order to saturate the oxidized iron formed during the following oxidizing process; the heat is raised, and when it is high enough, the blast is put on. By the inclination of the tuyeres, strong pressure on the hot blast, and its concentration in smaller jets, the heat generated by the oxidation of the iron and sulphur ought to increase and maintain the temperature in the furnace so far that, when the reaction has fully commenced, the gas may be entirely or considerably decreased. The jets of blast will of course stir up very vigorously the molten bath of metal, causing new particles to be exposed to the action of the air, and also causing a very rapid oxidation, mixing the oxidized partioles with the sulphureted ones, forming sulphurous acid, which passes away, and oxidized iron, which rises to the surface. When enough slag has accumulated, the blast is shut off, the tuyere-holes closed up, siliceous fluxes are put in, the slag stirred, and heat given as before, to separate slag and metal, and to have FeS to convert Cu_2O to Cu_2S. In order to obtain a more complete separation and reaction, longer time is now required than at first. The slag is again skimmed off, and the process kept up in this way until most of the iron is scorified. At this stage of the process, the product consists chiefly of sulphide of copper; the blast now oxidizes both the sulphur and copper, forming cupreous oxide, which reduces the metallic copper from sulphide of copper. The metallic copper sinks to the bottom and there collects. When most of the sulphur is oxidized, the blast is shut off and the cupreous oxide dissolved allowed to reduce the remaining sulphide of copper. The sulphurous acid having worked off, the heat is raised, the thin slag skimmed off, and the product tapped as blister or set copper. The furnace-man requires, of course, some practice to know the right moment when to shut off the blast, in order to get blister copper. If the blast is kept on a little longer than necessary, more copper will pass into the slag; but the product obtained will, in consequence of its containing more dissolved cupreous oxide, be so much easier to refine. The slag from the first skimmings will contain less copper than the later ones, and by putting in proper fluxing substances, they may be poor enough to throw away. The later ones may be run down in the cupola-furnace, together with the ores. When the charge has been tapped out, the bed is carefully mended with silica, and the furnace is ready for the next charge. It would, perhaps, be an improvement to tap the product, when in a state of strong pimple metal, in a heated converter, and Bessemerize it. The making of blister or set copper from pimple metal would then only require from ten to fifteen minutes, and the disadvantage of the Bessemerizing of poorer metal in a converter, on account of the strong corroding action of the iron on the lining, would now be got rid of. The sulphur would pass away as sulphurous acid, and the blowing might be kept up so far as to obtain a somewhat dry copper. The slag very rich in copper would be put into the Siemens furnace.

The Siemens furnace ought, of course, to have great advantage over the common English reverberatory furnace. With a Siemens furnace and hot blast, the two conditions that are essential to the success and rapid execution of the process, namely, a strong heat and a strong oxidizing blast, may be completely controlled; when the heat generated by the oxidation of the iron and sulphur is sufficient to carry on the process, the gas may be shut off, thus saving fuel. In France, copper matte is treated in a converter with success; but starting on a matte with only from 20 to 30 per cent copper, the great quantity of iron that is to be scorified, and which must take the necessary silica from the lining, must be taken into consideration. I think the reverberatory furnace, with blast through inclined tuyeres, is the most natural and practical furnace to treat a product of such quality. The slag formed may easily be skimmed off, and fluxing substances put in when necessary, giving a clean slag, and at the same time preventing a too strong corroding action of the iron on the lining. The metal being concentrated to strong pimple metal, when scarcely any thing but sulphur is to be removed in order to get copper, the converter ought to be the most natural furnace for this process. The question is only whether the time and quality of copper gained by Bessemerizing would pay the increased cost of the converter and its management. The converter could be used many times before mending its lining, and could probably have the same blowing-engine as the Siemens furnace. By this way of treating matte, especially by using a converter for treating the product when brought to pimple metal, a charge of ten tons, holding 40 per cent copper, may easily be brought up to blister copper in from ten to twelve hours.

This blister copper may now be refined in the usual way: but I think a Siemens furnace is even here to be preferred, provided that, by washing or in any other way, the gas produced is made sufficiently free from impure matter. If these experiments are executed by a person who understands this matter not only theoretically, but has had to do himself practically with copper smelting, I am sure they will prove successful.

In order to compare the advantage of this proposed process over that now generally in use, we may see what is required for making a certain quantity of copper in either way, supposing we start from matte containing about 35 per cent copper, and which, by the admixture of rich oxidized ores, is made up to contain 40 per cent copper.

If a charge of a little more than ten tons is treated in the Siemens furnace, this may in twelve hours turn out four tons of blister copper. Supposing one furnace-man and two helpers are required for the furnace, this will require in addition one man for the gas-producer and one engineer for the blowing-engine. That is, for making eight tons of blister copper in twenty-four hours, one Siemens furnace and ten men are required.

Let us now see what is required for the same work in the usual way now in use. At one of the larger copper-works of this kind in the United States, they use, in order to calcine the crushed matte, four calciners, each treating 2½ tons in twenty-four hours, calcining away from a matte of about 25 per cent sulphur from 10 to 15 per cent, requiring per shift three men. There are required besides three men for the crusher, and one engineer, that is, fourteen men in twenty-four hours. In order to do the double work in twenty-four hours, there may thus be required eight calciners and at least twenty-four men, if one larger crusher has to do all the work of crushing. If this calcined matte, by fusion in a reverberatory furnace in charges of five tons each in twelve hours, turns out strong white metal, I think the result is considered good. In order to make twenty tons calcined matte up to strong white metal in twenty-four hours, are thus required two reverberatory furnaces and eight men. From ten to twelve tons white metal thus obtained are now to be made up to eight tons of blister copper by roasting in twenty-four hours. This may be done by two reverberatory furnaces in twenty-four hours, each treating from five to six tons white metal and requiring eight men. Supposing the cost of keeping the blower for the Siemens furnace to be equal to the cost of the crusher for the calciners, the question is reduced to this point: Is it cheaper to bring twenty tons of matte to blister copper in one furnace in twenty-four hours, with fuel and repairs required for one furnace, and ten men, than to do the same work in eight calciners, four reverberatory furnaces, with fuel and repairs to all these, and forty men? I claim, too, that the blister copper from the Siemens furnace, on account of the increased heat and strong oxidizing blast, may not contain more—on the contrary less—impurities than the copper from the other process, though by this process it has required only one sixth of that time.

The Corrosion of Iron and Steel.—At a recent meeting of the Paris Academy of Sciences, a paper was read describing some researches by M. Gruner, on the relative corrosion of cast-iron, steel, and soft iron. Various plates, suspended in a frame by their four corners, were immersed simultaneously in water acidulated with 0·5 per cent of sulphuric acid, or sea-water, or were simply exposed in moist air of a terrace foundry. In moist air, chrome steels were corroded most rapidly, and tungsten steel less than carbon steel. Cast-iron, even when high in manganese, is oxidized less than steel and soft iron, and white forge pig less than gray foundry-iron. Sea-water, on the other hand, attacks cast-iron more than steel, and with special energy white iron. Tempered steel is less attacked than the same steel annealed, soft steel less than steel high in manganese or chrome steel, etc. Acidulated water, like sea-water, dissolves gray pig-iron more rapidly than steel, but not white iron; the gray impure pig-iron is most strongly attacked. These results agree with the complete experiments on the subject by Mallet in 1843.

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OFFICIAL STATEMENTS AND REPORTS.

QUINCY MINING COMPANY, LAKE SUPERIOR, MICHIGAN.

The directors of the Quincy copper mine, the most productive on the lake, after the Calumet & Hecla, have just issued their report on the business of the mine during the year 1882. The shipment of the season was 6,853,660 pounds of mineral, which has been smelted, and yielded about 82·67 per cent, or 5,665,796 pounds of refined copper. The product of the mine for the year, as prepared for shipment, was 6,874,230 pounds, or $3437\frac{230}{2000}$ tons of mineral, of which 6,508,410 pounds were stamp copper, and 365,820 pounds mass—a total of 6,874,230 pounds; for which, estimating copper on hand in New York at 18 cents per pound, and the product left over at the mine at 82 per cent yield and 15 cents per pound, has been realized the gross sum of $970,363.27, to which must be added $6142.83, realized from sale of silver, making a total of $973,506.10.

The expenses of the year were as follows: Running expenses at mine, $381,010.82; building and construction account, $63,427.63; smelting, transportation, and all other expenses, $96,969.13; making a total of $541,407.58; which, deducted from gross earnings, $973,506.10, leaves as mining profit $432,098.52. There has also been realized during the year, from interest and profit on sale of company's stock, $16,455.33, carrying the total to $448,553.85. The statement of assets and liabilities in the last report showed a balance on hand, as of date January 1st, 1882, $735,313.79, to which add earnings of 1882, $448,553.85, or $1,183,867.64. Deducting the dividend of February 20th, 1882, of $320,000, and the dividend of August 21st, 1882, of $200,000, a total of $520,000, leaves a balance of assets, January 1st, 1883, $663,867.64.

A dividend of $6 per share, or $240,000, payable February 15th, has been declared, which, with the dividend of $5 per share paid August 21st last, makes the total for the year $440,000. The total dividends paid to date aggregate $3,300,000.

The Quincy, at the beginning of the year, was carrying a stock of 880,000 pounds of copper.

The following is a brief summary for the year:

Average force employed	438 men.
" number of miners	152 "
" wages of miners on contract, per month	$48.83
Yield of mineral per fathom of ground broken	970 lbs.
" refined copper per fathom of ground broken	800 "
Total rock mined	120,377 tons.
" " hoisted	109,751 "
" stamp-rock treated	101,327 "
Yield of stamp-rock treated (3·21 per cent)	6,508,410 lbs.
Product mineral	6,874,230 "
" refined copper	5,682,663 "

The report of the agent, Mr. F. G. White, shows that the mine was in a satisfactory position.

IRON SILVER MINING COMPANY, LEADVILLE, COLORADO.

In accordance with a resolution passed at the last annual meeting of this company, making the close of the fiscal year correspond with the close of the calendar year, the Board of Trustees have submitteda report for the five months ended December 31st. The total receipts for that period were $1,047,387.32, while the expenditures were $697,667.52, leaving a profit of $349,719.80. By the payment of $400,000 in dividends, the cash on hand on March 1st, 1882, of $182,605.27, has been reduced to $132,325.07, making the surplus, including timber and supplies on hand, at the beginning of the year $151,153.78. The trustees say: "There have never been any stated times for the payment of dividends. The rule has been to pay dividends of $100,000 whenever there was on hand the sum of $200,000, thus always keeping a reserve of not less than $100,000; and the sentiment of your Board of Trustees is, that this reserve should rather be increased than diminished."

The report in conclusion gives the following data:

Ore produced in ten months, 60,186 dry tons; average moisture, 12 per cent; product of silver, 895,426 ounces; product of lead, 34,360,856 pounds; average number of employés, 500.

Mining work accomplished as per report of surveyor: Stopes, 4012 cubic fathoms; shafts, 305 feet; winzes and rises, 1096 feet; drifts, 11,626 feet.

The mining captains report the mine fully as well opened, and as much ore in sight as at the date of the last report, February 28th, 1882. There is, therefore, every reasonable prospect that the business of the coming year may be comparatively as successful as that of the last year.

PROGRESS IN SCIENCE AND THE ARTS.

Amber in New Jersey.—Mr. G. F. Kunz, in a paper read before the New York Academy of Sciences, describes a mass twenty inches long, six inches wide, and one inch thick, and weighing sixty-four ounces, found at Kirby's marl-pit, on Old Man's Creek, near Harrisonville, Gloucester County, New Jersey, about twelve months ago. A one quarter inch section showed a light grayish-yellow color. A section one and a quarter inch thick showed a light, very transparent yellowish-brown color. The entire mass was filled with botryoidal-shaped cavities filled with glauconite or green sand, and a trace of vivianite. The hardness is the same as the Baltic amber, only slightly tougher and cutting more like horn, and the cut surface showing a curious pearly luster, differing in this respect from any other amber yet examined by Mr. Kunz. This luster is not produced by the impurities, for the clearest parts show it the best. It admitted of a very good polish. The specific gravity of a very pure piece of the carefully selected amber is 1·061, which is the lowest density on record, the usual amber range being from 1·065 to 1·081. It ignites in the same way as other ambers. It was found at a depth of twenty-eight feet, in and under twenty feet of the Cretaceous marl, the amber being found in a six-foot stratum of fossils.

Boracic Lagoons in Italy.—An interesting report upon the springs in the province of Pisa, Italy, which yield boracic acid, has recently been issued by the United States Consul at Leghorn. The district in which the springs occur belongs entirely to one owner, the Count de Lardarel, who in his seven "borax" villages has most conscientiously looked after the welfare, moral and social, of his work-people. Although the whole of the neighborhood contains most extensive borax deposits, it is not from these sources that the most abundant supplies are obtained, but from shallow artesian wells. The boring, however, is carried down until the well yields water, when the machinery is withdrawn and water let into the shallow pond previously dug around the bore-hole. This water becomes heated up to boiling-point and impregnated with the borax, which rushes up from the opening of the artesian well, after which the water is drawn off and evaporated by passing it over a series of shallow metal pans, from 15 to 20 in number, arranged like a cascade. The borax, as it reaches the bottom pan, is half solidified, and when cold has the appearance of being frozen over with a skin of rotten ice. This skin is removed and strewed on the floor of a drying-house, heated by hot pipes, and by this means the borax becomes crystallized. The lagoons have a most peculiar aspect during the issue of the borax. When full of water, the boiling is continuous, rising to some feet in hight, and the vapor is unpleasant from its sulphurous odor. The smell of sulphur, indeed, pervades every thing about the establishment, and every thing in the shape of metal is discolored. The quantity of borax produced from the estate averages from 3 tons to 3½ tons a day; but as this is only one of the borax villages (though the most profitable), the total yield may be put down at 11 tons per diem. Upward of 1800 laborers are employed on the property, of whom 800 are exclusively engaged in the production of the acid.

THE *Chemiker-Zeitung* quotes from a German journal devoted to the sugar industry an advertisement asking for the services of an "academically educated chemist, fully acquainted with the manufacture of sugar, who can undertake in summer the coppersmith's work, or the oversight of the teams of draught-oxen." This is a little worse than an American iron-master who wanted a chemist capable of keeping a watch on his phosphorus and teaching the cornet for laborer's wages.

AT a fancy dress ball, held at Hull, England, recently, a lady somewhat electrified the remainder of the company by appearing with incandescent lamps arranged about her person. To quote a local contemporary: "Small incandescent lamps were artistically introduced into the headdress and other portions of the costume, and the electricity was supplied by a gentleman who was in attendance with a box representing a hand-organ, from which were wires attached to the lamps." According to this extract, it seems a matter of conjecture as to whether the source of the electricity was the gentleman in attendance or the box representing a hand-organ. The fact of the matter is, that the box was a bichromate battery, which, together with the lamps and fittings, had been supplied by Mr. T. Muse, an electrician of Hull.

DIVERS IN A CORNISH MINE.—We are indebted to Mr. R. J. Frecheville, of Truro, for the following account of the first diving operation of the kind carried out in a Cornish mine. The heavy and almost incessant rains during the winter have so increased the water in the Phœnix United Mines, Liskeard, that it has risen above the plunger-pole, which is situated 200 fathoms from the surface. After the plunger had been working some time under water, it failed to work satisfactorily. Soon after, it was discovered that it required to be packed, and the question arose as to how the obstruction was to be removed, there being from 10 to 20 feet of water above the top of the pole. The manager and agents held a consultation, and decided to engage the service of a diver. This course was generally approved in the mines, and was accordingly adopted. At first, one diver and his assistant came to the mines, and prepared themselves to perform a piece of work underground which they had never before seen. They, however, determined to make an attempt in a vigorous manner, knowing that, if their efforts were successful, much credit would be reflected on them, as it was the first time any such work by divers had been done in mining operations. The diver succeeded in packing the pole, and a signal was given to the engine-man to work the engine. It started, and the plunger-pole worked in a very satisfactory manner all night; but in the morning, the shaft-men ascertained that the pole had failed, and wanted to be attended to again. The diver prepared and packed the pole the second time, and continued to attend to it until the work was deemed too laborious for one man to continue to do, and the service of a second diver was called in to perform the same kind of work as the former.

FURNACE, MILL, AND FACTORY.

The Philadelphia Hydraulic Works have just completed a 5500-pound steam-hammer, for Anderson, Du Puy & Co., of Pittsburg, and are building a similar hammer for the Co-operative Iron and Steel Works, of Danville, Pa.

For a long time past, the Russians have drawn their supplies of steel shovels almost exclusively from America. Latterly, the Germans have competed for the trade. Two steel-works at Witten, in Westphalia, have succeeded in producing shovels which, according to the German Consul-General at Moscow, are fully equal to the American make and nearly one third cheaper. The import trade in American shovels has consequently nearly ceased.

It is proposed to increase the capital stock of the Glamorgan Iron Company, of Lynchburg, Va., to $80,000.

At Jonesboro', Ala., the site has been selected for one of the largest iron and coal enterprises in the State, and the plans are prepared already.

A Northern company has purchased the iron bed near Rome, Ga., and another blast-furnace will very soon be erected.

The directors of the suspended Union Iron and Steel Company held a meeting at Chicago on the 28th ult., at which, it is said, that it was resolved to submit a proposition to the stockholders at a meeting to be held on March 12th, to issue $1,400,000 of preferred stock on which to start the mills again.

The Republic Iron Mining Company has released its attachment against Brown, Bonnell & Co., and affairs are advancing so favorably under the direction of Receiver Brown that it is expected that the fires will be relighted, and that a start will be made in all departments on the 4th. Many contracts are received, and a determination is expressed to assist Brown, Bonnell & Co. through their present embarrassment.

The firm of D. W. R. Read & Co., a prominent firm of iron-ore importers, of New York, Philadelphia, Baltimore, and London, has suspended.

The managers of the Smithsonian Institution have undertaken to present in all the leading branches of mechanical and manufacturing industry examples on the one hand of the old, crude, and primitive appliances which exist as relics of a past age, and on the other the most approved specimens of American machines or devices which those arts in their modern state afford. In that branch of industrial science which comprises the utilization of the power of water, the managers of the Institution have selected the James Leffel Double Turbine as a representative modern American water-wheel, embodying the most improved and efficient means for the development of water-power as applied to the propulsion of all kinds of machinery. To this end, they requested the firm of James

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Leffel & Co. to furnish them a specimen of the Leffel wheel, to be placed in the new National Museum building lately completed, adjoining the original structure of the Institution, where it will form a part of the collection of the best modern machinery which is now forming on the plan above described. The wheel asked for by the Smithsonian Institution has been made at the shops of James Leffel & Co., in Springfield, Ohio, and is now at their office at 110 Liberty street, New York. It is not a "model" merely, but a working wheel of 7⅝ inches diameter, one of the regular sizes made by the firm. It differs in no respect from those of their ordinary make, save in its ornamental finish, upon which special care has naturally been bestowed. The gates and gate-rods are plated with gold, and the other parts of the casing with silver.

The sheriff of Washington County, Pa., will sell, on March 27th, the property known as the Antietam Iron-Works, situated in the Sharpsburg District, owned by Daniel V. Ahl, of Newville, Pennsylvania. The works are sold under an execution issued at the suit of the Hagerstown Bank.

J. M. Downing & Co., proprietors of the tube-works in New Castle, have made a proposition to the citizens of Mercer, Pa., to remove their establishment there, provided they will raise $10,000 and furnish a location. Eight thousand five hundred dollars of the amount has already been raised.

The Lehigh bar and guide mill, connected with the Allentown, Pa., rolling-mill, has started. The mill was shut down three weeks ago to make extensive repairs.

The Youngstown steel-works, after numerous delays caused by the non-arrival of machinery, commenced active operations this week by producing steel, the main object being to test their converters and ascertain if every thing was satisfactory.

The Lambert & Bishop Wire Fence Company, in Joliet, Ill., has had plans prepared for a new mill, and will soon begin on it.

The Red Wing furnace, at Sharon, Pa., will probably soon blow out.

A company has been formed in Pittsburg to work the Adams direct process. They will take the works of the Siemens-Anderson company at Linden.

A new firm has been formed, composed of Andrew Carnegie and Henry Phipps, of the Edgar Thomson Steel-Works; H. W. Hartman, formerly of the Gautier Wire-Works, of Johnstown; J. L. Ellwood, wire fence manufacturer, of New York; Mr. Stiles, of Chicago; and Mr. Sears, of Wisconsin. These gentlemen have purchased about twenty acres of land in Beaver Falls, Pa., where they will erect works on a large scale for the manufacture of nail rods, wire, barbed fence wire, etc. The various articles manufactured by the company will be made from Bessemer ingots obtained from the Edgar Thomson Steel-Works.

Dispatches from St. Louis, which look as though they were "inspired," state that great trouble is experienced at the works of the Vulcan Steel Company in its rail department, in its effort to run it without union men.

The Ashland furnace, at Ashland, Ky., has started up again, having been banked on account of rise of water.

It is said that the Billings & Spencer Company, Hartford, Conn., does the largest drop-forging business in the United States. It runs twenty-five drop-hammers, ten presses, one atmospheric and four tilt-hammers, and manufactures upward of 2000 different aricles for parts of guns, pistols, sewing-machines, special machinery, and machinists' tools, besides manufacturing a large variety of goods in a finished state.

A meeting of the Western Nail Association was held in Pittsburg, on the 20th ult., in conformity with a resolution passed at the last regular session, two weeks ago, which was to the effect that work should be resumed in the mills, and continued for a fortnight only, when it would then be decided whether the state of trade would warrant a further run, or whether another suspension would be necessary. A resolution was passed unanimously providing for a stoppage of all nail mills west of the Alleghany Mountains for a period of two weeks, commencing March 4th. Trade was reported fair and the stocks on hand quite light. The stoppage is considered necessary to prevent accumulation of stocks, and to thereby keep the market in a healthy condition. It not being a regular meeting, no action was taken as to prices, neither was there any action taken on the disposition of Eastern manufacturers to cut prices.

Parties representing the Columbus & Hocking Valley Coal and Iron Company consolidation have been in session for two days at Columbus closing up the business and getting ready for operations. The capital stock of the company is $5,000,000, with an estimated cash basis of over half that amount. The consolidation elected a board of directors, which organized as follows: Samuel Thomas, of New York, President; T. Longstreth and Walter Crafts, of Columbus, and J. R. Buchtel, of Akron, Vice-Presidents; S. Churchill, Treasurer; and H. D. Turney, Secretary. J. S. Farlow, of Boston, is a member of the board of directors.

Mr. Horace Ware has sold his furnace, its machinery, and all the lands connected with the operation of this business, to Charles Cobb, of New York; John F. Dickson, of Marshall, Texas; and the Marshall Car and Foundry Company, for $40,000. It is said the purchasers will very soon remove the car-works, now at Marshall, to the furnace, and greatly enlarge the business.

The Cleveland Furnace Company, a furnace and iron company operating under a lease at Steubenville, failed this week; liabilities, $90,000; assets, from $30,000 to $40,000. Inquiries among ore-dealers and others developed the statement that the company, which is a small concern, failed six weeks ago, but was given an extension of time. Mr. F. A. Bates is president of the company, and Mr. W. P. Murray, Secretary.

A number of English capitalists, among them Sir Titus Salt, Charles Stead, and C. Howson, are expected to visit Tennessee at an early date, to examine the Dayton coal mines and a number of iron deposits, with a view to the investment of large amounts of capital in iron and steel manufacturing.

GENERAL MINING NEWS.

ARIZONA.

The following companies have filed articles of incorporation: Ajo Mining and Development Company. Blue Jacket Mining and Milling Company. Central Illinois Mining and Reduction Company. Columbia Copper Company No. 3. Morning Star Consolidated Mining Company. Morning Star and Crescent Consolidated Silver Mining Company. Randolph Mining Company. Sidney Mill and Mining Company. Sonora Coal and Construction Company. Takoma Copper Company. Yavapai Mining Company.

The purchasers of the Peabody mine, at Russellville, are grading for the erection of two more smelters.

COCHISE COUNTY—TOMBSTONE DISTRICT.

A large body of ore has been struck near the side-line of the Good Enough mine, at a depth of 126 feet, the shaft having passed through limestone nearly the entire distance. The extent of the ore-body is not yet developed. Considerable horn-silver is appearing in the west side.

McMahon won the suit against the Last Chance mine, recovering one half.

The 400 level of Contention shows an ore-body over 40 feet in width.

Forty thousand shares of the Emerald Company's stock have been taken by capitalists. The consideration is a certain amount of development-work to be done in shafts, drifts, and cross-cuts. In sinking the shaft the last 20 feet, the ore doubled in value. Extensive development is to begin at once. The Aunt Sally shaft is down 30 feet, all in ore, and is to be sunk to the depth of 100 feet.

Ore has been struck in the Gilded Age mine, assaying $2000 per ton.

PIMA COUNTY.

A report says that there is great excitement over a remarkable silver discovery twenty miles south of Tucson, in the Santa Rita Mountains. The ore-crossing is 100 feet wide and over a mile long. One claim to the property has just been purchased.

HOWARD MINING COMPANY.—The average of ten assays was $9772.76 in silver. This rich ore-streak was found in the Great Republic mine, the property of the company, in a winze sinking below the 200-foot level at a depth of about 20 feet. This company has a complete mill. It has a battery of ten stamps, and has every thing in shape to increase it to 20 stamps if necessary. It also has eight Frue concentrators and roasters, so that it is prepared to treat any kind of ore that may be found in the mine.

CALIFORNIA.

The following companies have filed articles of incorporation: Buchanan Gold Mining Company. Capital, $2,000,000. Directors: John A. Davis, W. Hamilton, Alexander Warner, F. F. Moulton, A. Martin. Inyo Borax Company. Capital, $50,000. Directors: J. D. Langborne, Jr., Robert E. McGill, John T. O'Brien, Henry Glass, and Charles C. Kinsey. Lucky Hill Mining Company. Capital, $10,0000,00; shares, 100,000. Directors: Alexander McAbee, Max Gruenberg, Charles Shaw, A. K. Greene, John Carlin. Mexican Mill and Mining Company. Capital, $60,000; shares, 1200. Directors: John Cushing, Allen D. Cushing, John W. Phillips, W. L. McCrary, Grant I. Taggart, and W. Dingee. Principal place of business, Oakland. Myrtle Gold Mining Company. Capital, $2,000,000; shares, 100,000. Directors: M. M. Estee, John H. Boalt, Ramon E. Wilson, C. T. Bridge, W. E. Sell. San Miguel & La Trinidad Consolidated Silver Mining Company. Capital, $240,000; shares, 24,000. Operations, Mexico. Directors: M. Rosenbaum, George Johnson, John Rodda, J. Bandmann, and C. Nobmann. Zilka Gold Mining Company. Operations, Colorado. Directors: Orrin Skinner, of Quincy, Ill., Henry H. Lynch, Beverly S. Taylor, Frank G. Newland, and J. J. Corrigan.

SAN BERNARDINO COUNTY—PROVIDENCE MINING DISTRICT.

The railroad has been completed to Providence, reaching an extensive mining country.

The mines which are worked in the district show generally good results.

BONANZA KING.—The mill is turning out 2000 ounces of bullion daily. It is reported that a new strike of extraordinarily rich ore has been made in the extreme north end of the first level of this company's mine.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GENESEE.—It is reported that the mill will start up shortly.

GREEN LEDGE.—A force of men has been put to work. The tunnel has been cleared up and pay-ore is now taken out; the best ore has a copper stain and contains a small amount of sulphurets. The average value of the ore, as worked in an arrastra, has been, thus far, $30 per ton. The bullion is very fine, being worth $19.50 per ounce. The men are at work in a rich pocket in a drift below the tunnel, and about 200 feet from its mouth; when this is got into proper order, a new tunnel will be started on the ledge, where it crops out on the surface, and run in till it strikes the breast of the present workings.

CANADA.

NEW BRUNSWICK.

Quispamsis Mining Company. Capital, $300,000; shares, 60,000. Incorporators: George F. French and F. J. Lewis of Boston; Thomas Elston and F. J. Baldwin of Somerville, Mass.; and Alfred A. and Robert O. Stockton, of St. John, N. B.

The St. John *Telegraph* says that some years ago silver was discovered on the James F. Wanamake farm, Hammond River, King's County. The deposit is about three miles from the St. Martins and Upham Railroad. A lease of the land has been secured by Messrs. James Robertson and Robert Shearman, of Albert mines, and D. N. Webster, of Salisbury, and they will form a company to work the mine. Analyses have been made by Professor Burwash, of Sackville, and Mr. Best, of St. John. Professor Burwash's analysis shows: Lead, 26 per cent; silver, 22 ounces troy to ton of lead; gold, 10 pwt. to ton.

NOVA SCOTIA.

According to the Halifax *Herald*, valuable manganese mines have been discovered at Tenny Cape, Cheverie, Walton, and Truro, giving ores of the best quality. At Tenny Cape and Cheverie, the mines have been worked by the proprietors for some years. At Walton, most valuable deposits have been discovered, the ore being of the highest grades. A company is now forming to work this mine, under the name of the Eureka Manganese Mining Company, which will commence operations immediately. At Truro, the St. James Manganese Company is in operation, and the outlook for the return from its mine is also very promising.

COXHEATH MINING COMPANY.—A report from Halifax says that the company has taken out a silver license at the Mines Department there, covering its entire copper areas in Cape Breton, owing to the ore showing a larger percentage of the richer metal as greater depth was attained. It is said these recent developments add considerably to the value of the property and are arousing some excitement among mining speculators.

PROVINCE OF QUEBEC.

The following analysis of apatite taken from the township of Templeton, Ottawa County, has been furnished us by Messrs. Benedict & Cole, of this city:

Phosphoric acid*	40·812
Fluorine†	3·554
Chlorine‡	0·040
Carbonic acid§	0·518
Lime	49·102
Calcium	3·763
Magnesia	0·620
Alumina	0·565
Sesquioxide of iron	0·125
Alkalies	?
Insoluble residue	0·630
	99·729

COLORADO.

The following companies have filed articles of incorporation:

Alcove Consolidation Mining Company. Capital, $500,000; shares, 50,000. Operations, Colorado. Directors: Q. J. Wellington, J. J. Pochon, and Sparoc Wellington. Principal office, Colorado Springs; branch offices in New York and Chicago. Belleville Mining, Smelting and Prospecting Company. Capital, $200,000. Operations, Colorado. Principal office, Belleville, Ill. Bowman Mining Company. Capital, $100,000. Operations, Colorado. Directors: J. B. Bowman, A. D. Breed, and H. B. Gillespie. Principal office, Stamford, Conn. Cape Cod Mining and Reduction Company. Capital, $260,000; shares, $10 each. Operations, Colorado. Directors: W. C. Armor, George C. Hallett, C. E. Smith, Samuel Eldridge, and J. E. Benjamin. Principal office, Golden. Celina Mining and Milling Company. Capital, $5,000,000; shares, $100 each. Operations, Ouray County. Directors: Judge C. M. Hughes, of Lima, Ohio; Christopher Schenck, David J. Roop, Stephen Howick, Seth S. Snyder, of Celina, Ohio; and James C. Weller and William H. Gebbert, of Colorado. Principal office, Celina, Ohio. Climax Mining and Milling Company. Capital, $2,000,000; shares, $10 each. Operations, Gilpin County. Directors: Henry Perrse, Mark M. Pomeroy, John J. Rilley, J. E. Still, and J. W. Plunkett. Principal office, Denver. Denver & Mount Carbon Coal Company. Capital, $150,000; shares, $10 each. Operations, Jefferson County. Directors: A. E. Burwell, George S.

* Equal to 89·098 tribasic phosphate of lime.
† " " 7·295 fluoride of calcium.
‡ " " 0·062 chloride of calcium.
§ " " 1·177 carbonate of lime.

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Lee, James W. Jefferson, W. J. Lee, and S. Richards. Principal office, Denver. Dome Mining Company. Capital, $80,000; shares, $100 each. Operations, El Paso County. Directors: Linus E. Sherman, George M. Arnold, Theodore Ingalshe. A. Z. Shelkon, and William J. Bail. Principal office, Colorado Springs. East Hukill Gold and Silver Mining Company. Capital, $500,000. Operations, Colorado. Directors: William M. Shaw, E. B. Parvin, R. H. Shaw, and Dr. G. F. Hoop. Principal office will be at Clearfield, Pa. Enterprise Consolidated Mining Company. Capital, $1,000,000; shares, $10 each. Operations, Summit County. Directors: Joseph Reynolds, Alfred J. Cross, George H. Loplin, of Chicago; John R. Cleveland, of Arapahoe County, and John D. Morrisey, of Lake County. Principal office, Robinson. Fort Collins Land, Mining, and Coal Company. Capital, $25,000. Operations, Larimer County. Directors: Andrew James, Frederick A. Crane, and Alexander McGregor. The principal office will be at Fort Collins. Grand Island Silver Mining and Milling Company. Capital, $5,000,000; shares, $5 each. Operations, Boulder County. Directors: N. E. Nicholson, A. E. Powell, Thomas Wilkins, F. Irving Davis, and W. H. Nicholson. Principal office, Boston, Mass. Harlem Gold Mining Company. Capital, $100,000; shares, $10 each. Operations, Gilpin County. Directors: Edwards, Peter French, Oscar Versettish, and William Freden. Principal office, Central City. Hibernia Mining Company. Capital, $1,000,000; shares, $10 each. Operations, Lake County. Directors: Dennis Sullivan, James V. Dexter, Homer Pennock, Herman Berger, and Sylvester Nichols. Office, Leadville. Jamestown Mining and Tunnel Company. Capital, $1,000,000; shares, $10 each. Operations, Boulder County. Directors: Samuel P. Barbee, A. B. Ingolls, J. D. Alkine, Leonard Alkine, A. J. McCorkle, W. F. Thompson, A. W. Hilles, J. C. Carter, and D. T. Sanderson. Principal office, Denver. Keystone Gold and Silver Mining Company. Capital, $60,000; shares, $10 each. Operations, Chaffee County. Directors: Charles S. Hill, Thomas R. French, Edmund Tabor, Samuel H. Manifold, P. R. Bolm, John O. Wilson, and George O. Dobyne. Principal office, Buena Vista. Lake Mountain Milling, Mining, and Smelting Company. Capital, $50,000; shares, $10 each. Operations, San Juan County. Directors: G. C. Marshall, W. H. Edeburn, L. L. McCully, J. Y. Hamilton, E. S. Townsend, James Fitzsimmons, R. S. Cochrane, Joseph F. Denniston, and James Godfrey. Principal office, Mineral City. Louis Cook Mining, Milling, and Developing Company; Capital, $1,500,000; shares, $10 each. Operations, Colorado. Louis Cook, James Hockheimer, and James R. Johnson are three out of the five directors to be appointed. Missouri & Colorado Mining Company. Capital, $500,000; shares, $100 each. Operations, Chaffee County. Directors: James H. Payne, John R. Stoller, H. P. Bickford, William Small, and Richard I. Boggess. Principal business office at mines, and an office at Kansas City, Missouri. Mount Sneffles Mining Company. Capital, $500,000; shares, $10 each. Operations, Ouray County. Incorporators: Robert A. Burnett, Charles Hamm, and James Whitehead. Principal office, Ouray. Ohio Consolidated Mining and Milling Company. Capital, $1,000,000; shares, $10 each. Operations, Ouray County. Directors: Lewis Scott, Robert C. Fawcett, and Hiram Kirby, Principal office, Ophir. Pembroke Mining Company. Capital, $1,000,000; shares, $5 each. Operations, Colorado. Incorporators: J. Pembroke Thom, W. Stewart Polk, John Gill, De Courcey W. Thom, Stephen Bonsal, Charles D. Fisher, P. Lea Thom, and Willoughby N. Smith. Principal office, Baltimore, Md. Rico Reduction and Mining Company. Capital, $500,000; shares, $25 each. Operations, Colorado. Directors: D. J. Neff, Hon. Samuel Calvin, Hon John Dean, H. C. Dern, Theodore C. Wigton, A. B. Hoover, A. A. Stevens, Hon. John Reily, and Dave Caldwell. Principal office, Horse Gulch, Rico, and branch office, Altoona, Penn. Silver Cloud Mining Company. Capital, $500,000; shares, $10 each. Operations, Colorado and Illinois. Directors: Albert Brendel, James A. Landon, James G. Jansen, Marvin R. Brainard, Henry Kline, James Low, and Josiah S. Wolfe. Principal business offices are to be at Howardsville, San Juan County, Colo., and Chicago, Ill. St. Louis Syndicate Mining Company. Capital, $2,000,000; shares, $10 each. Operations, Colorado. Directors: John F. Watkins, William A. Adams, Henry Stanley, Edwin L. Doris, William R. Moore, George H. Lawer. Principal office, St. Louis, Mo. Stockholm Mining Company. Capital, $300,000; shares, $10 each. Operations, Summit County. Directors: H. A. Plimpton, F. A. Malins, H. W. Pollitz, D. Jackson, and Emerson Gee. Principal office, Red Cliff. Summit Consolidated Mining Company. Capital, $1,250,000; shares, $10 each. Operations, Clear Creek County. Incorporators: Melvin Edwards, Russell F. Lord, of Georgetown, Colo.; Major James H. Lord and William Sturgis, Jr., of Cheyenne. Principal office, Georgetown. Branch office, Cheyenne, Wyoming. Tecolate Silver Mining Company. Capital, $1,000,000; shares, $10 each. Operations, Mexico. Directors: W. T. Heldrup, James Harlan, J. E. Rutherford, George Macklin, J. B. Coate, Charles L. Bailey, D. L. Jauss, George G. Boyle, and J. M. Dickey. Principal office at Colorado Springs, Colo., and branch office at Santa Barbara, Mexico. Tower Mountain Silver Mining Company. Capital, $500,000; shares. $10 each. Operations, Colorado. Incorporators: Tunis W. Van Hosen, Peter Gray, William V. McGrath, William Devine, Thomas Morris, and William J. Gray. Principal office at Philadelphia, Pennsylvania, and branch office at Silverton. Viola Mining and Smelting Company. Capital, $250,000; shares, $10 each. Operations, Idaho and Colorado. Incorporators: Charles B. Rustin, Amos H. Fowler, Theodore Berdell, and Nathaniel Witherell. Principal office, Denver. What Cheer Company. Capital, $1,000,000; 1,000,000 shares. Operations, Colorado. Directors: David Skeeles, William Crein, and Thomas R. Lee. Offices, Ophir and Carrolton, Ohio. White Star Tunnel Mining Company. Capital, $300,000; shares, $10 each. Operations, Gilpin County. Directors: James Powell, James E. Powell, and Gerald Leahy. Principal office, Black Hawk.

CLEAR CREEK COUNTY.

GOOD LUCK.—The tunnel is driving into the mountain; it is now in 1250 feet. At this point they are raising a winze to connect with a drift which is extending from the bottom of the main shaft, which is now 560 feet in depth. When this connection is made, it will drain the mine and give it good ventilation and save largely in expense.

LITTLE MATTIE.—The Argo mine has disposed of one half of its property to this company for $10,000. Machinery will be erected immediately, and the property will be developed extensively.

POLAR STAR LODE.—The work of clearing out the mine is nearly completed.

SNOWDRIFT.—The lower level east shows three feet of quartz, interspersed throughout with rich sulphurets. The formation is appearing in the level above, which seems to indicate a body of ore coming up from below eastwardly. The proposed seventy-foot shaft at the cross-cut from the lower level is down four feet.

WALLACE.—The company will build a concentrator either at the mouth or the head of Ute Creek, in the near future. The company has also purchased the Cecil lode. The Wallace and Cecil lodes are the extension of the Freeland mine on the west, and both properties will be extensively developed.

GUNNISON COUNTY.

ISLET.—The mill was shut down after running the Goldsmith ore, and will not be started again until some radical changes and additions have been made. Among these is contemplated an increase of the capacity to twenty or forty tons; the substitution of a 75 horse-power boiler and engine for the present ones, which have proved inadequate to drive even the present machinery; the procuring of new screens, and also additional pan room for the present furnace, which is capable of treating ten tons of ore per day, while the pans are insufficient for more than four.

LAKE COUNTY.

Late Leadville exchanges contain the following:

The great flow of water in the deeper shafts on the north side of Fryer Hill, seriously interfering with the work in the deeper shafts for the past two years, is reported to have greatly abated, and in some instances nearly ceased. In consequence, quite a number of the shafts have resumed work.

AMIE.—This property is producing a great deal of ore, of all possible grades and varieties, at present. The property has a number of lessees working upon it, most prominent of whom are those who secured the No. 3 shaft and contiguous territory. The mine from this shaft is producing about 125 tons daily, ranging from ten to forty dollars per ton. About 140 men are at present on the pay-rolls of the lessees, and worked in eight and ten-hour shifts.

BIG PITTSBURG.—The company has stopped all its leases except the one upon the Haytrosser shaft. Manager Bulkley began on work for the company the Lent shaft during the week, but, owing to trouble with the machinery, a temporary suspension was found necessary. Work will be resumed.

CHRYSOLITE.—The company is still engaged in pushing work on the incline from the Colorado Chief No. 2 shaft, and a small streak of pay-ore has been disclosed in the second or lower body of iron, but no pay. Recent developments confirm the statement that there are two distinct bodies of iron in this portion of Fryer Hill, being separated by eighty to ninety feet of rock. A new strike, of doubtful importance, has been made in the past week in the Colorado Chief shaft, worked on a lease of Mr. J. C. Langhorne and others.

COLONEL SELLERS.—The mine, situated on the south side of Iron Hill, has resumed the sinking of the shaft. The new pumps are handling the water with ease, and no further trouble in this direction is anticipated. The shaft is still in ore of low grade.

HENRIETT.—The continuation of the Henriett incline recently encountered another large water-course, and the flow of water since then has seriously retarded work in this particular portion of the mine. Manager Harker expects to drain the water from the incline in a short time, when development will be renewed. The mine is looking well and producing regularly.

IRON SILVER.—The Stone mine continues making an average daily output of two hundred tons of ore. The large production of the property necessitates economy in handling the ore, and to provide proper facilities, a large force is engaged in surface improvements. About forty men are employed in grading and cutting away a portion of Iron Hill, in order to make room for the large ore-bins, now at the Rock mine, which are to be removed to this side of the gulch. The No. 6 Stone shaft, situated on the north side of the road, having a depth of sixty feet, and formerly used exclusively as a timber shaft, is to be utilized in hoisting ore. At the Moyer shaft, work is at a stand-still, except the steam-pumps, which are kept in operation maintaining the shaft's freedom from water to some extent, though of insufficient capacity to permit the sinking of the shaft, now down one hundred and ninety feet, to greater depth.

THESPIAN SHAFT.—The shaft on Carbonate Hill has recently passed through the contact-matter and struck lime at a depth of about six hundred feet. Drifting in the limestone has been commenced, and it is hoped that a chute of mineral may be encountered at no great distance from the shaft.

SUMMIT COUNTY.

CLINTON.—A correspondent of the Denver *Republican*, in speaking of this mine, says that the mining operations in that camp are in a very prosperous condition, with the promise of an increased ore output for the coming year. The Clinton especially has rapidly enhanced in value under the extensive development which has been made. The mine is now opened by an incline 550 feet in length, from which six levels are extended, having an aggregate length of 300 feet. All these headings are in ore of shipping grade, and the daily output is now thirty tons of a value of $30 per ton. Thirty men are employed and a tramway is constructing by which the ore will be delivered to the track of the Rio Grande Railroad about 1000 feet distant, at the base of Battle Mountain.

QUEEN OF THE WEST.—The Ten Mile *News* says that the mine has shut down. The prevailing opinion, which seems to gain ground from the reticence of the owners, is, that the mine has been sold.

ROBINSON.—The mine continues to ship about three or four car-loads per day, which, it is presumed, includes the shipments made by Mr. Doolan from his lease, which will expire on the first of March.

WHITE QUAIL.—The company has paid off its indebtedness to George R. Fisher & Co., and as soon as the sheriff's fees, over which there is some dispute, are adjusted, work will be resumed on the mine.

DAKOTA.

CALEDONIA.—The company is sinking a winze from the 100 level to the depth of 150 feet. The winze is now down thirty feet. The mine shows marked improvement, the ore-body having a width of eighty feet.

FATHER DE SMET.—The report of the superintendent for week ended February 15th shows ore extracted from first, second, and third levels, 1750 tons; ore milled, 1800 tons. Water short from the 8th to 13th inst. Third level header advanced 6 feet; header in, 134 feet; Italian winze advanced 12 feet; winze down 53 feet; north end tunnel advanced 10 feet; tunnel in 815 feet.

FLORENCE.—The mill is still idle. Machinery for its enlargement is awaited.

SITTING BULL.—The smelter will fire up March 1st.

SUMMIT.—The mill is in successful operation on Initial ore.

GEORGIA.

The Dahlonega *Signal* says:

GOLDSMITH.—The new placer is worked. The company has been washing off the clay for the past week, and intends to wash the gravel this and next week. A ditch from the Fish Trap extension has just been completed, and a reservoir 1000 feet in length. After every thing is ready, the intention is to run a little giant, which will reduce expenses greatly, and increase the yield.

IDAHO.

POCAHONTAS.—This company has been organized to develop the well-known Washington lode, which is situated five miles north of Galena, on the mountain that divides the waters of the Wood and Salmon rivers. It outcrops the entire length of the claim—1500 feet. A smelter will be built by the company the coming summer.

SAWTOOTH GOLD AND SILVER MINING COMPANY.—This company has been organized in San Francisco to develop the Jupiter, Justice, Ophir, and Midnight mines. The mines are located within one mile of Sawtooth, in Beaver Cañon. The Jupiter is opened by a shaft 125 feet deep—at which depth the ore-body is 38 inches wide and ore is in the shaft all the way from the surface down, averaging 38 inches in width. The Justice is a smaller vein, dipping at an angle of 45 degrees, and is in granite formation with a slate hanging-wall, and strong, heavy clay gangue on the foot-wall. The vein-matter is quartz containing ruby silver, which has produced up to $1900 in silver and $420 in gold to the ton. The silver ore is black sulphurets, ruby, and stephanite. The vein carries 11 inches of ore at a depth of 35 feet, which is the lowest point yet reached on the vein. The Ophir is a 35-foot vein, cut across on the surface from wall to wall, and all the ore exposed is free milling and averages 57 ounces in silver per ton. It crops out strong a distance of two miles, and carries a uniform width of 35 feet. It is quartz carrying ruby, native, and wire silver, and some gold. The Midnight is not much developed, as the deepest work on this mine is 12 feet. The ore is continuous and free milling, ruby, stephanite, and native silver, carrying 135 ounces to the ton, and some gold. The vein is 28 inches wide. A new mill is to be built.

MAINE.

HERCULES.—Work upon this mine, says the Bangor *Jonrnal*, was suspended last fall from lack of funds, as some of the stockholders declined to pay their assessments and the management was unwilling to run the mine into debt. The mine itself never looked so promising as on the day it was shut down. The ore-vein was more than four feet thick and rapidly widening, of nearly solid zinc-blende

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and galena, containing scarcely any rock. During the past few months, several of the leading stockholders have been quietly buying up the shares held by the obstructionists, with a view to place them in the hands of those who will be willing to assist in pushing the work of development in the spring, and arrangements are now making to start up the mine about the first of April. Every thing at the mine is in perfect working order, and the facilities for shipment are excellent, the company's new wharf being probably the best in Hancock County.

MEXICO.

We have received the following letter:

I see, by your issue of December, 9th, a notice of the Candelaria of this place, which calls for a word of comment from me. It is remarkable principally for the number of errors that are compressed into so few lines, being an epitome of a report by Mr. R. E. Chism, who was here as my book-keeper for a year and a half, and afterward in charge of the property about a year more. Mr. Chism was aided in his suits by two lawyers, Don Francisco Alvarado and Don Luis Fernandez. The "unscrupulousness" of Don Toribio Rocha consisted in trying to collect a just debt which has since been paid.

As "one Temple, a former officer of the company, who seems to be ignorant on all questions of mining," was appointed by the court "*interventor interino*" (receiver) in one of the suits, and in that capacity found it necessary to put Mr. Chism in jail, it is quite natural that in Chism's eyes he should be "ignorant on all questions," not only of "mining" but every thing else. A. V. TEMPLE.

SAN DIMAS, MEXICO, Jan. 24, 1888.

A German firm proposes to put up reduction-works at Chihuahua, shipping the product to refining-works in Germany.

The foundations for the concentrating-works now erecting on the banks of the Pachuca River by the American Company are well under way. The work is under the direction of Superintendent D. Browne, who has general charge and management, and is pushing the work rapidly. Mr. A. J. Elian has been appointed master-mechanic of the works.

Extensive machinery for the new Progreso reduction-works at Pachuca has arrived at Vera Cruz, and will be erected at once.

The Atargea mine of El Chico District, Hidalgo, is now drained by an adit, and stopes are opening on a rich body of ore discovered just before the influx of the water. The adit works well, and the extraction of ore is more than sufficient to cover expenses, though the stopes on the ore-body are not yet fully opened.

NEW YORK MEXICAN MINING COMPANY.—At the annual meeting held in Covington, the following officers were elected: President, Ira A. Hutchinson, of Columbus; Vice-President, J. M. Clark, of Cincinnati; Second Vice President and General Manager, resident in Mexico, A. B. Clark; Treasurer, C. O. Lockard Cincinnati; Secretary, Edward Worthington, Cincinnati. The report shows that the company has its machinery in operation, and it is now engaged in taking out and reducing its ore. The returns are of a nature that fulfill expectations, and leave no room for doubt as to the profitableness of the work.

MICHIGAN.

Custer Mining Company. Operations, Michigan. Officers, President, John McKenna; Vice-President, James H. Gee; Secretary and Treasurer, James H. Malloy; Directors, John McKenna, James H. Gee, James H. Malloy, Hugh McLaughlin, James M. Gray. Summit Exploring, Mining and Manufacturing Company. Capital, $1,200,000. Operations, Michigan. Directors, G. M. Wakefield, J. R. Morgan, D. L. Libbey, J. L. Mead, J. B. Davis, H. H. Stafford. Tobin Exploring, Mining, and Manufacturing Company. Capital, $600,000; 24,000 shares. Operations, Michigan. Officers, President, James Tobin; Vice-President, G. H. Gile; Secretary, E. T. Ellsworth; Treasurer, Frank Heilig; Executive Board: G. M. Wakefield, G. H. Gile, and George A. Fay.

CENTENNIAL.—The stamp-mill has been temporarily shut down, and other surface work, except such as is absolutely necessary in conjunction with underground operations, has been discontinued. Operations (underground) will for the present be confined to sinking and drifting. The openings at bottom and on either side of Nos. 1 and 2 shafts are looking very well, and sinking will be pushed in both, at the same time the second level drift will be carried north to connect Nos. 1 and 2 shafts as speedily as possible.

MONTANA.

BELL.—A contract has been let to sink a three-compartment shaft to the depth of 400 feet, the contractors stipulating to complete the work in one hundred days. While the shaft is sinking, no extensive operations will be conducted in the old workings, and most of the force has been laid off. The new shaft will be sunk about midway between the two ledges and at a point 60 feet east of the present main shaft, or 500 feet east of the west end line. At the depth of 300 feet, it is the intention to connect the new shaft with the old workings by a cross-cut run south from the latter, and thereafter the two old shafts will be abandoned for hoisting purposes. At a depth of 400 feet, north and south cross-cuts will be extended from the new shaft to intersect both ledges, and as soon as possible thereafter the smelter will be started at its full capacity. One furnace, however, will be fired up about the middle of April on ore which has been already extracted, and of which there is between $50,000 and $75,000 worth available for reduction at the smelter.

BROADWAY.—The sinking of the shaft to prove the further extent of the ore-body will be continued. Should the result of the development prove satisfactory, the mill will be refitted with new machinery and the treatment of the ore under a new and improved process will be resumed.

MOULTON.—During the past month, work has been vigorously pushed on the south cross-cut from the west 300. The vein has now been penetrated a distance of 14 feet, a small streak of very rich ore was cut into, a picked sample from which assayed 478 ounces. The vein pitches a little southward and trends westward, and a west drift on the vein has been started. Development in the north drift of the 300 last week was also quite satisfactory, an 18-inch ledge of high-grade ore having been uncovered in the west drift from the north cross-cut. Sufficient ore is produced to keep the 40 stamps at the mill constantly dropping. The mill is making a remarkable run, having now run fifty-five days without an hour's stoppage.

NEVADA.

The Berryman Tunnel and Mining Company has filed articles of incorporation. The trustees are: Henry K. Mitchell, Louis Dibber, D. R. Sessions, M. H. Joseph, and Richard Berryman.

ALBION.—A large number of heavy attachments against the company were filed in the county clerk's office at San Francisco recently. There appeared to be concert of action on the part of many creditors. The total amount of attachments so far filed is $61,027. It is alleged that if claims are presented in a similar way, the amount will reach $150,000. It is stated that work in the mines continues, and one furnace is kept running to its fullest capacity.

EUREKA TUNNEL.—A strike was made recently in what is known as the Sullivan chamber of the Eureka tunnel, some sixty feet below the tunnel level. The face of the drift is all in ore, which extends below, above, and on both sides, for a distance of six feet in. Two assays made from the new find go $125 and $150 per ton. The ore is of the character common in the mine. It is stated that the mine is looking remarkably well generally, and that ore has been found in several other places, with favorable indications for prospecting.

TUSCARORA.

NAVAJO.—The latest official information is to the effect that there is sufficient ore broken down in the stopes of the mine to run the mill for nine months; that the 450 level is developed by winzes, and the level opened, from which no ore has been extracted; that the mine has large ore-reserves above the 350 level, and is shipping $80,000 per month from a 10-stamp mill. The company has $150,000 cash in the treasury.

WISCONSIN.

The Silver Creek Mining and Milling Company has filed articles of incorporation. The capital is $500,000.

WYOMING.

A correspondent of the Salt Lake *Tribune* reports on some mines situated in the Miner's Delight Mining District as follows: About a year ago, some miners who were working some placers in Strawberry Gulch struck a ledge crossing the gulch, in an east and west direction, the decomposed (barren) rock, as they thought, looked so favorable, they concluded to pan some of the same, which they did with favorable results. They immediately located a quartz vein, calling the same the Bullion. A shaft was sunk and a ten-stamp mill erected. The first clean-up resulted in $16 per ton, the second in $22, and the third in $29. While water is found within less than five feet of the surface on the ledge, still the same can not as yet be procured in desirable quantities for running the mill steadily. A well has been sunk at the mill forty-two feet in depth, which has served to keep the mine dry (the deepest shaft sunk on the ledge being twenty-seven feet). Prospecting has been done in various places on the claim, and everywhere the ore is uniform in value with that at discovery. It has been stripped on the surface for 100 feet in width on the ledge with like results. The character of the ore in the First West Extension, the Second (Midas) and Third (Dahlonega) extensions of the Bullion is the same as that found in the Bullion, but there has been no development of either of the three properties mentioned. The ore in a claim situated about two miles from the Bullion appears to be different from that found in any of the above-mentioned claims, being black slate and iron, and from assays shows from $90 to $160 gold per ton. The vein is said to be five feet wide. Several other claims which show favorable prospects will be developed by the owners in the spring. There are within a radius of twelve miles of Strawberry Gulch, seven mills, some steam, some water, with from five to twenty stamps, the owners of which would work ore, or possibly sell. An abundance of timber, with splendid roads to haul the same. There is an abundance of water in Rock Creek, Willow Creek, and Sweetwater for running water mills. Hundreds of claims are lying idle, and many others which are worked could be purchased at reasonable prices.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

Julia Travers (administratrix), Manquetta lode.

CALIFORNIA.

SACRAMENTO DISTRICT.

William Backlage *et al.*, Golden State quartz lode. Peter Hories, Old Road placer mine.

SHASTA DISTRICT.

Winthrop Mining Company, Excelsior mine and mill-site.

COLORADO.

CENTRAL CITY DISTRICT.

Harley B. Morse, Golden Treasure lode. Silver Ledge Consolidated Mining Company, Silver Ledge lode. James B. Tourtellot *et al.*, December lode. Harry M. Thompson, Lucia lode. Christian Clausen, Old Settler lode. King Gold Mining Company, Skeleton lode. Marcus W. Rasback, Mohawk lode. George B. Tayler, Maggie lode. Franklin E. Morse, Telephone lode. Henry N. Coffey, Western Slope lode. Petter C. Hasen *et al.*, Concrete lode. Gardner B. Weeks *et al.*, Mackey lode. George B. Bonnell *et al.*, Bismarck lode. Ellis F. Olden, Tiller House and Grand Gift lodes. Chiga & Middle Park Mining, Prospecting, and Real Estate Company, east half of the Grand Lake lode.

DEL NORTE DISTRICT.

Golconda Gold Mining Company, Nick lode.

DURANGO DISTRICT.

Joseph P. Hale, Staatsburg, Missouri Girl, and Arlington lodes. John Monroe *et al.*, Richmond lode. Robert L. Martin, Lead Chief lode. Midland Mining Company, Henry Ashurst lode.

LAKE CITY DISTRICT.

H. B. Adsit *et al.*, Silver Star lode. Midland Mining Company, Augustus Begole and Cimarron lodes. Charles W. Lewis *et al.*, Mayflower lode. John S. Hough *et al.*, Carbonate Queen and F. X. Aubury lodes. H. L. Norton, Green Mountain lode. Serrano Silver Mining Company, Serrano lode. W. W. Humphreys *et al.*, Richmond lode. Henry A. Wood, Black Silver lode.

LEADVILLE DISTRICT.

Charles H. Riggins *et al.*, Josephine lode. A. R. Byrd *et al.*, La Plata lode. Samuel Hilton *et al.*, Colorado Mint and Big Sunflower lodes. Millionaire Mining and Tunneling Company of Colorado, Millionaire and Newark lodes. C. Markell, Harrisburg and La Salle lodes. John H. North *et al.*, State of Maine lode. Silver Cord Combination Mining Company, A. P. Willard lode. Unexpected Mining Company, Unexpected lode. L. D. Kneeland *et al.*, Peerless lode. D. H. Elder *et al.*, D. H. Elder lode. James R. Mead, C. Z. lode. Berlin Mining Company, B. F. D. and Venus lodes. Smuggler Mining Company, Smuggler lode. James L. Welch, Maid of the Mist lode. W. S. Maxwell *et al.*, Bella lode. Manistee Mining Company, Manistee lode. Edwin Fry *et al.*, Senator lode. George Jess, Bond, Echo, and Badger lodes. B. M. Arms *et al.*, Lord Baltimore lode. F. Walworth Smith *et al.*, Revenue Cutter lode. Frederick Lottes, his placer in Gunnison County.

PUEBLO DISTRICT.

Empire Gold and Silver Mining Company, Copper Bottom lode.

DAKOTA.

DEADWOOD DISTRICT.

Henry Frawley *et al.*, Cora Ella lode.

IDAHO.

OXFORD DISTRICT.

Robert C. Beardsley, Beardsley quartz mine.

MONTANA.

HELENA DISTRICT.

Adam Farady, Skip lode. Frank Shootin *et al.*, Silver Tick lode. William T. McClintock, Eclipse, Iron Age, and Aurora lodes and mill-sites. Robert S. Hale, his placer in Lewis and Clark County. William Tiernan, his placer in Madison County.

NEVADA.

CARSON CITY DISTRICT.

Consolidated Virginia Mining Company, Comstock lode.

UTAH.

SALT LAKE CITY DISTRICT.

R. C. Chambers, administrator, Union lode. James R. Sheepbach *et. al.*, Nimrod lode. Old Hickory Mining and Smelting Company, Old Hickory lode. Charles M. Sickles, Alta lode. Monroe Salisbury, Benham lode. Patrick Mallory *et al.*, Jay Hawker lode.

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DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Feb. 24. H.	Feb. 24. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28. H.	Feb. 28. L.	March 1. H.	March 1. L.	March 2. H.	March 2. L.		Sales.	§
1	Alice s. c.	Mont	$10 000,000	400,000	$25	*				$400,000	Dec.	1881	.10	3.55	3.45	3.45	.....	3.55	3.35	3.45	3.25	3.25	3.00	3.05	3.00	1	9,600	....
2	Amie Con., s. L.	Colo.	5,000,000	500,000	10	*				305,000	May	1880	.10	.21	.....	.22	.20	.20	.19	.19	.....	.21	.19	.22	.21	2	25,700	B.
3	Atlantic, c.	Mich	1,000,000	40,000	25	$280,000	Apl.	1876	$1.00	140,000	Feb.	1882	$2.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	300	....
4	Argenta, s	Nev..	10,000,000	100,000	100	225,000	Nov	1882	.25	40,000	Feb.	1880	.20	.50	.....	.....	.....	.....	.....	.40	.35	.....	.....	.....	.....	4	.....	....
5	Barbee & Walker, s.	Utah	1,000,000	10,000	10	*				60,000	Nov	1880	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	....
6	Bassick, G. S.	Colo.	10,000,000	100,000	100	*				25,000	Feb.	1880	.25	8.50	8.25	9.00	8.50	.....	.....	10.75	.....	.....	.....	.....	10.50	6	627	....
7	Belle Isle, s.	Nev..	10,000,000	100,000	100	65,000	May	1882	.10	300,000	Dec.	1879	.25	.....	.....	.80	.75	.....	.....	.....	.....	.75	.....	.50	.....	7	1,700	....
8	Black Bear, G.	Cal..	3,000,000	30,000	100	15,000	Sept	1879	.50	8-9,000	Sept	1882	.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	.....	....
9	Belcher, G. S.	Nev..	10,400,000	104,000	100	2,562,000	Sept	1882	.25	15,397,000	Apl.	1879	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	.....	S.F.
10	Bodie Con., G.	Cal..	10,000,000	100,000	100	125,000	Dec.	1881	.50	1,295,000	Nov	1882	.20	.....	.....	.....	.....	1.40	.....	1.75	1½	1.75	.....	.....	.....	10	950	S.F.
11	Boston & Mont, G.	Mont	2,000,000	200,000	10	.....	.....	.....	.....	310,000	Jan.	1883	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	.....	....
12	Breece, s.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	.....	....
13	Bulwer, G.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	140,000	Jan.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.90	.....	.....	.....	13	10	P.
14	California, G. S.	Nev..	54,000,000	540,000	100	638,000	Nov	1882	.20	31,320,000	Dec.	1879	.50	.35	.....	.....	.....	.24	.23	.12	.....	.11	.06	.10	.....	14	7,525	....
15	Calumet & Hecla, c.	Mich	2,500,000	100,000	25	.....	.....	.....	.....	22,850,000	Jan.	1883	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	.....	S.F.
16	Caribou Con., s.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10	.....	.....	.....	.....	.34	.....	.....	.....	.23	.....	.18	.....	16	1,200	....
17	Carolina Queen, c.	N. C.	200,000	100,000	2	.....	.....	.....	.....	8,000	Oct.	1882	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	.....	....
18	Castle Creek, G.	Idah.	100 000	100,000	1	.....	.....	.....	.....	24,000	Jan.	1882	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	.....	B.
19	Cataipa, s. L.	Colo.	3,000,000	300,000	10	*				210,000	Dec.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19	.....	....
20	Central, c.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,610,000	Feb.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	.....	....
21	Christy, s. L.	Utah	6,000,000	60,000	100	.....	.....	.....	.....	78,000	Dec.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21	.....	....
22	Chrysolite, s. L.	Colo.	10,000,000	200,000	50	*				1,600,000	Dec.	1881	.50	1.45	1.40	1.40	1.35	1.40	1.35	1.40	.....	1.50	1.40	1.45	.....	22	4,250	B.
23	Climax, s. L.	Colo.	2,000,000	200,000	10	*				180,000	Aug.	1880	.30	.08	.....	.08	.....	.08	.....	.....	.....	.....	.....	.....	.....	23	1,900	....
24	Con. Gold Mining, G.	Ga..	500,000	100,000	5	*				80,000	Dec.	1882	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	.....	....
25	Con. Virginia, G. S.	Nev..	54,000,000	540,000	100	897,000	Aug	1882	.30	42,930,000	Aug.	1880	.50	.56	.....	.60	.57	.62	.60	.55	.....	.57	.53	.57	.....	25	7,000	S.F.
26	Contention, s.	Ariz.	12,500,000	250,000	50	*				42,087,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26	.....	....
27	Copper Queen, c.	Ariz.	2,500,000	250,000	10	*				850,000	Jan.	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27	.....	S.F.
28	Crown Point, G. S.	Nev..	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28	.....	....
29	Deadwood-Terra, G.	Dak..	5,000,000	200,000	25	*				4900,000	Jan.	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29	.....	B.
30	Dunkin, s. L.	Colo.	5,000,000	200,000	25	*				200,000	July	1881	07½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	.....	....
31	Eureka Con., G. S. L.	Nev..	5,000,000	50,000	100	100,000	May	1876	1.00	4,817,500	July	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	9.25	.....	9.50	.....	31	250	S.F.
32	Evening Star, s. L.	Colo.	500,000	50,000	10	*				1,225,000	O t.	1882	.50	.....	.....	10.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	.....	....
33	Excelsior, G.	Cal..	10,000,000	100,000	100	300,000	Jan.	1882	1.00	875,000	Oct.	1880	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	.....	....
34	Father de Smet, G.	Dak..	10,000,000	100,000	100	.....	.....	.....	.....	530,000	Dec.	1882	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34	.....	....
35	Findley, G.	Ga..	200,000	200,000	1	*				8,000	May	1879	1 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	.....	....
36	Freeland, s.	Colo	5,000,000	200,000	25	*				50,000	May	1880	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36	.....	....
37	Glass-Pendery, S. L.	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	37	.....	....
38	Gold Stripe, G.	Cal..	1,500,000	150,000	10	*				76,000	July	1881	.15	.....	.07	.....	.....	.....	.08	.....	.08	.07	.07	.....	.....	38	1,100	....
39	Gould & Curry, G. S.	Nev..	10,800,000	108,000	100	3,476,000	Sept	1882	.50	3,826,000	Oct..	1870	10 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39	.....	S.F.
40	Grand Prize, s.	Nev..	10,000,000	100,000	100	420,000	Nov	1882	.25	450,000	Sept	1880	.25	.70	.....	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	200	S.F.
41	Great Eastern, G.	Dak..	300,000	300,000	1	*				16,000	July	1880	.01	.....	.....	.03	.....	.04	.03	.....	.....	.....	.....	.....	.....	41	1,300	....
42	Green Mountain, G.	Cal..	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½	.65	.....	.70	.65	.67	.65	.64	.....	.60	.....	.70	.68	42	7,200	....
43	Hale & Norcross, G. S.	Nev..	11,200,000	112,000	100	4,066,000	Sept	1882	50	1,598,000	Apl.	1871	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43	.....	S.F.
44	Hall-Anderson, G.	N. S.	150,000	150,000	1	.....	.....	.....	.....	7,000	Jan.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44	.....	....
45	Hecla Con., S.	Mont	1,500,000	30,000	50	.....	.....	.....	.....	387,000	Jan	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	.....	....
46	Hibernia, s. L.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	200	....
47	Holyoke, G.	Idah.	200,000	200,000	1	.....	.....	.....	.....	14,000	Jan.	1882	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47	.....	....
48	Homestake, G.	Dak.	10,000,000	100,000	100	200,000	July	1878	1.00	1,812,000	Jan.	1883	.50	16.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48	100	....
49	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				1,700,000	Nov.	1882	.75	7.25	7.00	7.25	7⅛	7⅜	7.25	7.50	7.25	7⅛	7 50	8.25	8.00	49	6,695	....
50	Hukill, G. S.	Colo.	1,000,000	200,000	5	*				210,000	Dec.	1878	.10	.17	.16	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	50	1,400	....
51	Independence, S.	Nev..	1,000,000	100,000	100	135,000	Feb.	1882	.15	225,000	Sept	1879	.25	.....	.....	.70	.....	.70	.69	.....	.....	.62	.....	.60	.....	51	2,200	S.F.
52	Indian Queen, S.	Nev..	250,000	125,000	2	*				365,000	Nov	1882	02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52	.....	B.
53	Inyo, G.	Cal..	500,000	100,000	5	*				45,000	Apl.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53	.....	....
54	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	*				900,000	Dec	1882	.20	2.90	2.85	2.90	.....	3.00	.....	.....	.....	3.25	3.00	3.00	.....	54	2,120	....
55	Jocuistitta, s.	Mex.	10,000,000	100,000	100	.....	.....	.....	.....	750,000	Nov	1882	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	.....	....
56	Kentuck	Nev..	3,000,000	30,000	100	342,000	Nov	1881	.30	955,000	Feb.	1870	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	56	.....	....
57	La Plata, s. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	57	.....	....
58	Leadville, s. L.	Colo.	4,000,000	400,000	10	*				270,000	Jan.	1883	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58	.....	....
59	Leeds, s.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59	.....	....
60	Little Chief, s. L.	Colo	10,000,000	200,000	50	*				700,000	Aug.	1880	.50	.....	.....	.41	.....	.41	.....	.....	.....	.40	.....	.40	.....	60	1,900	....
61	Little Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*				1,050,000	Mch	1880	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	.....	B.
62	Marguerite, G.	Cal..	500,000	25,000	20	.....	.....	.....	.....	18,750	Oct..	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	.....	....
63	Martin White, s.	Nev..	10,000,000	100,000	100	950,000	Sept	1882	.25	90,000	July	1879	.30	.....	.....	.....	.....	.....	.....	.90	.....	.....	.....	1.25	.....	63	200	S.F.
64	Minas Nuevas, s.	Mex.	300,000	100,000	3	*				20,000	July	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64	.....	....
65	Moose, s.	Colo.	2,000,000	200,000	10	.....	.....	.....	.....	550,000	Mch	1878	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	.....	....
66	Morning Star, s. L.	Colo.	1,000,000	100,000	10	*				565,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	.....	....
67	Navajo, G. S.	Nev..	10,000,000	100,000	100	235,000	Mch	1882	.20	100,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	67	800	S.F.
68	New York & Colo., G.	Colo.	1,250,000	50,000	25	.....	.....	.....	.....	25,000	July	1879	.10	.....	.....	.....	.....	.....	.....	5⅛	5.00	5.00	.....	.....	.....	68	.....	....
69	Northern Belle, s.	Nev..	5,000,000	50,000	100	.....	.....	.....	.....	2,300,000	Nov	1882	50	10.00	.....	10.00	.....	.....	.....	10¼	10.00	10.00	.....	.....	.....	69	360	S.F.
70	North Bell Isle, s.	Nev..	10,000,000	100,000	100	75,000	Nov	1882	.20	45,000	Sept	1882	.15	.....	.....	.....	.....	.....	.....	.....	.....	.57	.53	.54	.....	70	1,100	....
71	Ontario, s. L.	Utah	15,000,000	150,000	100	.....	.....	.....	.....	14,000	Jan.	1882	.50	.....	.....	22.00	21.00	22.00	20.00	.....	.....	22⅜	22.00	.....	.....	71	220	....
72	Ophir, G. S.	Nev..	10,000,000	100,000	100	3,495,000	Dec.	1882	1 00	1,595,000	July	1882	1.00	.....	.....	.....	.....	.....	.....	3.13	3.00	.....	.....	.....	.....	72	200	S.F.
73	Osceola, c.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	785,000	Dec.	1882	1 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	.....	B.
74	Pleasant Valley, G. S.	Cal..	10,000,000	100,000	100	.....	.....	.....	.....	30,000	Dec.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	.....	....
75	Plumas, G.	Cal..	1,000,000	100,000	10	*				151,000	July	1879	08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	....
76	Prussian, s. L.	Colo	1,550,000	150,000	10	.....	.....	.....	.....	132,000	Jan	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	.....	....
77	Quick-Silver, pref., Q.	Cal.	4,300,000	43,000	100	.....	.....	.....	.....	654,000	July	1882	6.00	.....	.....	.....	.....	41.75	41.50	.....	.....	43.00	42.50	.....	.....	77	500	....
78	" com., Q.	Cal..	5,700,000	57,000	100	.....	.....	.....	.....	151,000	July	1882	.40	.....	.....	.....	.....	8.00	.....	8.50	.....	.....	.....	.....	.....	78	400	....
79	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,330,000	Aug.	1882	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	.....	B.
80	Rising Sun, s.	Dak..	750,000	150,000	5	*				52,000	May	1881	07½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	4,200	....
81	Robinson Bar, G.	Idah.	100,000	100,000	1	*				9,000	Dec.	1882	.03	.....	.....	.....	.....	.07	.05	.05	.....	.....	.....	.04	.....	81	.....	....
82	Robinson Con, S. L.	Colo.	10,000,000	200,000	50	*				575,000	Nov	1881	.50	1.10	1.05	1.05	1.00	1.05	1.00	1.10	.....	1.10	1.05	1.05	1.00	82	21,925	B.
83	Robert E Lee, s. L.	Colo.	250,000,000	500,000	500	.....	.....	.....	.....	100,000	Dec.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	.....	....
84	Savage, s.	Nev..	11,200,000	112,000	100	5,484,000	Nov	1882	.50	4,460,000	July	1879	3.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	.....	S.F.
85	Shoshone, G.	Idah.	150,000	150,000	1	.....	.....	.....	.....	3,000	Nov	1882	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	.....	P.
86	Sierra Grande, S.	N. M.	10,000,000	400,000	25	.....	.....	.....	.....	300,000	Jan.	1883	.25	3.35	3.10	2.70	2.60	2.75	2.65	2.85	2.75	2.90	2.70	2.80	2.75	86	24,925	S.F.
87	Sierra Nevada, G. S.	Nev..	10,000,000	100,000	100	5,150,000	Dec.	1882	1.00	102,000	Jan.	1871	1.00	3.75	.....	4.00	3.85	4.15	3.90	3.75	.....	3.70	.....	3.90	.....	87	1,600	S.F.
88	Silver King, S.	Ariz.	1,000,000	100,000	100	.....	.....	.....	.....	1,125,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	10.75	.....	11.00	.....	11.00	.....	88	540	S.F.
89	Silver King, S.	Colo.	1,000,000	500,000	2	.....	.....	.....	.....	50,000	Aug.	1881	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	.....	....
90	Socorro, C.	N. M.	250,000	2,500	100	.....	.....	.....	.....	4,000	Mch	1882	.00¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	.....	....
91	Spring Valley, G.	Cal..	200,000	200,000	1	*				50,000	Jan.	1881	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	.....	....
92	Standard, G. S.	Cal..	10 000,000	100,000	100	.....	.....	.....	.....	4,050,000	Jan.	1883	.25	.....	.....	.....	.....	6.50	.....	.....	.....	6.25	.....	6½	.....	92	184	B.
93	Starr-Grove, S.	Nev..	2,000,000	200,000	10	*				160,000	Jun.	1881	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6 50	.....	93	.....	....
94	Stormont, s.	Utah	200,000	200,000	1	*				155,000	Nov	1881	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	.....	....
95	St. Joseph, L.	Mont	1,000,000	100,000	10	*				390,000	Dec.	1882	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	.....	....
96	Tip Top, S.	Ariz.	10,000,000	100,000	100	170,000	Mch	1880	.50	100,000	Nov	1881	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	96	.....	....
97	Tombstone, G. S.	Ariz	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	97	.....	P.
98	Vizina, S.	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	98	.....	B.
99	Yellow Jacket, G. S.	Nev..	12,000,000	120,000	100	5,358,000	Feb.	1862	1.00	2,184,000	Aug.	1871	1.50	1⅝	1.50	1.50	.....	1.45	.....	1.50	.....	.....	.....	.....	.....	99	500	S.F.
100	New York Hill, G.	Cal..	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	.....	....
101	Bonanza Developm't	C & M	3,000,000	300,000	10	.....	.....	.....	.....	135,000	Oct..	1882	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	101	.....	....
102	Carbonate Hill, S. L.	Colo.	.....	.....	.....	.....	.....	.....	.....	.....	Jan.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	102	.....	B.
103	United Gregory, G.	Colo.	300,000	300,000	1	.....	.....	.....	.....	26,250	Oct..	1882	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	103	.....	....
104	United Gold Min. Co.	Colo.	.....	.....	.....	.....	.....	.....	.....	.....	Oct..	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	104	.....	....
105	Smuggler, S. L.	Colo.	600,000	60,000	10	.....	.....	.....	.....	18,000	Dec.	1882	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	105	.....	....
106	Gem, S.	Colo.	125,000	125,000	1	.....	.....	.....	.....	16,250	Dec.	1882	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	106	.....	....
107	Glen, S.	Colo.	100,000	100,000	1	.....	.....	.....	.....	4,000	Dec.	1882	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	107	.....	....
108	Granite, S.	Colo.	125,000	125,000	1	.....	.....	.....	.....	2,500	Dec.	1882	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	108	.....	....
109	Grand Central, S.	Ariz.	1,000,000	100,000	10	.....	.....	.....	.....	625,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	109	.....	....
110	Idaho, G.	Cal..	310,000	3,100	100	.....	.....	.....	.....	3,326,250	Dec.	1882	2.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	110	.....	....
111	Napa, G.	Cal..	700,000	100,000	7	.....	.....	.....	.....	260,000	Jan.	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	111	.....	B.
112	Renfrew, G.	N. S.	60,000	30,000	2	.....	.....	.....	.....	4,800	July	1882	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	112	.....	....
113	Richmond, S. L.	Nev..	1,350,000	54,000	25	.....	.....	.....	.....	3,772,587	Nov	1882	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	113	.....	....
114	San Francisco, C.	Cal..	.....	50,000	.....	.....	.....	.....	.....	22,500	Nov	1882	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	114	.....	....
115	Sierra Buttes, G.	Cal..	225,000	22,500	10	.....	.....	.....	.....	1,429,683	Oct..	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	115	.....	....
116	Polonia, S.	Colo.	200,000	8,000	25	.....	.....	.....	.....	12,000	.....	1882	1.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	116	.....	....
117	Hope, S. C. L.	Mont	.....	8,000	.....	.....	.....	.....	.....	73,115	Dec.	1882	3.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

	NAME AND LOCATION OF COMPANY.		CAPITAL STOCK.	SHARES. Number.	SHARES. Par Value.	ASSESSMENTS. Total levied to date.	ASSESSMENTS. Date and amount per share of last.			†	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Feb. 24. H.	Feb. 24. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28. H.	Feb. 28. L.	March 1. H.	March 1. L.	March 2. H.	March 2. L.		SALES.
1	Advance M & M. Co.	Nevada	15,000,000	150,000	100	472,500	January	1883	.50	S. F.											.40		1	100
2	Albion, S. L.	Nevada								B.													2	
3	Allonez, C.	Michigan								S. F.													3	
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1883	.50	S. F.													4	
5	Alta, S.	Nevada	10,080,000	100,800	100	1,392,090	January	1883	.25	S. F.													5	
6	Alta-Montana, G. S. L.	Montana	5,000,000	500,000	10						.11		.14	.13	.12		.12	.11	.12	.11			6	8,800
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25														7	
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*					.19	.18	.19						.19		.18		8	3,400
9	Battle Creek																						9	
10	Bear Creek	California	300,000	300,000	1																		10	
11	Beauce																				4.75		11	
12	Bechtel Con., G.	California	10,000,000	100,000	100	135,000	January	1883	.10	S. F.													12	100
13	Best & Belcher, G. S.	Nevada	10,080,000	1 0,800	100	1,345,790	November	1882	.50	S. F.			.18		.20	.18	.18		.19	.18			13	2,100
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																	14	
15	Black Jack, G.	California	250,000	100,000	2½	*																	15	
16	Bonanza Chief	Montana	1,000,000	1,000,000	1																		16	
17	Bondholder	Colorado	500,000	200,000	2½																		17	
18	Boston Con., G.	California	10,000,000	100,000	100	93,000	October	1882	.25														18	300
19	Boulder Con.	Colorado									.31	.30									.02		19	1,100
20	Bradshaw, S.	Arizona	2,250,000	225,000	10						.02												20	
21	Buckeye	Colorado	2,000,000	400,000	5	*																	21	
22	" preferred	Colorado				*																	22	
23	Bull Domingo, S. L.	Colorado	10,000,000	200,000	50																		23	100
24	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,747,000	October	1882	.50	S. F.									.03				24	
25	Bye and Bye	Arizona	1,000,000	100,000	10	*																	25	
26	Calaveras, G.	California	500,000	500,000	1	*																	26	
27	Cal. W'r & M. Co., G.	California									1.00												27	100
28	California, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15	U. Q.					.95								28	100
29	Carbonate Hill, S. L.	Colorado	2,000,000	200,000	10																		29	
30	Catskill, S.	Nevada	1,500,000	300,000	5					B.							.42	.37	.39		.40		30	2,700
31	Central Arizona, S.	Arizona	10,000,000	100,000	100						.06				.05		.00						31	3,700
32	Chapparal	California																					32	
33	Cherokee, G.	California	1,500,000	150,000	10																		33	
34	Chollar, S.	Nevada	11,200,0 0	112,000	100	465,000	September	1882	.50	S. F.													34	
35	Clarence	Canada																					35	
36	Colorado Central, S.	Colorado	3,000,000	300,000	10																		36	
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50																		37	
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,425,000	January	1882	.10														38	
39	Con. Pacific, G.	California	6,000,000	60,000	100	141,000	August	1882	.25														39	
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*				B.			.03		.02				.03				40	2,100
41	Crowell, G.	North Car.	500,000	500,000	1																		41	
42	Dahlonega, G.	Georgia	250,0 0	250,000	1	*																	42	
43	Dardanelles, G.	California	1,000,000	100,000	10						.11		.11	.09	.10	.09	.10	.07	.08	.07	.07	.06	43	76,800
44	Decatur														.07				.07				44	3,500
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*																	45	
46	Durango, G.	Colorado	500,000	500,000	1	*																	46	
47	Eastern Oregon										.11		.12	.11	.11				.10	.09	.10		47	16,100
48	Elko Con., S.	Nevada								B.	.56	.54	.55		.53								48	
49	Empire, S.	Utah	10,000,000	100,000	100																		49	600
50	Enterprise	Colorado									2.20		2 20		2.20								50	
51	Exchequer	Nevada	10,000,000	100,000	100	630,000	January	1882	.2														51	300
52	Fannie Barret, S.	Colorado																					52	
53	Globe Copper	Arizona																					53	
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*					.05												54	100
55	Goodshaw, G.	California	10,000,000	100,000	100	200,000	October	1882	.10				1.15				1.15		1.20				55	
56	Granville, G.	North Car.	300,000	300,000	1	*																	56	3,100
57	Harlem M. & M. Co., G.	California								B.													57	
58	Harshaw, S.	Arizona	10,000,000	100,000	100						.12		.12										58	1,400
59	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20														59	
60	Hortense, S.	Colorado	2,000,000	200,000	10	*																	60	
61	Index	California																					61	
62	Julia, G. S.	Nevada	11,000,000	110,000	100	1,394,000	January	1882	.20														62	
63	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15														63	
64	Lacrosse, G.	Colorado	1,000,000	100,000	10	*													.01				64	100
65	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														65	
66	Lucerne, S.	Colorado	5,000,000	500,000	10	*																	66	
67	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881															67	
68	" common, G.	California	10,000,000	100,000	100	1,950,000	February	1882															68	
69	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20				3.10				3 13	2.90					69	
70	Mayflower, S.	Colorado	10,0 0,000	100,000	100	*																	70	800
71	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,146,000	October	1882	1.00	S. F.													71	
72	Michoacan Synd.	Mexico																					72	
73	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*											.25	.20					73	300
74	Miller	Nevada	5,000,000	200,000	25																		74	
75	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20	S. F.													75	
76	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																	76	
77	Nevada Syndicate																						77	
78	North Standard, G.	California	10,000,000	100,000	100	20,000	November	1881	.10														78	
79	North Horn-Sil., S. L.	Utah		400,000																			79	
80	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00	S. F.													80	
81	Old Dominion, C.	Arizona	20,000,000	200,000	100	*																	81	
82	Oriental	Nevada	2,000,000	200,000	10						.14	.13	.14		.15	.14	.14		.15	.14	.15	.14	82	17,800
83	Oriental & Miller, S.	Nevada	10,000,000	400,000	25																		83	
84	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25	S. F.													84	
85	Potosi	Nevada	10,200,000	112,000	100	500,040	November	1882	.25	S. F.			.09		.09								85	
86	Quartz Creek				100	*							.08		.07		.08		.08	.07	.08		86	1,500
87	Rappahannock, G.	Virginia		250,000							.08		.08		.07		.08		.08	.07	.08		87	3,100
88	Red Elephant, S.	Colorado	500,000	500,000	1	*																	88	
89	Retort M. & M. Co.	Colorado			10	*					.57		.57		.57		.50				.50		89	1,000
90	San Pedro, G. S. L.	New Mex.		400,000																			90	
91	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*				B., P.	.40		.40				.41		.43	.42	.43	.42	91	2,000
92	Silver Islet	Canada	1,000,0 0	40,000	25																		92	103,600
93	Sonora Con.	Mexico									.35		.35		.36	.35	.36	.35	.37	.35	.38	.37	93	
94	South Bodie, G.	California		100,000		100,000	March	1882	.15														94	
95	South Bulwer, G.	California	10,0 0,000	100,000	100	195,000	May	1881	.25														95	
96	South Hite	California	10,000,000	100,000	100		May	1882	.10														96	
97	South Pacific	California			5								.07		.07		.07		.06		.06	.05	97	12,800
98	State Line, No. 1, S.	Nevada		200,000	1					B.													98	
99	" No. 2, S.	Nevada	5,000,000	200,000	25																		99	
100	" No. 3, S.	Nevada	5,000,000	200,000	25																		100	
101	" No. 4, S.	Nevada	5,000,000	200,000	25																		101	
102	" Nos. 1 and 4, S.	Nevada																					102	300
103	" Nos. 2 and 3, S.	Nevada									.03				.01				.05				103	2,200
104	Sutro Tunnel	Nevada		2,000,000		*					.07		.07		.07				.07		.07		104	11,500
105	Taylor-Plumas	California			10					B.	.22	.21	.22	.21	.22	.21	.21		.21	.20	.22	.20	105	18,100
106	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10	B., P.	.17		.17		.17		.17		.17		.17		106	
107	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														107	
108	Unadilla, S.	Colorado	10,000,000	100,000	100	*																	108	
109	Union Con., G. S.	Nevada	50,000,000	500,000	100	1,570,000	January	1883	1.00														109	1,200
110	Utah, S.	Nevada	10,000,000	100,000	100	1,360,000	December	1882	1.00	S. F.	4 62	4.50			5.25	5.00	4.75	4 70	5.00	4.50	5 13		110	
111	Vandewater	Nevada	2,000,000	20,000	100												28						111	1,000
112	Washington	Arizona	20,000,000	200,000	100	*																	112	1,100
113	Whalen Copper	Nevada	2,000,000	200,000	10								.11	.10									113	
114	Wide West		2,500,000	100,000	25																		114	
115	Willshire	California	250,000	50,000	5	*																	115	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F., San Francisco; B., Boston; P., Philadelphia; and U. Q., Unlisted Quotations, tables.
Non-Dividend shares sold, 303,800. Total shares sold, 447,381.

firm, with a moderate business, selling from $4½@$5¼@$4½@$5½. Mexican was quiet and a little weak at $3.18@$2.90. Ophir sold at $3½@$3 with a business of 200 shares. Best & Belcher sold at $4¾, with one transaction. Sutro Tunnel was quiet and steady, selling from 20@22c. Yellow Jacket was moderately dealt in at irregular prices, selling from $1½@$1.45@$1½.

The Leadville stocks were quiet and irregular. Amie had an active business at irregular prices, selling from 19@22@21c. Chrysolite was also irregular, under a moderate business, and sold from $1.35@$1.50@$1.45. Hibernia was quoted at 3c. Iron Silver records a moderate business at strong prices, selling from $2.85@$3.25@$3. Little Chief was dealt in to the extent of 1900 shares at 41@40c. Climax sold at 8c. Big Pittsburg was quiet and a little weak at 20@18c.

The Bodie stocks were quiet and strong. Bodie Consolidated sold from $1.40@$1.75, with a business of 950 shares. Standard showed some strength under a small business, and sold from $6⅛@$6½. Bulwer, with one small transaction, sold at 90c. Goodshaw sold at 5c.

The Tuscarora stocks record but a moderate business at weak prices. Grand Prize was quiet and strong, selling from 70@80c. Argenta records a small business, and was weak; it sold from 50@35c. Belle Isle showed considerable weakness, under a moderate business, selling from 80@50c. Navajo was dealt in to

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the extent of 800 shares at $5⅛@$5. North Belle Isle had a moderate business at irregular prices; it sold from 57@53@54c. Independence declined from 70@60c., under a small business. Elko Consolidated was active and irregular, selling from 12@9@@10c., with a business of 16,100 shares.

In the miscellaneous list, Alice has had a fair business, but has grown weak; it declined from $3.55 @$3, closing at $3.05. Bassick showed considerable strength, with a small business, selling from $8¼@ $10½. Eureka Consolidated was quiet and irregular, selling from $10½@$9¼@$9½. The Green Mountain stocks were quiet and weak. Gold Stripe sold at 8@7c. Green Mountain declined from 70@60c. and then reacted, and closed to-day at 70c. Rising Sun sold from 7@4c. and Cherokee at 5@6c. Horn-Silver has shown considerable strength, under a fair business; it sold from $7@$8¼@$8. Robinson Consolidated has been active and weak; it sold from $1.10@ $1@$1.05. Sierra Grande sold ex dividend this week, and has been very irregular, under a large business; it ranged from $3.35@$2.60@$2.90, closing to-day at $2.75, sales aggregating 24,925 shares. Silver King has been strong with small sales, selling from $10¾ @$11.

Alta-Montana records a fair business at steady prices, selling from 11@14@11c. Bradshaw was quiet and steady at 31@30c. Central Arizona records a small business at irregular prices, selling from 42@37 @40c. Decatur has been very active and a little weak; it sold from 11@6@7c., with a business of 75,600 shares. Harlem M. & M. Co. has been quiet and steady, selling from $1.15@$1.20. Oriental & Miller was very actively dealt in, but shows no material change in price; it sold from 13@15c. Rappahannock sold at 9c., with a moderate business. Red Elephant has had a moderate business at steady prices, selling at 7@8c. Silver Cliff has been quiet and steady at 40@48c. Sonora Consolidated records a very active business at strong prices; it sold from 35@38c., the sales aggregating 103,600 shares. South Pacific has been active and weak, selling at 7@5c. The State Line stocks have been quiet; Nos. 1 & 4 sold at 4@3c., and Nos. 2 & 3 at 7c. Taylor-Plumas was steady at 17c. throughout the week, and was actively dealt in at that figure.

The collapse of Gilbert L. Crowell, who was the chief backer of the Empire mine, Park City, Utah, has been a surprise to his friends, although in mining circles his faith in the future of that mine was not shared. It was claimed by those interested in the mine that it was on an extension of the famous Ontario. A mill, which was put up before the condition of the property warranted its erection, burnt down, and there were other troubles which made the development more costly. Utah dispatches state that the mine is in debt to the extent of $65,000, of which $36,000 is due to Utah parties.

According to all appearances, the scheme to consolidate the New York Mining Exchange and the New York Petroleum Exchange has been dropped.

The recent decline in the price of the shares of the Green Mountain Gold Mining Company is owing to the appearance of an advertisement by the sheriff of Plumas County, Cal., in the *Plumas National* newspaper, offering the company's property for sale to pay delinquent taxes; also to the fact that, on account of want of water, the company's three mills, of 92 stamps, have been closed; and also to a demand having been made on the New York office for funds to pay the miners their back wages. The work of running tunnel No. 6 is progressing favorably, and if the company can pull through the next ten months without losing its property, it is believed all will go well, as in that time the Blake chute, it is believed, will be producing rich ore. It is in the power of the stockholders to save this valuable property to themselves, by taking the balance of the unsold bonds, thus furnishing the company with funds to tide over the present emergency.

MEETINGS.

Atlantic Mining Company, No. 76 Wall street, New York. Annual meeting of stockholders and election of trustees, March 13th, at twelve o'clock M.

Conglomerate Mining Company, No. 205 Walnut place, Philadelphia. Annual meeting of stockholders and election of trustees, March 15th, at three o'clock P.M.

Hancock Copper Mining Company, Hancock, Michigan. Annual meeting of stockholders and election of trustees, March 5th, at two o'clock P.M.

Minesota Mining Company, No. 98 Broadway, New York. Annual meeting of stockholders and election of trustees, March 21st, at two o'clock P.M.

Osceola Consolidated Mining Company, No. 69 Devonshire street, Room 15, Boston. Annual meeting of stockholders and election of trustees, March 8th, at twelve o'clock M.

Pewabic Mining Company, No. 19 Congress street (Rooms 11 and 12), Boston. Annual meeting of stock, holders and election of trustees, March 28th, at twelve o'clock M.

Sherbrooke Gold Mining Company, No. 101 Duane street, New York. Annual meeting of stockholders and election of trustees, March 7th, at twelve o'clock M.

United States Ore Milling Company, office of Mr. E. Mygatt, No. 36 Broad street, New York. Annual meeting of stockholders and election of trustees March 8th.

DIVIDENDS.

The Bulwer Consolidated Mining Company, of California, has declared a dividend (No. 16) of five cents per share, payable March 12th at the Farmers' Loan and Trust Company. Transfer-books close March 2d, and reopen March 13th.

The Castle Creek Gold Mining Company, of Idaho, has declared a dividend (No. 10) of three per cent on the capital stock, payable March 16th. Transfer-books close March 10th, and reopen March 17th.

The Charleston, S. C., Mining and Manufacturing Company has declared the usual quarterly dividend of $1.50 per share and an extra dividend of $1 per share on the capital stock, payable on and after March 1st at the company's office in Philadelphia.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 6) on the capital stock, payable March 10th. Transfer-books close on the 3d and reopen on the 12th.

Dividends paid by mining companies during the month of February, and from January 1st, 1883:

NAME OF COMPANY.	Location of mines.	Paid during month of February.	Since January 1, 1883.
Atlantic, C.	Mich.	$80,000	$80,000
Boston & Montana, G.	Mont	.....	10,000
Bulwer Consolidated, G.	Cal	5,000	10,000
Calumet & Hecla, C.	Mich	500,000	500,000
Carbonate Hill, S.	Colo.	10,000	20,000
Castle Creek, G.	Idaho	3,000	6,000
Central, C.	Mich.	60,000	60,000
Contention, S.	Ariz.	62,500	125,000
Con. Gold M. Co. of Ga.	Ga.	4,000	8,000
Copper Queen, C.	Ariz.	.....	125,000
Cosmopolitan.	Utah.	.....	50,000
Deadwood-Terra.	Dak	.....	20,000
Father de Smet, G.	"	20,000	40,000
Gem, S.	Colo.	.....	1,250
Glen, S.	"	.....	1,000
Granite, S.	"	.....	1,000
Hecla, S.	Mont	.....	15,000
Holyoke, G.	Idaho.	4,000	8,000
Homestake, G	Dak	50,000	100,000
Horn Silver, S. L.	Utah.	300,000	300,000
Idaho, G.	Cal.	7,750	15,000
Indian Spring Drift.	"	1,000	1,000
Jocuistita, S.	Mexico	50,000	50,000
Kentuck, S.	Nev.	3,000	6,000
Leadville Consolidated, S.	Colo	.....	20,000
Navajo, G. S.	Nev.	25,000	50,000
Northern Belle, S.	"	.....	25,000
Ontario, S.	Utah	.....	75,000
Prussian M. and M. Co., S.L.	Colo	.....	15,000
Quincy, C.	Mich	240,000	240,000
Richmond, S. L.	Nev.	.....	135,000
San Francisco, C.	Cal	.....	2,500
Shoshone, G.	Idaho.	1,500	3,000
Sierra Grande, S.	New Mex.	100,000	200,000
Silver King, S.	Ariz	25,000	50,000
Smuggler.	Colo	.....	3,000
Standard Cons., G.	Cal	25,000	50,000
		$1,576,750	$2,420,750

G., gold. S., silver. C., copper. L., lead. N. nickel. Q., quicksilver.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, 55 Broadway, report as follows for the week ended March 2d:

The market has been depressed during the week by the uncertain development of Grandin well No. 5. At the final moment, when it struck sand, the market fluctuated in accordance with the rumored showing, some reports asserting it to be a "gusher," others pronouncing it small and unimportant. The latter has proved true, but the market has been left in a comatose state.

Dullness in oil is almost equivalent to a decline, as carrying charges are constantly running against the holder.

There is more bearish sentiment developing than has existed for some time, based upon the fact that consumption is not outrunning the production as was expected, and that more wells and rigs are in progress than a month ago.

On the "bull" side, it is shown that there has been a decline in the new Forest County wells between January 31st and February 28th of about 700 barrels daily; that the shipments from the oil regions must soon increase, and thus change the present showing of the Pipe Line Company which is an increase of stocks on hand. The enlargement of the constituency of New York petroleum brokers has brought much oil to this city, and into strong hands, who are holding for an advance. This increased absorption of certificates makes a quick and sharp advance probable within the next few weeks. It has been impossible to break it below 97¾c., and for a dull market it exhibits considerable strength.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 24...	$0.98¾	$0.98¾	$0.97⅞	$0.98⅛	268,000
26...	.98	1.00	.97¾	.99¾	477,000
27...	1.00⅛	1.01⅝	.99½	1.00¾	890,000
28...	1.00⅞	1.01⅛	.98⅞	.98⅞	815,000
Mar. 1...	.98⅝	.99	.98⅛	.98⅛	851,000
2...	.98⅜	.98¾	.97¼	.97⅜–¼	628,000
Total sales.					3,929,000

SAN FRANCISCO MINING STOCK QUOTATIONS

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Feb. 23.	Feb. 24.	Feb. 26.	Feb. 27.	Feb. 28.	Mar. 1.
Albion	.....	.....	.....	.....	.....	.....
Alpha	.....	.....	.....	1½	1	.....
Alta	11-32	5-16	5-16	5-16	5-16	11-32
Bechtel	5-32	.....	.....	.....	.....	.....
Belcher	.....	7-16	9-16	.....	.....	.....
Belle Isle	19-32	9-16	½	19-32	19-32	½
Best & Belcher	4¼	4⅜	4¼	4¼	4¼	4¼
Bodie	2	1⅞	1¾	1½	1½	1½
Bullion	.....	.....	.....	.....	.....	.....
California	3-16	3-16	5-32	3-32	3-32	3-32
Challar	.....	.....	.....	.....	.....	.....
Con. Virginia	9-16	19-32	9-16	9-16	9-16	19-32
Crown Point	.....	¾	¾	¾	¾	13-16
Elko Cons	5-32	5-32	5-32	5-32	5-32	5-32
Eureka Con	.....	9	9⅜	9½	.....	.....
Exchequer	3-16	¼	3-16	.....	.....	.....
Gould & Curry	2⅝	2¾	2⅞	2⅞	2⅞	2⅞
Grand Prize	11-16	11-16	19-32	.....	.....	7-16
Gale & Norcross	2¾	3⅛	3¼	3¼	3¼	3⅛
Independence	.....	21-32	19-32	.....	.....	19-32
Martin White	1¼	37-32	11-16	¾	.....	1
Mexican	2⅞	3	3	3	3¼	.....
Mono	¼	¼	3-16	.....	.....	.....
Mount Diablo	3¼	3½	.....	.....	.....	3½
Navajo	5¼	5	5	4⅞	4¼	.....
Northern Belle	9¾	10	9¾	9¾	9¾	9¾
North Belle Isle	.....	.....	19-32	21-32	19-32	19-32
Ophir	3	3⅛	3⅛	3⅛	3⅛	3¼
Overman	.....	.....	.....	.....	.....	.....
Potosi	1¼	1⅜	1¼	1¼	1¼	1¼
Savage	.....	.....	.....	.....	.....	.....
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nev	3⅝	4	3⅞	3⅝	3⅝	3¾
Silver King	10	.....	11	.....	10¾	10¾
Tip Top	.....	.....	.....	.....	.....	.....
Union Con.	4½	4⅞	4¾	4¾	4¾	5⅛
Wales Con	¼	¼	5-16	.....	.....	7-16
Yellow Jacket	1⅛	1⅛	1⅛	1⅛	1⅛	1⅛

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, March 1.

There is absolutely next to nothing doing in copper stocks, the past week being the dullest of this dull season. Calumet & Hecla sold in small lots at $243, but a ten-share lot being placed on the market, caused a drop to $242. Franklin was barely steady at $13, buyer sixty, with regular stock selling at $12¾. Pewabic was very weak, notwithstanding the report of a rich find in one of the lower levels of the mine; a lot of 600 shares being pressed upon the market, forced the price down to $7½, the last regular sale (21st inst.) being at $9¾. Quincy has been fairly steady at $50, although a lot of 300 shares was sold at $49¾. Osceola was firm but dull, at $31. Allouez sold at $2½, and National at $1⅛. The aggregate sales for the week foot up only about 2000 shares, which fully indicates the extreme inactivity of the market in this class of securities. The outlook for the future is not very encouraging, there being no disposition with the public to speculate in mining stocks.

In silver stocks, the recent law enacted in Colorado taxing net proceeds of the mines in that State has had a depressing effect on Catalpa and Crescent, two of the most active mining stocks in this market, the former declining from 80@60c. and the latter from

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BOSTON MINING STOCKS.

	Feb. 23.		Feb. 24.		Feb. 26.		Feb. 27.		Feb. 28.		March 1.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez					2⅛				2⅛				400
Atlantic													
Aztec													
Best & Bel													
Bodie Con					2⅝		2¾		2¾		2¾		300
Bonanza D							15.00						100
Bruns. Ant													
Bulwer													
California			243				242½	242					17
Cal. & Hec													
Carbon. Hill			72½	.70	.67½	.63	.65	.60	62½	.60			2,650
Catalpa													
Central Ariz							.25						500
Cherryfield													
Chrysolite							.56						500
Con. V'ginia	.58												
Copp'r Falls			.30	.27½	.28	.25	.25	.24	.27	.24	.30		7,300
Crescent													
Cumberl'd													
Deer Isle													
Denver City	.75				.80	.75	.80	.75	.80	.75			1,100
Douglas													
Duncan							.20						1,100
Dunkin			.27				.27	.26	.28	.27			5,500
Empire	.25	.24	.25		.26	.25							
Eureka Con			13.00	12¾	12¾	12.50			12¾				270
Franklin													
Gila County					9⅛	9.00							300
Hancock G	9.00						.75						200
Harshaw													
Horn-Silver									1¾				300
Huron	1⅝				1⅝								50
Indian Q'n					1.31¼								
Madison													
Mammoth					.09	.08	.08	.06	.08				43,575
Mass. & N.M	.10	.08	.09										
Milton													
Napa													100
National									1⅛				
North. Belle							31.00		31.00				21
Osceola	31.00												
Penn-Breck									7⅛		7⅛		750
Pewabic			9.00										
Pine Tree													600
Plymouth	.23				.24								195
Quincy	49¾		50.00		50.00		50.00		50.00		50.00		
Ridge													
Robinson									.57½				325
San Pedro					.75								
S'ra Nevada									2.70				200
S'ra Grande	2.95										5¼	5.00	150
Silver Islet													
Silver King													3,100
Simpson Gd	.06		.06		.06								
Sc. Pacific													
Standard													
State Line													
Nos. 2 & 3													
Sullivan									.21				400
Sutro Tun	.22												
Sycamore													
Twin Lead	.09		.09	.08	.08		.08		.07				5,500
Vizina													

PHILADELPHIA MINING STOCKS.

	Feb. 23.		Feb. 24.		Feb. 26.		Feb. 27.		Feb. 28.		March 1.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American							.25		.25		.27½	.25	28,225
Argent													
Arizona So													
Aztec													
Battle Mt													
Black Sul													
Bodie													
Buena	.06		.06		.06		.05		.05				20,200
California													
Calista							.11		.10		.11		11,600
Cincinnati	.10		.10		.30		.30		.30		.30		13,100
Comprom'e	.30						.01						100
Dauntless													3,000
Del Monte	.04								.17				6,600
Denver City					.16								10,000
Fairview	.01		.01										
Eureka													23,700
Girard	.17		.18	.17	.20	.19	.22	.20	.21		.20		
Golconda													
Golden Age													17,500
Governor	.09		.09		.09		.09		.09		.10		19,400
Grand Uni'n	.19		.19		.19				.10		.20		1,000
Gunnison							.60	.55					
Hancock													27,900
Iowa Gulch	.10		.10		.10		.10		.10	.09	.10		
King Bul'on													
Ledger Con													
Little Dia'd													
Little Maud					.06				.06				6,600
L'g & D'y Hl							.01						1,000
McCullough													
Magnolia			.01		.02		.01				.02		49,500
Montana													
Mt. Lincoln													
Mt. Sheridan											.04		200
National													
Orion			.06										200
Orion Pref			.12								.10		500
Palmetto E													
Pembina	.20		.20		.21		.21	.20			.21		12,800
Penn-Breck			.10		.10		.11		.12	.11	.11		11,000
Permanent													
Pizarro													
Pizarro Ex													
Potosi													
Rara Avis			.55						.52½		.52½		2,200
Rara Avis E	.07		.07		.07		.07		.07		.07		13,900
Record													
Rico Pion'r													
San Pedro													
Sierra G'nde	3.50	3.25	3.50	3.00	3.00	2.60	2.65	2.60	2.75	2.70	2.85	2.80	17,950
Silver Cord													
Silv'r Plume													
Silver Rock													
Sovereign													
Standard											.04		12,600
Sultana	.04		.04		.04						.22		600
Sutro Tun'l							.28				.82½		4,150
Tombstone	.75				.80	.77½	.80		.82½				
Tranquilli'y													
Tyrone													
Victor													
Yale Mt	.07								.10	.09			1,300

30@25c. The rest of the market was entirely neglected.

At the Boston Mining and Stock Exchange, Massachusetts & New Mexico continues to be active at 7@9c. per share. Empire is also in good demand and has advanced from 24@29c. Brunswick Ship's Berth Company, a new stock recently listed, has been quite freely dealt in, and advanced from 40c.@$1.20, with later sales at 90c.@$1. Simpson Gold Company, of North Carolina, which started up again into activity a few weeks ago and sold from 2c. up to 8c., has declined to 4c., with very little doing.

3 P.M.—There was no change in the market this afternoon. Quincy sold at $50. Silver Islet, $5¼@$5. Bonanza, $2¾. Closing prices: Antimony, $14 bid, $15 asked. Bonanza, $2½ bid, $2¾ asked. Catalpa, 60c. bid, 70c. asked. Crescent, 27½c. bid, 35c. asked. Franklin, $12⅛ bid, $12¾ asked. Harshaw, $1 asked. Huron, $1¾ asked. National, $1⅛ bid, $1¼ asked. Osceola, $30½ bid, $31 asked. Pewabic, $7¼ bid, $7½ asked. Quincy, $49¾ bid, $50 asked. Silver Islet, $5 bid, $5½ asked. Sullivan, $⅞ bid, $1 asked.

BULLION MARKET.

NEW YORK, Friday Evening, March 2.

The silver market abroad has been firm the past week on steady East India exchanges, but has been lowered here by a decline in sterling exchange.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Feb. 24	51	110⅞	Feb. 28	51	110¾
26	51	110⅞	Mar. 1	51	110¾
27	51	*	2	51	†

*110⅞@110¾. †110⅝@110¾.

United States Mint at Philadelphia.—The coinage executed at the Mint during February amounted to 6,265,440 pieces, valued at $1,100,360. This was composed of 40 double-eagles, 40 eagles, 40 half-eagles, 40 three-dollar gold pieces, 40 quarter-eagles, 1240 gold dollars, 900,000 silver dollars, 610,000 dimes, 2,224,000 five-cent pieces, and 2,530,000 cents.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended March 2d, as compiled from various sources, amounted to $363,463.06, as against $209,130.38 reported for the previous week. The receipts from January 1st, 1883, to date are $2,643,501.11.

BULLION PRODUCTION FOR 1883.

MINES.	States.	For the week.	Month of January.	Year from Jan. 1st, 1883.
Alice, G. S.	Mont		$90,041	
*Alta-Montana, G. L. S.	"		†10,625	
Bodie, G. S.	Cal		26,084	
Bodie Tunnel, G.	"		13,631	
Bonanza King, G.	"		61,777	
*Central Arizona, S.	Ariz		15,627	
*Christy, S.	Utah		23,260	
*Chrysolite, S. L.	Colo		26,312	
Contention, S.	Ariz		88,694	
Crescent, G.	Cal		13,000	
*Custer, G. S.	Idaho		43,572	
*Deadwood-Terra, G.	Dak		45,696	
*Derbec Bl. Grav., G. S.	Cal		8,337	
*Father de Smet, G.	Dak		42,077	
*FriscoM. & S. Co., G. S. L.	Utah		22,671	
*Homestake, G.	Dak		107,678	
Horn-Silver, S. L.	Utah		203,000	
Lexington, S.	Mont		89,050	
*Little Pittsburg, S. L.	Colo		5,107	
*Marguerite, G.	Cal		10,300	
Martin White, S	Nev		19,407	
Moultos, G. S.	Mont		41,005	
Navajo, G. S.	Nev		80,000	
Northern Belle, S.	"		65,174	
*Ontario, S. L.	Utah		‡182,221	
*Oxford, G.	N. S.		2,865	
*Satemo, G.	"		1,800	
Standard, G.	Cal		82,959	
Star, S.	Nev		14,796	
Stormont, S.	Utah		19,130	
Syndicate, G.	Cal		9,217	
Tintic M. & M. Co.	Utah		7,632	
*Tip Top, S.	Ariz		7,976	
*Tombstone, G. S.	"		72,011	
Yellow Jacket, S.	Nev		14,252	
Total amount of shipments to date			$1,564,984	

* Official. ‡ Assay value. †Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended February 24th	$411,638
Corresponding week last year	1,709,563
Since January 1st, 1883	2,020,892
Corresponding period last year	8,792,740

Imports.

Week ended February 24th	$128,555
Corresponding week last year	75,372
Since January 1st, 1883	894,376
Corresponding period last year	585,633

United States Assay-Office at New York.—Statement of business for the month ended February 28th, 1883:

Deposits of gold:		
Foreign coin	$73,000.00	
Foreign bullion	67,000.00	
United States bullion	500,000.00	
United States bullion (re-deposits)	120,000.00	
Jewelers' bars	78,000.00	
Refined gold	96,000.00—	$934,000.00
Deposits of silver:		
Jewelers' bars	$14,000.00	
Foreign coin	700.00	
Foreign bullion	30,000.00	
United States bullion (contained in gold)	5,500.00	
(Re-deposits)	5,000.00	
Bullion, Arizona	3,800.00	
Colorado	12,000.00	
Lake Superior	800.00	
Montana	60,000.00	
Nevada	10,000.00	
New Mexico	18,000.00	
Utah	103,200.00	
Refined silver	234,000.00—	497,000.00
Total deposits		$1,431,000.00
Gold bars stamped	$2,144,795.00	
Silver "	466,114.00—	$2,610,909.00

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, reduced the minimum rate for discount from 3½ to 3 per cent. During the week, the bank gained £167,000 bullion; but the proportion of its reserve to its liabilities was reduced from 44 1-16 to 43 per cent, against 37 11-16 per cent at this date a year ago. The weekly statement of the Bank of France shows an increase of 1,800,000 francs gold and a decrease of 1,050,000 francs silver.

METALS.

NEW YORK, Friday Evening, March 2.

Copper.—The market again shows signs of being demoralized. Lake has sold as low as 17¾c. in small lots as they came into the market, and on the part of buyers there does not seem to be any eagerness to take what little is offered even at that. For other kinds of copper, we note that large bids have been made for Baltimore, at considerably below 16c., but have been declined.

England cables £65 10s.@£65 15s. for Chili Bars, and £72@£72 5s. for Best Selected. The Chili charters for the first two weeks of February have been exceptionally light.

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Tin.—A moderate business has been done, the feeling being better for futures, however, than for spot. Sales during the week aggregate from 250 to 300 tons, the market closing at 20⅞@21c. for Straits.

Lead.—The deadlock here remains unbroken, the only news of any interest, though not affecting the market, being the burning of the St. Joe works. There has not been a single wholesale transaction either in common or corroding lead. We understand that some Richmond lead was offered at 4·55c., but found no takers. It is likely that a few hundred tons, widely distributed, could be placed at 4·50c., which is bid.

Holders are very firm. Those Western smelters who contracted for ores on a falling market, both for lead and for silver, with a slow competition in smelting charges, are not inclined to sell at the loss which present quotations would entail, and appear to prefer to hold on for better prices. On the other hand, manufacturers are fairly well supplied for some time to come.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

The market is very steady at some advances on last week's quotations, with a good demand for chemical lead. Sales for the week sum up over 250 tons of Hard lead, at 4·25c., and 200 tons of Refined at the same price.

Spelter.—There is nothing new to report. Common Domestic is quoted 4⅝@4¾c., but it would not be easy to market any considerable quantity at the former price.

Antimony.—The feeling is better. Hallett's is well sold ahead, and is nominally 10@10½c., while Cookson's is firmer, in the absence of the former brand, it being quoted at 11@11½c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 2.

American Pig.—The market is decidedly weaker, and there is some talk about the prices to be fixed for next season's delivery, the time for these contracts being at all events close at hand. It is considered very probable that there will be shading. We quote $23.50@$25 for standard to choice brands of Foundry No. 1 at tide-water, and $21.50@$22.50 for No. 2. Gray Forge remaining at $20@$20.50. Bessemer Pig is dull and unchanged both here and in England, the nominal range at tide-water being $22@$22.50. Nothing has been done in spiegeleisen, which is nominally $26@$27 for 10 to 12 per cent, and $32@$33 for 20 per cent.

Scotch Pig.—Business has been dull, arrivals being 1600 tons, of which 1200 tons have gone into consumption. Freights are unchanged at 6s. 6d. We quote Coltness, $24.75@$25.25; Glengarnock, $22@$22.50; Langloan, $24.50@$25; and Eglinton, $21@$21.50. The Wall Street Exchange has received the following Glasgow quotations by wire to-day: Carnbroe, 55s. 3d.; Gartsherrie, 61s. 9d.; Summerlee, 62s.; Coltness, 64s. 9d.; Langloan, 64s. 6d.; Glengarnock, 55s.; and Eglinton, 49s. 6d. Warrants were 47s. 9d.

Rails.—Business is limited in character. For early delivery, Eastern mills are fairly engaged, and some are delivering orders which go to Western mills and make the latter busier than they have been. We quote here $39@$40 at mill, at St. Louis $45, and at Chicago $42.50.

Old Rails.—These are fairly steady with some sales at $24.25@$24.75 for Ts, and $27@$27.50 for D.Hs.

Scrap.—Very little is doing at $24.75@$25.50 as the nominal range.

It is now probable that a tariff bill will pass. As we go to press, the news is received that the Conference Committee has reached an agreement which fixes the duty on iron ore at 75 cents, the rate on pig-iron at $6.72, on steel rails at $17, on steel valued at 4 cents per pound or less, 45 per cent, valued at 7 cents and less than 11 cents, 2¾ cents duty, and above 11 cents value, 3¼ cents per pound. In other items of the metal schedule, so far as learned, the duties are those proposed by the Senate bill.

Philadelphia. March 2.

The iron situation in Pennsylvania has improved slightly. At present writing, the protectionists see a few glimmers of hope, which, if realized, will place them in a better condition than they contemplated a week ago. A growing feeling of the past few days has pointed to the probable postponement of tariff legislation until next winter; but withcertain modifications of the present metal schedule, a prompt decision would be more acceptable to the greater portion of the iron interests here and throughout the West. Prices have been quite uniform all the week, in view of the adjournment of Congress this week, and the settlement of tariff duties thereby. Several buyers have made their appearance with requirements, which they intend to place next week if prices and delivery suit. No rise in prices is thought probable, but at the same time the possibilities are sufficiently strong to induce some few large consumers of iron and steel to place their requirements for 60 or 90 days to come at this time rather than make further delay, though their action in this respect will be determined largely by the results to be reached between this hour of writing and Saturday noon. There are several encouraging features in the iron market, notwithstanding many discouraging ones. The great factor of railroad construction is assuming a more encouraging aspect. Several hundred miles of road will be undertaken in the North and Northwest in the spring, and completed, if possible, before the coming of cold weather next winter.

Rails.—Makers are confident that, with fair advantages, their mills will be busily employed throughout the year, especially in the East, and at about $40 per ton, though less positive statements can be made of Western mills. A few transactions have taken place this week at a little below $40, and there are offers in hand which makers do not feel justified in accepting at present. There are a good many requirements to be filled, and makers think they will be placed during March, though buyers will hold back to the last hour because of the fact that Eastern mills are filled for months and a good many risks are to be run before contracts can be executed.

Bessemer Pig is without any activity, and quoted at $22.50. Buyers are waiting for better prices, and say they will not pay over $21 at tide-water. A few small lots of Scotch iron sold at bottom figures.

Merchant Bar.—Small lots are selling at about 2·30@2·35c. Stocks are sufficiently large to meet all requirements. Card rates are not easily maintained at mills; but notwithstanding the decline in prices, manufacturers are not disposed to accept contracts for remote delivery, neither will they place orders for forge iron at $20@$21, though at present cost of production no decline in prices are probable.

Bar-Iron is moving quietly all the way from 2@2·30c., and mill owners are waiting for the disturbing elements to disappear. Skelp-Iron is 2·20@2·40c. Wrought Pipes are 67½@70 off small sizes, and 55 per cent off card list for Boiler Tubes. Several orders are to be placed next week.

Sheet-Iron is moving in small lots, as usual, and consumers are waiting for bottom prices to be reached before placing requirements for supplies for the spring and summer. The output will be absorbed in meeting the spring trade. Stocks are larger than they have been for several months, and there is confidence that the future demand will be large.

Hardware for the spring trade is in improving request, and jobbers from the West and South are placing orders.

Angle Iron is quoted at 2·50c.; Tees, 3¼c.; Beams, 3½c.; Channel Iron, 3¾c. Manufacturers have a few specifications in hand, and will do some business next week for April delivery.

Plate and Tank is in improving demand, though prices will not probably feel the impulse, as books are empty of orders and the volume of the demand is uncertain. Tank Iron is quoted at 2½c., though sold at less. Shell is 3⅛c.; Flange, 4⅛c.; Fire-Box, 5¼c. Manufacturers expect to do a fair business, though they have very little to speak of for several weeks past. As to the probabilities of heavy requirements during this and next month, different opinions have been expressed, but a careful summing up of the situation justifies the opinion that the demand will be no less than last spring, and that prices will not be quite as strong.

Steel Rails are in an uncertain position and are quoted at $39@$40. No large requirements have been placed for several weeks, and there is an accumulating demand which is likely to be put upon the market at any time now that uncertainties as to tariff duties have been virtually removed and railroad companies can figure down cost. There are rumors that contracts will be placed at $38, but they can not be traced to authoritative sources.

Old Rails are weak at $25.50@$26 for Tees quoted, though no sales are mentioned. Sellers of Double-Heads are offering them at $27@$27.50 for shipment to tide-water. Railroad Scrap sold at $28. No. 1 selected from yard sold at $27.50. A few small lots of Scrap sold at $26.

Cleveland. Feb. 27.

[Specially reported by H. S. MOULD & Co.]

The feeling in the iron markets is still one of uncertainty, and is decidedly unsatisfactory, but still has assumed some more encouraging features since our last report. Trade continues in a small way, and consumers only buy from hand to mouth. Stocks of Foundry Irons are exceedingly light, and, should the trade buy in their way, they would quickly exhaust furnace stocks. American Scotch or good soft irons are particularly scarce, and command relatively more than strong irons. The ore trade remains practically at a stand-still. We quote:

No. 1 Bessemer	$23.50@$24.00
" Foundry, all ore	22.50@ 23·50
" Foundry, cinder mixture	22.00@ 23.00
" Soft Foundry	21.50@ 23.00
" Open silvery	21.50@ 22.00
Mill Irons	19 50@ 22.00
No. 1 and 2 Charcoal	26 50@ 27.50
" 3, 4, 5, and 6 Charcoal	27.00@ 28.00
Hanging Rock Charcoal	23.00@ 26.50
Strictly Cold-Blast	28.50@ 31.00
Four months, f. o. b. cars Cleveland:	
Bessemer ores	8.50@ 10.00
Hematite "	6.00@ 8.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 2.

Anthracite.

The anthracite coal trade continues dull, though in some quarters a slight improvement in the demand is reported, particularly so far as steam sizes and pea are concerned. The representatives of the companies have had a number of conferences in relation to the fixing of opening prices for the season. The feeling seemed to prevail that it would not be judicious to take any steps until navigation is opened, and it has been accordingly decided to let things alone until the 1st of April. It is reported that the figures contemplated will be $3.80, $3.90, and $4.35, though the latter one, for stove, is considered too high by some authorities in the trade. It is certainly the policy which the companies are bound to pursue to make these prices as high as they reasonably can, in order to make their contracts covering large periods remunerative. This feeling probably will make them continue the policy of restricting during the rest of the month, and as there will be fifteen idle days, there is little doubt that the market must experience at least a temporary revival. Much is apparently expected from the general resumption of buying to follow the adjournment of Congress, but there are those who very strongly insist that the hopes of the improvement in the manufacturing industries will not be realized. The developments of the next few weeks will be watched with close interest.

Bituminous.

The interest in the bituminous trade still centers in the question of freight rates on the Baltimore & Ohio and Pennsylvania railroads. A few figures will best serve to place the entire matter in the right light. The circular of the Pennsylvania Railroad provides for the following rates, from Clearfield, Snow Shoe, Broad Top, Sonman, etc., per net ton:

To South Amboy	$2.90
To Greenwich, destined to points south of Wilmington and outside the Capes	2.08
To Greenwich, points on river front	2.38
To Philadelphia, city delivery	2.50
To Baltimore, shipment	2.00
To Baltimore, city delivery	2.25

The Baltimore & Ohio rates are as follows to the Locust Point shipping wharves:

From Cumberland	$1 62
" Piedmont	1.83

Basing calculations on these figures, the transportation charges on Cumberland coal alongside New York via Baltimore would be $3.50; taking the barge freights the same as last year's contracts, $1.25. Clearfield coal via South Amboy, alongside New York, would have to pay $3.70 for transportation, while it would cost $2.55 f. o. b. Philadelphia and $2.48 f. o. b. Baltimore. Cumberland coal could be brought to Baltimore, f. o. b., via Cumberland, for $2.25 and to Georgetown by canal for $1.95. It will be seen, therefore, that Clearfield coal is at a disadvantage so far as freight rates are concerned to the extent of at least 20 cents. The Clearfield shippers have naturally urged the Pennsylvania Company to give them a fair chance, and it seems that there is a prospect of another conference. Meanwhile, we hear that orders are solicited and obtained in a few instances by both Clearfield and Cumberland shippers, which are inconsistent with the freight rates established, in some cases being so low that there can be absolutely no profit, indicating that the Cumberland shippers who have made the offers in question must look to some other source for a margin. On the other hand, Clearfield shippers have taken low contracts, showing that either they are determined not to lose their grip on the market or that they are willing to impress the railroad company in this way.

For current business, there seems absolutely no inquiry, and we quote nominally $4.50@$4.60 for Clearfield and $4.55@$4.75 for Cumberland coal.

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How rapidly the mining industries of the Rocky Mountains are developing under the impetus of increased railroad facilities is shown by the traffic returns contained in the annual report of the directors of the Union Pacific Railroad Company. That company carried, in 1882, 349,960 net tons of coal, 20,762 tons of stone and brick, 13,495 tons of cement, plaster, and lime, 16,489 tons of salt, 21,152 tons of metallic ores, and 66,670 tons of other ores and coke. The same road carried 13,522 tons of lead, 57,885 tons of base bullion, and 9232 tons of tailings and matte. The report speaks of the completion of the Oregon Short Line to Shoshone, from which the grading of the branch to the Wood River region, fifty miles long, is completed. The directors make the very important statement that within sixty days the track will be laid. There can be no doubt that, with this connection established, a new and very prolific source of supply will be opened to our markets of lead, which, fortunately, are again beginning to show signs of animation.

THE Bureau of Statistics has just issued its December bulletin, which makes it possible to give the imports and exports for the calendar year, which are more acceptable than those relating to the fiscal year, to which, unfortunately, the government clings with such persistency. The following are the net imports of foreign iron, steel, and metals, that is, making allowance for re-exports, which we do not publish separately, because they are not heavy in any case.

IMPORTS OF IRON, STEEL, METALS, AND CHEMICALS, ETC., IN 1882 AND 1881.

IRON AND STEEL, METALS, AND CHEMICALS.	Quantities.		Values (1000 dollars).	
	1882.	1881.	1882.	1881.
Iron and steel.				
Iron ore, gross tons	589,611	782,887	1,640	2,223
Pig-iron, net tons	602,762	517,196	9,864	8,860
Castings, net tons	2,074	632	115	37
Bar-iron, net tons	78,783	46,927	3,272	2,012
Boiler-iron, net tons	175	260	13	10
Band, hoop and scroll iron, net tons	6,011	818	209	28
Iron rails, net tons	40,876	136,649	1,047	3,452
Steel rails, net tons	146,217	240,749	4,463	7,387
Sheet-iron, net tons	12,945	8,060	789	607
Old and scrap	146,792	134,917	2,733	2,705
Hardware	.....	.....	68	73
Machinery	.....	.....	2,186	1,641
Steel ingots, bars, sheets, and wire	.....	.....	12,975	9,994
Cutlery	.....	.....	2,019	1,947
Fire-arms	.....	.....	1,650	1,306
Other manufactures of iron and steel	.....	.....	6,234	5,830
Metals.				
Tin plates, gross tons	354,600	304,000	17,871	14,838
Tin, gross tons	17,484	13,111	5,777	3,737
Copper ore, gross tons	34,948	3,632	111	118
Copper, net tons	238	269	55	60
Copper, manufactures of	.....	.....	286	292
Lead, net tons	2,894	3,454	180	231
Spelter, net tons	12,826	2,755	1,024	210
Sheet-zinc, net tons	2,328	1,824	215	117
Metals, metal composition, and alloys, n.e. sp.	.....	.....	2,026	1,549
Chemicals.				
Chloride of lead, net tons	46,809	43,476	847	822
Nitrate of soda, net tons	75,149	63,307	3,045	2,909
Crude sulphur, gross tons	101,595	117,392	2,674	3,101
Bicarbonate of soda, net tons	1,049	889	53	57
Carbonate, incl. sal soda and soda ash, net tons	165,180	143,703	4,010	3,524
Caustic soda, net tons	29,021	24,700	1,312	1,126
Other salts of soda, net tons	4,984	1,602	66	26
Salt, net tons	408,106	505,008	1,614	1,884
Nitrate of potash, net tons	5,225	6,430	391	479

These figures tell their own story. The noteworthy points are, the striking increase, in the iron and steel list, on steel ingots, bars, wire, etc.; the heavy increase, so far as quantity is concerned, in bar iron; the addition, notwithstanding the adverse position of the markets, to the volume of pig-iron received; and the maintenance of heavy shipments of scrap, although the entire world has been scoured for years to supply our market. Quite a heavy falling off is noted in iron ore, and iron and steel rails. Tin plates head the list with a valuation of nearly 18 millions of dollars. Copper and lead have remained stationary, while copper ore, so far as quantity is concerned, has taken a sudden jump, although the values are unaltered. It is presumed that the bulk of this increase in quantity is due to Canadian and Spanish pyrites. Taking them at an average net yield of 50 pounds of copper to the gross ton, these imports represent approximately 1,800,000 of copper. The most interesting feature in the metal list has, however, been the heavy imports of Silesian spelter, which have now, however, practically ceased, owing to the prevalence of low prices.

Our exports of domestic iron, steel, and metals cut a sorry figure, as the following table will eloquently show:

EXPORTS OF IRON, STEEL, AND METALS IN 1882 AND 1881.

IRON AND STEEL, AND METALS.	Quantities.		Values (1000 dollars)	
	1882.	1881.	1882.	1881.
Iron and steel.				
Pig iron, net tons	6,245	6,897	186	184
Bar iron, net tons	849	448	61	32
Boiler plate, net tons	41	69	3	6
Iron rails, net tons	2,518	597	127	34
Sheet, band and hoop, net tons	122	115	11	9
Castings	.....	.....	379	288
Car-wheels	.....	.....	149	139
Stoves	.....	.....	213	142
Locomotives, number	174	104	1,878	914
Stationary engines, number	104	94	183	88
Boilers	.....	.....	189	161
Machinery	.....	.....	6,129	4,818
Manufactures of iron	.....	.....	6,490	5,766
Nails and spikes, net tons	4,053	4,577	321	312
Steel rails and ingots, bars and sheet, net tons	1,589	321	170	53
Cutlery, edge tools, files and saws	.....	.....	1,157	1,254
Fire-arms	.....	.....	227	1,018
Manufactures of steel	.....	.....	453	562
Metals.				
Copper ore, gross tons	3,342	1,150	180	54
Copper, net tons	1,500	3,517	534	1,139
Manufactures of copper	.....	.....	112	60
Manufactures of brass	.....	.....	266	321
Parts of clocks	.....	.....	1,457	1,115
Lamps	.....	.....	401	293
Manufactures of lead	.....	.....	50	169
Quicksilver, net tons	1,314	1,340	1,005	1,027
Manufactures of tin	.....	.....	203	187
Oxide and ore of zinc	.....	.....	14	16
Sheet-zinc and bars	580	641	98	117

The most gratifying figure is that of machinery; unfortunately, we have no details as yet concerning the countries to which it was shipped, nor as to its character; but we have little doubt that a great part, if not the bulk of it, is mining machinery sent into Mexico. This is probably the case also with the greater part of the railroad material. The export of copper ore shows very little change in the above table, because the heavy movement now developed began only toward the end of Novem-

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ber last year. Altogether, the contrast between the two tables given is one which few who are concerned in the development of American industries will fail to note without dissatisfaction.

WE print elsewhere those provisions in the new tariff bill which are likely to affect our readers. As the new bill now stands, it has very little to commend it, and we are far from believing that it is entitled to be considered a measure which would have grown out of a thorough consideration and discussion of the subject. It was modified in an exceedingly high-handed manner in the Conference Committee, which was not representative of the parties in both branches of Congress, and was pushed through because the majority of members of the House of Representatives and of the Senate did not dare to return to their constituents without having done something to lighten the burden of taxation. How long the question will now remain at rest remains to be seen, and the feeling of distrust on this score to a certain extent lessens the feeling of relief growing out of the fact that for the present the tariff agitation is ended.

It is a difficult matter, in considering many of the clauses, to form any definite idea whether the changes made mean a reduction or not, there having been a re-classification which, in the absence of data, defeats any calculations. Taken as a whole, the reduction on iron has been moderate and on metals has practically amounted to nothing. On steel, the lowering of the duties has been greatest. While it does not, at present prices here, make very much difference to the steel rail makers whether the duty is $17 or $50, it does narrow down their chances of profit in times of great prosperity very materially. Experience during the last decade has shown how extremely fluctuating is the demand for rails. On the other hand, the mills can not stock their finished product and have a heavy outlay of capital and great stocks of raw material, so that steady work is a necessity. They are therefore in a particularly difficult position so far as their future is concerned, standing as they do between a consumer notoriously vacillating and producers of pig and ore who can not respond to their demands promptly.

One of the curiosities of the new tariff is the duty on wire rods. Wire above No. 5 gauge is placed at 0·6 cent per pound; but a few passes through the rolls, bringing it down to a size smaller than No. 5, makes it dutiable at 1¼ cents per pound.

Iron ore, it will be seen, is placed at 75 cents per ton, although the Tariff Commission, the Senate Finance Committee, and the Ways and Means Committee, all recommended 50 cents per ton, and though the Senate and House bills contained that figure. It is stated that Senator MAHONE is chiefly responsible for this remarkable change, which, we presume, is intended to make available the enormously rich deposits of exceptionally low phosphorus ores which Virginians have so persistently claimed to possess. The duty on copper ore has its curiosities. According to the provisions of the tariff, 2 per cent pyrites pay 75 cents, 3 per cent pyrites pay 75 cents plus 2½ cents per pound on the copper, or $2.43, while 3·6 per cent ore pays $2.02. Importers will, therefore, have to shun carefully the range between 2 and 3½ per cent. There is a good deal of talk about the alleged enormous quantities of copper from Canadian and Spanish pyrites with which our markets will be flooded, it being glibly asserted that we may expect 250,000 tons of pyrites, containing at least 5000 tons of copper, which would come in duty free. We import upward of 110,000 tons of brimstone, equivalent to at least 250,000 tons of pyrites, in the manufacture of sulphuric acid. This, therefore, would supply the entire market of the country, provided the use of brimstone was entirely abandoned.

Of the other metals, lead, spelter, and antimony are unchanged, quicksilver taken from the free list and given a duty of 10 per cent, while nickel has been considerably reduced.

THE IRON AGE AND MR. HEWITT.

An anonymous correspondent of the *Iron Age* attacked Hon. A. S. HEWITT in the following words (February 15th):

"As usual, Mr. Hewitt attempts to mislead the public as to his interests in the iron trade, by pretending to be principally engaged in mining iron ore and making pig-iron, whereas these operations are secondary to his main business of rolling iron and steel and drawing wire at Trenton, N. J. He probably consumes five times as much crude metal as he makes in his blast-furnaces in New Jersey."

To this, Messrs. COOPER, HEWITT & Co. replied, in a letter published in the *Iron Age* of February 22d:

"As a matter of fact, when our furnaces are in blast, as they usually are, we make nearly twice as much pig-iron as we consume of pig and scrap together in our works at Trenton, N. J."

In the *Iron Age* of March 1st, the anonymous assailant returns to the charge with a pretended statement of the grounds for his assertion and a deliberate accusation that Messrs. COOPER, HEWITT & Co. are making false representations about their business. The course of the *Iron Age* in permitting such an outrage upon reputable manufacturers, and repeatedly publishing the slanders of a nameless coward, without taking any pains to inform itself, as it could easily have done, as to the facts, is unworthy of its reputation for fairness, and seems all the more surprising in view of the remark of Messrs. COOPER, HEWITT & Co. in their letter of February 19th to the Editor:

"We can not conceive any justification for the admission to your columns of a communication which charges deliberate misrepresentation on our Mr. HEWITT, when, by application to this office, you could have ascertained the facts, so that the correction might have appeared with the charge."

The immediate reply of the *Iron Age* to this dignified rebuke is the publication of the same slander in aggravated form. We can only explain this by supposing that somebody did it while the gentlemanly Editor was absent at Boston, delivering a good-natured satire upon mining engineers, metallurgists, and chemists, in which we do not remember the following stanza:

If Iam an Editor, 'twill be my pride,
Said I to myself, said I,
To bring out the truth from the opposite side,
Said I to myself, said I.
First letting my paper some person abuse,
Then letting the victim reply, if he choose —
Which doubles the "copy," and gives *all* the news,
Said I to myself, said I.

But if the witty poet of the Boston banquet said nothing of this kind to himself, it is a pity that, by an unfortunate oversight, it should become possible for others to say it to him.

As to the last question of fact raised by the anonymous *protégé* of the *Iron Age*, it is sufficient to say that it is the meanest variety of a misrepresentation, because it rests upon the quibble that, at the principal pig-iron works of COOPER, HEWITT & Co., though part of the property is in New Jersey, and part of the work is done in New Jersey, the blast-furnace itself is a few hundred feet over the line, and in Pennsylvania. As this furnace supplies pig-iron to the works at Trenton, its existence and capacity are of course essential elements in the real question, whether COOPER, HEWITT & Co. "consume five times as much crude metal as they produce," or not. By ignoring it altogether, and misrepresenting other facts, the foundation is laid, on which a respectable journal permits Messrs. COOPER, HEWITT & Co. to be accused of lying, for the purpose of securing on false pretenses the passage of laws which would benefit their business.

The unknown sharp-shooter who thus fires from behind the *Iron Age* assumes the capacity of the New Jersey furnaces at 20,000 tons and their product at 10,000. The Durham furnace, which he excludes (though the catalogue of the American Iron and Steel Association, his pretended authority, mentions it in two places in its New Jersey list), produced in 1882, in about ten months of running, 27,264 net tons of pig-iron, or at the rate of say, 32,717 net tons per annum. The product of the last six months of 1882 was 16,454 net tons, or at the rate of 32,908 tons per annum. It is now producing at even a larger rate. These figures, by the way, are probably the best that have been attained in continuous running through long periods by an anthracite furnace with iron hot-blast stoves. They reflect much credit on Mr. B. F. FACKENTHAL, Jr., the manager of the Durham Iron-Works; and we presume the *Iron Age* will be glad to publish them as a matter of news, whatever it may feel bound or not bound to do as a matter of justice.

The tariff struggle being over for a time, and the advocates of higher duties on iron ore having succeeded in getting a small increase, the necessity for employing, as arguments of political economy, personal attacks upon character and motives, has probably passed away; and after the publication of the *Iron Age's* apology, the "incident," as the French say, will be concluded.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Product of the Lexington Mine.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Allow me to correct two erroneous statements concerning the Lexington Mining Company, which have crept into your paper. In the first place, in the statement of bullion production for 1882, given in your number for January 13th, 1883, you give the production of the Lexington for 1882 as only $88,508; and further, you class this production with others subject to a reduction of about 13½ per cent.

The Lexington new mill was started a few days before the end of September, 1882, and up to December 31st, 1882, the output from this mill alone was $248,048.22. The Lexington old mill (wet-crushing) ran from September 17th, 1881, to December 31st, 1882, partly on tailings left by the vendor of the Lexington mine, and partly on free-milling ore, and the output from this mill, during 1882, was $168,054.54. Both of these sums represent the actual values realized by sales of bullion, and are subject to no deduction.

The new mill of the Lexington Mining Company has fifty stamps, and is a dry-crushing mill. The old mill has only ten stamps. The total realized value of the output of the Lexington mine during 1882 was therefore $416,102.76.

The second error concerning the Lexington appeared in your number for February 10th, 1883. You there state that, at a meeting of the company held in Paris, France, on the 5th of January, 1883, it was shown

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that, during the first four months of the working of the mill, it treated 11,800 tons of ore at a gross profit of 647,000 francs, or 56 francs per ton.

I have before me a copy of the proceedings of this meeting, and it was there stated that, since the Lexington mine had become the property of the present company, there had been treated as follows:

Tailings (treated at old mill)	4,369 tons.
Ore (treated at old mill)	1,588 "
Ore (treated at new mill)	5,332 "

It was further stated that the profits earned during the few days in September during which the new mill ran were as under:

Profits during September, francs	47,000
" October, "	110,000
" November, "	254,000
" December, "	236,000
Francs	647,000

These profits were earned by the new mill, and therefore the profit per ton was a trifle over 121 francs instead of only 56 francs. These statements are absolutely correct, and were made from figures furnished by me. I am, dear sir, yours truly,

F. MEDHURST,
General Manager Lexington Mining Company.

LAKE IRON INTERESTS.

Special Correspondence of the Engineering and Mining Journal.

The disasters which have overtaken the iron business since my last letter lend urgency as well as attraction to a further study of the condition and prospects of the industry. Some of our mercurial leaders of public opinion have become pessimistic in the last few weeks, and predict that the decline in general manufacturing and commerce, observable in Eastern and Western circles alike, and rendered still more grave by the recent appalling floods on our Western tracts, and the tide of assignments, justifiable and otherwise, which has lately set in, will show the greatest destruction in the production and manufacture of iron and steel. There are others, on the other hand, who are over-sanguine if not over-buoyant, and who, by the convenient use of arithmetic, predict a certain return of flourishing prices and markets. Both parties have much of truth and much of error; the former, with monocular vision, seeing only the disturbing forces, and the latter, in a similar way, ignoring them altogether. The safe path lies in middle soil. Certainly, the surface history of mills and mines during the past month gives the chronics much leverage on public opinion. The Union Iron and Steel Company has closed down—"for reasons," I am told by one of the stockholders—with a million and a quarter's worth of ore and pig in its inventory; three or four other rail factories have suspended operations, and probably none of our Western mills is running at any considerable profit, even if—which Mr. Potter of the North Chicago Mills denies—they are making expenses. The president of one of the largest rail mills in the country informed a solicitous mine-owner (so I learn from private sources) that he had over two millions' worth of ore and pig in stock, and little or no demand for their manufactured product. The Menominee Iron Mining Company, which had sold over 250,000 tons by the close of January, last year, has heard no inquiries, as yet, for this year's output; and the inspiring and controlling genius of a still larger corporation writes that no sales have yet been effected—and it is the first of March. This last mine has over 150,000 tons unsold in Eastern ports and on its home stock-piles. I learn from local papers that the Republic is as yet without wooers, except at $2 per ton discount on the prices of last season; and as for smaller concerns, they, like the maids of Dee, are languishing for desirable offers, and finding no suitors at all. Evidently, the industry is fallen sick; the pessimists think the malady may carry off the patient, as in 1873; but although this is an untrue interpretation of the symptoms, yet the case is sore enough to require sober counsel on the part of the public physicians.

On the other hand, the Utopians think that the present storm is a short-lived squall, not making it at all essential that mine operators reef even their largest sails. The demand for rails will not fall short of 2,500,000 tons, say they, and the figures were also my own, in my last letter; and to manufacture this, there are but 700,000 tons of ore on hand in furnace markets. *Ergo*, times must be good, and no mistake; and therefore any furnace-man who pins his faith to the statements advanced in your correspondent's analysis of the iron market, published February 10th, will find procrastination to be the thief, not only of time, but of profits also. This view is worthy of careful scrutiny.

In the first place, the supposed demand for rails this year, as given above, is undoubtedly far in excess of any possible interpretation of facts as they now appear. From an independent and, I trust, approximately reliable computation, made from the actual exhibits of individual States, your correspondent is led to reduce his former figures by at least thirty-five per cent, although he does not here lay any claim to infallibility, nor can exact figures be given much before the latter part of May. However, from what data are accessible, we infer that 15,000 miles of road, or its equivalent of 1,600,000 tons of rails, may safely be taken as the maximum demand for 1883. This would ask for a contribution of 3,700,000 tons of ore, or its equivalent in American and foreign pig, as the necessary quotum of the year's product. Shrewd mine operators will accuse your correspondent of gilding over the demand for ores when, in these figures, ores are made to yield an average of only forty per cent metallic iron, when our mines will run nearly or over twice as high and lean ores are abandoned; but this is not, as it seems to me, a delusive calculation, when we contrast the production of pig for 1882 with the amount of rails thrown off by our American mills. Three million seven hundred thousand tons may safely, I think, be taken as the aggregate demand for ores during the season of 1883, although, for the sake of making the calculation as favorable as possible, we will base our figures on a demand for 4,000,000 tons of ore. One widely circulated journal, whose opinion is always deserving of careful attention, just a little color-blind in this instance, naïvely inquires where is this supply to come from? and in answer builds up the comforting theory that ores are to have a fine career during the season of 1883. We answer, and, because the matter involves the outlay of such enormous sums of money, somewhat in detail: Of this amount say 700,000 tons were on hand at the opening of the new year; this would leave not more than 3,300,000 tons at the outside, remaining to be accounted for. But taking the figures of the American Iron and Steel Association as authority, we have something over 810,000 tons of domestic and foreign pig on hand, or an equivalent of at least 1,300,000 tons of ore, doing violence in this computation, in favor of the miners, to our standard of forty per cent metallic iron. This would leave 2,000,000 tons in round numbers, as the demand for 1883. But if the tariff is left in such a condition that it will be profitable to ask our British cousins for as much pig as found its way hither from their furnaces last year, another round million will be to be taken off from the demand from home producers, and 1,000,000 will be left as the total tons to be inquired after in domestic circles. We can now afford to repeat the question: Where is this all to come from? The answer is not far to seek. The Cambria mills of Pennsylvania operate mines whose aggregate output for 1882 fell only a trifle short of 325,000 tons; the North Chicago mills calculate to mine about 100,000 tons from the Metropolitan (I am unaware whether they own other properties); the Cleveland Rolling-Mill Company can easily provide itself with 175,000 tons from its home and Canadian mines; and, not to particularize further, other mills can, if they will, use 300,000 tons (I presume the figures are not half large enough) of *their own* ores. "Where is the rest coming from?"

Of course, in the iron business as in all others, there are small concerns who must pump or drown, and who in a forlorn hope will sell for what they can get, rather than let their properties go under the auctioneer's hammer. To deny that the aggregate influence of such forced sales in a stringent market will have a disorganizing effect is childish if not criminal. Say that these sales amount to 250,000 tons; what then is left for the general trade? Of course, the hard ore mines will receive some offers, though it is hard to see how they will be very massive, and the hematites may likewise be favored with occasional inquiries.

All this is an honest effort to decipher the signs of the times. Forethought is better than hind thought, and trimming one's sails is better than a sudden capsize and ruin of fortune. It may be that the "signs" are not, in this and in my last, rightly interpreted; it may be that business will shake off its melancholy lethargy, the fields pour forth excessive harvests, the carrying trade spring into colossal proportions, manufacturers again rush into production at high pressure, and a balance of trade in our favor throw heaps of money upon the market for investment. Of course, this will inaugurate another boom period, and our mines will be the first to feel the throes of the new life. It is all very pretty, and it is well to hope; but the business pointers do not at this writing look in any respect that way. To sum up: The early part of the season will be dull, owing to accumulated stocks; but the season as a whole will be busy, though not excessively so, and, for reasons set forth in a former letter, prices for ores will be remunerative, although subject to slight vicissitudes from forced competition.

SPECULAR.

BOILER EXPLOSIONS IN 1882.

The managers of the Hartford Steam Boiler Inspection and Insurance Company have published in the *Locomotive* some very instructive figures relating to boiler explosions during the year 1882. A classified list of the works at which such disasters occurred is as follows:

CLASSIFIED LIST OF BOILER EXPLOSIONS FOR THE YEAR 1882.

Saw-mills and wood-working establishments generally	50
Steamboats, steam-tugs, and steam vessels generally	24
Iron-works, rolling-mills, foundries, machine and boiler-shops	18
Locomotives	14
Portable hoisters and agricultural engines generally	9
Flour-mills and elevators	8
Steam-heating, drying, dwellings, public buildings, ranges, etc	8
Paper-mills, bleaching, digesting, etc	7
Distilleries, breweries, malt and sugar-houses, soap and chemical works	4
Mines, oil-wells, etc	10
Miscellaneous	20
Total for the year	172
Number of persons killed	271
Number of persons injured	369

The list of explosions kept in the office of the Hartford Company does not include every accident that happens to a boiler, but only those that find their way into the papers. The number of these accidents is much larger than it should be, though, when compared with the number of boilers in use in the country, the percentage is small, being only about eleven one hundredths of one per cent of the whole. The summary of the reports of the inspectors of the company is very instructive. It appears that during the year there were 25,742 visits of inspection, an increase of 3330, or nearly 13 per cent, over the number made in 1881. The total number of boilers examined was 55,679, an increase of 8434, or slightly more than 15 per cent more than were examined in 1881. The number of complete internal inspections foots up 21,428, being an increase of 3888, or almost 18 per cent more than were made in the previous year. The hydrostatic test was applied in 4564 cases. The number of boilers condemned was 478. The number of defects reported was 33,690, of which number 6867 were considered dangerous. Appended is a detailed statement of the defects found:

Nature of defects.	Whole number.	Dangerous.
Cases of deposit of sediment	3,138	467
Cases of incrustation and scale	4,913	450
Cases of internal grooving	237	112
Cases of internal corrosion	1,210	232
Cases of external corrosion	1,803	437
Broken and loose braces and stays	613	293
Defective settings	935	158
Furnaces out of shape	1,030	204
Fractured plates	1,801	902
Burned plates	1,084	412
Blistered plates	2,853	385
Cases of defective riveting	4,807	535
Defective heads	386	149
Serious leakage around tubes	3,414	845
Serious leakage at seams	1,957	342
Defective water-gauges	640	146
Defective blow-out apparatus	290	118
Cases of low water	131	84
Safety-valves overloaded	358	136
Safety-valves defective in construction	238	99
Defective pressure-gauges	1,808	344
Boilers without pressure-gauges	43	14
Defective feed-pipe	1	1
Dangerous defect unclassified by inspectors	...	2
Total	33,690	6,867

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THE MAXWELL-LYTE PROCESS OF WORKING COMPLEX ORES.

Mr. F. Maxwell-Lyte, of London, England, has proposed a method for the treatment of complex ores and metallic compounds which is worthy of attention, because it utilizes known chemical reactions in quite an ingenious manner. It is well known that there exist in many of the principal mineral countries large bodies, notably of close mixtures of argentiferous galena and blende, or carbonate of lead or galena and calamine, or copper or iron pyrites with blende or galena, often carrying also considerable quantities of antimony. Until quite recently, when the Parnell process is said to be treating these classes of ores, they have resisted economical working either by dressing or smelting, and have been consequently practically worthless. Mr. Maxwell-Lyte describes his process as follows: He begins by calcining the ore so that most of its sulphur is burnt off. A part is oxidized into sulphuric acid, variable quantities of which remain combined with the metallic oxides produced. The gases resulting from this calcination, strongly charged with sulphurous acid, may be utilized for the manufacture of sulphuric acid, or the sulphurous acid may be condensed by means of magnesia milk, and subsequently utilized according to Heinrich Precht's method. There generally remains in the calcined ores from 3 to 5 per cent of sulphur, in one form or another; but this does not interfere with the subsequent treatment of the ore.

When this calcined ore is first finely pulverized and then treated for a certain length of time with hot or boiling hydrochloric acid of from 15 to 17 per cent of hydrochloric acid in proper quantity—that is, the quantity requisite to bring into solution the zinc and other more soluble bases—the zinc and the copper can be for the most part dissolved; and if this solution be now decanted off and cooled, most of the lead and silver remain insoluble, either with the gangue in the attacking-tub, or separate out of the decanted liquor as it cools. (For the most perfect working of the process, the acid should be used in such quantity as to leave an excess of about 5 or 6 per cent of free hydrochloric acid, still in solution, together with the chlorides produced, but some latitude is allowable in this respect.) On adding another like quantity of hydrochloric acid, any part of the lead or silver which may have before escaped attack becomes completely chloridized, and largely dissolved by this second acid, while more or less of the sesquioxide of iron, always present in such ores after calcination, passes into solution as sesquichloride. This sesquichloride of iron seems materially to assist in completing the chlorination of the lead and silver. According, then, to the quantities of lead and silver present in the ore, the whole or part of these metals will have been dissolved by this second acid; but portions of these may, and generally do, remain, mixed with the gangue as chlorides.

If, again, this solution of the chlorides of lead and silver in hydrochloric acid resulting from this second attack be decanted into another vessel containing a fresh charge of calcined ore, it will take up more zinc and copper, and, becoming partially neutralized, most of the lead and silver will again separate and fall down as the liquor cools, so that the clear liquid may be drawn off nearly free from lead or silver.

These operations being completed, the first vessel where the ore was attacked, which for clearness we will call A, will contain a gangue together with more or less lead and silver chlorides, this said gangue being still wet with some of the acid liquor of the second attack containing sesquichloride of iron. The ore, on the other hand, in the second attacking-vessel, which we will call B, will have lost most of its zinc and copper, but will have got added to it some of the lead and silver drawn over from A by the second acid. It is now evident that by boiling the partially saturated acid with the fresh ore in the second vessel B, allowing it to settle, and decanting the liquor off, we can, with the application of a fresh charge of acid, chloridize all the lead and silver in the new batch of ore in B, and by decanting B once more on to a fresh charge of ore placed in A, we can again cause nearly all the lead and silver this acid had taken up to reprecipitate on cooling, and so on *ad infinitum*, always obtaining as residues, on the one hand, the decanted (partially neutralized and cooled) liquors, rich in zinc or copper, but poor in lead or silver; and, on the other hand, gangues wet with acid, and containing the lead and silver completely chloridized. Were these liquors allowed to cool and decanted off quite neutral, they would retain and carry over in actual solution but insignificant traces of lead or silver, and nearly the whole of these metals would remain as chlorides with any gangue that had been mechanically carried over when this had settled. In practice, however, where speed is desirable, it is not convenient to obtain them so, since they have to be decanted while still hot. Some traces, then, of these metals are therefore still carried over in the hot decanted liquors; but these weakly acid zincous and cupreous liquors, when allowed to stand and cool, deposit nearly every trace of the lead and silver chlorides they may have carried over, whether that which may been carried over in suspension or that which may have been taken into actual solution.

It is worth while here also to observe that it is by no means always necessary to attack the ore with hot acid as above described. If the ore be only properly calcined and then reduced to fine powder, say to a sixty-mesh, there is no real necessity for heating the ore with the acid; the only difference usually being that the attack takes rather longer to become complete; but, on the other hand, there are certain refractory ores that can never be made to yield up the whole of their zinc to cold acid. Where, however, cold acid can be used (and this is easily settled by experiment in the laboratory), it is certainly to be preferred, as involving on the whole less trouble and expense, and if allowed to settle well before decantation, practically speaking no lead or silver chlorides at all are carried over when the zinc liquor is finally drawn off from the second attack.

The acid zinc liquor derived from the attacks of the several batches of ore by the hydrochloric acid contains, as well as zinc and copper chlorides, the chlorides of any other soluble bases the ore may have contained, usually iron, alumina, lime, and often some soluble silica. If this liquor, after being cooled, be simply neutralized with chalk, that is, if chalk be added and stirred up with the liquor till a further addition ceases to cause effervescence, the iron and alumina it contains are for the most part precipitated, only that quantity of iron remaining in solution which the calcined ore may have contained as protoxide or sulphide. If the liquor be now decanted through a filter, this precipitated iron, together with any excess of chalk which may have been added, as well as the silica and alumina present, are retained, while the liquor passes off containing the copper and the zinc. If the work has been carefully conducted, no more than four grains of silver to each cubic foot of zinc liquor should remain in solution, and even this silver, if it be considered worth while, may be collected by some spongy lead reduced by means of spelter from a solution of chloride of lead in brine. The copper and these traces of silver may also be conveniently extracted by immersing bits of spelter or scrap-zinc in the neutralized filtered solution, and, finally, the zinc may be extracted as oxide by heating the solution to boiling, and treating it while boiling with the least possible excess of lime in the form of milk of lime.

Some late experiments have also shown that the small portion of copper sometimes contained in the zinc liquor may be extracted therefrom by the addition of the least possible quantity of milk of chalk, or of milk of lime, and blowing air through the liquor as in the Weldon oxidizer. The addition of a small quantity of solution of bleaching-powder or of lead peroxide seems further to facilitate this separation. The copper in this case becomes separated as an oxychloride, which is often slightly argentiferous, traces of silver going down with it, if any of that metal be present. If bleach solution be employed, manganese, nickel, cobalt, and other metals capable of being thrown down as peroxides may also be found in the precipitate. Some valuable substances occasionally present in small quantities in these mixed ores may be thus recovered.

The actual quantity of hydrochloric acid to be employed in the attack will of course depend in each case on the composition of the ore to be treated. In treating the Welsh bluestone already mentioned, about six and a half or seven of acid of fifteen per cent of hydrochloric acid to one of calcined ore may be used; but the quantity is easily adjustable for each kind of ore by an experiment in the laboratory on a small scale, or the quantity requisite may be calculated on an analysis of the ore. In practice, it is found that, even if double the amount of real hydrochloric acid be employed which would be requisite for attacking and chloridizing the soluble bases (not including the iron the ore may contain), the cold zinc solution obtained will not retain more than mere traces of lead or silver. We thus see how the zinc, and for the most part the copper, may be separated as chloride, and decanted off from the lead and the silver chlorides which are left insoluble in the cooled liquors or with the gangue.

If now a quantity of strong brine (say ten gallons of brine to every four pounds of lead the charge of ore may have contained) be heated to boiling and flushed hot on to the mixture of gangue with the lead and silver chloride and boiled (those chlorides of lead and silver which separated from the zinc solution on cooling being returned to the gangue), the lead and silver are entirely taken into solution; and this brine being allowed to settle and run off as hot as possible into a clean vessel and cooled, will deposit most of its lead as lead chloride, but none of its silver, this latter metal being retained entirely in solution, provided it be not present in larger proportion than about one fiftieth part of the lead, or provided there be at least about one gallon of brine to every seven grains of metallic silver the ore contained. Silver rarely occurs in those mixed ores where it is associated with lead in such quantity that the proportion of brine requisite for the solution of the lead when hot is insufficient to be able to retain in solution all the silver when cold; but if it does, the quantity of brine must of course be increased and apportioned to it so that all the silver may be taken up and retained in solution on cooling.

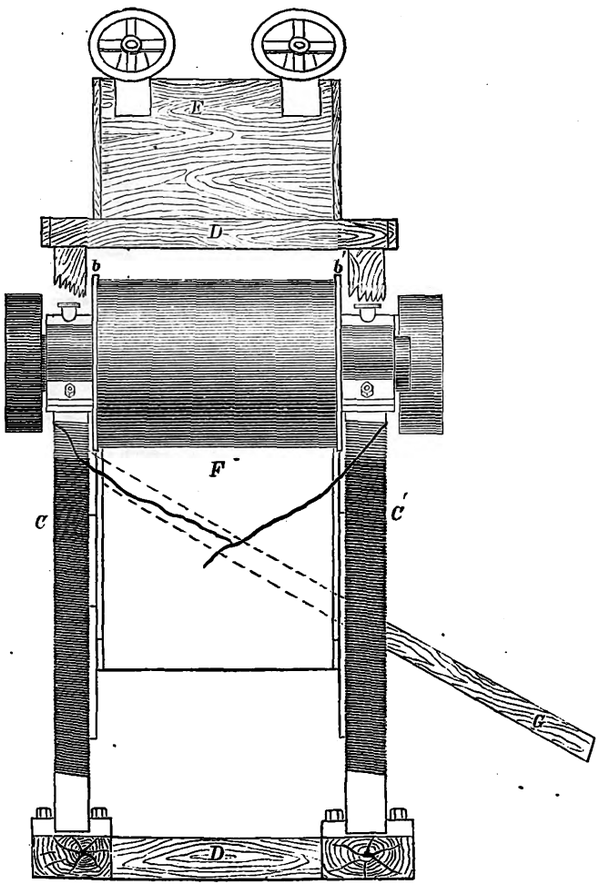
Lead chloride is soluble in a boiling saturated solution of sodium chloride (brine) to the extent of about 53¼ parts (=40 parts of metallic lead) to 1000 parts by measure of boiling brine; whereas, on cooling down to ordinary temperatures, most of it crystallizes out until no more than about 10·8 of lead chloride (= 8 of metallic lead) to 1000 of brine remains in solution. Silver is soluble in the same liquid to the extent of about 1 of silver chloride (= 0·75 parts of metallic silver) to 1000 of brine at from about 10 degrees to 12 degrees C., and about 1·2 of silver chloride to 1000 of brine at from about 25 degrees to 26 degrees C., and about double that quantity at a boiling temperature. The presence of lead chloride in the brine would appear not to diminish this rate of solubility of silver as silver chloride. The solution of silver chloride in brine appears to be peculiarly liable to that condition chemically termed super-saturation, so much so, that it will often be found that hot brine saturated with silver chloride will remain perfectly clear on cooling, until some determining cause, such as the addition of an atom of solid silver chloride, intervenes, when immediately the whole liquid will turn milky from the separation of silver chloride. When lead and silver chlorides then are present together, they are dissolved; and, if care be taken to have brine enough present in proportion to the silver, all the silver is retained in solution on cooling, while most of the lead becomes deposited as lead chloride.

If the cooled brine be now decanted from the precipitated lead chlorid and a piece of metallic zinc be immersed in it, the lead chloride sti remaining in solution and the whole of the silver chloride are reduced, together with formation of spongy metallic lead and silver on the one hand, and zinc chloride which passes into solution on the other. It suffices, however, and is more convenient in practice, to only precipitate part of the lead from the brine, and by leaving this light spongy lead floating about in flocks and agitating the brine with it, this lead gradually picks up all the silver from the brine, till it becomes very argentiferous. Successive charges of argentiferous brine may be run into a tub properly disposed for the purpose with such flocks of spongy lead floating about in it, and the silver may be picked up from each such successive charge, the brine being thus desilverized. This brine then, as it now contains but a fraction of the lead it had taken from the ore, and no silver, may be pumped up, neutralized if necessary, reheated, and used afresh. Thus the same brine may be employed over and over again to withdraw the lead and silver from successive charges of ore, depositing lead chloride in one tub, and all the silver with but a little lead in a third, while, by mere reheating, the same lot of brine becomes repeatedly regenerated in its solvent powers.

The above-mentioned employment of spongy lead is by far the most suitable and convenient in these circumstances, and offers special facilities for the subsequent separation and refining of the silver, being for this reason far superior to iron, copper, or any of the metals the employment of which may have been previously proposed as a means of collecting silver from its solutions. The fact of the silver remaining in the brine together with what lead is still retained in solution after cooling,

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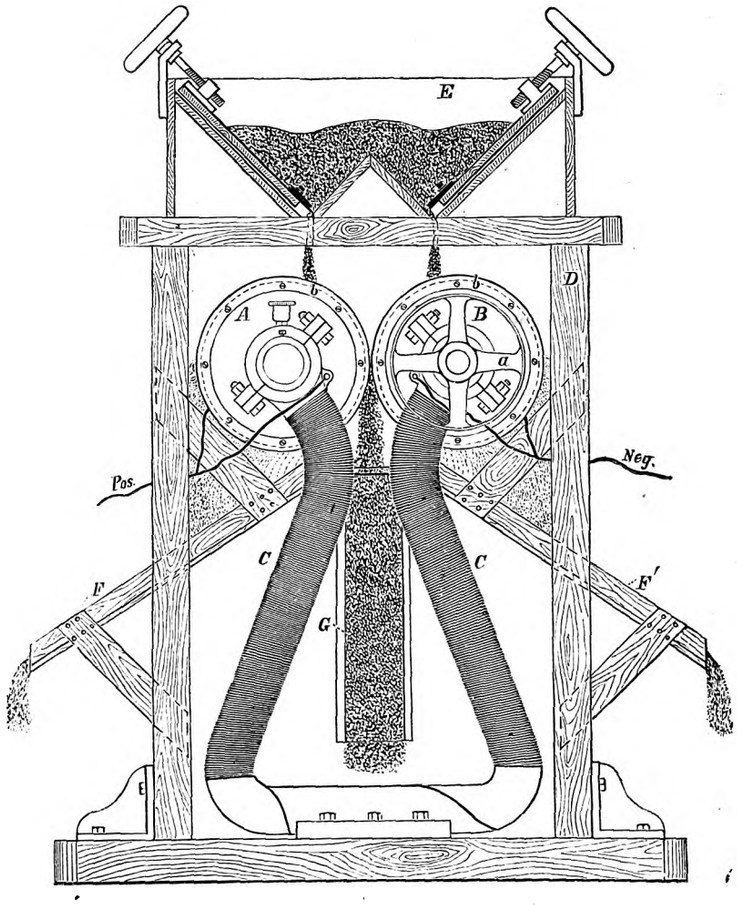
especially facilitates this mode of its recovery, while it admits of the utilization of the same brine over and over again as a carrier and depositor of the lead on the one hand, and of silver on the other; and, as shown above, by so proportioning the quantity of the brine as to make it sufficient to retain the whole of the silver in solution, this metal can be entirely carried over into a separate tub or vessel, where it may be thrown down completely, the brine being thus freed from silver at each successive operation. The Rozan, Pattinson, or other processes usually employed in desilverizing—or rather, in what should be termed concentrating the silver in lead previous to cupellation—may be dispensed with when this process is employed; for the silver is thus at once obtainable with lead in a sufficiently concentrated form for immediate cupellation. Heating the brine during the desilverizing materially accelerates the operation, a tubful being thus capable of complete desilverization in a few hours. As the brine sometimes contains traces of copper gathered from the ore, it may be found convenient to even rather increase the quantity of lead in the precipitate and to so apportion the lead thrown down as to have enough of that metal present to insure proper cupellation, and further, in order to avoid loss, it is well not to obtain the silver in too concentrated a form. Lead with from 2 to 4 per cent of silver will be rich enough, and indeed ten times as rich as any of the ordinary enriched lead as it usually goes to the cupel. The quantity of lead precipitated is of course proportionate to the time of immersion of the spelter, the quantity of the spelter employed, and the temperature of the brine. Argentiferous precipitates are easily, however, obtainable with 28 or even 30 per cent of silver from ores containing but a few ounces of silver per ton. Instead of spelter, zinc-dust may be used for this precipitation; or, instead of employing spongy lead at all for the collection of the silver, the same end may be obtained by stirring into the argentiferous brine some precipitated lead or copper sulphide. This will also gather the silver from the brine, though not perhaps quite as efficaciously or as rapidly as the spongy lead.



THE BUCHANAN MAGNETIC SEPARATOR.

Among the many recent applications of electricity to the arts, one of the most interesting to those engaged in mining and metallurgy is that of concentrating ores. Though repeatedly attempted, particularly for magnetic iron ores, by the use of permanent magnets, it was not until the perfection of dynamo-electric machines permitted the economical generation of electric currents that any work worthy of serious attention was done. Naturally, the first field in which any effort was made was in the dressing of magnetic iron ores, and sands containing that ore, and in this direction the greatest progress has been made in this country. It may be of interest, however, here, to recall the fact that, at a number of places abroad, magnetic separation has been extended to other classes of ores, notably close mixture of spathic iron ore, or iron pyrites and blende, previously roasted, as it is possible that by this remain similar ores, now useless, may be made available here. The principal field of magnetic separation will, however, always remain the dressing of magnetic iron, sands, and ores. In the case of the former, drying in a suitable revolving cylinder is resorted to, while with the latter class of material a system of c ushing, pulverizing, and sizing is necessary. Mr. C. G. Buchanan, of this city, the inventor of the machine we are about to describe, has shown us a sketch of a mill for this purpose, in which he has, by suitable exhaust arrangements, provided for the removal of the dust made during the crushing and screening, which would prove objectionable in the later separation. The principal market for fine magnetic ore, obtained by this system of dressing, is of course for forge fires and puddling-furnace fix, the quantity which could be used in blast-furnaces being limited by the inconvenience which raw material of such fineness would entail in the working of the furnace.

The Buchanan magnetic separator, which we illustrate this week, has been at work for upward of two years on sands, at Block Island, and possesses features of special interest. *A* and *B* represent the two cast-iron rolls, provided with heavy wrought-iron shafts or journals. In section, these rolls have an oval core, so that the surface of the rolls is uniformly magnetic. The distance between the surface of the two rolls is two inches. *C C* represent the iron standards supporting the rolls, and having journals in which they revolve. The rolls are provided with brass collars *b b'*, intended to prevent the ore from dropping outside of them. *D* represents the wooden frame to which the stands are bolted, and it also supports the hopper *E*, and the chutes *F* and *G*. The standards *C* are first insulated and then closely wound with heavy insulated copper wire, and the two ends of the wire are connected with the poles of a dynamo machine. It is evident that, if a strong current of electricity is passed through the wires, the standards *C* will become powerful electro-magnets, and that, if they are properly wound, each end of the same standard will be of opposite polarity, as indicated by the wires marked Positive and Negative. It is also evident that the rolls will be charged by induction, and that one roll will be of north polarity and the other south. The peculiarity of this arrangement is, that a powerful magnetic field is formed between the rolls, and they are capable, while charged, of holding a weight of 500 or 600 pounds, if it is placed between them, while on their opposite side they are practically non-magnetic, and will not hold a tack.



The variations needed in dressing ores of different grades and sizes are controlled by regulating the power of the current of the dynamo-electric machine. The latter is of a special pattern, producing a current of a low electro-motive force, the wire being heavier and larger electro-magnets being chosen. It is built by the well-known Weston Electric Light Company.

The operation of the machine is as follows: The rolls are rotated toward each other, at a circumference speed of 150 feet per minute, and the hoppers opened so that the ore falls upon the top of the rolls. In passing over the rolls, it is carried through the magnetic field, and all that is magnetic is attracted and attached to the faces of the two rolls, and carried around by them to a point where they lose their magnetic effect, and the ore falls into the chutes *F F*. The rock being acted upon by gravity alone, falls directly into the chute *G*, and a nearly perfect separation is thus effected.

The Union Foundry Company, of Rockaway, N. J., which builds these machines for Mr. C. G. Buchanan, the inventor, manufactures three sizes, the largest having rolls 24 inches in diameter and 36 inches long, with a capacity of treating 100 tons of ore per day, and larger quantities of sand. The range of sizes seems to be considerable. We are informed that ores as fine as from 40 to 60 mesh and as coarse as from 8 to 10 mesh have been treated successfully.

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OUR CHEMICAL INDUSTRIES IN THE CENSUS YEAR.

The Census Bureau, in its compendium recently published, gives the statistics of the chemical industry in this country. The total number of establishments in 1880, according to the tables submitted, was 1349, employing 29,520 hands, to whom $11,840,704 were paid in wages. With a total capital of $85,394,211, they manufactured from raw material valued at $77,471,836 products worth $117,377,324. The following are the figures for the leading States :

STATES.	Establishments	Total capital.	Hands employed	Wages paid.	Value of materials.	Value of products.
California	42	$2,406,350	573	$282,614	$2,119,078	$3,179,700
Connecticut	41	1,434,250	549	270,754	1,822,435	2,419,743
Delaware	23	931,379	539	100,026	809,074	1,140,086
Illinois	52	3,348,550	1,463	571,417	5,915,430	7,681,325
Maryland	60	5,578,302	1,380	535,125	4,625,637	7,243,122
Massachusetts	179	6,828,473	2,143	953,784	7,390,703	10,604,662
Missouri	39	3,415,300	1,174	542,769	4,056,274	5,827,493
New Jersey	62	7,371,490	2,655	1,172,654	6,088,296	9,499,577
New York	217	20,141,586	5,249	2,901,960	20,418,018	29,805,614
Ohio	92	5,961,003	1,803	706,434	5,075,395	7,678,374
Pennsylvania	181	18,349,930	4,796	2,151,799	13,085,892	20,884,991
Rhode Island	41	1,291,136	687	274,657	1,169,202	1,968,041
South Carolina	29	3,496,300	2,760	577,100	1,275,115	2,693,053
Virginia	38	645,700	855	125,010	528,675	1,007,166

The products of these establishments are given in the next table, with the amounts of each and their value :

Products.	Quantity.	Value.
Aniline colors	lbs. 80,518	$107,292
Anthracene	" 314,114	99,242
Sulphate ammonia	" 16,575,088	618,485
Alum	" 39,217,725	808,105
Borax	" 3,692,443	277,233
Bromine	" 404,690	114,752
Phosphorus	" 56,292	29,271
Castor oil	galls. 893,802	790,741
Stearic acid candles	lbs. 18,363,066	2,281,600
Oleic acid soap	" 33,058,411	1,707,969
Soap, other hard	" 378,743,627	18,299,350
Soft soaps	" 34,494,100	358,280
Glycerine	" 7,117,825	961,477
Nitro-glycerine	" 3,039,722	1,830,417
Manures, manufactured	tons 727,453	19,921,400
Dry colors	lbs. 67,482,415	4,086,821
White lead	" 123,477,890	8,770,690
Other lead salts	" 11,375,466	758,680
Barytes, ground	tons 19,165	371,829
Zinc, oxide	lbs. 20,121,761	766,337
Acetate lime	" 6,593,000	156,892
Potash and pearlash	" 4,571,671	232,640
Soda	" 40,259,938	866,560
Sulphur	" 1,200,000	21,000
Sulphuric acid	" 308,765,432	3,661,876
Glucose	" 151,740,400	4,551,212
All other products		44,927,101

While the above articles are made in thirty-eight States and territories, not one article of the entire list is made in all of them. Alum is made in only three States ; borax in two, California and Nevada ; bromine in three ; phosphorus only in New Jersey ; oxide of zinc in only four States, Missouri, New Jersey, Ohio, and Pennsylvania ; soda only in Nevada and Pennsylvania ; and sulphur in Nevada only. Pennsylvania leads off in the manufacture of sulphate of ammonia with a product of 4,999,738 pounds ; New York following with 3,870,000 pounds, and Ohio with 2,500,000. Of alum, Pennsylvania furnishes about three quarters of all that is produced in the United States. Of borax, the State of Nevada supplies nearly two thirds ; the remainder comes from California. Seven States produce nitro-glycerine, of which California furnishes 1,242,424 pounds—nearly one half of the total production. In manufactured manures, Maryland takes the lead with a production of 191,571 tons, and although twenty eight States have establishments, none of them produces large quantities. Pennsylvania produces the largest amount of white-lead, 30,540,499 pounds ; then follow New York, with 28,144,009 pounds ; Missouri, with 26,400,324 pounds ; and Ohio, with 13,140,458 pounds. New Jersey produces rather more than three quarters of all the oxide of zinc, or 16,774,756 pounds, while Pennsylvania produces 2,656,600 pounds. New York produces nearly one half of all the acetate of lime, 3,171,544 pounds, and Michigan comes second, with 1,500,000 pounds. In the production of potash and pearlash, Wisconsin takes the lead, with 1,511,181 pounds, closely followed by Michigan, with 1,393,962 pounds, these two States producing nearly three quarters of the entire amount. Of soda, Pennsylvania produces 38,459,938 pounds, and Nevada the remainder, 1,800,000 pounds. Of sulphur, Nevada produces all, 1,200,000. Eighteen States contribute to the supply of sulphuric acid, of which four States furnish over two thirds of the total, New Jersey leading with a production of 74,994,625 pounds ; then follow Pennsylvania, with 66,346,819 pounds ; Maryland, with 43,920,000 pounds ; and New York, with 41,363,543 pounds.

IN the *American Naturalist* for February, 1883, Dr. F. M. Endlich gives an ideal section of the geological formation of the Lake Valley region, New Mexico.

THE number of tons of freight moved over the main line and branches of the Pennsylvania Railroad, including 1,345,700 tons of fuel, and other materials for the company's use, was 21,706,099 tons ; for the previous year, 19,312,227 tons ; showing an increase of 2,393,872 tons, or 12·40 per cent : of this increase, 2,393,744 tons were in local freight, and 128 tons in through freight. Of the 20,360,399 tons of individual freight transported over the main line and branches, 1,944,819 were through, and 18,415,580 local, freight. The coal shipments increased 1,474,616 tons, and the coke shipments, 473,224 tons ; their aggregate being 11,157,146 tons, as against 9,209,306 in 1881—a gain of 1,947,840 tons. The East-bound coke tonnage from the Connellsville region shows an increase of 108,689 tons, and the West-bound an increase of 281,332 tons ; the entire movement from that district amounting to 2,370,050, out of a total of 2,888,787 tons from all sources.

THE NEW TARIFF BILL.

The following are the rates of duty provided for in the new Tariff Bill, which goes into effect on the 1st of July, 1883. We have chosen those in which our readers are likely to be interested, directly or indirectly :

SCHEDULE A—CHEMICAL PRODUCTS.

Phosphorus, ten cents per pound.

Acid, acetic, acetous, or pyroligneous acid, not exceeding the specific gravity of one and forty-seven one thousandths, two cents per pound ; exceeding the specific gravity of one and forty-seven one thousandths, ten cents per pound.

Iodine, resublimed, forty cents per pound.

Soda and potassa, tartrate, or rochelle salt, three cents per pound.

Alumina, alum, patent alum, alum substitute, sulphate of alumina, and aluminous cake and alum in crystals or ground, sixty cents per hundred pounds.

Ammonia, anhydrous, liquefied by pressure, twenty per centum *ad valorem*.

Ammonia aqua, or water of ammonia, twenty per centum *ad valorem*. Muriate, or sal ammoniac, ten per centum *ad valorem*. Carbonate, twenty per centum *ad valorem*. Sulphate, twenty per centum *ad valorem*.

Asbestos, manufactured, twenty-five per centum *ad valorem*.

Baryta, sulphate of, or barytes, unmanufactured, ten per centum *ad valorem*.

Baryta, sulphate of, or barytes, manufactured, one fourth of one cent per pound.

Refined borax, five cents per pound. Pure boracic acid, five cents per pound ; commercial boracic acid, four cents per pound ; borate of lime, three cents per pound ; crude borax, three cents per pound.

Cement, Roman, Portland, and all others, twenty per centum *ad valorem*.

Chromic acid, fifteen per centum *ad valorem*. Chromate of potash, three cents per pound. Bi-chromate of potash, three cents per pound.

Cobalt, oxide of, twenty per centum *ad valorem*.

Copper, sulphate of, or blue vitriol, three cents per pound.

Iron, sulphate of, or copperas, three tenths of one cent per pound.

Acetate of lead, brown, four cents per pound. Acetate of lead, white, six cents per pound. White lead, when dry or in pulp, three cents per pound. When ground, or mixed in oil, three cents per pound. Litharge, three cents per pound. Orange mineral, and red lead, three cents per pound. Nitrate of lead, three cents per pound.

Magnesia, medicinal, carbonate of, five cents per pound ; calcined, ten cents per pound ; sulphate, or Epsom salts, one half of one cent per pound.

Potash, crude, carbonate of, or fused, and caustic potash, twenty per centum *ad valorem*. Chlorate, three cents per pound. Hydriodate, iodide and iodate, fifty cents per pound. Prussiate, red, ten cents per pound. Prussiate, yellow, five cents per pound. Nitrate, or saltpeter, crude, one cent per pound. Nitrate, or refined saltpeter, one and one half cents per pound. Sulphate, twenty per centum *ad valorem*. Soda. Soda ash, one quarter of one cent per pound. Sal or soda crystals, one quarter of one cent per pound. Bi-carbonate, or super-carbonate and salaratus, calcined or pearl ash, one and one half cents per pound. Hydrate or caustic, one cent per pound. Sulphate, known as salt cake, crude or refined, or niter cake, crude or refined and Glauber's salt, twenty per centum *ad valorem*. Silicate or other alkaline silicate, one half of one cent per pound.

Sulphur, refined, in rolls, ten dollars per ton. Sublimed, or flowers of, twenty dollars per ton.

Ocher and ochery earths, umber and umber earths, and sienna and sienna earths, when dry, one half of one cent per pound ; when ground in oil, one and one half cents per pound.

Zinc, oxide of, when dry, one and one fourth cents per pound. Zinc, oxide of, when ground in oil, one and three fourths cents per pound.

All non-dutiable, crude minerals, but which have been advanced in value or condition by refining or grinding, or by other process of manufacture, not specially enumerated or provided for in this act, ten per centum *ad valorem*.

All earth or clays, unwrought or unmanufactured, not specially enumerated or provided for in this act, one dollar and fifty cents per ton.

All earths or clays, wrought or manufactured, not specially enumerated or provided for in this act, three dollars per ton ; china clay, or kaolin, three dollars per ton.

SCHEDULE B—EARTHENWARE AND GLASSWARE.

Brick, fire-brick, and roofing and paving tile, not specially enumerated or provided for in this act, twenty per centum *ad valorem*.

Slates, slate pencils, slate chimney pieces, mantels, slabs for tables, and all other manufactures of slate, thirty per centum *ad valorem*. Roofing slates, twenty-five per centum *ad valorem*.

SCHEDULE C—METALS.

Iron ore, including manganiferous iron ore, also the dross or residuum from burnt pyrites, seventy-five cents per ton. Sulphur ore, as pyrites or sulphuret of iron in its natural state, containing not more than three and one half per centum of copper, seventy-five cents per ton ; *Provided*, That ore containing more than two per centum of copper shall pay, in addition thereto, two and one half cents per pound for the copper contained therein.

Iron in pigs, iron kentledge, spiegeleisen, wrought and cast scrap iron, and scrap steel, three tenths of one cent per pound ; but nothing shall be deemed scrap iron or scrap steel except waste or refuse iron or steel that has been in actual use and is fit only to be re-manufactured.

Iron railroad bars, weighing more than twenty-five pounds to the yard, seven tenths of one cent per pound.

Steel railroad bars and railroad bars made in part of steel, weighing more than twenty-five pounds to the yard, seventeen dollars per ton.

Bar iron, rolled or hammered, comprising flats not less than one inch wide, nor less than three eighths of one inch thick, eight tenths of one cent per pound ; comprising round iron not less than three fourths of one inch in diameter, and square iron not less than three fourths of one inch square, one cent per pound ; comprising flats less than one inch wide, or less than three eighths of one inch thick ; round iron less than three fourths of one inch and not less than seven sixteenths of one inch in diameter, and square iron less than three fourths of one inch square, one and one tenth of one cent per pound ; *Provided*, That all iron in slabs, blooms, loops, or other forms, less finished than iron in bars, and more advanced than pig-iron, except castings, shall be rated as iron in bars, and pay a duty accordingly ; and none of the above iron shall pay a less rate of duty than thirty-five per centum *ad valorem ; Provided further*, That all iron bars, blooms, billets, or sizes or shapes of any kind, in the manufacture of which charcoal is used as fuel, shall be subject to a duty of twenty-two dollars per ton.

Iron or steel tee rails, weighing not over twenty-five pounds to the yard, nine tenths of one cent per pound ; iron or steel flat rails, punched, eight tenths of one cent per pound.

Round iron, in coils or rods, less than seven sixteenths of one inch in diameter, and bars or shapes of rolled iron not specially enumerated or provided for in this act, one and two tenths of one cent per pound.

Boiler, or other plate-iron, sheared or unsheared, skelp iron, sheared or rolled in grooves, one and one fourth cents per pound ; sheet-iron, common or black, thinner than one inch and one half, and not thinner than number twenty wire gauge, one and one tenth of one cent per pound ; thinner than number twenty wire gauge, and not thinner than number twenty-five wire gauge, one and two tenths of one cent per pound ; thinner than number twenty-five wire gauge, and not thinner than number twenty-nine wire gauge, one and five tenths of one cent per pound ; thinner than number twenty-nine wire gauge, and all iron commercially known as common or black taggers' iron, whether put up in boxes or bundles or not, thirty per centum *ad valorem ; And provided*, That on all such iron and steel sheets or plates aforesaid, excepting on what are known commer-

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cially as tin plates, terne plates, and taggers' tin, and hereafter provided for when galvanized or coated with zinc or spelter or other metals, or any alloy of those metals, three fourths of one cent per pound additional.

Polished, planished, or glanced sheet-iron or sheet-steel, by whatever name designated, two and one half cents per pound; *Provided*, That plate or sheet or taggers' iron, by whatever name designated, other than the polished, planished, or glanced herein provided for, which has been pickled or cleaned by acid, or by any other material or process, and which is cold-rolled, shall pay one quarter cent per pound more duty than the corresponding gauges of common or black sheet or taggers' iron.

Iron or steel sheets, or plates, or taggers' iron, coated with tin or lead, or with a mixture of which these metals is a component part, by the dipping or any other process, and commercially known as tin plates, terne plates, and taggers' tin, one cent per pound; corrugated or crimped sheet-iron or steel, one and four tenths of one cent per pound.

Hoop, or band, or scroll, or other iron, eight inches or less in width and not thinner than number ten wire gauge, one cent per pound; thinner than number ten wire gauge and not thinner than number twenty wire gauge, one and two tenths of one cent per pound; thinner than number twenty wire gauge, one and four tenths of one cent per pound; *Provided*, That all articles not specially enumerated or provided for in this act, whether wholly or partly manufactured, made from sheet, plate, hoop, band, or scroll iron herein provided for, or of which such sheet, plate, hoop, band, or scroll iron shall be the material of chief value, shall pay one fourth of one cent per pound more duty than that imposed on the iron from which they are made, or which shall be such material of chief value.

Iron and steel cotton ties, or hoops for bailing purposes, not thinner than number twenty wire gauge, thirty-five per centum *ad valorem*.

Cast-iron pipe of every description, one cent per pound.

Cast-iron vessels, plates, stove plates, andirons, sad-irons, tailors' irons, hatters' irons, and castings of iron, not specially enumerated or provided for in this act, one and one quarter of one cent per pound.

Cut nails and spikes, of iron or steel, one and one quarter of one cent per pound.

Cut tacks, brads, or sprigs, not exceeding sixteen ounces to the thousand, two and one half cents per thousand; exceeding sixteen ounces to the thousand, three cents per pound.

Iron or steel railroad fish plates, or splice bars, one and one fourth of one cent per pound.

Malleable iron castings, not specially enumerated or provided for in this act, two cents per pound.

Wrought-iron or steel spikes, nuts and washers, and horse, mule, or ox shoes, two cents per pound.

Anvils, anchors or parts thereof, mill-irons and mill-cranks of wrought-iron, and wrought-iron for ships, and forgings of iron and steel for vessels, steam-engines, and locomotives, or parts thereof, weighing each twenty-five pounds or more, two cents per pound.

Iron or steel rivets, bolts, with or without threads or nuts, or bolt blanks, and finished hinges or hinge blanks, two and one half of one cent per pound.

Iron or steel blacksmiths' hammers and sledges, track tools, wedges, and crow-bars, two and one half of one cent per pound.

Iron or steel axles, parts thereof, axle-bars, axle blanks, or forgings for axles, without reference to the stage or state of manufacture, two and one half of one cent per pound.

Forgings of iron and steel, or forged iron, of whatever shape or in whatever stage of manufacture, not specially enumerated or provided for in this act, two and one half cents per pound.

Horseshoe nails, hob-nails, and wire nails, and all other wrought-iron or steel nails, not specially enumerated or provided for in this act, four cents per pound.

Boiler tubes, or flues, or stays of wrought-iron or steel, three cents per pound.

Other wrought-iron or steel tubes, or pipes, two and one-quarter cents per pound.

Chain or chains of all kinds, made of iron or steel, not less than three fourths of one inch in diameter, one and three quarter cents per pound; less than three fourths of one inch and not less than three eighths of one inch in diameter, two cents per pound; less than three eighths of one inch in diameter, two and one half cents per pound.

Cross-cut saws, eight cents per linear foot.

Mill, pit, and drag-saws, not over nine inches wide, ten cents per linear foot; over nine inches wide, fifteen cents per linear foot.

Circular saws, thirty per centum *ad valorem*.

Hand, back, and all other saws, not specially enumerated or provided for in this act, forty per centum *ad valorem*.

Files, file blanks, rasps, and floats of all cuts and kinds, four inches in length and under, thirty-five cents per dozen; over four inches in length and under nine inches, seventy-five cents per dozen; nine inches in length and under fourteen inches, one dollar and fifty cents per dozen; fourteen inches in length and over, two dollars and fifty cents per dozen.

Steel ingots, cogged ingots, blooms, and slabs, by whatever process made; die blocks or blanks; billets and bars, and tapered or beveled bars; bands, hoops, strips, and sheets of all gauges and widths; plates of all thicknesses and widths; steamer, crank, and other shafts; wrist or crank-pins; connecting-rods and piston-rods, pressed, sheared or stamped shapes, or blanks of sheet or plate-steel, or combination of steel and iron, punched or not punched; hammer molds or swaged steel; gun molds not in bars; alloys used as substitutes for steel tools; all descriptions and shapes of dry sand, loam, or iron molded steel castings; all of the above classes of steel not otherwise specially provided for in this act, valued at four cents a pound or less, forty-five per centum *ad valorem*; above four cents a pound and not above seven cents per pound, two cents per pound; valued above seven cents and not above ten cents per pound, two and three fourth cents per pound; valued at above ten cents per pound, three and one fourth cents per pound.

Provided, That on all iron or steel bars, rods, strips or steel sheets, of whatever shape, and on all iron or steel bars of irregular shape or section, cold-rolled, cold-hammered, or polished in any way in addition to the ordinary process of hot-rolling or hammering, there shall be paid one fourth cent per pound in addition to the rates provided in this act, and on steel circular saw-plates there shall be paid one cent per pound in addition to the rate provided for in this act.

Iron or steel beams, girders, joists, angles, channels, car-truck channels, T T, columns and posts, or parts or sections of columns and posts, deck and bulb beams, and building forms, together with all other structural shapes of iron or steel, one and one fourth of one cent per pound.

Steel wheels and steel-tired wheels for railroad purposes, whether wholly or partly finished, and iron or steel locomotive, car, and other railroad tires, or parts thereof, wholly or partly manufactured, two and one half of one cent per pound; iron or steel ingots, cogged ingots, blooms, or blanks for the same, without regard to the degree of manufacture, two cents per pound.

Iron or steel rivet, screw, nail, and fence wire rods, round, in coils and loops, not lighter than number five wire gauge, valued at three and one half cents or less per pound, six tenths of one cent per pound. Iron or steel, flat, with longitudinal ribs for the manufacture of fencing, six tenths of a cent per pound.

Screws, commonly called wood screws, two inches or over in length, six cents per pound; one inch and less than two inches in length, eight cents per pound; over one half inch and less than one inch in length, ten cents per pound; one half inch and less in length, twelve cents per pound.

Iron or steel wire, smaller than number five and not smaller than number ten wire gauge, one and one half cents per pound; smaller than number ten and not smaller than number sixteen wire gauge, two cents per pound; smaller than number sixteen and not smaller than number twenty-six wire gauge, two and one half cents per pound; smaller than number twenty-six wire gauge, three cents per pound.

Provided, That iron or steel wire covered with cotton, silk, or other material, and wire commonly known as crinoline, corset, and hat wire, shall pay four cents per pound in addition to the foregoing rates; *And provided further*, That no article made from iron or steel wire, or of which iron or steel wire is a component part of chief value, shall pay a less rate of duty than the iron or steel wire from which it is made either wholly or in part; *And provided further*, That iron or steel wire cloths, and iron or steel wire nettings, made in meshes of any form, shall pay a duty equal in amount to that imposed on iron or steel wire of the same gauge, and two cents per pound in addition thereto. There shall be paid on galvanized iron or steel wire (except fence wire) one half of one cent per pound in addition to the rate imposed on the wire of which it is made. On iron wire rope and wire strand, one cent per pound in addition to the rates imposed on the wire of which it is made. On steel wire rope and wire strand, two cents per pound in addition to the rates imposed on the wire of which it is made.

Steel not specially enumerated or provided for in this act, forty-five per cent *ad valorem*.

Provided, That all metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation, or converted, cast, or made from iron or its ores, by the crucible, Bessemer, pneumatic, Thomas-Gilchrist, basic, Siemens-Martin, or open-hearth process, or by the equivalent of either, or by the combination of two or more of the processes, or their equivalents, or by any fusion or other process which produces from iron or its ores a metal either granular or fibrous in structure, which is cast and malleable, excepting what is known as malleable iron castings, shall be classed and denominated as steel.

No allowance or reduction of duties for partial loss or damage in consequence of rust or of discoloration shall be made upon any description of iron or steel, or upon any partly manufactured article of iron or steel, or upon any manufacture of iron and steel.

Argentine, albata, or German silver, unmanufactured, twenty-five per centum *ad valorem*

Copper, imported in the form of ores, two and one half cents on each pound of fine copper contained therein; regulus of and black or coarse copper, and copper cement, three and one half cents on each pound of fine copper contained therein; old copper, fit only for remanufacture, clippings from new copper, and all composition metal of which copper is a component material of chief value not specially enumerated or provided for in this act, three cents per pound: copper in plates, bars, ingots, Chili or other pigs, and in other forms, not manufactured, or enumerated in this act, four cents per pound; in rolled plates, called brazier's copper, sheets, rods, pipes, and copper bottoms, and all manufactures of copper, or of which copper shall be a component of chief value, not specially enumerated or provided for in this act, thirty-five per cent *ad valorem*.

Brass, in bars or pig, old brass, and clippings from brass or Dutch metal, one and one half cents per pound.

Lead ore, and lead dross, one and one half cents per pound.

Lead, in pigs and bars, molten, and old refuse lead run into blocks and bars, and old scrap lead, fit only to be remanufactured, two cents per pound.

Lead, in sheets, pipes, or shot, three cents per pound.

Nickel, in ore, matte, or other crude form not ready for consumption in the arts, fifteen cents per pound on the nickel contained therein.

Nickel, nickel oxide, alloy of any kind in which nickel is the element of chief value, fifteen cents per pound.

Zinc, spelter, or tutenag, in blocks or pigs, and old worn-out zinc, fit only to be remanufactured, one and one half cents per pound; zinc, spelter, or tutenag in sheets, two and one half cents per pound.

Sheathing, or yellow metal, not wholly of copper, nor wholly nor in part of iron, ungalvanized, in sheets, forty-eight inches long and fourteen inches wide, and weighing from fourteen to thirty-four ounces per square foot, thirty-five per centum *ad valorem*.

Antimony, as regulus or metal, ten per centum *ad valorem*.

Steel plates, engraved, stereotype plates, and new types, twenty-five per centum *ad valorem*.

Quicksilver, ten per centum *ad valorem*.

Chromate of iron, or chromic ore, fifteen per centum *ad valorem*.

Mineral substances in a crude state, and metals unwrought, not specially enumerated or provided for in this act, twenty per centum *ad valorem*.

Manufactures, articles or wares, not specially enumerated or provided for in this act, composed wholly or in part of iron, steel, copper, lead, nickel, pewter, tin, zinc, gold, silver, platinum, or any other metal, and whether partly or wholly manufactured, forty-five per centum *ad valorem*.

SCHEDULE N—SUNDRIES.

Burr-stones, manufactured or bound up into mill-stones, twenty per centum *ad valorem*.

Candles and tapers of all kinds, twenty per centum *ad valorem*.

Coal-slack or culm, such as will pass through a half-inch screen, thirty cents per ton of twenty-eight bushels, eighty pounds to the bushel.

Coal, bituminous, and shale, seventy-five cents per ton of twenty-eight bushels, eighty pounds to the bushel. A drawback of seventy-five cents per ton shall be allowed on all bituminous coal imported into the United States which is afterward used for fuel on board of vessels propelled by steam which are engaged in the coasting trade of the United States, or in the trade with foreign countries, to be allowed and paid under such regulations as the Secretary of the Treasury shall prescribe.

Coke, twenty per centum *ad valorem*.

Fulminates, fulminating powders, and all like articles, not specially enumerated or provided for in this act, thirty per centum *ad valorem*.

Grindstones, finished or unfinished, one dollar and seventy-five cents per ton.

Gunpowder, and all explosive substances used for mining, blasting, artillery, or sporting purposes, when valued at twenty cents or less per pound, six cents per pound; valued above twenty cents per pound, ten cents per pound.

Gun-wads, of all descriptions, thirty-five per centum *ad valorem*.

Lime, ten per centum *ad valorem*.

Marble of all kinds, in block, rough or squared, sixty-five cents per cubic foot; veined marble, sawed, dressed, or otherwise, including marble slabs and marble paving tiles, one dollar and ten cents per cubic foot.

All manufactures of marble not especially enumerated or provided for in this act, fifty per centum *ad valorem*.

Percussion-caps, forty per centum *ad valorem*.

Philosophical apparatus and instruments, thirty-five per centum *ad valorem*.

Salt, in bags, sacks, barrels, or other packages, twelve cents per one hundred pounds; in bulk, eight cents per one hundred pounds; *Provided*, That exporters of meats, whether packed or smoked, which have been cured in the United States with imported salt, shall, upon satisfactory proof, under such regulations as the Secretary of the Treasury shall prescribe, that such meats have been cured with imported salt, have refunded to them from the treasury the duties paid on the salt so used in curing such exported meats, in amounts not less than one hundred dollars; *And provided further*, That imported salt in bond may be used in curing fish taken by vessels licensed to engage in the fisheries, and in curing fish on the shores of the navigable waters of the United States, under such regulations as the Secretary of the Treasury shall prescribe; and upon proof that the salt has been used for either of the purposes stated in this proviso, the duties on the same shall be remitted.

Stones, unmanufactured or undressed, freestone, granite, sandstone, and all

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building or monumental stone, except marble, not specially enumerated or provided for in this act, one dollar per ton; and upon stones as above, hewn, dressed, or polished, twenty per centum *ad valorem*.

THE FREE LIST.

CHEMICALS.

SEC. 2503. The following articles, when imported, shall be exempt from duty:

Bones, crude, not manufactured, burned, calcined, ground, or steamed. Bone-dust and bone-ash for manufacture of phosphate and fertilizers. Argal, or argol, or crude tartar. Iodine, crude. Vegetable and mineral wax. Acids used for medicinal, chemical, or manufacturing purposes, not specially enumerated or provided for in this act. Agates, unmanufactured. Apatite. Asbestos, unmanufactured. Arsenic. Antimony ore, crude sulphide of. Arsenic, sulphide of, or orpiment. Baryta, carbonate or witherite. Bauxite. Bromine. Cadmium. Calamine. Chalk and cliff-stone, unmanufactured. Feldspar. Cryolite or kryolith. Iridium. Kieserite. Kyanite or cyanite, and kainite. Lime, chloride of, or bleaching powder. Magnesium. Magnesite, or native mineral carbonate of magnesia. Manganese, oxide and ore of. Osmium. Palladium. Phosphates, crude or native, for fertilizing purposes. Potash, muriate of. Soda, nitrate of, or cubic nitrate. Strontia, oxide of, and proto-oxide of strontian, and strontianite, or mineral carbonate of strontia. Sulphur, or brimstone, not specially enumerated or provided for in this act. Uranium, oxide of, verdigris or subacetate of copper.

Crude minerals, not advanced in value or condition by refining or grinding, or by other process of manufacture, not specially enumerated or provided for in this act.

SUNDRIES.

Aluminium. Asphaltum and bitumen, crude. Bismuth. Bullion, gold and silver. Burr-stone, in blocks, rough or unmanufactured, and not bound up in mill-stones. Coal, anthracite. Coal stores of American vessels, but none shall be unloaded. Cobalt, ore of. Copper, old, taken from the bottom of American vessels, compelled by marine disaster to repair in foreign ports. Copper, when imported for the United States Mint. Diamonds, rough or uncut, including glaziers' diamonds. Diamond-dust or bort. Emery ore. Stones and whetstones. Mica and mica waste. Ores of gold and silver. Pewter and britannia metal, old, and fit only to be remanufactured. Platina unmanufactured. Platinum, unmanufactured, and vases, retorts, and other apparatus, vessels and parts thereof, for chemical uses. Plumbago. Sodium. Sweepings of gold and silver. Tin ore, bars, blocks or pigs, grains or granulated.

FURNACE, MILL, AND FACTORY.

Furnace No. 1, at Sheridan, Pa., was compelled to suspend operations on Wednesday, by the falling in of a portion of the lining. The work of cleaning out is in progress. The break will involve considerable loss of time and a heavy expense.

The sheet and plate mill in course of erection at the Republic Iron-Works, Pittsburg, will be completed and in operation about the middle of April. All kinds of plate and galvanized sheet-iron will be manufactured, a large galvanizing works now being in the course of erection. The knobbling department of the new mill will probably start up this week.

The annual meeting of the stockholders of the Billings & Spencer Company was held at the company's office in Hartford, on the 19th ult. The old board of directors was unaminously re-elected, as follows: Messrs. C. E. Billings, W. A. Healy, L. A. Barbour, C. M. Spencer, L. H. Holt, Silas Chapman, Jr., and E. H. Stocker. At a subsequent meeting of the directors, the old officers were elected, as follows: C. E. Billings, President and Superintendent; L. H. Holt, Treasurer; E. H. Stocker, Secretary. The business for the past year was the largest in the history of the company.

The capacity of the Henry Clay furnace, at Reading, Pa., has been increased from 150 to 200 tons, by raising the furnace twelve feet. It was blown in Tuesday of last week.

Spang, Chalfant & Co. and Graff, Bennett & Co. are drilling a new well in Butler County, to supply their mills with gas. This, we understand, is the sixth well these firms have put down.

The partnership heretofore entered into between H. M. Rolfe, W. S. Bissell, Uri Haskins, and D. S. Bissell, under the name and style of Steel Nail and Spike Company, Limited, having been dissolved by the death of H. E. Rolfe, the business of said partnership will be settled by D. S. Bissell. This is the company formed some time ago for the purpose of manufacturing steel nails and railroad spikes, at a works to be erected by the company in the vicinity of McKeesport.

The Alton Rolling-Mill Company, Alton, Ill., has been incorporated; capital stock, $25,000. The incorporators are James T. Drummond, Charles H. Randal, James W. Kerr, John Haynod, Frederick W. Drury, and W. Pierce.

The Excelsior Iron-Works, of Chicago, are building for the Western Mining Company, Philadelphia, a complete galena plant, consisting of an engine, blower, crusher, a Pacific water-jacket, galena smelter, and other machinery, to be put in operation at Sheridan, Montana. They are also building two 150 horse-power boilers for the Inter-State Industrial Exposition of Chicago.

A bill has been filed against Herbert C. Ayer and a number of railroad companies by the Otis Iron and Steel Company, of Cleveland, to prevent them from paying over any moneys to Ayer or the Union National Bank. Ayer acted as the Otis Company's agent, receiving a commission on his sales; but he has made no remittance since January 31st, and is now owing them $43,000, less the commission for the steel sold by him. It is alleged that Ayer attempted to transfer these accounts to the Union National Bank, and complainant asks for an injunction to prevent defendants from paying, or the banks or Ayer from collecting, such claims. A similar bill has been filed by the Standard Steel Company, of Lewiston, Pa., against Ayer and a number of railroad companies, the amount claimed being $1400.

The John Scott medal "To the Most Deserving," has just been awarded to the Pratt & Whitney Company, of Hartford, by the city of Philadelphia, on the recommendation of the Franklin Institute. The medal was given for the "standard gauges, taps, and dies" of the company. The quality of exact tools made by this company is not surpassed by those of any other manufacturer at home or abroad.

The Taper Sleeve Pulley-Works is a new enterprise at Dubuque, Ia. The works are not yet fairly in operation, the company having started about the 1st of December last.

Robert Wetherill & Co., Chester, Pa., are building a compound Corliss pumping-engine, with a capacity of 2,500,000 gallons per day, for the Gloucester water-works.

The St. Louis Wire Mill Company will shortly begin the erection of a 100 × 30-foot building, to be used, when completed, as a warehouse. A part of the present warehouse will be converted into a galvanizing department. The works are running full on single turn.

Soft steel for agricultural implements is to be made at the South Chicago Steel-Works, experiments to produce a steel that can be welded having been made recently.

The Pennsylvania Iron-Works, Coatesville, have reduced puddlers' wages from $4.25 to $3.75.

The Weimer Machine-Works Company, Lebanon, Pa., is building two 7×4-inch engines for the Citico furnace, Chattanooga, and a 5×4-inch engine for the new blast-furnace erecting at the Texas penitentiary, at Huntsville. The company is also putting up two of its 7×4-inch blowing-engines for the Crozier Iron and Steel Company, Roanoke, Va., and has lately shipped a 7×4-inch engine to the Eureka Company, Oxmoor, Ala., and a 5×5-inch blowing-engine to be used to blow the spiegel furnaces of the Passaic Zinc Company, at Jersey City, N. J.

The Lake Superior and the Jackson iron companies, of Michigan, filed bills of equity in the United States Court on the 6th of March against Brown, Bonnell & Co., of Youngstown, O., alleging that the defendants are indebted to the plaintiffs on promissory notes for $13,714 and $14,700 respectively, and, as the defendants are insolvent, they ask, in behalf of themselves and other creditors, that the court appoint a receiver.

Stockholders of the New England Pressed-Brick Company, of Boston, have applied for the appointment of a receiver to wind up its affairs. The liabilities are reported to be about $60,000. It is said that the company lost about $1.50 a thousand on all the bricks manufactured.

In five days, in eleven nine-hour shifts, the wire-rod mill of the Cleveland Rolling-Mill Company produced 775,505 pounds of steel wire rods, making 16,300 pounds of scrap at the same time.

The Swamscot Machine Company, South Newmarket, N. H., is building one of its improved Swamscot automatic cut-off steam-engines, of 225 horse-power, for Dempsey's new bleachery at Pawtucket, R. I.

The Vulcan Forge Iron-Works, at Pittsburg, were partially destroyed by fire on the 4th. Loss, $35,000, fully covered by insurance.

The Ashland Furnace, Kentucky, made in one week 426½ tons of iron, using raw coal only.

The articles of association of the Hartman Steel Company, Limited, have been filed for record in the recorder's office of Alleghany County, Pa. The capital stock of the partnership is $300,000, and is held in the amounts named by the following persons: Andrew Carnegie, of New York, $112,500; Henry Phipps, Jr., of Pittsburg, $36,000; John Walker, of Pittsburg, $1500; Henry W. Hartman, of Beaver Falls, $25,000; Isaac L. Ellwood, of Chicago, $75,000; Aaron K. Stiles, of Chicago, $15,000; John W. Calkins, of Chicago, $15,000; Reuben E. Seares, of Marshalltown, Iowa, $20,000. This is the Beaver Falls enterprise already referred to repeatedly.

The rolling-mill of Potts Brothers, at Pottstown, Pa., which has been stopped for five weeks past on account of uncertainty about the tariff, was started on the 5th; but after one heat, the puddlers and their helpers refused to work and went home. The cause of the strike was a notice of a reduction to $3.50 a ton for puddlers and of 8 per cent in the wages of the other workmen.

The *Brick, Tile, and Metal Review* publishes the following furnace statistics: There were erected in Pittsburg, during the year 1882, 15 Siemens gas-heating furnaces for heating iron; 3 Siemens gas-heating furnaces for heating steel; 2 Siemens open-hearth furnaces for making steel; 14 gas-heating furnaces for welding steel; 5 gas-heating furnaces for heating iron; 5 gas double puddling-furnaces; 20 steel heating furnaces for tempering steel; 51 open-hearth furnaces rebuilt; 104 crucible steel melting furnaces rebuilt, with a capacity of 3096 pots; 3 crucible kilns, with a capacity of 1000 crucibles per heat (taking one week to make a heat); 120 gas-producers to supply the gas-furnaces, and 30 pot steel melting furnaces. To build the above enumerated furnaces, with their accompanying gas canals for conveying the gas from the producers to the furnaces, smoke-stacks, foundations, etc., required the use of 9,140,000 brick and 2280 tons of iron, representing a total cost of $452,000. The brick used in the above enumerated work is simply enormous. It represents 2,000,000 more brick than can be produced in the largest fire-brick work in the United States in a whole year.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

J. B. W. Gardner, South Extension of the Grand Central lode.

CALIFORNIA.

SACRAMENTO DISTRICT.

J. L. Goodman, Gold Mountain Overplus quartz mine. W. A. Wallace *et al.*, Lost Boy quartz mine.

COLORADO.

CENTRAL CITY DISTRICT.

Sidney P. Haines, Logan lode. James A. Fisher, Wolverine lode. John Guiname *et al.*, Rapparie lode. Conrad Bardell, True Blue lode. Robert O. Old, Argyle lode. Charles P. Baldwin, Central Indian lode. Michael Klein, Saint Clair lode. Gardner B. Weeks, Benegal lode and mill-site. Joseph B. Johnson, Jack Frost lode. J. B. Hoenig *et al.*, Gulch lode. John Brennan *et al.*, Columbia Chief Extension lode. Andrew Albro *et al.*, Chicago lode. William H. Lane, Hillsdale lode. Harvey M. Thompson, Maple Leaf lode. Julia F. Gorstine *et al.*, Troy lode.

LAKE CITY DISTRICT.

Allied Mines, Talisman lode, and Norma, Emily, and Hidden Treasure lodes and mill-sites. H. D. Pearsall, Green Horn lode. Chicago Enterprise Gold and Silver Mining Company, White lode.

LEADVILLE DISTRICT.

L. D. Kneeland *et al.*, Matchless lode. Grand Rapids Mining and Smelting Company, Himmala lode. Daniel A. Recen *et al.*, Queen of the West lode. George Jess, Nesbitt lode. John K. Martin *et al.*, Modoc lode. John E. Iszard, Ætna and Vesuvius lode. Charles F. Cuno *et al.*, Great Western lode. Charles L. Hall *et al.*, Elk Mountain lode. Black Barnett Consolidated Mining Company, Little Mary lode. George Partridge, Brighton lode. John W. Gaynor *et al.*, Snow Storm lode. August Rische *et al.*, New York lode. Albert Mead *et al.*, Ogden lode. Frederick W. Rose *et al.*, St. Louis Pride lode. Lennox Mining and Milling Company, Owasso lode. B. M. Arms *et al.*, Sallie P. lode. A. Mayer *et al.*, Collina lode. Robert N. Scott, Iron lode.

IDAHO.

BOISE CITY DISTRICT.

Levi Allen *et al.*, Peacock Copper lode.

MONTANA.

HELENA DISTRICT.

Charles Larrabie *et al.*, Magnolia lode. Samuel Neel *et al.*, Pay Up lode. Oliver P. Blain *et al.*, Elba lode. Charles F. Messigbrod *et al.*, Linchburg lode. Frank P. Sterling *et al.*, his placer.

UTAH.

SALT LAKE CITY DISTRICT.

Samuel S. Marshall *et al.*, Belfast lode. Fisco Mining and Smelting Company, Rattler lode. Robert C. Chambers, Utah No. 2 and Utah No. 3 lodes. Thomas Street *et al.*, Norris lode. Wallis Brady *et al.*, E. P. H. lode. Haskell & Welles Utah Mining Company, General Welles lode. Joseph Marion *et al.*, Winnemuck lode.

GENERAL MINING NEWS.

ARIZONA.

TOTAL WRECK.—A correspondent writes us that work at the Total Wreck mine, at Pantano, was started on February 13th, with ten stamps crushing ore, and that on February 20th ten more stamps were started. They crush from 65 to 75 tons of ore per day, averaging from $85 to $95 per ton, with average tailings of from $8 to $9. The following telegram was received yesterday from the superintendent: Shipped 20 bars silver; value, $40,000. The body of ore is widening; has appearance of fine body of ore. Average width of ledge is 25 feet. Superintendent James, of the Contention mine, has stated that in his opinion there was at least a year and a half's supply of ore in sight. The company expects

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soon to commence the payment of dividends and to continue them for an indefinite period.

COCHISE COUNTY—TOMBSTONE DISTRICT.

The latest dispatches state that the Bunker Hill Company has bought the Randolph mill, and is working Rattlesnake and Mammoth ore.

Work on the Head Center mine was resumed yesterday.

The grading for the smelter on the San Diego mine has been completed.

The Sulphuret pumps have been started up and are working successfully.

The case of the Tombstone Mill and Mining Company against the Way Up Company has been argued in the Supreme Court, and has been taken under advisement.

The case of Bidwell against Gird for one half of the Tombstone Company mines has been decided in favor of Gird in the District Court at San Bernardino.

PIMA COUNTY.

AJO.—The first car-load of ore from this copper mine, located a little over one hundred miles from Tucson, has been produced. With present rates of shipment, these mines will be made to pay for their own development.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

A strike of very rich silver ore has been made in the Northern and Southern Light mines, Sweetwater Mountains.

BODIE CONSOLIDATED.—During the past week, 139 tons of ore were crushed; average assay value, $82 per ton. The east cross-cut, 1000 level, is in 295 feet. The north drift, 800 level, is 252 feet long. The mill is running steadily on ore from the 780 level and the levels above.

BODIE TUNNEL.—The mill crushes about 50 tons of ore daily; average pulp-assays, $15.50 per ton.

STANDARD CONSOLIDATED.—During the past week, 1363 tons of ore were crushed. The main east cross-cut, 1000 level, is 1230 feet long; and the east cross-cut from south drift, same level, is 315 feet long, showing quartz seams. The workings on the upper levels continue to show large quantities of ore.

CLOVER PATCH DISTRICT.

WILD ROSE.—According to the Candelaria *True Fissure*, this mine is developed by a tunnel 260 feet in length, by a shaft and drift running north and south, following the ledge. The north drift is in a distance of 125 feet, and some very fine ore is taken from the face. The drift to the south has been run but 30 feet, having been started for the purpose of prospecting the ledge in that direction. The formation in the face is favorable, yet no ore has been encountered of high enough grade. An uprise was started to connect the tunnel level with the shaft above, the shaft having been sunk meanwhile, and the connection made afforded ample and very desirable ventilation. While this work was progressing, a very fine streak of ore was uncovered at a point 46 feet above the tunnel level. It has been followed a distance of 60 feet to the north, and in this was made a development that insures the future success of the mine. It consists of a ledge of ore from two to four feet in width, that carries free gold in considerable quantities. The drift to the south on this level is some forty feet in length, and from it is extracted some excellent ore. A chute has been made from the upper to the tunnel level, and by means of this all the ore is run into cars and conveyed by them to the ore-dump. At present, the old Diana mill, at Benton, is used for crushing the ore, which has to be hauled about eight miles. The mill is kept busy on the output of this mine alone. All the ore is mixed together, and is found to mill about $100 per ton, running some $70 per ton in gold and $30 in silver. The ore is of a character which is easily crushed; that from the north drift on the upper level pulverizes almost to the consistency of coarse sand when it is taken from the ledge. A new mill is to be built early in the spring.

CANADA.

BRITISH COLUMBIA.

A report from Victoria says that a prospector who has just returned from the Kootenay District, brings a specimen of lead and silver ore. He says the mines are extensive. These mines are within sixty miles of the route selected by the Canadian Pacific Railroad, via Kicking Horse Pass.

COLORADO.

ARAPAHOE COUNTY.

BOSTON & COLORADO.—These works produced $402,000 worth of bullion in gold, silver, and copper during February.

BOULDER COUNTY.

LONDON.—A strike is reported to have been made at a depth of twenty-five feet.

CLEAR CREEK COUNTY.

DIAMOND TUNNEL GOLD AND SILVER MINING COMPANY.—It is proposed to erect a mill at Silver Plume for the treatment of the large amount of concentrating ore which this property is capable of producing. The company will either purchase the old Silver Plume mill or build another somewhere along the creek.

DONALDSON.—The company has a strong force of men at work on its new mill and concentration-works, which it is erecting on Clear Creek, below the mouth of Fall River. It is also putting up a wire tramway from the mines to the mill and concentration-works.

SPRINGFIELD.—The company has bought the Silver Queen mine, situated on Seaton Mountain, for $15,000.

VICTORIA TUNNEL.—A contract has been let to run this tunnel 1050 feet from present breast, which is now thirty feet under cover. They will intersect the celebrated Mendota lode in about 800 feet, and estimate that it will take them fourteen months to reach this point and five or six months more to complete the contract. The contractors are putting up a full plant of air-drills, and the motive power will be steam.

CUSTER COUNTY.

BASSICK.—It is reported that a suit has been begun in the United States Court in Colorado by one Joseph L. Phillips against this company, to recover $2,000,000, which Phillips claims has been extracted from his two claims that adjoin the Bassick.

GILPIN COUNTY.

Several of the gulch miners below Black Hawk are preparing to resume placer mining as early as possible in the spring. Dams have been constructed, ditches repaired, and other necessary preparations made for an active season's work.

CALIFORNIA.—This company has added a portion of the Hidden Treasure mill to its stamping capacity, and the California mine on Quartz Hill, operated by it, shows as favorable prospects as at any former period in its history.

UNITED GREGORY.—This company has lowered the water in No. 2 or the pump-shaft, on the Gregory lode, to a point 665 feet below the surface. This is the first time in seven weeks that the water has been lowered to that point. The pump, since being rearranged and remodeled, is working splendidly, and no fears are entertained of any mishap occurring again through defective portions of the pump—Cornish pattern—one of the largest in use in the State of Colorado.

HINSDALE COUNTY.

BONANZA.—The tunnel is in 1480 feet, or 480 feet beyond the cross-cut of the Norris vein.

LITTLE DORA.—Three assays recently made in Chicago, on ore taken from the shaft at a depth of 20 feet, show as follows: No. 1, 1573 ounces silver and 304 ounces of gold; No. 2, 1280 ounces silver and 281 ounces gold; No. 3, 1871 ounces silver and a trace of gold. Extensive developments will be made at the mine this season, and as many men as possible will be put to work upon the shaft, drift, and tunnel, and the rich ore stoped out preparatory to large shipments when roads and other necessary additions are made.

LAKE COUNTY.

Late Leadville exchanges contain the following:

AMIE.—Shipments continue to be made, although the ore is somewhat lower grade than formerly.

BIG PITTSBURG.—Work has been resumed on the Lent shaft.

CATALPA.—The annual report of 1882 shows that the total receipts from silver, iron, and interest account were $95,450.23, and the expenditures $58,332.45, leaving $37,117.78 as the net profit. A dividend of $30,000 was paid, and the balance of $7117.78 was added to the company's surplus, which now amounts to $62,279.23, or more than enough to pay two more dividends. During the year, 5202 tons and 415 pounds of silver ore and 2176 tons and 168 pounds of iron ore were mined.

DINERO.—The shaft is down about 175 feet, and four levels have been run on the vein, the ore produced from this development-work having more than paid the expenses of working the property and making surface improvements. Ore is shipped to the Shields mill.

IRON HILL CONSOLIDATED.—This company has filed papers with the Secretary of State announcing that its capital stock has been increased from $500,000 to $2,500,000, and that its principal office will be at Chicago.

LITTLE SILVER.—About forty men are employed on development-work. No stoping is done, the shipments being confined to the product from development, and the output from that source more than paying the running expenses.

MORNING AND EVENING STAR.—Manager Ward has purchased a five-stamp mill in Denver recently, which is now erecting near the Cummings & Finn smelter. It will be used in the experiments in concentration which Mr. Ward is now making in connection with the low-grade ores of the mines under his management.

ONLY CHANCE.—An important strike is reported to have been made in this lode, located at the head of Georgia Gulch, adjoining Coon Valley. Some ore has been found for some time, but not in profitable quantity, until the present ore-body, which is reported to show a face of six feet of excellent ore, was developed. The strike was made in a drift from the shaft at a depth of over three hundred feet. Shipments will be made.

SUMMIT COUNTY.

GRAY EAGLE.—No work has been done on this mine for some time. It is stated that the lessees have made arrangements to resume operations shortly, and the original plan will then be carried out. The property shows favorable prospects.

ROBINSON CONSOLIDATED.—At a meeting of the stockholders, held in New York recently, the following gentlemen were elected directors for the ensuing year: Hiram A. Johnson, Thomas I. Richman, S. Ayres, Jr., John C. Marron, Charles W. Arthur, S. H. Millard, and S. H. Parsons. The new board then held a meeting and elected Hiram A. Johnson President; John C. Marron, Vice-President; James K. Selleck, Secretary; and Charles B. Selleck, Assistant-Secretary.

DAKOTA.

BLUE LEAD.—Work has been started at the mine, and it is expected that a thirty-ton smelter will be erected.

CALEDONIA.—The superintendent reports, for the week ended February 18th: Ore produced, 1025 tons. Bullion shipped, 457½ ounces; value, $8000. As the south leader is in fair milling ore, we have discontinued running it, and have started stopes. The lower winze has advanced 4½ feet; total, 25½ feet. Upper winze advanced 16 feet; total, 25 feet. Both winzes are in good ore. Machinery at both mill and mine is running well.

FATHER DE SMET.—The report of the superintendent from February 15th to February 22d shows ore extracted from first, second, and third levels, 1975 tons. Ore milled, 1975 tons. Third level header advanced 8 feet. Header in 142 feet. North end tunnel advanced 5 feet. Tunnel in 820 feet. Italian winze advanced 7 feet. Winze down 60 feet. Stopped.

GOLDEN SUMMIT.—Work upon the mine and mill is progressing favorably.

GEORGIA.

CALHOUN.—Is running to its full capacity.

GARNET.—This company recently purchased a considerable tract of mining property in White County, on the Chestatee River. The mine is supposed to be of great value. Considerable improvements have been made. The body consists of some thirty-five lots, taking in several of the auriferous leads which traverse this and adjoining counties. The ore is to be crushed by a 40-stamp water-power mill.

IDAHO.

A very remarkable discovery is reported of a vein of platinum. It is located up a gulch on Wood River, not far from Hailey.

A correspondent of the Salt Lake *Tribune* writes from Senate Hill, Wood River: In this vicinity, the ores are chiefly argentiferous galena, sulphurets, carbonates, etc. On Senate Hill, several mines are opened. Among the most important are the following: More work has been done on the Senate mine than any other. It has a shaft sunk 240 feet, and a tunnel in 140 feet. The ledge is 18 feet wide, and looks well.

The Red Cloud is opened by a shaft about 75 feet deep and a tunnel, and a good quantity of ore is exposed at the bottom of the shaft. Large quantities of good ore were taken from this mine and the Senate last season, and they will be worked extensively this season.

The Conway Castle Company expects to commence improving its property and working its mines as soon as the weather is suitable.

The Modoc is a very large ledge, from 20 to 30 feet wide at the opening. The ore is argentiferous galena and carbonate. It has well-defined walls, and promises to be one of the largest and best mines on Senate Hill. It is well located, and can be easily and cheaply worked. But little work has yet been done (a cut run across the ledge some 25 feet and twenty or thirty tons of ore taken out). Its owners expect to begin work on it soon, and will prosecute the work with all possible energy.

The Occident is a very promising mine. It has an open cut on the ledge about 60 feet long and 15 feet deep.

There are several fine prospects extending south from this hill for several miles, notably the Tennessee, Highland Chief, Alps group, Tenderfoot, Silver King, and others.

Several companies are organized and preparing to commence work in the neighborhood as soon as the weather is suitable.

ILLINOIS.

A telegram to the Chicago *Inter-Ocean* says that the Peru diggings, near Galena, the most extensive black-jack mines in this part of the Northwest, have been closed by order of the owners, the La Salle Zinc Company, whose works at the latter place have been abandoned on account of the flood. The closing of the mines throws 110 men out of employment.

MAINE.

BLUE HILL.—Development-work is progressing vigorously, the main shaft having reached the third level and started for the fourth. The rock is changing its character somewhat, becoming much more favorable and easier to work. Thirty-five men are employed.

MASCOT.—A cross-cut from the lower level struck the hanging-wall of the vein, at a distance of thirty feet from the tunnel, and encountered on the wall a seam of solid galena fully ten inches thick. The force at this mine is soon to be increased.

MEXICO.

A large body of rich ore has just been struck in the Cusihuiriachic mine, near Chihuahua.

A statement published by Señor Lorenzo Castro shows the number of mines worked and idle in the different States, as follows: State of Aguas Calientes, 23 mines worked. State of Chihuahua, 575 mines given, about half being idle. State of Coahuila, 51 mines, nearly all idle. State of Durango, 43 mining dis-

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ricts, but the number of mines not given. State of Guanajuato, many mines, but the number not given. State of Guerrero, 450 mines, number worked not given. State of Hidalgo, 137 mines in 5 districts, with 11 districts not given, 23 mines worked. State of Jalisco, 303 mines worked, number of idle mines not given. Federal District of Mexico, 65 mines worked and 259 idle. State of Michoacan, 55 mines worked, number idle not given. State of Morelos, 30 mines idle. State of Nuevo Leon, very many mines, number not given. State of Queretaro, 69 idle mines. State of San Louis Potosi, 90 mines worked and 231 idle. State of Sinaloa, 406 mines, 32 gold placers, 9 salt mines, and 52 smelting-works. State of Sonora, 34 mineral districts. State of Tamaulipas, 6 mining districts, 8 mines worked, 37 old ones idle, whole number not given. State of Zacatecas, number not given, but it is large and the mines rich. The wonderful Veta Grande, Veta Negra, El Sombrerete, and other old and famous mines are in this State.

A correspondent of the Mexican *Financier* gives the following notes on the Real del Monte and Pachuca districts:

The Dulce Nombre mine, in the Real del Monte District, was first located in 1820, and was recorded then. A shaft was sunk on a north and south lode which at a depth of 550 feet dipped to the east. The shaft is 10 by 16 feet from surface to the bottom. The vein averaged ten feet, with firm hanging and foot-walls of porphyry. A very rich pay-streak in the vein averaged two feet six inches; but the ores were very refractory, and under the old system much of their value was lost. This mine has been re-located lately. The owners propose to drift south from the bottom of the shaft, so as to intersect another diagonal lode cropping on the surface and showing good prospects. It is expected that the junction of the two lodes can be reached by about 70 feet of drifting.

The San Ignacio mine still yields large quantities of good ore. Those interested, however, are looking down at the water covering all below the 80-foot level, and which they have not the means to remove, though it is known to cover very rich ores. If a company controlled this mine with resources to buy and work the Acosta pumping-engine near by, the property would become very valuable.

The Gran Trompillo mine, in the Lerezo District, is to resume operations, under Mr. M. Fuertes as president, and Mr. A. Vergara as superintendent. The mine is a good one, but has been idle because of differences among the owners, now happily settled.

After four months of delay, a manager has at length been appointed for the Santa Gertrudis mine, in the person of Mr. Bolland, late manager of the San Buena Ventura mine. The mine is in excellent ore, but it remains to be seen whether better management will insure resumed dividends. The ores average eight marks to the montone, a mark of silver being quoted at eight dollars, equaling $64 per montone, or $42.50 per ton. The reduction-works charge $38 for working the ores, leaving only four dollars per ton for all expenses and dividends. And yet we are told that stamps and pans and settlers which in the United States work $10 ores to advantage can not work these ores as well as the patio process! Somebody has been reaping profits, but it is not the stockholders.

There has been a great improvement in the ores of the Encino mine, at Pachuca. There are rumors here that a strong company has been formed in England, not to lease or locate mines, but to purchase and work developed property showing clear title.

MICHIGAN.

CENTENNIAL.—New openings on the north end of the Osceola lode are exposing vein-matter most favorable in character.

DETROIT.—The cave-in hinders the work of ore-hoisting at present; but the fallen ground is taken to the surface at a rapid rate, and the mine will soon again be in as good shape as ever. It is improving in ore-showing as work progresses.

LAKE ANGELINE.—The developments at the new shaft are of a gratifying character. The shaft is down 157 feet, and from the bottom a drift has been driven 100 feet toward the lake, all the way in clean ore and without encountering any rock, while another in the opposite direction caught the hanging in 30 feet. The ore is a very fine quality of Bessemer hematite, and the drifts would seem to indicate that the deposit is a very large one.

MCCOMBER.—According to the Norway *Iron Chronicle*, operations are to be suspended and all the men discharged, except three or four, who will be retained to run the pumps. The reason assigned is the inability of the company to make sales of ore, a large amount remaining unsold in Cleveland and also at the mine. The Union Iron and Steel Company, of Chicago, was indebted to the McComber in the sum of about $30,000 at the time of its failure.

NEVADA.

Four important suits were recently commenced in the District Court of Storey County. The plaintiffs are the Consolidated Imperial Mining Company, the Kentuck Mining Company, the Crown Point Gold and Silver Mining Company, and the Yellow Jacket Silver Mining Company, against the Original Gold Hill Gold and Silver Mining Company, defendant. The suits are brought under the United States laws regulating applications for patents and adverse claims thereto. It is alleged in the complaints that the latter company has made an application for a patent from the United States, and that its alleged premises and property conflict with the several mining claims of the said plaintiffs. These suits, consequently, are to settle the question of the boundaries of the said claims, and to quiet title thereto. It is understood that the Bullion Mining Company will also begin an action against the same defendant in a few days, and on the same grounds.

ALBION.—A dispatch from Eureka to the San Francisco *Stock Report* states that a crisis in the affairs of this company has occurred, and that there is no hope of a settlement. The mine and furnaces have been closed.

EUREKA CONSOLIDATED.—The Logan shaft has reached a depth of 1000 feet. The machinery is working well.

SILVER STATE.—The cross-cut in the main tunnel is now in nearly 30 feet, the face of it being in a good lime formation, with good-looking iron and small streaks of low-grade ore running through it. There are several good ledges visible on the surface of the claims that comprise this mine, from which rich ore has been extracted. The main tunnel is sure to encounter some of these when it is carried in some short distance farther.

NORTH CAROLINA.

The Salisbury *Watchman* says:

CID.—This mine has been recently opened. The vein is bold, incased in walls of solid blue slate. The shaft is sinking on the incline of the vein. The ore is highly cupriferous, with an occasional trace of gold.

CROWELL.—Prospecting and some sluice-washing are carried on. The severe weather has greatly retarded work.

DUTCH CREEK.—Prospecting and underground development are the only work going on. A new shaft has opened a vein of peacock ore.

EMMONS.—Work is going on, and the machinery from the Baltimore gold and silver mine (which has been abandoned) is in course of erection on this property with a view of opening it up.

GOLD HILL.—Work is progressing in the most satisfactory manner. The Old Field vein is proving all that had been anticipated. The pumps are going steadily, forking the water from the Randolph shaft. The appearance of the place indicates that the work will be pushed with reasonable vigor, with good prospects of permanent success.

SILVER VALLEY.—As formerly stated, the output of this mine has been sold to a smelting firm in Swansea, Wales. During the winter months, no ore could be hauled to the railroad. There are on the dumps about 800 tons of ore. At present, the operators are hoisting ore from one shaft, and dropping a large pump into a new shaft. As soon as the roads will allow constant travel, they will continue shipping their ores.

PENNSYLVANIA.

The California mine, at Boyertown, Berks County, owned and operated by the Phœnixville Iron Company, will be immediately prepared for active operations. The mine has been lying idle for a number of years.

UTAH.

EMPIRE.—The mine was flooded Thursday night, and work has been temporarily suspended, says the Park *Mining Record* of February 24th. It is thought the recent actions brought against the company in the Third District Court will be satisfactorily adjusted. The company has been very unfortunate in its operations in this district, and the blame can not be attached to any of the superintendents or to the ground which is worked. Good judges who have gained access to the mine are firm in their belief that, if work was continued without interruption, the Empire would soon come out in the finest shape. There is good, rich ore in some of the levels, but to what extent is not known. We hope the management will be able to pump the mine out soon and continue work without interruption until the property is fully developed.

[This is the same report we have had in the "inspired" papers for several years. The facts are, that the Empire never had any considerable quantity of pay-ore, and there is now less probability than there was four years ago that it ever will find a profitable ore-body. We have advised the public many times during the past four years of this fact.—ED. E. AND M. J.]

SAMPSON.—The following dispatch from the manager has been received in this city: Cross-cut to ledge from bottom of incline in two feet ore. Drifted about 20 feet each side. Ore improving every foot and is high grade. This gives us so far 40 feet in length, 60 feet in hight, and 2 feet in width of high-grade stoping ground, and assures the mine to be self-sustaining for further developments. Will ship two or three car-loads as soon as sampled.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED FEBRUARY 6TH, 1883.

271,627. Boiler Furnace. William A. Greene, Brooklyn, N. Y.
271,657. Ore and Mineral Separator. Robert H. Richards, Boston, Mass., and Frederick G. Coggin, Lake Linden, Mich.
271,683. Cupola-Furnace. William J. Clapp, Nantyglo, and Thomas Griffiths, Blaenavon, County of Monmouth, England.
271,717. Production of Sound Ingots and Apparatus therefor. Frederick A. Krupp, Essen, Germany.
271,792. Stone-Drilling Machine. James T. Clark, Bath, Cal.
271,829. Double-Acting Pump. Hamline J. French, Pelham Manor, and George G. Shenton, Brooklyn, N. Y.
271,906. Process of and Apparatus for obtaining Chlorine and Sodium. André Leopold Nolf, Brussels, Belgium.
271,929. Miner's Pick. Harvey F. Seybert, Brady's Bend, Pa.
271,989. Smoke-Burning Furnace. John Ritchie, Chicago, Ill., Assignor to John N. Manning and George Mehring, same place.

GRANTED FEBRUARY 13TH.

272,035. Smoke and Gas Consuming Furnace. George Farr, Cincinnati, O.
272,045. Ore-Amalgamator. William E. Harris, New York City.
272,085. Basic Process for the Dephosphorization of Iron and Steel. Jacob Reese, Pittsburg, Pa.
272,086. Universal Rolling-Mill. Jacob Reese, Pittsburg, Pa.
272,088. Casting Brass and other Metals. Henry A. Rowland, Baltimore, Md.
272,195. Vapor-Burner. Henry S. Belden, Canton, O.
272,331. Combined Instrument for Leveling, Surveying, etc. Rudolph Peter Gallis, Hartford, Conn.
272,233. Stone-Breaking Machine. Philetus W. Gates, Chicago, Ill., Assignor to the Gates & Scoville Iron-Works, same place.
272,249. Pig-Iron Breaker. William R. Havens and John W. Nesmith, Denver, Colo.
272,264. Steam-Pumping Engine. Philip S. Kingsland, Chicago, Ill.
272,326. Radiator for Furnaces. Dwight S. Richardson, Brooklyn, N. Y.
272,343. Pump. William R. Smith and Neil A. Bigger, Bentonville, Ark.
272,378. Process of and Apparatus for Burning Water-Gas in Furnaces. Charles J. Eames, New York City.
272,391. Process of and Apparatus for Extracting Metals from their Ores. Antonin Thiollier, Villebœuf de Roche la Moliere, Assignor of one half to Albert Ancel, Chateau de Bouches d'Uzure, Canton de Craon, Mayenne, France.

GRANTED FEBRUARY 20TH.

272,428. Turbine Water-Wheel. Marquis D. Grow, Dubuque, Iowa.
272,431. Hoisting-Machine. Edwin Harrington, Philadelphia, Pa., Assignor to Edwin Harrington & Son, same place.
272,439. Hoisting-Machine. Harry S. Haskins, Philadelphia, Pa., Assignor to Edwin Harrington & Son, same place.
272,458. Condenser for Pumping-Engines. William A. Miles, Copake Iron-Works, New York.
272,494. Surveying Instrument. Charles W. Stickney, Washington, D. C.
272,497. Chill for Chilling Metal. William Tuttle, Dowagiac, Mich.
272,504. Steam-Boiler Furnace. Charles H. Wilson and Samuel S. Wilson, Paducah, Ky.
272,509. Ore-Concentrator. John M. Adams and William F. Carter, San Francisco, Cal.
272,544. Amalgamator. William E. Harris, New York City.
272,550. Coal-Car. David Hoit, West Albany, Assignor of one half to Charles R. Hicks, Troy, N. Y.
272,564. Amalgamator. Stephen G. Lindsey, Salt Lake City, Utah.
272,599. Assay-Furnace. John C. Tappeiner, Bisbee, Ariz.
272,614. Machine for Concentrating and Amalgamating Ores. David H. Anderson, Butte City, Mont.
272,682. Art of Preparing Steel Ingots for Rolling. William Hainsworth, Pittsburg, Pa.
272,683. Bessemer Plant. William Hainsworth, Pittsburg, Pa.
272,684. Feed-Water Heater for Steam-Boilers. Edward J. Hall, Buffalo, N. Y.
272,687. Mechanism for Preventing the Lapping of Belts on Shafting. William Hayes, Jr., Fall River, Mass., Assignor to himself and Samuel D. Howland, same place, and Charles E. Cook, Dartmouth, and Abbott P. Smith, New Bedford, Mass.
272,711. Apparatus for Compressing Air. James J. Lawler, Scranton, Pa.
272,726. Machine for Amalgamating Ores. Edward R. Lucas, Peoria, Ill., Assignor of one half to Willard W. Lind, same place.
272,741. Amalgamator. William Moller, Yonkers, N. Y.
272,742. Amalgamator. William Moller, Yonkers, N. Y.
272,766. Charcoal-Kiln. Henry M. Pierce, Chicago, Ill.
272,771. Air-Compressing Machinery. George H. Reynolds, New York City, Assignor of two thirds to Cornelius H. Delamater and George H. Robinson, both of same place.
272,788. Gold-Washer. John P. Spencer, South Pueblo, Colo.
272,804. Apparatus for the Purification of Coal-Gas. Charles C. Walker, Lilleshall, County of Salop, and William T. Walker, Highgate, County of Middlesex, England.

GRANTED FEBRUARY 27TH.

272,930. Smoke-Consuming Furnace. Harvey R. Wolfe, Louisville, Ky., Assignor to Charles A. Wolfe, Thomas Brennan, W. Garnett Munn, and John Leamy, same place.
272,959. Ore-Furnace. Frederick J. Hoyt, New York City.
272,976. Process of Manufacturing Charcoal. Henry M. Pierce, Chicago, Ill.
272,977. Rock-Drill. Thomas Radford, Bloomington, Ill., Assignor of four-fifths to James B. Stevenson, William Stevenson, Matthew T. Scott, and William Radford, all of same place.
273,011. Apparatus for Extracting Gold and Silver from their Ores. Richard Barker, London, County of Middlesex, England.
273,014. Air-Compressor. William A. P. Bicknell, Riverdale, New York County, N. Y.
273,051. Dumping-Car. Lawrence Fitzsimmons, Alleghany, Pa.
273,099. Steam-Boiler Furnace. Frank H. Kane, Riverside, Assignor of one half to William Kruse, Sedamsville, O.
272,156. Safety-Shell for Blasting. Robert B. F. Reed and George Freund, Durango, Colo., said Reed Assignor to said Freund.
273,194. Gas-Seal for Blast-Furnaces. Edward A. Uehling, Sharpsville, Pa.
273,230. Process of and Apparatus for Manufacturing Gas. John Hanlon, New York City; James E. Leadley, Camden; and Silas Gibbs, Warren County, N. J., Assignors to the United Gas Improvement Company, Philadelphia, Pa.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, March 9.

The mining market continues very dull and has been almost featureless. In fact, the only item worthy of mention has been the sharp decline in Robinson Consolidated. This stock reached its weakest market price to-day. The remainder of the market is of little interest. The dealings have been mostly in such low-priced stocks as Sonora Consolidated, Decatur, Elko, etc. Amie records a large business, and has been quite strong. A summary of the market is given below: The total sales of mining shares at all the Exchanges aggregate 416,443, as against 447,381 last week.

The Comstock shares have been very quiet at steady prices. California was weak, selling from 15@10c. with a business of 3550 shares. Consolidated Virginia was also quiet and weak, selling from 60@51c. Sierra Nevada records a quiet business at strong prices, selling from $3.50@$4. Union Consolidated was also strong, under a small business, selling from $4.75@$6@$5.25. Yellow Jacket was quiet and irregular at $1.63@$1.38@$1.50. Best & Belcher sold at $4 under one transaction. Sutro Tunnel was quiet and steady; it sold at 22@21c.

The Leadville stocks were also very quiet at steady prices. Amie Consolidated, the only exception to the rule, was very active and quite strong; it sold from 22@28@35c., with a business of 59,000 shares. Chrysolite records a quiet business at irregular prices, selling from $1.45@$1.35@$1.40. Iron Silver declined from $3@$2.90 under a small business. Leadville was quiet and irregular, selling at 70@65@70c. Little Chief sold to the extent of 1400 shares at 40@41c. Big Pittsburg was quiet and steady; it sold at 18@20c. Climax sold at 9@10c., with a business of 2300 shares.

The Bodie stocks have been quiet and irregular. Bodie Consolidated has levied an assessment, and has, in consequence, grown quite weak; it sold from $1.85 @95c.@$1 under a small business. Bulwer was quiet and irregular, selling from 95@90@93c. Standard records a moderate business and has been strong, selling from $6@$6.50.

The Tuscarora stocks have been quiet at about steady prices. Grand Prize was quiet and steady at 40@50c. Argenta sold at 55c., with one transaction. Belle Isle, with a small business, declined from 50@ 45c. Navajo had a moderate business at irregular prices; it sold from $4@$3.50@$3.75. Independence was weak, under moderate transactions, selling from 52@45c. North Belle Isle sold to the extent of 300 shares at 54@50c. Elko Consolidated was quiet and weak, declining from 10@7c.

In the miscellaneous list, Alice has declined from its recent strong prices, and this week sold from $3.15 @$3. Bassick has been quiet and steady at $10. Father de Smet records a moderate business at strong prices, selling from $4.75@$5. The Green Mountain stocks have been quiet and steady. Gold Stripe sold from 8@7c. Green Mountain sold from 64@69@68c. Rising Sun sold at 5c, and Cherokee at 4c. Homestake has developed a moderate business at irregular prices; it sold from $16@$15@$16@$15½. Horn-Silver has grown a little weaker, declining from $8.63@$7.75, with a fair business. Northern Belle has been quiet and strong, selling from $9.75@$10.50. Robinson Consolidated has been very active and quite weak; it sold from $1@84c., closing to day at 87c. Sierra Grande records a more moderate business than usual, and has been very irregular; the price of this stock ranged from $2.80@$3.05, closing to-day at $2.90. Silver King has been irregular, selling from $10¾@ $11½@$11.

Alta-Montana records a quiet business at steady prices, selling from 13@11c. Bradshaw has also been quiet and steady, and has sold from 33@31c. Decatur has been very active at steady prices, selling from 8@ 7c. Durango records a small business at 7@9c. Harlem M. and M. Company continues steady, selling from $1.25@$1.20, under a moderate business. Oriental & Miller sold from 16@14c., with a fair business. Silver Cliff was quiet and steady, selling from 38@42@40c. Sonora Consolidated has been very active and irregular; it sold from 38@51@40@50c., closing at 49c. to-day; the sales, or reported sales, aggregate 73,500 shares. South Pacific has been active and steady at 6@5c. The State Line stocks have been quiet and weak; Nos. 1 and 4 sold from 3@4c., and Nos. 2 and 3 from 7@6c. Taylor-Plumas records an active business at steady prices, selling from 16@19@18c. Eastern Oregon was moderately dealt in at irregular prices, selling from 75c.@$1@95c.

At the annual meeting of the stockholders of the Iron Silver Mining Company, held March 7th, the following-named gentlemen were elected trustees: Thomas F. Mason, John S. Newberry, James D. Smith, W. H. Stevens, R. H. Rickard, T. B. Brooks, L. H. Pierce, D. H. Dongan, and Jacob Houghton. At a subsequent meeting of the trustees, Thomas F. Mason was elected President; John S. Newberry, Vice-President; James D. Smith, Treasurer; Homer A. Hoit, Secretary; and W. H. Stevens, Chairman Executive Committee. A dividend of 20 cents per share was declared, payable March 28th. Total dividends to this date, $1,000,000.

In regard to the proposed union of the New York Mining Board and the New York Petroleum Exchange, the recent action of the Governing Committee of the former body is regarded as definitely settling that question. The committee passed resolutions forbidding members of the Board from joining any other organization that deals in pipe line certificates, and laid over the cases of those members who have already joined the Petroleum Exchange for future consideration.

MEETINGS.

Lucky Boy Gold and Silver Mining Company, No. 18 Wall street, New York. Annual meeting of stockholders and election of trustees, March 13th, from ten A.M. to twelve M

Total Wreck Mining and Milling Company, No. 18 Broadway, New York. Annual meeting of stockholders and election of trustees, April 10th, at three o'clock P.M.

DIVIDENDS.

The Barclay Coal Company, of Pennsylvania, has declared a semi-annual dividend of three per cent, payable March 15th.

The Consolidated Gold Mining Company, of Georgia, has declared its usual dividend.

The Kentuck Mining Company, of Nevada, has declared a dividend of 10 cents, payable March 19th.

The Iron Silver Mining Company, of Colorado, has declared a dividend (No. 10) of twenty cents per share, payable March 28th. Transfer-books close March 17th, and reopen on the 31st.

The Navajo Mining Company, of Nevada, has declared a dividend of twenty-five cents per share, payable March 13th.

The Osceola Mining Company, of Michigan, has declared a dividend (No. 14) of $1 per share, payable in Boston to stockholders of record March 10th.

The Shoshone Mining Company, of Idaho, has declared its regular monthly dividend (No. 4) of 1 per cent, payable March 16th. Transfer-books close on the 10th inst., and reopen on the 17th.

The Standard Consolidated Mining Company, of California, has declared a dividend of twenty-five cents, payable March 12th.

The Union Mining Company, of Maryland, has declared a dividend of 2½ per cent, payable on and after March 15th, at the office of the company, Room 46, No. 115 Broadway.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, No. 55 Broadway, report as follows for the week ended Friday, March 9th:

The week, Friday, March 2d, opened with 98c. bid for United Pipe Line Certificates, and to-day it opened 88c. bid, or a decline of exactly 10c. per barrel during the week. This morning, a sharp decline followed the opening, declining to 86c., but reacting sharply to 90⅝c. and falling back to 89½c. bid at half-past twelve to-day.

The decline, during the past week, can not be fully explained, though there were some bearish facts, as indicated in our report last week.

The runs from the wells to the pipe lines were from 10,000 to 20,000 barrels per day in excess of the shipments from the oil regions. The surplus seemed to be increasing, contrary to the expectations of the "bulls," who predicted that the current demand would soon exceed the daily supply. But the selling movement, once inaugurated, margins were swept away; and when, on Wednesday, the McCalmont Oil Company's well near Reed & Brenneman came in as a large producer (1800 barrels per day), the market went down with a rush from 92 to 88 inside of five hours. This rapid and serious decline naturally caused heavy sales of long oil that holders could not carry, and even this was aggravated by the tight money market in New York, in which Stock Exchange houses were paying from 7 to 15 per cent for money. The "bears" pressed their advantage hard, and scarcely a reaction was experienced during the week until this morning. Our telegrams this morning from Oil City and Bradford advise us of a heavy short interest there, and report further that the McCalmont well, like all those found in the Cooper tract, is rapidly declining in its production. The market is nervous, and it is not likely to become permanently strong or even steady until the new Reno well comes in, and the size of the Patterson well is determined.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
March 3...	97⅛	97⅛	95⅛	95⅛	590,400
5.....	96⅛	96¾	95½	96	748,000
6.....	95¾	95⅞	93	93	1,047,000
7.....	92⅝	93⅜	91¼	91⅞	830,000
8.....	91¾	91¾	88⅛	88⅛	1,227,000
9.....	88	90⅛	86⅛	88⅞	2,822,000
Total sales.....					7,264,400

REVIEW OF THE SAN FRANCISCO MARKET.

The Comstock shares on the San Francisco market have been strong for a week past, but they suffered a slight decline at the close. No late news of importance has been received from the mines. There has been considerable strife for possession of Hale & Norcross, and it has acted to make the stock strong and scarce. The outside stocks have been rather quiet, not much interest being manifested in any, with perhaps the exception of Navajo. Independence has levied an assessment of thirty cents a share, and this has tended to make the Tuscaroras weak. Bodie Consolidated has also levied an assessment of fifty cents per share, and Albion one of fifty cents.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Mar. 2.	Mar. 3.	Mar. 5.	Mar. 6.	Mar. 7.	Mar. 8.
Albion						
Alpha		1			1	1
Alta	11-32	5-16	5-16	5-16	11-32	5-16
Bechtel						
Belcher		½	½	½	7-16	13-32
Belle Isle	½	½	½	7-16		
Best & Belcher	4¼	4¼	4¼	4¼	4¼	4
Bodie	1½	1¾	1¾	15-16	29-32	29-32
Bullion						
California	5-32	5-32	5-32	5-32	5-32	5-32
Challar						
Con. Virginia	19-32			19-32	9-16	19-32
Crown Point	13-16	21-32				
Elko Cons	3-32	5-32	5-32	5-32		
Eureka Con						9
Exchequer				3-16	3-16	3-16
Gould & Curry	2⅞	2¾	2¾	2¾	2⅞	2¾
Grand Prize	7-16			½	13-32	½
Hale & Norcross	3⅛	3⅛	3⅛	3⅛	3⅛	2¾
Independence	19-32	½	½	13-32	7-16	13-32
Martin White	1	1	1	¾	¾	13-16
Mexican	3¼	3⅛	3⅛	3¼	2⅞	2¾
Mono		3-16	3-16	3-16	¼	3-16
Mount Diablo	3⅛					
Navajo	4⅛	3⅝	3⅝	3⅝	3⅝	3¾
Northern Belle	9¾				6⅞	10
North Belle Isle	19-32	9-16				
Ophir	3¼	3¼	3¼	3⅜	3¼	3
Overman						
Potosi	1¼	1⅛	1⅛	1¼	1¼	1
Savage						
Scorpion						
Sierra Nev	3¾	3¾	3¾	3¾	3¾	3⅝
Silver King	10¾					10¾
Tip Top						
Union Con	5⅛	5⅛	5⅛	5⅝	5⅝	4⅞
Wales Con	7-16	½	½	13-32	13-32	½
Yellow Jacket	1½	1½	1½	1½	1½	1½

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, March 8.

The market for copper stocks the past week has been sensibly affected by the passage of the new tariff bill, reducing the duty on ingot copper one cent per pound and admitting ore of low grade at reduced rates. Calumet & Hecla, the largest producing copper mine in this country, will be one of the first to feel the effects of this reduction, but, with its large surplus and ingot copper even at 15c. per pound, will no doubt continue to pay its regular dividends for many years to come. The stock has declined from $242 to $233 on forced sales of some frightened holders, with later sales at $235 closing, $233 bid. Quincy, the next mine of importance to the Calumet & Hecla as a producer and dividend-paying mine, has also declined on very free offerings of stock from

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$50@$47. Franklin also declined from $12¾@$12, and Pewabic from $7½@$7. Osceola has been quite active for this stock, with sales at $30, a decline of $1 per share. A small lot of Atlantic sold at $14, same as before. Huron declined from $1¾@$1½, and Allouez sold at $2½.

In the silver stocks, Catalpa advanced from 62½@80c., when it betrayed weakness on reports that the mine was to be leased to tributers, and that the showing was not as good as formerly. The result was a decline to 57½c., closing, however, with sales at 60c. Crescent has been dull at 25@30c. Harshaw sold at 75c.; San Pedro at 65c.; and Silver Islet at $5. With the exception of Catalpa, the market has been dull and stupid.

At the Boston Mining and Stock Exchange, the feature of the week is the break in Empire, which closed strong last week at 29@30c. The report that the mine had closed down for the present induced a free selling of stock, forcing prices down to 17c., at which price buyers became plenty, and the stock closed quite firm. Massachusetts & New Mexico continues steady at 13@14c., assessment of 5c. paid. Brunswick Ship's Berth declined from $1@70c., but later sales were made at 80@85c. Simpson Gold was more inquired for, and a lot of 10,000 shares were sold at 6c., buyer 60 days.

3 P.M.—The market was without any special feature this afternoon. Quincy sold at $47. Calumet & Hecla, $233 bid, $235 asked. Franklin, $11½@$12½. Pewabic, $6¾@$7. Huron, $1¾ asked. Osceola, $30 bid. Allouez, $2½ asked. Catalpa, 55 60c. Crescent, 25@30c. Harshaw, 75c.@$1. National, $1 bid. Sullivan, $1 asked. San Pedro, 60@65c.

BULLION MARKET.

NEW YORK, Friday Evening, March 9.

In consequence of a receding sterling Exchange market, the rise of silver in London has been neutralized, and our figures for silver here remain unchanged.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
March 3...	51 1-16	110¾	March 7.	51⅛	110⅞
5...	51⅛	111	8...	*	110¾
6...	51⅛	110⅞	9...	*	110¾

* 51⅛@51 3-16.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended March 9th, as compiled from various sources, amounted to $258,298.41, as against $363,463.06 reported for the previous week. The receipts from January 1st, 1883, to date are $2,901,799.32.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended March 3d	$6,890
Corresponding week last year	2,501,600
Since January 1st, 1883	2,036,782
Corresponding period last year	11,294,340

Imports.

Week ended March 3d	$232,792
Corresponding week last year	59,622
Since January 1st, 1883	1,127,168
Corresponding period last year	645,255

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 1 per cent. During the week, the bank lost £190,000 bullion on balance, and the proportion of its reserve to its liabilities was reduced from 48 to 42½ per cent, against 40 3-16 per cent at this date a year ago. March 8th, the bank lost an additional £340,000 bullion on balance, reported to have been withdrawn for shipment to the United States. The weekly statement of the Bank of France shows a gain of 3,400,000 francs gold, and a loss of 825,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an unce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13½ per cent, to arrive at actual value.

MINES.	States.	For the week.	Month of February.	Year from Jan. 1st, 1883.
Alice, G. S.	Mont	.....	$73,864	$163,905
*Alta-Montana, G. L. S.	"	.....	.....	†10,625
Bodie, G. S.	Cal	.....	18,714	44,798
Bodie Tunnel, G.	"	.....	7,315	18,946
Bonanza King, G.	"	.....	28,300	90,077
*Central Arizona, S.	Ariz.	.....	.....	15,627
*Christy, S.	Utah	.....	.....	23,260
*Chrysolite, S. L.	Colo.	.....	.....	26,312
Contention, S.	Ariz.	.....	.....	88,694
Crescent, G.	Cal.	.....	.....	13,000
*Custer, G. S.	Idaho	.....	.....	43,572
*Deadwood-Terra, G.	Dak.	.....	.....	45,696
*Derbec Bl. Grav., G. S.	Cal	.....	.....	8,337
*Father de Smet, G.	Dak.	.....	9,870	51,947
*FriscoM. &S. Co. G. S. L.	Utah	.....	.....	22,671
*Homestake, G.	Dak.	.....	.....	107,678
Horn-Silver, S. L.	Utah	.....	276,000	479,000
Independence, S.	Nev.	.....	.....	10,000
Lexington, S.	Mont.	.....	.....	89,050
*Little Pittsburg, S. L.	Colo.	.....	.....	5,107
*Marguerite, G.	Cal	.....	15,600	25,900
Martin White, S	Nev.	.....	36,842	56,249
Moulton, G. S.	Mont.	.....	.....	41,005
Navajo, G. S.	Nev.	.....	64,450	144,450
Northern Belle, S.	"	.....	139,371	204,545
*Ontario, S. L.	Utah	.....	.....	‡182,221
*Oxford, G.	N. S.	.....	.....	2,865
*Satemo, G.	"	.....	.....	1,800
Standard, G.	Cal	.....	87,843	170,802
Star, S.	Nev.	.....	1,169	15,965
Stormont, S.	Utah	.....	15,440	34,570
Syndicate, G.	Cal	.....	.....	9,217
Tintic M. & M. Co.	Utah	.....	.....	7,632
*Tip Top, S.	Ariz.	.....	.....	7,976
*Tombstone, G. S.	"	.....	.....	72,011
Yellow Jacket, S.	Nev.	.....	14,704	28,956
Total amount of shipments to date				$2,364,466

* Official. ‡ Assay value. † Not including value of lead.
G. Gold. S. Silver. L. Lead.

METALS.

NEW YORK, Friday Evening, March 9.

According to statistics compiled by Mr. Edward J. Shriver, Secretary of the New York Iron and Metal Exchange, the following was the import movement of metals to this port in the first two months of the year:

Articles.	Imports. Net tons.	Stock in bond. Net tons.
Tin	1,618	.....
Spelter	559	327
Copper (old chiefly)	37	6
Antimony, casks	583	125

The exports for the two months include 353,112 pounds of copper, to which 186,115 pounds have been added during the first week in March.

Copper.—The market has been dull and quiet, with values declining further. Lake is selling in small lots at 17¾c., and bids generally do not go higher than 17½c. There is a little inquiry for export. Small sales, aggregating about 100,000 pounds, have been made of Baltimore and other brands at 15¾@15½c. At the close, 15¼@15⅝c. is bid, but has been declined.

English cables are a little better, being £65 15s.@£66 5s. for Chili Bars, and £71@£71 5s. for Best Selected.

Tin.—With a moderate business doing and better advices from England, London cabling £94 15s. for Straits, the feeling here is better, Straits being held firmly at 21c. cash for round lots. Large foreign buyers have been in the market, offering to take round lots at 20¾c., without, however, procuring any tin.

Lead.—The week has been one of much interest in the lead trade, and for two or three days there was considerable excitement, which has now, however, entirely abated. On Tuesday, the holders of Pueblo and Newark lead in this market cleverly set the ball rolling, and within two days disposed of fully 2400 tons of those brands, one large pipe and shot mill alone taking nearly 1500, while the rest was taken by other manufacturers, dealers, and one corroder, who refines common lead. In addition to the quantity given above, about 600 tons of various brands of Missouri lead found takers. The first sales were at 4·60c., the bulk, however, being at 4·65c. Since then, 200 tons of a Western desilverized corroding brand sold at 4·67½c. This movement effectually reduces the spot stock of one of the largest holders; but, on the other hand, has pretty well supplied the large trade, so that a period of dullness may be looked forward to. It is not likely that, for the present, holders will be inclined to accept lower figures. We quote nominally 4·65c. for Common and 4·70c. for Refined, but would add that round lots offered of the latter were not taken at that figure.

It is officially announced that the recent statement that the Eureka companies had made a contract to ship 10,000 tons of lead East was based on a misunderstanding. It was stated that the contract (meaning the old one) had now been completed. No arrangements have as yet been made as to a new contract

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is unchanged. There have been sales of 300 tons of Refined during the week at 4·25c. Charcoal is quoted at the same figure.

London cables £13 10s.@£13 15s.

Spelter.—This metal continues dull, with quotations unchanged at 4⅝@4¾c. for Common Domestic. England cables £15 15s. @£15 17s. 6d.

Sheet-Zinc.—Manufacturers have advanced the price ¼c., making it now 6⅝c., spot.

Antimony.—The feeling is fairly good, with quotations nominally unchanged at 10@10½c. for Hallett's, and 11@11½c. for Cookson's.

Quicksilver.—The market closes at 36@36½c. There is no price for flasks. Transactions of late have been large, including the sale of 2000 flasks that have been in stock for two years.—*San Francisco Journal of Commerce.*

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 9.

According to statistics compiled by Mr. Edward J. Shriver, Secretary of the New York Iron and Metal Exchange, the following is the import movement into this port for the months of January and February:

Articles.	Imports. Tons.	Warehoused. Tons.	Withdrawn. Tons.	Stock in bond March 1.
Pig-iron	16,416	2,250	540	4,532
Spiegel iron	2,116	.....	460	2,545
Old rails	2,476	1,778	1,799	4,501
Scrap iron	4,367	1,435	150	1,979
Steel rails	673	.....	.....	2,603
Scrap steel	1,190	.....	.....	456
Iron rails	.....	.....	84	5,558
Iron ore	10,237	.....	.....	.....
Steel wire rods	20,539	1,895	1,317	5,131
Iron wire rods	2,092	490	.....	1,197
Swedish iron	1,600	511	437	1,640

American Pig.—The Thomas Iron Company has opened its books for orders for the season's delivery, and has closed contracts aggregating 6000 tons at $24 for No. 1 and $22 for No. 2 Foundry. The other companies are following suit, and those making red-short irons are booking orders for a little less than above figures. Thus far, buyers are not displaying much vim, although some of them are insisting upon prompt delivery. The Thomas Company is not selling Gray Forge, having booked in all orders for 30,000 tons, the full capacity for this grade. We quote: $23.50@$25 for standard to choice brands of No. 1 Foundry; $21.50@$22.50 for No. 2; and $19.50@$20.50 for Gray Forge, all at tide-water. In Bessemer pig, the only thing of interest is the rumor of a sale at low figures of a lot of American. We quote nominally $22@$22.50. Spiegeleisen is dull at $27, nominally, for 10 to 12 per cent, and $32 for 20 per cent, at which 1500 tons are reported sold from Baltimore and Philadelphia. The aggregate make of spiegeleisen in Germany in 1882 is estimated by the German Iron-Masters' Association at 157,714 metric tons.

Scotch Pig.—Business has been dull, but the market has been fairly steady. Arrivals aggregate about 1200 tons, all of which have gone into consumption. Freights are unchanged at 6s.6d. from Glasgow to this port. We quote: Coltness, $24.50@$25; Summerlee, $24@$24.50; Glengarnock, $22@$22.25; and Eglinton, $21.25@$21.50. The Wall Street Exchange has received the following cable quotations from Glasgow to-day, showing little change: Carnbroe, 55s. 3d.; Gartsherrie and Summerlee, 62s. 3d.; Coltness, 64s. 9d.; Langloan, 65s.; Glengarnock, 55s. 3d.; and Eglinton, 49s. 9d. Warrants were 47s. 8d.

Rails.—Increased inquiry has led to a number of transactions aggregating 10,000 tons in small lots at about $39 at mill, almost exclusively for delivery beyond July. Most of the Eastern mills are engaged up to that time. England is unchanged at £5@£5 5s.

Old Rails.—We hear of no transactions worthy of special mention. We quote $23.50@$24.50 for Ts, and $27@$27.50 for D. Hs., of which there are few here.

Scrap.—Business is quiet, holders having firmer views. We quote nominally $25@$25.75.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	March 3.		March 5.		March 6.		March 7.		March 8.		March 9		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	3.00	.....	3.10	3.00	3.15	3.10	.....	.....	3.15	3.10	3.05	3.00	2,400
Amie Con., Co.	.22	.....	.23	.22	.28	.24	.27	.25	.26	.24	.25	.....	59,000
Argenta, Ne.	.....	.....	.....	.....	.....	.....	.55	.....	.....	.....	.....	.....	200
Barr. & Walker, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	10.00	.....	10.00	.....	.....	.....	.....	.....	.....	.....	250
Belle Isle, Ne.	.....	.....	.60	.....	.....	.....	.45	.....	.....	.....	.....	.....	400
Bodie Cons., Ca.	.....	.....	1.85	.....	1.60	1.30	1.00	.95	1.00	.....	1.00	.....	1,825
Breece, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer, Ca.	.....	.....	.95	.....	.95	.....	.94	.90	.....	.....	.95	.93	850
California, Ne.	.14	.10	.15	.....	.....	.....	.10	.....	.....	.....	.10	.....	3,550
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribou Con., Co.	.....	.....	.18	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Chrysolite, Co.	.....	.....	1.45	.....	1.35	...	1.40	1.35	1.40	.....	1.40	.....	1,400
Climax, Co.	.09	...	.09	.....	.....	.....	.10	.....	.10	.....	.....	.....	2,300
Cons. Va., Ne.	.57	.....	.57	.....	.60	.58	.59	.54	.52	.....	.53	.51	1,695
Deadwood-Terra, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka Cons., Ne.	.....	.....	.....	.....	10.50	.....	.....	.....	10.00	.....	.....	.....	200
Excelsior, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dk.	.....	.....	.....	.....	.....	.....	5.00	4.75	5.00	.....	5.00	.....	700
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.08	.07	.....	.....	.07	.....	4,500
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.50	.....	.....	.....	.40	.....	.50	.....	.....	.....	.....	.....	385
Great Eastern, Dk.	.....	.....	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Green Mountain, Ca.	.65	.64	.65	.....	.67	.66	.69	.68	.69	.68	.68	.....	4,000
Hale & Norcross, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....	.....	100
Hall-Anderson, N. S	.....	.....	.....	.....	.....	.....	1.50	.....	.....	.....	.....	.....	700
Hibernia, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	16.00	15.50	15.25	.....	15.63	15.00	15.25	.....	16.00	15.50	15.50	.....	1,390
Horn-Silver, Ut.	8.63	8.50	.....	.....	8.25	8.13	8.00	.....	8.00	7.75	7.75	.....	2,250
Hukill, Co.	.16	.....	.....	.....	.....	.....	.....	.....	.15	.....	.16	1.15	3,300
Independence, Ne.	.....	.....	.52	.....	.50	.....	.46	.45	.50	.....	.45	.....	3,220
Iron Silver, Co.	3.00	.....	3.00	.....	3.00	.....	3.00	2.95	2.90	.....	.....	.....	1,602
La Plata, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co.	.70	.65	.66	.....	.....	.....	.....	.....	.....	.....	.70	.....	4,700
Little Chief, Co.	.....	.....	.....	.....	.....	.....	.41	.40	.....	.....	.41	.40	1,400
Little Pittsburg, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moose, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	3.95	.....	4.00	3.75	3.50	.....	3.75	.....	3.75	3.70	3.80	3.75	1,495
Northern Belle, Ne.	9.88	.....	10.00	9.75	10.00	.....	10.50	.....	.....	.....	10.50	10.25	555
North Belle Isle, Ne.	.54	.....	.63	.....	.50	.....	.....	.....	.....	.....	.....	.....	300
Ontario, Ut.	22.88	.....	.....	.....	.....	.....	22.50	.....	23.00	22.50	22.75	.....	360
Ophir, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plumas, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca.	44.00	.....	46.00	45.50	46.50	.....	46.00	45.75	.....	.....	.....	.....	700
" Com., Ca.	9.50	8.75	9.50	.....	.....	.....	.....	.....	.....	.....	10.00	.....	550
Rising Sun, Ca.	.05	.....	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,100
Robinson Cons., Co.	1.00	.96	.98	.93	.95	.91	.93	.85	.93	.88	.89	.84	71,400
Savage, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sierra Grande, N. M.	2.80	.....	2.90	.....	3.05	3.00	3.00	2.90	2.90	2.85	2.95	2.90	6,000
Sierra Nevada, Ne.	3.50	.....	.....	.....	4.00	.....	4.00	.....	.....	.....	.....	.....	370
Silver King, Ar.	11.00	10.75	11.00	.....	11.50	11.25	11.38	.....	.....	.....	11.00	.....	1,210
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	6.25	6.00	6.50	6.25	.....	.....	6.25	.....	6.25	.....	6.50	.....	916
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.63	1.38	500
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	March 3.		March 5.		March 6.		March 7.		March 8.		March 9.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Albion, s. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alta-Montana, g.	.....	.....	.13	.11	.12	.....	.13	.12	.11	.....	.11	.....	2,700
Am. Flag, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barcelona, g.	.19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.19	.18	4,300
Bear Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'lcher, g. s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.00	.....	.....	200
Big Pittsburg, s. L	.....	.....	.20	.18	.....	.....	.20	.....	.18	.....	.....	.....	1,600
Bradshaw, s.	.....	.....	.33	.32	.....	.....	.33	.31	.....	.....	.33	.31	1,700
Buckeye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, s. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bye and Bye.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calaveras, g	.....	.....	.....	.....	.....	.....	.08	.....	.....	.....	.03	.....	1,000
C'lav'r's W. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill, s. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.85	.....	100
Catakill	.....	.....	.....	.....	.....	.....	.....	.....	1.25	1.20	1.30	.....	1,700
Central Ariz'na, s.	.....	.....	.36	.....	.....	.....	.....	.....	.....	.....	1.25	.....	.....
Chapparal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.35	.....	.....	500
Cherokee, g.	.....	.....	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imp'ri'l, g. s.	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Con. Pacific, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Crowell, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dahlonega, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.07	.....	.08	.07	.08	.07	.08	.07	.08	.07	.07	.....	23,500
Durango, g.	.07	.....	.07	.....	.....	.....	.....	.....	.08	.....	.09	.08	1,700
Eastern Oregon	.....	.....	.90	.75	.90	.....	.95	.90	1.00	.90	.95	.90	5,700
Elkh Cons.	.10	.....	.10	.09	.08	.....	.09	.08	.08	.....	.07	.....	6,100
Enterprise	.....	.....	.51	.49	.51	.44	.45	.....	.....	.....	.52	.45	5,200
Fannie Barret	.....	.....	2.20	.....	2.20	.....	.....	.....	.....	.....	2.20	.....	700
Gold Placer, g	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granville, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	1.20	.....	1.20	.....	1.25	.....	.....	.....	1.25	.....	1.20	.....	4,700
Hortense, s.	.....	.....	.....	.....	.....	.....	.....	.14	.13	.....	.....	.....	1,800
Lacrosse, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	.....	500
Mariposa Pref., g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, g. s.	.....	.....	3.00	.....	3.35	3.00	3.00	.....	.....	.....	.....	.....	310
Mono.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	.22	1,300
North Standard, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, s. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, s.	.16	.14	.16	.15	.15	.....	.15	.....	.15	.....	.15	.14	3,400
Quartz Creek.	.....	.....	.....	.....	03	.....	.02	.....	.....	.....	.....	.....	1,600
Rappahannock, g.	.09	.08	.....	.....	.10	.....	.09	.....	.....	.....	.....	.....	1,000
Red Elephant, s.	.07	.....	.....	.....	.....	.....	.06	.....	.....	.....	.....	.....	1,000
Ruby, of Arizona.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,100
Silver Cliff, s.	.40	.38	.40	.....	.40	.....	.42	.....	.....	.....	.40	.....	1,700
Sonora Con.	.43	.38	.51	.40	.48	.41	.48	.45	.49	.45	.50	.48	75,500
South Bodie, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, g.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific.	.05	.....	.06	.05	.05	.....	.05	.....	.06	.05	.05	.....	13,800
State Line	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 1 & 4, s.	.04	.....	.04	.....	.....	.....	.03	.....	.04	.03	.04	.....	4,500
" Nos. 2 & 3, s.	.06	.....	.07	.06	.....	.....	.07	.06	.07	.06	.06	.....	11
Sutro Tunnel.	.22	.....	.22	.21	.22	.21	.22	.....	.....	.....	.22	.21	10,300
Taylor-Plumas	.17	.16	.17	.....	.17	.....	.19	.17	.18	.17	.18	.....	24,500
Tuscarora, s	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, s.	.....	.....	.05	.04	.05	.04	.05	.....	.....	.....	.....	.....	9,800
Union Cons., g. s.	4.75	.....	.....	.....	6.00	5.50	5.25	.....	.....	.....	.....	.....	360
Vandewater.	.....	.....	.....	.....	.....	.....	.....	.....	.21	.....	.....	.....	400
Washington.	.09	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 192,073. Non-dividend shares sold, 224,370.

BOSTON MINING STOCKS.

	March 2.		March 3.		March 5.		March 6.		March 7.		March 8.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.	.....	.....	.....	.....	.....	.....	2.50	.....	.....	.....	2.50	.....	175
Atlantic	.....	.....	14.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Aztec.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & Bel.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza D.	.....	.....	2.75	.....	2.75	.....	2.75	.....	.....	.....	.....	.....	350
Bruns. Ant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hec.	.....	.....	241	.....	241½	.....	241	239½	238	.....	235	233	72
Carbon. Hill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Catalpa.	.75	.70	.80	.....	.77½	.75	.70	.60	.60	.57½	.60	.....	6,700
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherryfield.	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	.....	.....	500
Chrysolite.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. V'ginia	.....	.....	.....	.....	.56	.....	.....	.....	.....	.....	.....	.....	300
Copp'r Falls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent.	.30	.....	.....	.....	.30	.24	.25	.....	.....	.....	.....	.....	700
Cumberl'd.	.....	.....	.....	.....	.20	.....	.60	.....	.....	.....	.....	.....	1,200
Deer Isle.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas.	.80	.....	.80	.....	.80	.....	.....	.....	.....	.....	.....	.....	900
Duncan.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Empire	.30	.29	.30	.....	.27	.....	.22	.21	.....	.....	.....	.....	8,400
Eureka Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin.	12.50	.....	12.50	.....	12.50	12.25	12.25	.....	.....	.....	12.00	.....	495
Gila County	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hancock G.	.....	.....	.....	.....	9.12½	.....	.....	.....	.....	.....	.....	.....	100
Harshaw.	.75	.....	.....	.....	.75	.....	.....	.....	.....	.....	.....	.....	170
Horn-Silver.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron.	.....	.....	1.50	.....	.....	.....	.....	.....	1.50	.....	.....	.....	500
Indian Q'n.	.....	.....	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Madison.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mass. & N.M.	.08	.....	.08	.....	.13	.....	.14	.13	.....	.....	.....	.....	50,727
Milton.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North. Belle	10.00	.....	.....	.....	9.87½	.....	10.00	.....	.....	.....	.....	.....	120
Osceola.	31.00	.....	31.00	.....	.....	.....	30.00	.....	30.00	.....	30.00	.....	495
Penn-Breck.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewabic.	7.60	.....	.....	.....	.....	.....	7.50	.....	7.50	7.00	.....	.....	386
Pine Tree.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth.	.....	.....	.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Quincy.	50.00	.....	50.00	.....	50.00	49.50	49.50	49.25	48.25	48.00	47.00	.....	652
Ridge.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Pedro.	.65	.....	.....	.....	.....	.....	.....	.....	.65	.....	.....	.....	400
Sra Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S'ra Grande	.....	.....	.....	.....	2.80	.....	.....	.....	.....	.....	.....	.....	100
Silver Islet.	5.00	.....	5.00	.....	.....	.....	.....	.....	5.00	.....	.....	.....	150
Silver King.	.....	.....	.....	.....	.....	.....	11.00	.....	.....	.....	.....	.....	25
Simpson Gd	.....	.....	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	1,900
So. Pacific.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nos. 2 & 3.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tun.	.22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Sycamore.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead.	.....	.....	.06	.....	.06	.05	.06	.....	.....	.....	.....	.....	2,500
Vizina.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	March 2.		March 3.		March 5.		March 6.		March 7.		March 8.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Argent.	.25	.....	.25	.....	.27½	.....	.....	.....	.....	.....	.27½	.....	13,200
Arizona So.	.....	.....	.23	.....	.22	.....	.....	.....	.....	.....	.....	.....	200
Aztec.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Battle Mt.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Black Sul.	.....	.....	.02	.....	.02	.....	.....	.02	.....	.....	.....	.03	3,000
Bodie.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,700
Buena.	.05	.....	.04	.....	.05	.....	.05	.....	.....	.....	.....	.....	.....
California.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19,000
Calista.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati.	.....	.....	.11	.10	.11	.....	.....	.....	.....	.....	.....	.....	.....
Comprom'e.	.30	.....	.30	.....	.32½	.30	.35	.....	.....	.....	.35	.32½	4,500
Contention.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.00	.....	26,600
Dauntless	.....	.....	.....	.....	01	.....	.....	.....	.....	.....	.....	.....	600
Del Monte.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Denver City	.17	.....	.15	.....	.15	.....	.16	.....	.16	.....	.15	.....	6,900
Fairview.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka.	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.....	.....	.....
Girard.	.20	.....	.18	.....	.....	.....	.17	.....	.16	.12	.14	.....	6,000
Golconda.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33,800
Golden Age.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Governor.	.09	.....	.10	.09	.10	.09	.10	.....	.09	.....	.09	.....	20,400
Grand Uni'n	.21	.20	.....	.....	.20	.....	.19	.17	.18	.....	.18	.....	15,000
Gunnison.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hancock.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch.	.11	.10	.10	.....	.11	.10	.10	.....	.09	.....	.09	.....	42,000
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Maud	.....	.....	.06	.....	.06	.....	.06	.....	.07	.06	.07	.....	25,600
L'g & D'y Hl	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McCullough	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Magnolia.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	5,000
Mt. Lincoln.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Sheridan	.04	.....	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National.	.....	.....	.....	.....	.....	.....	.....	.....	.05	.04	.....	.....	4,700
Orion.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion Pref.	.11	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palmetto E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	800
Pembina.	.22	.....	.21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn-Breck.	.11	.....	.12	.10	.11	.....	.11	.....	.15	.10	.12	.....	5,300
Permanent.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28,800
Pizarro.	.....	.....	.....	.....	.....	.....	.....	.....

Philadelphia. March 9.

The situation of the Eastern Pennsylvania iron trade has materially improved since my last report, and though not much more business has been closed, a great deal is in hand and likely to be placed any hour. Manufacturers throughout the city feel that they have been freed from a nightmare, and speak with a great deal more confidence of the present situation of trade and its future than they have done for three months. They congratulate themselves on their escape from the battle-field with so much credit.

Pig-Iron.—To-day's quotations for standard brands of Foundry Iron are $25 for No. 1 and $23 for No. 2. A fair inquiry is coming to hand, and orders for several thousand tons will be placed before Saturday night. The trade will meet all requirements at current rates. Those who defer covering requirements for standard brands will perhaps pay a little more in two or three weeks. Foundry Iron is also in good request, and a few pretty large transactions were closed at about $20.50@$21, though some lots as low at $20, tide-water quotation. There will be no effort made to advance prices.

Manufactured Iron.—Merchant Bar has improved in demand, and prices are unchanged. Buyers have not yet placed very many large orders, but from the tone of correspondence to hand yesterday and to-day, manufacturers and brokers feel confident that the business of the next two weeks will be such as to impart an upward tendency. Mills are all short of orders and are hungry for trade. Muck Bars are selling at $37 at mill, and a half-dozen buyers have been heard of to-day. Charcoal Blooms are quoted at $63 @$65, and Anthracite at $54@$56.

Sheet-Iron shares in the general improvement, and leading manufacturers report an increase in orders, though most of them are small lots, and 4@4½c. is still quoted. Concessions will be extended on large orders until the capacity is pretty well occupied for from 60 to 90 days. Several small lots of Plate and Tank were closed at inside figures. The demand is improving, and quotations are 2½c. for Tank; 3·40 @3·50c. for Shell; 4·30@4·50c. for Flange; and 5¼ @5½c. for Fire-Box.

Steel Rails are quoted at $39@$40, and rail companies have several inquiries in hand which will result in business at about this price. Small orders are booking, and large orders are under consideration.

Old Rails are quoted at $25.50@$26; Double Heads, $27@$28. Demand light. Scrap sold ex yard at $25@$25.50 for medium. Two or three selected lots sold at $27.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 9.

Anthracite.

The anthracite coal trade is quiet but still shows signs of an undercurrent of more strength. The supply is no longer excessive, nor is there any evidence of scarcity. The trade is getting into good shape, and the action of the majority of the companies in refusing to start full work next week is likely to keep it so for the time being. Two or three companies, it is understood, were, for a number of days, pressing for full time, and there were a number of conferences on the subject, which resulted finally in a decision to continue restriction, possibly till the end of the month. How matters will shape after resumption, remains to be seen. Consumers are still slow in buying, and show little anxiety to replenish stocks, except possibly in steam sizes.

Bituminous.

The market is very dull and the outlook is not particularly encouraging. Consumers are evidently looking forward to a break, and the offers and protestations of large shippers, both in the Clearfield and Cumberland regions, certainly are not calculated to dispel such a notion. There is a feeling of mutual distrust and an anxiety not to be outdone by rivals which will work to the advantage of buyers. The latter, however, appear to be as much at sea as the shippers, who are as yet uncertain as to what course the railroad companies will pursue.

So far as current business is concerned, there is little to report, Cumberland coal, alongside, offering as low as $4.50@$4.70, and Clearfield nominally the same, with Broad Top $4.60@$4.65.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended March 3d, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co..	64,398	519,523	83,824	502,297
D. L. & W. RR. Co.	71,372	658,964	90,139	619,599
Penna. Coal Co.....	14,337	174,076	22,962	145,563
L. V. RR. Co.....	4,410	153,212	31,292	171,499
P. & N. Y. RR. Co..	2,434	28,624	.....	24,120
C. RR. of N. J.....	64,962	330,818	24,610	322,515
North & West Br. RR.....	9,608	83,074	.....	.....
	231,521	1,948,291	252,827	1,785,593
Lehigh Region.				
L. V. RR. Co.....	70,629	664,606	118,574	633,251
C. RR. of N. J.....	61,454	300,174	23,760	273,179
S. H. & W. B. RR..	170	2,362	.....	2,223
	132,253	967,142	142,334	908,653
Schuylkill Region.				
P. & R. RR. Co.....	110,980	935,415	129,834	854,894
Shamokin & Lykens Val.....	26,231	194,001	16,101	183,246
	137,211	1,129,416	145,935	1,038,140
Sullivan Region.				
N. Line & Sul. RR. Co.	757	9,714	....	7,449
Total	501,742	4,054,563	541,096	3,739,839
Increase.....	....	314,728	.....	.....
Decrease	....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878.....2,308,960 tons.
" " " " 1879.....3,395,082 "
" " " " 1880.....3,273,493 "
" " " " 1881.....4,040,900 "

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 97,293 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended February 24th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	....	125	... .
Coal for shipment at South Amboy.....	14,204	112,234	96,684
Coal for distribution.....	13,507	118,062	93,515
Coal for company's use	2,513	21,721	21,012
Total	30,124	252,142	211,211
Increase...	.....	40,931	.....
Decrease.....	.....	.....	.....

The Production of Bituminous Coal for the week ended March 3d was as follows:

Tons of 2000 lbs., unless otherwise designated.	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs..... .. .	35,104	294,401
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,305	61,026
Broad Top Region, Pa.		
Huntingdon & Broad Top RR....	...	39,089
East Broad Top.....	704	9,757
Clearfield Region, Pa.		
Snow Shoe.	4,662	49,065
Tyrone and Clearfield..... . . .	52,598	460,640
Alleghany Region, Pa.		
Pennsylvania RR..	8,245	109,363
Pittsburg Region, Pa.		
West Penn RR.....	10,626	88,273
Southwest Penn. RR.....	2,535	24,006
Penn & Westmoreland gas-coal, Pa. RR	26,571	241,850
Pennsylvania RR.....	11,545	90,120
Total.... 158,895		1,467,590

The Transportation of Coke over the Pennsylvania Railroad for the week ended March 3d and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region).....	2,667	20,090
West Penn. RR	1,088	18,545
Southwest Penn. RR	32,637	328,157
Penn. & Westmoreland Region, Pa. RR	3,270	43,342
Pittsburg, Penn. RR.....	21	212
Snow Shoe (Clearfield Region)..... .	469	2,384
Total...	41,061	412,770

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to March 5th, 1883.

PORTS.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria.....	....	.85	... .
Annapolis.... ...	....	....	....
Albany.....	....	....	....
Baltimore	....	....	....
Bangor.....	....	....	....
Bath, Me.....	....	1.80	.....
Beverly..... ...	....	....	....
Boston, Mass.....	... .	1.80	1.00@1.25
Bristol..... ...	....	....	....
Bridgeport, Conn.	....	1.50	.....
Brooklyn	....	....	....
Cambridge, Mass.	....	....	....
Cambridgeport..	....	....	....
Charleston, S. C..	....	....	....
Charlestown.... ..	....	....	....
Chelsea.....	....	....	....
City Point..... ..	....	....	....
Com. Pt., Mass..	....	....	....
E. Boston..	....	....	....
East Cambridge.	....	....	....
E. Gr'nwich, R. I.	....	....	....
Fall River.....	....	1.45	....
Galveston.....	....	....	....
Georgetown, D.C.	....	....	....
Gloucester.....	....	....	....
Hartford..... ...	....	2.00	....
Hackensack.....	....	....	....
Hudson..... ...	....	....	....
Lynn	....	....	....
Marblehead.....	....	....	....
Medford..... ...	....	....	....
Millville, N. J....	....	....	....
Milton.....	....	....	....
Newark, N. J.....	....	1.60	....
New Bedford	....	2.00	....
Newburyport	....	1.50	....
New Haven.....	....	1.65	....
New London.....	....	....	....
Newbern..... ...	....	....	....
Newport.....	....	....	....
New York.....	....	1.35	....
Norfolk, Va	....	.80	....
Norwich.....	....	1.75	....
Norwalk, Conn ..	....	1.60	... ...
Pawtucket.....	....	1.75	....
Philadelphia.....	....	.70	....
Portland..... ...	....	1.80	....
Portsmouth, Va..	....	....	....
Portsmouth, N.H.	....	....	....
Providence.....	....	1.50	.70@.80
Quincy Point....	....	....	....
Richmond, Va..	....	....	....
Rockland, Me....	....	....	....
Rockport	....	....	....
Roxbury, Mass..	....	....	....
Saco.....	....	....	....
Sag Harbor.....	....	1.85	....
Salem, Mass.....	....	....	....
Saugus	....	....	....
Savannah.....	....	....	....
Somerset.....	....	....	....
Staten Island....	....	....	....
Trenton.....	....	1.10	....
Troy...	....	....	....
Wareham.....	....	1.80	....
Washington.....	....	.85	....
Weymouth.....	....	....	....
Williamsbg, N.Y.	....	....	....
Wilmington, Del.	....	.70	....
Wilmington, N.C.	....	....	....

* And discharging. † And discharging and towing. ‡3c. per bridge extra. § Alongside. ‖ And towing up and down. And towing. ** Below bridge. †† Towing and pilotage, $75. H Hoboken.

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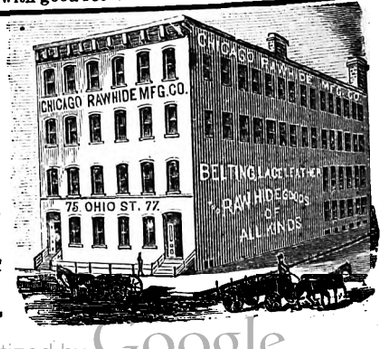
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THE ENGINEERING AND MINING JOURNAL

VOL. XXXV. No. 11.

RICHARD P. ROTHWELL, C.E., M.E.,
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CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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AS will be noted from the second list of subscriptions to the Holley Memorial Fund, which we print elsewhere, the total amount has not yet been quite raised. Other subscriptions are promised, and there is no doubt that the sum estimated to be necessary will be collected, it is believed chiefly by a large number of small contributions.

ON the second of this month, Mr. CLARENCE KEMPER CRESSY, for a number of years connected with the Scientific Publishing Company, died of pneumonia, after a brief illness. He was the son of the late Brevet Commodore W. A. CRESSY, U. S. N. He studied law for two years, and displayed marked ability in the position of trust which he occupied.

M. PAUL TRASENTER'S statistical review of the status of the steel trade of the world, which we print elsewhere, shows rare insight into the questions which have been agitating the steel-makers of the continent and of Great Britain for the past few years, and which now are beginning seriously to agitate those engaged in the industry in this country. European makers who have not had a railroad system developing with enormous rapidity to fall back upon had to face an over-supply years ago, and obtained only temporary relief through the outlet which, for a few years, high prices in this country opened to them. So far as the prospective demand for new construction and renewals of railroads is concerned, the producers in this country are exceptionally well situated. But, on the other hand, the absence of any great ship-building industry, and, under the new tariff, a threatened sharp competition in the supply of wire rods, restrict an outlet to which, under other circumstances, they might turn for relief. The market for boiler-plates is not a promising one until consumers can be taught that the product of a Bessemer converter can be made as high in grade as that of an open-hearth furnace.

M. TRASENTER is not one who delights in "sounding the death-knell" of the puddling-furnace, which, as he well points out, is destined, for many years to come, to fill the demand for the commoner grades.

It has been a source of regret to us that the absence of data has, in so many instances, made it impossible to place the figures relating to the United States in the list. Thus, we have no means of accurately stating the various grades of pig-iron, nor can we, with any degree of accuracy, follow the raw material, iron or steel, into the many channels into which it goes as a finished product, so far as the rolling-mills are concerned; and these defects become more striking still in the statistics of Great Britain. Until now, in our country, there has been comparatively little occasion for such greater detail in the statistics of the manufacture of steel. But now, when the time is approaching that such data are of incalculable value, is it too much to ask the steel-makers of the country to place such figures at the disposal of Mr. JAMES M. SWANK, who, we are sure, will gather and arrange them with his usual skill and accuracy? In England, the good work was only begun a few years ago by Mr. J. S. JEANS, who has shown much enterprise, and will probably in time succeed in this direction also.

LINE UPON LINE.

It appears that we were too sanguine in expecting the Editor of the *Iron Age* to disavow the wrong presumably done by a subordinate and inexperienced journalist in permitting his columns to be used for an anonymous accusation of deliberate falsehood against Messrs. EDWARD COOPER and ABRAM S. HEWITT; and this, too, for a second time, after those gentlemen, in a dignified protest, had offered the *Iron Age* every opportunity to satisfy itself as to the facts. It now appears that the Editor was his own subordinate. We might even infer that he had been, after the fashion of the late Mr. TOOTS, his own correspondent, but for his declaration that this person was "a disgusted reader"—a characterization which opens a wide field for conjecture, with but one limit: it excludes, we presume, the Editor himself.

We shall not engage in any impertinent allusions to the private friendships of the Editor of the *Iron Age*, or charge him with trying to make himself famous by either attacking or defending "a great man." In his private life associations, accomplishments, and character, we are not aware of any particular in which he could be improved; and if we were, we should not choose the columns of this journal for an allusion to the subject. But in the matter of journalistic etiquette and honor, the Editor of the *Iron Age* has much to learn; and we will give him, line upon line, a little elementary instruction.

The first principle, the knowledge of which would be an inestimable advantage to him, is, that it is one thing to accuse men of mistake, and another to accuse them of falsehood. And when the falsehood is alleged to be uttered with the deliberate purpose of misleading the public and concealing the fact that the utterers are seeking, under the hypocritical pretense of the public good, to advance their private interests, the difference is as great as it well could be.

The issue made by the disgusted reader of the *Iron Age* (and now adopted by the disgusted Editor) with Messrs. COOPER & HEWITT, is of both kinds. Mr. HEWITT is accused of error on several points, concerning which he might have been honestly mistaken. Whether his firm are the largest miners of iron ore in New Jersey; whether the cost of New Jersey and Pennsylvania ore is invariably less than the freight on foreign ores; whether every ton of foreign ore imported permits exactly a ton of domestic ore to be used; and so on, are matters concerning which a positive contradiction involves no charge of dishonesty. If the *Iron Age*, not wishing to discuss the main argument presented by these sweeping assertions, prefers to pick flaws in the assertions themselves, and to assert that somebody else is a larger miner of iron ore; that not every pound of New Jersey or Pennsylvania ore is put on the cars for less than the freight from Africa or Spain to New York, but, on the contrary, several pounds have been sold for more; that less than a ton of domestic ore is used with a ton of foreign ore; and so on, it is free to argue in that way; and the ENGINEERING AND MINING JOURNAL takes just as much interest in the argument as it deserves, that is to say, very little. On the main question, whether low duties, or no duties, on iron ore would benefit the iron industry throughout, we have expressed our opinion, and given our grounds for it.

But the *Iron Age* (which now avows responsibility) and a certain class of assailants who do not avow responsibility began long ago a systematic attempt to weaken the force of the arguments of Mr. HEWITT by asserting that he was secretly endeavoring to promote the interests of his firm; that his pretense to be identified with the ore-producing industry was a fraud; that he was, "as usual," attempting to "mislead the public;" and that his preponderant interest is in the manufacture of wrought-iron, not the production of ore or pig. This charge was speciously qualified with an allusion to the State of New Jersey, behind which the utterers of the slander now take refuge. The *Iron Age* says it regarded this accusation as true, and was fully prepared

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to publish it. In other words, it was perfectly aware that a technical distinction, calculated to mislead the public, was being made the basis of a charge of dishonesty. The charge itself was false, as the *Iron Age* tacitly confesses; but the words in which it was couched being carefully guarded so as to leave a geographical loop-hole through which the libeler could crawl, the *Iron Age* was "fully prepared" to publish it. This kind of preparation to publish ought to be made very secretly, and not avowed afterward.

The ingeniously prepared statement probably did mislead the public; at all events, it misled Messrs. COOPER & HEWITT, who met the essential misrepresentation of their business with a dignified and positive contradiction. A rejoinder in the *Iron Age*, repeating the original assertion, with offensive aggravation, followed: and upon this we based our article of March 10th. That article was not seen by Mr. HEWITT until it was in print; it was not suggested in any way by him; it was not intended to defend him or his firm; it was not an answer to the impudent "invitation to Mr. HEWITT to vindicate his reputation for veracity." Mr. HEWITT himself can answer invitations of that kind whenever he thinks them worthy of notice.

Our article was neither more nor less than an exposure of the unworthy and contemptible course into which the *Iron Age* had been betrayed, and the responsibility for which its Editor had not then, as he has since, assumed. In reply, the *Iron Age* now proceeds to administer what it elegantly terms a "spank"—which is, we beg to observe, a very feeble offset to a brand. The temporary blush caused by the one soon fades out, the mark of the other is less easily removed. *

THE NEW YORK CITY WATER SUPPLY.

A report has recently been made by a very honorable committee upon this subject, in which the universally admitted urgent need of a larger supply of water for the city was insisted on and the Croton water-shed was stated to be the best and cheapest source of supply available. The committee was divided as to whether the increased storage capacity called for should be provided by the erection of a monster dam at Quaker Bridge, or by several smaller dams at points higher up the Croton Valley.

Though the members of the committee, FRANKLIN EDSON (Mayor), WILLIAM DOWD, JOHN T. AGNEW, O. B. POTTER, AMOS F. ENO, and HUGH N. CAMP, are not engineers or experts, yet they state that they "have had before them eminent engineers possessing experience and knowledge respecting the water supply of this and other cities." It would have made this report still more valuable had the names of the expert authorities and their testimony, of which stenographic reports were kept, been published.

The Commission recommends the building of a 15-foot diameter aqueduct, 27 or 28 miles in length, and is divided as to the advisability of building the Quaker Bridge dam, which would be some 230 feet in hight from bed-rock, and we believe about half a mile in length, and which it is estimated would cost about five million dollars, and require five and a half years to complete.

While no engineer will question the possibility of building a dam capable of withstanding a pressure of 230 feet, or say 100 pounds per square inch, yet under that pressure no common masonry can be counted on to prevent filtration, and no dam that leaks can be considered perfectly safe. The incalculable damage that would result from the bursting of such a dam should also be considered; for it is certain that, if it should give way, it would leave neither trace nor vestige of building or arable land in the valley from Quaker Bridge to the Hudson River.

The construction of the aqueduct is a mere question of money. It presents no engineering difficulties at all comparable with the building of such a dam. Whether an aqueduct is the cheapest or best means of bringing the water to the city, is quite another question, and we are surprised that this commission has not even referred to such other means as siphon-pipes, so largely in use elsewhere for conveying water.

A proposition has been made to secure the increased water supply from the Ramapo water-shed, and to bring the water to the city as water is so successfully and cheaply conveyed throughout our California hydraulic mining districts, and to the city of San Francisco and many other places, by means of iron pipes, following the irregularity of the surface. Unquestionably, this method is far less expensive than an aqueduct, while it has the immense advantage of utilizing the pressure, which, in the case of the Ramapo plan, would, we hear, amount to some 250 or 300 feet head, say 120 pounds per square inch, at the city line. This would probably be sufficient to dispense with steam fire-engines wherever pressure-pipes are provided.

This pipe line plan presents no engineering difficulties or untried experiments: it is cheap, and could be completed within a year, or in say one sixth of the time necessary to complete the great Quaker Bridge dam; and we believe it should be considered before any definite conclusion is arrived at. We understand that parties are ready to contract to furnish the city with the desired amount of water from the Ramapo basin, under a pressure of 250 or 300 feet head at the city line, at a given annual rental. This might or might not be the best way for the city to get its supply; but assuredly such a proposition, especially if accompanied by an option of purchase of the water-works at a given reasonable amount, is worthy of careful consideration. The experience of our cities in work done under commissions has been so uniformly unfortunate that we may be pardoned if we believe that the cost of the proposed dam, aqueduct, lands, etc., will be, not fifteen, but thirty million dollars, and that seven or eight years will be required for its completion under the administration of any commission that will be appointed.

We would further suggest that the selection of engineers and the adoption of plans for the construction of dams, aqueducts, or pipes be intrusted to the American Society of Civil Engineers. The thorough discussion any plan proposed would receive in the meetings of that society would be of immense benefit. The high standing and honorable record of this representative society of American civil engineers would be a guarantee that the work would be not only an engineering success, but be free from the stealings and scandals with which our city and public works have heretofore been accompanied.

The question of the best method of securing a larger supply of water is by no means settled by the Commission's report, and the proposal to build the enormous Quaker Bridge dam is far too serious to be adopted with the information thus far given. The probable cost of the proposed dam and aqueduct will certainly greatly exceed the estimated fifteen millions, if the work is to be under the control of the politicians; and we would, therefore, commend to the consideration of our citizens and our legislators the plan of contracting for a supply from the Ramapo water-shed, or any other proposed plan which, like that, is based on a thoroughly successful and economical application in great hydraulic works.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

Bessemerizing Matte in a Reverberatory Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of March 3d is contained a description of a so-called new process in copper smelting, by Mr. Paul Johnsson, and an editorial article commending it, and stating that it is new so far as you know. This article brings out into clear relief a strange psychological phenomenon which indicates that Mr. Johnsson's brain has an unusually sensitive mechanism.

His process consists in smelting copper ores in a shaft-furnace and bessemerizing the resulting matte in a reverberatory furnace, preferably regenerative. In your issue of March 29th, 1879, page 218, I described this same process. It was there proposed to connect the shaft-furnace with the reverberatory, allowing the products of the combustion which took place in the latter to pass up through the shaft-furnace, a combination evidently evolved from a cruder plan of having the shaft-furnace separate from the reverberatory. It would be hard to believe that one could think of the plan of joining the shaft to the reverberatory if he had not first thought of the shaft-furnace fusion followed by the proposed reverberatory treatment.

Mr. Johnsson has spent several months at the works of the Orford Nickel and Copper Company, at Bergen Point, N. J., studying copper metallurgy. At that company's works, Mr. W. E. C. Eustis, the superintendent, Mr. J. L. Thomson, and myself, have carried out the process described by Mr. Johnsson in all its important details. (We are satisfied that such a process as he describes is not advisable; but we have gone farther, and found modifications which we do not care to make public, and which we do believe of value.) Much thought, time, and money have been expended on it. Details of the results obtained are on record at the Bergen Point office, as are the drawings of several furnaces, regenerative and other, for carrying out the process as described by Mr. Johnsson, as well as for other modifications of it. The workmen who carried out the details of the work are still employed there.

Now how did this process, whose details he explains with such elaboration, get into Mr. Johnsson's brain? From conversation with the workmen, foremen, superintendent, the *personnel* in general of the company at whose works it has been practically worked out? From consulting the drawings and records at its office? From conversations which he there overheard? Manifestly not; for in this case, being a young, inexperienced man, with his reputation wholly to make, he would of course have given full credit for the invention to the men who had made it, who had worked out the details by the sweat of their brows, with their own money and with their own labor; the men who had shown him most extraordinary favors in allowing him to study their unique methods of work. In preparing his article, he would have clearly pointed out that the merits of the invention belonged, not to himself, but to them. As it is, he makes no reference to them, leaving it to be inferred that the process is wholly the fruit of his own brain.

How then did it get into his brain? It must have been through the brain wave of which we hear so much. Proximity is the soul of love: why not of inventions? Through some strange, unexplained psychic force, and without his knowledge, the germs of these ideas must have entered his brain at Bergen Point; not consciously, but from the mystical contact with the spirits of those who already had the idea fully grown in their brains; by proximity to the drawings of their furnaces; by rubbing against the books in which are recorded the results of their midnight and weary toil.

We are frequently told of mediums who can tell the contents of a letter by simply pressing it against their foreheads. Probably most unconsciously Mr. Johnsson has been pressing the Orford officers and men, their furnaces, drawers of tracings, record-books, etc., against his fore-

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head, or waistcoat, or whatever portion of his frame is most receptive, and mysteriously the thoughts have passed into and impregnated his brain. In brief, his ideas, thus impregnated, though born at Worcester, were conceived at Bergen Point.

Let me enumerate some of the details which Mr. Johnsson gives, and which were carried out by us years ago, passing over numerous trivial ones.

1st. The ENGINEERING AND MINING JOURNAL, 1883, page 119, line 41, Mr. Johnsson considers that the roofs of the reverberatories should be double: almost all our furnaces have been built with double roofs, to preheat the air or blast used in the furnace.

2d. *Ibid*, line 47, he advises two doors, so that two men can work at once in removing the slag. This is practiced in the Orford Company's furnaces, and indeed almost everywhere where the slag is of a consistency to make it desirable.

3d. *Ibid*, line 73, *et seq.*, he points out that the oxidation of the sulphur and iron will generate heat, and so reduce *pro tanto* the amount of extraneous fuel which will be needed to heat the furnace up to the required temperature. This was especially pointed out in my former article, and is indeed one of the chief advantages which the process offers, and whose importance we have fully tested in our numerous experiments.

4th. *Ibid*, line 49, he advises lateral removable tuyeres. Removable tuyeres were described in my former article, and we have used both horizontal and inclined removable tuyeres repeatedly, both immersed and not immersed.

H. M. HOWE.

241 BEACON STREET, BOSTON, March 8.

THE STATISTICS OF THE STEEL INDUSTRY OF THE WORLD.

M. Paul Trasenter, of Liége, Belgium, one of the most painstaking and industrious statisticians of Europe, has undertaken a work of some magnitude in endeavoring to gather the statistics relating to the steel industry of the world, and his familiarity with metallurgical subjects enables him to accomplish successfully the much more difficult task of correctly interpreting the figures which he has collected. M. Trasenter has tried to throw light upon the question whether the rapid development of the steel industry throughout the world has not assumed dangerous proportions to those engaged in it. The facts which he presents, and the conclusion which he draws from them, in a paper contributed to the *Revue Universelle des Mines*, are worthy of a careful study, because they reflect closely the condition of the industry abroad, which indirectly affects our own, and because to some extent its development there during the past decade foreshadows the course into which our own steel-makers will be forced sooner or later. They are now in fact making their first steps in that direction.

Beginning with the raw material, the yield of some of the principal sources of ore supplies in the world has been as follows, in metric tons:

SOURCES OF SUPPLY OF BESSEMER ORES.

	1879.	1880.	1881.
England, hematites	2,397,000	3,044,000	3,051,000
Prussia, spathic ores	869,000	1,009,000	1,095,000
Styria and Carinthia	542,000	.....	509,000
Sweden	642,000	770,000	.....
Bilbao, export	1,117,000	2,345,000	2,500,000
Algeria, production	418,000	614,000	.....
Elba, export	282,000	350,000	.....
Lake Superior	1,425,000	2,017,000	2,396,000

The exports from Bilbao are known to have been 1,192,000 tons greater in 1882 than in 1881. The Bessemer pig furnaces of England, France, Germany, the United States, and Belgium are partly supplied by ores shipped from Spain and from the Mediterranean, as the following table of imports of ores by sea by the various countries, being almost exclusively Bessemer ores, will show. The unit is the metric ton:

IMPORTS BY SEA OF BESSEMER ORES.

	1879.	1880.	1881.	1882.
England	1,098,000	2,675,000	2,485,000	3,330,000
France	668,000	789,000	815,000	850,000
Germany	275,000	400,000	500,000	630,000
United States	275,000	460,000	750,000	550,000
Belgium	45,000	100,000	120,000	170,000
Total	2,360,000	4,422,000	4,690,000	5,530,000

We have supplied a gap in M. Trasenter's figures relating to the imports of ores into this country in 1882, making due allowance for the estimated quantity of Canadian ores shipped by rail.

The production of pig fit for steel-making is not separately given, except in English, German, and Belgian statistics, according to which the output in 1881 was 3,110,000 metric tons in England, 886,000 tons in Germany, and 104,000 tons in Belgium. M. Trasenter estimates the make in this country at 1,400,000, in France at 450,000 tons, thus carrying the total to nearly six millions of tons of pig used for steel-making. We have, unfortunately, no means of verifying M. Trasenter's estimate of the quantity of that grade of pig produced in this country, as the statistics are not kept separately; and as the census returns on steel mix up the open-hearth and Bessemer manufacture, no deductions can be drawn from them. Besides the quantities produced in the various countries named, they received from England about 700,000 tons of steel pig, of which M. Trasenter estimates that 300,000 tons went to this country, 150,000 tons to Germany, 100,000 tons to Russia, and 100,000 tons to Belgium and France. English steel-works consumed 2,000,000 tons of pig, the rest, 400,000 tons, being required for the manufacture of special brands of iron, and notably for tin plates.

According to M. Trasenter, the production of steel ingots in the five principal producing countries in the world was as follows in 1881, the figures given being thousands of metric tons:

PRODUCTION OF STEEL INGOTS.

	Bessemer.	Open-hearth.	Crucible.	Total, 1881.	Total, 1880.	Total, 1870.
Great Britain	1,465	343	50	1,858	1,414	350
United States	1,395	133	82	1,610	1,258	64
Germany	861	125	38	1,024	762	170
France		425	8	433	426	80
Belgium	141	...	..	141	120	9
Total				5,066	3,980	673

For Austria, Russia, and Sweden, the figures for 1881 are not yet known, those for 1880 only being given:

	Bessemer.	Open-hearth.	Crucible.	Total, 1880.	Total, 1879.	Total, 1870.
Austria-Hungary	101	28	31	160	156	24
Russia	300		4	304	210	8
Sweden	30	8	2	40	28	12
				504	394	44

From this, the conclusion is drawn that, from a production of about 700,000 tons of steel in 1870, the industry has grown so that it turned out, in the whole world, about 3,525,000 tons in 1879, 4,500,000 in 1880, and more than 5,500,000 in 1881, and must have considerably exceeded 6 millions of tons of ingots and possibly reached 6½ millions during 1882.

The proportion due to works using the basic process is as yet small. In 1881, the production was about 200,000 tons, and certainly not as much as 250,000 tons, of which 120,000 tons were made in Germany. According to the statements made by the inventors, the weekly output was 30,000 tons during the beginning of the year and 47,000 tons in October, so that the total output of basic steel was not probably more than 500,000 tons of ingots, or about 8 per cent of the whole.

As for the capacity of the existing works, and those under construction, M. Trasenter furnishes the following data, from which he concludes that the steel-works of the world can easily produce from 7½ to 8 millions of tons of ingots. The number of establishments in the principal countries is:

NUMBER OF BESSEMER STEEL-WORKS.

	1878.	1879.	1880.	1881.	1882.	Building.
Great Britain	19	20	21	22	23	3
United States	10	10	11	13	15	3
Germany	13	14	16	18	19	5
France	10	10	9	9	11	6
Belgium	2	2	2	3	4	2
Total	54	56	59	65	71	19

This does not include Russia, Austria, or Sweden.

Besides the addition to the capacity by new plants, the number of converters and open-hearth furnaces has increased, as shown by the following table; and moreover the capacity of each individual plant has been steadily pushed up:

NUMBER OF CONVERTERS.

	1878.	1879.	1880.	1881.	1882.	Building.
Great Britain	61	66	78	82	84	3
United States	20	20	24	30	38	2
Germany	35	38	43	61	67	13
France	24	23	19	19	23	13
Belgium	12	12	11	13	15	4
Total	152	159	175	205	227	35

NUMBER OF OPEN-HEARTH FURNACES.

	1878.	1879.	1880.	1881.
Great Britain	100	102	126	149
United States	27	33	37	44
France	44	50	56	...
Total	197	213	249	...

Such are the means of production. Turning now to the consumption, M. Trasenter comes first to rails, and so far as the incomplete data will allow, presents the following, leaving out blooms and crucible steel, as the probable manner in which the output is divided between rails and other manufactures of steel:

OUTPUT OF RAILS AND MANUFACTURES OF STEEL.

		Rails.	Other mfs.	Total.
Great Britain,	1881	1,080	280	1,360
United States,	"	1,230	165	1,395
Germany,	"	504	316	820
France,	"	300	88	388
Belgium,	"	87	22	109
Austria,	1880	77	34	111
Russia,	"	200	65	265
Sweden,	"	2	30	32
Total		3,480	1,000	4,480

It will be noted that the total of this table falls behind the total of the production of ingots considerably—more, in fact, than waste in manufacture would seem to warrant. It is sufficiently accurate, however, to clearly show how overwhelming a proportion of the product of steel in the world goes into the manufacture of rails. A discussion of the prospects of the future consumption of rails has, therefore, a particularly striking interest. In a general way, it may be said that, in the absence of stocks, the consumption and production follow one another closely, and therefore the following table, giving the latter, pretty nearly reflects the variations in the former:

PRODUCTION OF STEEL RAILS.

	Great Britain.	United States.	Germany.	France.	Belgium.	Austria.	Russia.	Total.
1871	200	35	128	33	5	23	5	430
1872	250	86	179	82	6	38	5	650
1873	300	117	186	102	11	50	5	770
1874	350	131	237	154	21	57	5	955
1875	400	264	241	178	37	61	10	1,190
1876	470	374	253	181	58	64	15	1,420
1877	565	392	308	184	76	79	25	1,630
1878	700	508	375	231	75	80	55	2,030
1879	558	628	335	254	70	81	115	2,070
1880	810	878	407	279	75	74	200	2,725
1881	1,080	1,228	504	300	87	85	200	3,485

PRODUCTION OF IRON RAILS.

	Great Britain.	United States.	Germany.	France.	Belgium.	Austria.	Russia.	Total.
1871	1,000	668	321	123	155	90	10	2,365
1872	975	821	321	129	113	86	10	2,455
1873	750	690	387	154	122	80	10	2,190
1874	700	530	365	161	145	55	10	1,965
1875	300	454	227	119	103	40	10	1,455
1876	250	423	126	82	81	23	10	955
1877	200	301	90	60	59	18	10	740
1878	120	292	57	52	60	10	13	600
1879	70	381	34	40	39	5	6	575
1880	170	447	45	42	64	3	5	775
1881	150	442	26	28	45	2	5	700

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PRODUCTION OF RAILS OF ALL KINDS.

	Great Britain.	United States.	Germany.	France.	Belgium.	Austria.	Russia.	Total.
1871	1,200	703	449	156	160	113	15	2,795
1872	1,225	907	500	211	120	124	15	3,105
1873	1,050	807	573	256	133	131	15	2,965
1874	1,050	661	602	315	165	112	15	2,920
1875	900	718	469	297	140	101	20	2,645
1876	720	797	380	263	140	87	25	2,415
1877	765	693	398	244	135	97	35	2,370
1878	820	800	432	283	135	90	68	2,630
1879	630	1,009	370	294	109	86	151	2,645
1880	980	1,325	452	321	139	77	155	3,500
1881	1,230	1,670	530	328	132	87	155	4,185

As these tables show, iron has declined very rapidly in importance as a raw material for rails, the quantities manufactured in and for this country elsewhere alone keeping it from dropping into utter insignificance. The year 1882 will witness a sharp decline, and after 1883 it will probably be of no practical importance.

The annual consumption of rails in the world during the last decade has fluctuated between 2,350,000 and 4,150,000 tons. M. Trasenter, on the basis of the new mileage constructed during the past decade, has calculated the consumption for that purpose in the world, leaving the remainder for minerals. He holds, however, that in many cases the rails are really only laid a year after they have been made, and in a table gives the amounts used for renewals, arrived at by assuming the rails to have been laid in the year they were made (column A), and when made during the preceding year (column B). The following is the result of his labors:

CONSUMPTION OF RAILS.

	Total.	New roads.	Renewals. A.	Renewals. B.
1871	2,795	1,490	1,305	....
1872	3,105	1,220	1,885	1,575
1873	2,965	1,160	1,805	1,945
1874	2,920	960	1,960	2,015
1875	2,640	970	1,670	1,940
1876	2,415	930	1,485	1,710
1877	2,370	940	1,430	1,475
1878	2,630	830	1,800	1,540
1879	2,645	1,080	1,565	1,550
1880	3,500	1,200	2,300	1,495
1881	4,185	1,510	2,675	1,990

M. Trasenter makes a good point when he calls attention to the fact that an order for new construction means much more business to iron and steel industries than an order for the same quantity for renewal. In the former case, the equivalent of pig, etc., must be provided; while in the latter case, by the throwing upon the market of a given amount of old material, the furnace-man has a chance to provide only for that fraction of the whole which goes to make up the loss in manufacture. M. Trasenter has very carefully gone into the question how fast the wear of rails is, and what is the quantity of iron and steel rails in the tracks of the roads of some of the principal countries. He has reached the following results:

RAILS IN THE TRACKS OF SOME OF THE PRINCIPAL COUNTRIES.

	Iron.	Steel.
Great Britain	1,980,000	2,400,000
Germany	2,550,000	1,570,000
Belgium	265,000	255,000
Russia	800,000	900,000
Austria	930,000	730,000
United States	7,000,000	5,000,000
Other countries	4,000,000	2,600,000
Total	19,000,000	15,200,000

M. Trasenter figures out the time which the replacement of these rails will take. He concludes that the mean age of the iron rails in use on January 1st, 1882, was about ten years. The mean age of the steel rails in use at the same date he sets down at something over four years. As to the wear of each class, he takes figures showing the movement of traffic by weight only, and allows a mean of twenty years' duration for iron rails and ninety years for those of steel. Allowing for the gradual decrease of the number of iron rails in the tracks, M. Trasenter roughly estimates the renewals of 1882 at 1,900,000 tons, of 1883 at 1,710,000, 1884 at 1,540,000, and so forth, in a steadily decreasing ratio. Experience in this country has shown that there is no regularity in this process of replacement of old iron by steel, financial reasons often delaying such for years and accumulating orders for many years, to be let out upon the works of the country with a sudden rush. European roads have but little to hope from this source, as nearly one half of the iron rails now in the track are laid in this country. As to the renewals of steel by steel, M. Trasenter seems to us to take rather a gloomy view, giving them a wonderful longevity, and naturally, therefore, estimating the quantity annually thrown out of the track very low, or only one half of one per cent. We believe that the tendency so clearly exhibited, at least in this country, to increase the capacity of the cars, will soon make itself felt on the lighter steel rails laid years ago.

As to the requirements for new roads, statisticians must of course be almost entirely at sea, except in those countries where the railroads are built by the government. Still the following averages of past work in millimeters for the period of 1871–1881 is of interest.

NEW MILEAGE IN THE WORLD.

	1871–1881.	1880–1881.
Great Britain	450	500
Germany	1,325	500 (?)
Belgium	102	85
France	590	1,500
Russia	970	1,000 (?)
United States	7,160	17,600
Other countries	5,435	8,000

M. Trasenter reaches the conclusion that the consumption of rails in the world has reached its maximum, and that, even if it should be maintained, it will be kept up only for a small number of years, and that will only hasten the time when iron rails will be completely replaced. In the face of this, the production of the steel-works goes on developing so that a crisis can only be avoided by an extension of the other uses of steel. To the problem how far progress is possible in this direction, M. Trasenter turns his attention.

One of the great controversies among metallurgists, builders, and engineers to-day turns on this very subject, and the magnitude of the interests involved accounts for the persistency with which every point concerning the adaptability of steel to purposes for which iron is used is fought.

How great a field there is for steel in rolled metal, bars, track material, sheet wire, and forgings, is shown by the following table, in which the output of rolled open-hearth and Bessemer steel and wrought-iron other than rails, is approximately given:

	Steel.	Iron.
Great Britain, 1881	280,000	2,100,000 (?)
United States, "	165,000	1,955,000
Germany, "	316,000	1,325,000
France, "	88,000	990,000
Belgium, "	27,000	435,000
Austria-Hungary, 1880	35,000 (?)	200,000 (?)
Russia, "	60,000	294,000
Sweden, "	30,000	250,000
Total	1,000,000	7,550,000

The progress in Germany is striking. In our own country, the use of Bessemer steel for merchant purposes is just beginning, and is destined, we believe, to experience a rapid development. Unfortunately, full statistics of the work of the rolling-mills is given only in Germany and Belgium, so far as railroad material is concerned. In 1881, the product in Germany was distributed as follows:

	Iron.	Steel.
Ties	52,000	27,600
Frogs, etc	13,000	18,600
Springs	1,300	16,500
Wheels	3,800	27,000
Tires	10,300	32,700
Total	80,400	122,400

So far as springs and tires are concerned, steel has come out the victor in the struggle with iron, Belgian works having made 11,000 tons, Austrian establishments 10,000 tons, and British steel mills 50,000 tons, the entire product of the world approaching 200,000 tons.

In the manufacture of merchant bar, steel has as yet made little headway. In 1881, Germany produced 712,000 tons of iron and 13,000 tons of steel, while Belgium turned out 310,000 tons of iron and only 8000 tons of steel, the proportion probably being similar in other countries, if not considerably less favorable to steel. While the question of price may to some extent account for this, the principal cause probably lies in the fact that there is such a difference in working iron and steel. When it becomes necessary to forge, weld, or punch, steel presents difficulties and requires precautions which do not accord with the routine of the workmen, and oppose the prejudices of consumers; and the use of steel in bridge-building, car construction, etc., is developing slowly, while for general purposes it has scarcely begun.

For boiler and ship plates, the position is largely the same. M. Trasenter estimates the relative proportions of iron and steel in the product of some countries as follows:

	Iron.	Steel.
Germany	194,000	5,000
England	800,000 (?)	100,000
France	163,000	18,000
Belgium	105,000	2,000

M. Trasenter seems to have paid little attention to an important field for steel, which, it is true, is as yet confined to England. We refer to the higher grades of tin plates. It is pretty well understood that "charcoal" plates are more and more becoming a myth, and steel tin plates are now made quite extensively, with every prospect of gaining rapidly in the good graces of consumers. We have seen articles stamped and spun from such plates, which have a wonderful ductility, approaching copper.

One of the greatest advances made by steel during the past few years, notably in this country, has been in the use of wire. Unfortunately, no figures are as yet available to reflect the progress made. We have, however, full data from Germany, one of the greatest wire-producing countries, according to which the make of iron wire increased from 222,000 tons to 233,000 in 1881, while the production of steel jumped in the same period from 10,800 to 58,600 tons.

For machine, cannon, and other forgings, steel is rapidly displacing iron; but, so far as tonnage is concerned, the market is limited though valuable, on account of the high prices realized, few works having the necessary plant of special and heavy tools to produce such articles. We believe that the casting of such articles, to which much attention has been paid in this country, offers a means of avoiding such heavy outlay of capital, and thus will make it possible for steel to step into the field as a formidable competitor, with greater chances of success.

Summarizing the points brought out in his discussion of the subject, M. Trasenter concludes that steel tends to monopolize the market for railroad materials, but has now little to gain in that direction. The manufacture of wire and ship-building afford a growing market; but so far as plates, sheets, and merchant bar are concerned—the most important outlet for iron rolling-mills—the part played by steel thus far is unimportant. Efforts have been made for a number of years; but consumers are slow, and decline to indorse the condemnation of the puddling-furnace, so frequently pronounced by metallurgists. This is due, as has been already stated, to difficulties and novelty in manipulation and to the heavy difference in price. For a large number of uses, the lessening of weight and the greater resistance to wear are not as evident as with ship-plates or rails; and iron, therefore, fully meets the requirements. The production of small ingots, or the working down of large ones, tells against the use of Bessemer steel for such purposes, and the scrap is not as easily worked up as wrought-iron scrap. Raw materials of high grade must be used; and while the basic process has removed this obstacle, the greater cost of production to a large extent counterbalances the advantage thus gained.

Theoretically, the Bessemer process is cheaper, the waste is less, particularly in reheating, the consumption of fuel is materially reduced, and the cost of labor is lower. On the other hand, the general expenses and the cost of refractory materials are higher. Still, few steel-works would be willing or able to produce weight for weight at the same price. A decline in values of steel made by modern processes is imminent throughout the producing countries, if steel-makers do not succeed in finding consumers who are willing to consider the high quality, and pay accordingly. It is the duty of producers of steel to study and make known the high quality, and to watch closely that the metal which they furnish is well adapted to the uses to which it is to be put. This is the only means which they possess to avoid the effect of the decline in prices which must, sooner or later, result from the excess of the producing capacity over the requirements of the market for rails. The production of wrought-iron is so great, and its uses so numerous, that there are many branches in which steel may claim and conquer a market.

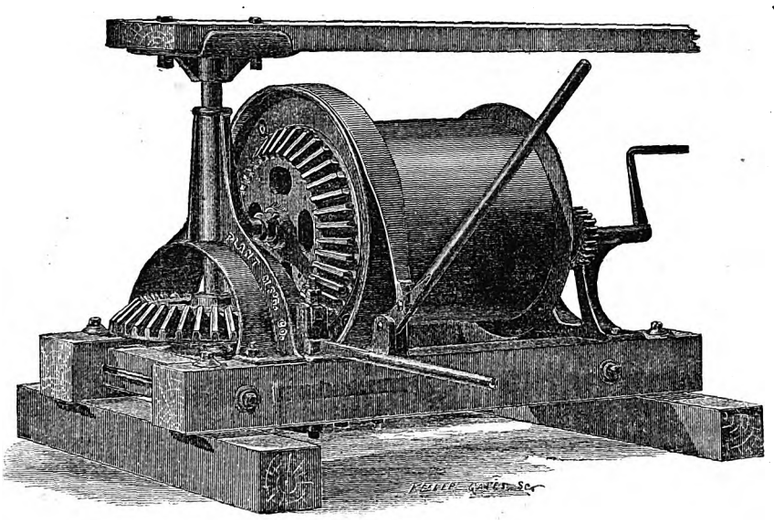
AN IMPROVED HORSE-POWER HOISTING-GEAR.

For the many purposes of engineers and contractors, and for quarries and mines, particularly in prospecting-work, a handy horse-power hoisting-gear is urgently required, the crude rigs with which work is often attempted entailing a loss of time and a waste of power and of money out of all proportion to the saving in first cost. We present, in the accompanying engraving, a general view of a hoisting winch designed by the Contractors' Plant Manufacturing Company, of Buffalo, N. Y., with patents taken out, we believe, by Mr. A. Dobbie. The design shown is specially adapted for derrick work. For mining purposes, where it is desired to hoist smaller weights, say from 300 to 500 pounds, at a speed of about 75 feet per minute, the drum gear-wheel is correspondingly smaller, and the driving-gear larger, the number of teeth being 18 and 45. The general features, however, are the same. The drum, which is 23 inches long and 21 inches in diameter, is moved by means of the gear-wheels shown by the power applied to the boom. The vertical shaft of the driving-gear can be lowered by raising the left-hand lever, so that the gear-wheels can be made to engage or can be put out while the horse is in motion. A gearing attachment at the other end of the drum is provided to take up the slack rope by hand, and a powerful strap-brake can be applied whenever necessary, so that the person working the hoist has full control of the entire machine, which in all weighs 1000 pounds, and has a bed-frame 5 feet 3 inches by 2 feet 9 inches, its total hight being 2 feet 10 inches. The shafts are cast-steel, and the only parts made of wood are the sills and the sweep.

GOLD IN NEW SOUTH WALES.

By Harrie Wood, Under-Secretary of Mines, Sydney.

Mining for gold in Australia commenced in the year 1851, but the discovery of gold is recorded as far back as 1823. Mr. Surveyor McBrian, in his field-notes of the survey of the Fish River, between Tarana and O'Connell, states, "February 15th, 1823. At 81·50 to river, and marked gum-tree. At this place I found numerous particles of gold in the sand in the hills convenient to the river."



In 1839, Count Strzelecki found auriferous pyrites.

In 1841, February 23d and 24th, Rev. W. B. Clarke, M.A., F.R.S., discovered gold *in situ* in the granite formation between Hartley and Hassan's Walls, and at the head of Winburndale Rivulet. He very shortly afterward spoke of the abundance of gold likely to be found in the colony, and as early as 1843 mentioned it generally. In 1844, he showed a sample to the Governor of New South Wales, Sir George Gipps, who said, "Put it away, Mr. Clarke, or we shall all have our throats cut."

Professor Geikie, Director of H. M. Geological Survey of Scotland, in his *Life of Murchison*, thus refers to Mr. Clarke's discovery of gold: "The first explorer who proclaimed the probable auriferous veins of Australia on true scientific grounds, that is, by obtaining gold *in situ* and tracing the present rock through the country, was the Rev. W. B. Clarke, M.A., F.R.S., who, originally a clergyman in England, has spent a long and laborious life in working out the geological structure of his adopted country, New South Wales. He found gold in 1841, and exhibited it to numerous members of the legislature, declaring, at the same time, his belief in its abundance. While, therefore, geologists in Europe were guessing, he, having actually found the precious metal, was tracing its occurrence far and near on the ground."

In 1843 or 1844, Macgregor, a shepherd, is said to have found gold in the Wellington District.

In 1844, Sir Roderick Murchison, from an examination of a collection of rock specimens from Australia, pointed out the resemblance of the Australian mountain chain to that of the Ural. "But," he says, "it so far differs from the Ural and many other meridian chains in having as yet offered no trace of gold or auriferous veins." But, in 1846, he writes, "I now learn, however, that fine specimens of gold have been found in the western flank of the Australian cordillera, particularly at the settlement of Bathurst, where it occurs in fragments composed of the same matrix (namely, quartz-rock) as in the Ural. My friend and associate at the Imperial Academy of Petersburg, Colonel Helmersen, has recently suggested that a careful search for gold in the Australian *débris* will, it is highly probable, lead to its detection in abundance; I therefore encouraged the unemployed miners of Cornwall to emigrate and dig for gold." Sir Roderick also stated that, in the year 1848, a resident in Sydney (Mr. T. W. Smith), who had read what he had written and spoken on the point, had sent him specimens of gold ore found in the Blue Mountains. This was probably the person referred to in the official dispatch from Sir C. A. Fitz Roy to Earl Grey, dated June 11th, 1851: "About two years ago, a Mr. Smith, who was engaged in some works near Berrima, produced to the colonial secretary a lump of gold imbedded in quartz, which he said he had picked up at a certain place, which he offered to make known to the government upon being previously rewarded for the intelligence by the payment to him of a large sum. The obvious reply to this offer was, that the government could enter into no blind bargain on such a subject; but that if Mr. Smith thought proper to trust to the liberality of the government, he might rely upon being rewarded in proportion to the value of the alleged discovery, when that was ascertained. Mr. Smith refused to accede to this proposal, and there the matter rested."

In 1849, a shepherd-boy was reported to have found a nugget of gold in the Pyrenees (Victoria).

On April 3d, 1851, Mr. E. H. Hargraves, who had recently returned from California, addressed a letter to the colonial secretary, stating that he had been prospecting for two months, and offered to point out the localities in which he had discovered gold to any officer of the government on condition of the government awarding him the sum of £500 as a compensation. To this the government directed that an answer should be given similar to that returned to the former proposal of Mr. Smith.

On the 30th April, Mr. Hargraves replied that he was satisfied to leave the remuneration for his discovery to the liberal consideration of the government, and named the localities where the gold would be found. The localities named by Mr. Hargraves were "Lewis Ponds and Summer Hill Creeks, Macquarie and ———— rivers, in the districts of Bathurst and Wellington."

Mr. Hargraves was requested to place himself in communication with Mr. Stutchbury, Government Geologist, who was instructed to inspect and report. This Mr. Stutchbury did on the 14th May, confirming the news of the discovery. It appears that in the first instance Mr. Hargraves, in company with Mr. John Lister, discovered gold—about five grains—on February 12th, 1851, at Lewis Ponds Creek, within two miles of Ophir. The Messrs. Lister and Tom were then instructed by Mr. Hargraves how to wash for gold, and after prospecting for some time, they at last, in April following, discovered payable gold at Fitzroy Bar, now called Ophir. The discovery being made known, persons of all classes flocked to the place, and soon proved the occurrence of extensive auriferous deposits in the beds of the creek and in the alluvial flats in the locality, and thus the first gold-field in Australia sprang into existence. Referring to this, Mr. Stutchbury reported—on May 25th, 1851—that at the diggings at Summer Hill Creek, upon an extent of about a mile, there were not less than 1000 persons, many of them getting large quantities of gold, the heaviest lump then found being four pounds in weight.

Prospecting operations were immediately directed to other districts throughout the colony, and many of our principal gold-fields were opened up during this year. The district of Port Phillip, now called Victoria, was separated from New South Wales on July 1st, 1851; and a few weeks after that date the Ballarat, Mount Alexander, and other Victorian gold-fields were discovered. Similarly, the opening of the gold-fields in Queensland occurred about the time—1859—of the severance of that territory from New South Wales. The gold production of those colonies, therefore, is not included in the returns of the quantity of gold raised in New South Wales. Since 1851, when our auriferous deposits were first worked, the quantity of gold raised, so far as can be ascertained, has been 9,225,179 ounces, valued at £34,343,857. The number of gold miners in the colony in 1881 is estimated at 7556, but many of them are only occasionally engaged in mining.

The distance between the Albert gold-field and the Delegate gold-field being 672 miles, and between the latter and the Ballina gold-field being 600 miles, it will be seen that gold-fields are distributed over the greater part of the colony. Notwithstanding that the search for gold has been carried on for thirty years, new fields or new deposits are continually discovered, some of them in localities which were supposed to have been thoroughly examined. Some of the fields recently discovered promise to equal in extent and richness any discovered in the early days; while our oldest fields, though apparently exhausted as far as the miner unaided by capital and skill is capable of exhausting them, yet contain deposits of gold which will yield a rich harvest to the skilled miner who shall bring to bear upon them appliances such as are successfully employed elsewhere. In order to encourage the introduction of such a system of mining as will lead to the profitable working of localities from which the operative miner can no longer extract a living by means of the pick and shovel alone, it will be necessary to provide security of tenure over comparatively large areas subject to the employment of necessary appliances and labor.

Gold has always been found in association with certain formations, and the extent of country occupied by these is about 70,000 square miles—or nearly one fourth of the whole area of the colony—a considerable portion of which has not yet been touched by the pick of the miner. Gold-bearing quartz reefs have been found in New South Wales in sedimentary rocks of Upper Silurian, Devonian, and Carboniferous ages; also in hornblendic granites, porphyry, diorite, and serpentine; while the deposits which contain alluvial or water-worn gold in payable quantity, and which have been derived from the degradation of these formations, are of Permian, Cretaceous, Tertiary, and Quaternary ages.

Auriferous quartz reefs in the Upper Silurian formation have been worked at Hill End and Tambaroora, Trunkey, Temora, Mount Brown, etc.; in the Devonian, at Nana Creek, Boorook, etc.; in the Carboniferous at Barrington or Copeland; in hornblendic granites, at Braidwood, Adelong, etc.; in porphyry, at Grenfell; in diorite, at Gulgong, Temora, Parkes,

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etc.; in serpentine, at Gundagai, Lucknow, etc. The reefs vary from a few inches to ten feet in width, though occasionally they attain a greater thickness. They generally have a meridional strike, especially where they traverse the Silurian formation; but in many localities, the strike runs in other directions. Thus at Hill End, Trunkey, and Adelong, the prevailing strike is about N. and S.; at Dalmorton, from E. 10° N. to E. 30° S.; at Grenfell, N.E.; at Temora and Copeland, from N.E. to E. and S.E.

In these reefs, the gold seldom occurs without one or more of the following sulphurets: Pyrites, galena, mispickel, blende, and copper pyrites; calcite is also frequently present, and barytes rarely. At Hill End, portions of the reefs contain potash mica (muscovite). "In some places, the mica was found to entirely replace the quartz, and here the gold was found to be excessively rich."* These reefs traverse chlorite slate, clay slates, and metamorphosed conglomerates; the latter contain obscure impressions of *encrinites*, *spirifera*, and *favosites*.

The rich quartz veins at Lucknow occur along the line of junction of serpentine and hornblende porphyry; besides quartz, the vein-stuff includes calcite, asbestos, serpentine, and abundance of mispickel, also a little magnetite; the gold is sometimes visibly disseminated through the mispickel and serpentine.† At Barmedman, in the Bland District, and at Cowarbee, in the Murrumbidgee District, gold is not only found in the veins of quartz with pyrites and galena, but also in the cleavage planes and joint-fissures of the adjoining slates. Near Glen Innes, in the New England District, it has been found in bismuth ores. At the Brown's Creek mine, six miles west from Blayney, an immense breccia lode has been worked for many years. The gold is disseminated in fine particles throughout the lode, and also in hard siliceous accretions, which have been formed by segregation in the lode stuff; the gold, therefore, has evidently been deposited from solution. The lode has been extensively worked, and yields an average of about three dwts. of gold per ton. A quartz reef near Braidwood contains gold, cobalt, iron pyrites, copper pyrites, blende, and galena. On several of the gold-fields, the reefs contain much pyrites, which, on assay, have been proved to be more or less rich in gold. New South Wales doubtless affords a very promising field for the introduction of efficient appliances for the extraction of gold from pyrites. A high yield of gold has, in some cases, been obtained from the silver lodes of Boorook, the ores from which consist of chloride and sulphide of silver, with a little iodide of silver.

Throughout the gold-fields, gold is always found to be more or less alloyed with silver, and occasionally with traces of copper, iron, osmo-iridium, and other metals.

The greatest depth at which auriferous reefs have been worked in New South Wales is 940 feet, namely, in the Adelong United gold mine, Adelong.

At Araluen, Uralla, the Granite Diggings, near Mount Brown, and other diggings where the formation consists of granite, the gold in the alluvium has evidently not only been derived from quartz reefs, but also from the granite rock itself.

Near Rockley, gold occurs in altered talcose schists.

The greater proportion of the gold hitherto raised has been from alluvial deposits. These, as before mentioned, are of Permian, Cretaceous, Tertiary, and Quaternary ages.

The Permian deposits consist of pebble conglomerates forming the base of the Coal Measures, or "*Glossopteris beds*," at the Tallawang Diggings, and resting upon Silurian schists traversed by quartz reefs from which the gold must originally have been derived. The conglomerate yields from 1 to 15 dwts. of gold per ton, while nuggets weighing 5 ounces have been obtained from it. The gold is generally in the form of flat scaly pieces, and water-worn.

Gold has been recently discovered in the marine conglomerates and shale beds, which are believed to be of Cretaceous age, and which rest upon the flanks of the Silurian, Devonian, and granite formations in the Mount Brown or Albert gold-fields.‡ It is probable that these marine beds will only be found payably auriferous where they fill hollows or "gutters" in the surface of the older formations.

Of the Tertiary deposits, gold in payable quantity has been obtained from the Lower, Middle, and Upper Pliocene alluvia, chiefly from the two latter. These are of fresh-water origin, and consist of ancient river drifts of pebbles, sand, and clays, the remains of auriferous formations which had been disintegrated by denuding agencies during the erosion of the valleys. "The fossils found in these fluviatile deposits or 'deep leads' of the Middle and Upper Pliocene beds are very numerous. Large trunks, branches, leaves, and fruits of trees, with ferns, bones of extinct marsupials and birds, remains of insects and fresh-water mussel-shells, have been exhumed from the clays and gravels of these old river-beds. Of the fossil fruits, Baron von Mueller, K.C.M.G., M. and Ph.D., F.R.S., the distinguished Government Botanist of Victoria, whose researches have thrown so much light upon the character of the vegetation of this period, has described no less than thirteen genera and sixteen species of extinct forms, some of which have living allies. It is worthy of remark that in Australia the Upper Pliocene is the oldest formation in which the *Eucalyptus* has been discovered; it would therefore appear that this genus, which now includes the principal forest-trees of Australia, is, geologically speaking, of comparatively recent introduction on the continent.

In many localities, the old river-beds, or "leads," as the miners term them, have been overwhelmed by flows of volcanic rocks which are sometimes 200 feet thick; consequently shafts have to be sunk through the basalt, as on the Forest and other gold-fields, to reach the gold-bearing gravels; but where, as on the Cudgegong River, etc., the basalt has been completely cut through by the subsequent erosion of the valleys, the leads may be readily worked from adits driven under the basalt.

From 1546 loads of wash-dirt from one of the rich claims (four men's ground) on the Happy Valley lead, near Gulgong, 6203 ounces of gold were obtained; and from a claim on the Canadian lead, on the same gold-field, seven men in three years obtained, free of all expenses, gold to the value of £28,000. One ounce of gold per load, though above the average yield, is not an uncommon return from the wash-dirt of the Pliocene leads. Such leads are at the present time (1882) worked within the Temora gold-field, where the depth of sinking before reaching the auriferous drift varies from about 30 feet to 200 feet. But upon the Gulgong, Parkes, Forbes, and other fields of gold-bearing fame, some of the leads have been followed into deep ground, where, owing to the heavy influx of water, they could not be further profitably worked by the ordinary manual efforts of the miners. However, with the aid of steam power and improved gold-saving appliances, they will probably afford remunerative employment for many years to come.

The Quaternary or Post-Pliocene and recent gold-bearing drifts are found in all the alluvial flats through which the rivers and creeks meander, and in the more shallow ground, or "surfacing," upon the sides and summits of the hills, in proximity to the rocks and reefs from which the gold has been derived. On many of the gold-fields these deposits proved immensely rich, and on account of the facility with which they could be worked, by even inexperienced miners, they were quickly exhausted, excepting in localities where water was scarce; and there are many such places where the surfacing will pay to re-work by ground-sluicing when a sufficient supply of water can be brought to operate upon it.

On the Mount Brown gold-field, in the northwest part of the colony, where there is a scarcity of water, owing to the aridity of the climate, large quantities of gold have been obtained from the alluvial by dry-blowing, which is a tedious and troublesome process for the miners. Latterly, however, two patents have been taken out—one by Messrs C. Phillips & Co., and the other by Captain Park—for inventions of dry-blowing machinery for treating dry and loose gold-bearing deposits: the recent public trials of these machines proved successful.

Taking into consideration, therefore, the above-mentioned deposits not yet worked out, together with the large extent of country occupied by formations of an auriferous character awaiting the search of the prospector, gold mining in New South Wales may be regarded as an important and permanent industry.

* See geological map of Hill End and Tambaroora, by E. F. Pittman, Geological Surveyor, 1880.

† See Report on Wentworth Gold-Field, by C. S. Wilkinson, F.G.S., F.L.S., Government Geologist, in *Annual Report, Department of Mines*, 1881.

‡ See "Report upon the Albert Gold-Field," by Henry Y. L. Brown, Geological Surveyor.

THE HOLLEY MEMORIAL FUND.

Mr. Charles Macdonald, Treasurer of the Holley Memorial Fund, reports the following subscriptions and collections to March 13th, 1883:

LIST OF SUBSCRIBERS TO THE "HOLLEY MEMORIAL FUND."

L. G. Laurean	$25.00	S. T. Williams	$10.00
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R. W. Raymond	100.00	M. Bird	5.00
Charles Macdonald	100.00	Employés at Bessemer Steel-Works, and Albany & Rensselaer Iron and Steel Company	292.00
C. A. Martine	50.00		250.00
Carnegie Brothers & Co	1,000.00	James A. Burden	10.00
A. Cosgriff	5.00	H. M. Howe	50.00
S. T. Wellman	200.00	T. M. Drown	50.00
W. R. Jones	500.00	Cash	100.00
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Dr. Persifor Frazer	10.00	R. H. Thurston	
Samuel McElroy	20.00		
Frederick J. Slade	100.00		
D. V. Jones	500.00	Total	$8,227.92
R. Forsyth	400.00	Of this $8227.92, there have been paid in	4,332.92
E. S. Chesbrough	10.00	Add interest	11.20
S. Gilchrist Thomas	50.92		$4,344.12
Edward L. Ford	50.00	Amount to be paid in	3,895.00
G. S. Morison	50.00		
W. A. Perry	100.00	Total	$8,239.12
Robert W. Hunt	100.00		
J. M. Sherrerd	10.00		
H. C. Shaw	10.00		

THE STEEL CRUISERS.

The Naval Advisory Board has submitted to the Secretary of the Navy the following recommendations for the 3000-ton steel cruisers, the building of which was authorized by Congress last summer: The principal dimensions of the hull should be: Length between perpendiculars, 270 feet; extreme breath, 42 feet; mean draught, 16 feet 6 inches; displacement in sea-water, 2950 tons. The ship should have an open or single deck, with poop and forecastle. The battery should consist of nine 6-inch rifles, two of which should have a direct head-fire, and one a direct stern-fire. Ports and guns should be so arranged as to admit of fighting five 6-inch guns in each broadside. The board reserves the arrangement and character of the battery for future consideration, the weight of the ordnance not to exceed 170 tons. The allowance of 28 tons should be made from the weight of ordnance for machine guns, torpedoes, and electric gear. In the opinion of the board, wood casing and metal sheathing are

neither necessary nor desirable, and hence the board recommends that they be not fitted. The bow should be of a modified ram shape, and, while not intended to develop full ram power, it should possess a greater strength than is applied to ordinary types of unarmored cruisers. A double bottom should extend throughout the entire space occupied by the machinery and transverse coal-bunkers. It is the opinion of the board that a steel deck, 1½ inches in thickness, should be fitted over the space occupied by the boilers and machinery, the outer edges to be about four feet below the load line. The magazines and shell-rooms should be inclosed by water-tight bulkheads, and covered by a protective flat three fourths of an inch in thickness. To have no main projecting keel, but bilge keels extending well fore and aft. The vessel should be bark rigged to topgallant sails. The area of the plain sail should not exceed 12,600 square feet. All main water-tight transverse bulkheads to extend to upper deck. To have a complete system of drainage, consisting of two large main drain-pipes, one on either side of the vertical keel in the double bottom, and connected with a stand-box in each main compartment, which shall contain valves and sluices open by rods led to the gun-deck. The valves in the drains to be so arranged that water can be drawn from each compartment, and the full pumping power concentrated on any compartment; sluice-valves and water-tight doors in all water-tight bulkheads, including coal-bunkers, shall be arranged to work both from below and from the berth-deck; the ships should have single screws operated by horizontal cylinder engines placed in separate water-tight compartments beneath, and thoroughly protected by the steel deck; the boilers should be cylindrical, and with internal furnaces, to be in at least two distinct groups in water-tight compartments; the draught should be forced by means of a closed fire-room, a pressure above the atmosphere to be maintained in it by means of blowers.

THE MINERAL STATISTICS OF SPAIN FOR 1880.

The official figures for the production of the mines of Spain have just been published for the year 1880, as follows, in metric tons:

	Production.	Export.
Iron ores	3,565,338	2,932,998
Lead ores	290,047	12,513
Argentiferous lead ores	30,852	.....
Silver ores	29,998	.....
Copper ores	1,476,209	501,425
Zinc ores	50,531	36,415
Quicksilver ores	26,336	.....
Manganese ores	5,034	11,552
Rock-salt	17,238	.....
Sulphate of soda	6,340	.....
Sulphur	30,281	.....
Phosphates	24,713	19,486
Coal	825,790	.....
Lignite	21,338	.....

It will be seen, therefore, that the bulk of the iron and manganese ores, the greater part of the zinc ores, chiefly calamines, almost all the phosphates, and a large share of the copper ores, probably almost exclusively pyrites, were exported. The number of men employed in the mines of Spain was 59,905, and 372 engines, rated at 8893 horse-power, were at work.

Spanish works produced in the same period the following quantities, of which the annexed amounts were exported:

Tons.	Production.	Export.
Pig-iron	85,939	3,725
Wrought-iron	49,021	41
Pig-lead	68,437	46,492
Argentiferous lead	11,371 (?)	45,907
Copper	23,675	20,939
Zinc	4,221	2,094
Quicksilver	1,387	1,099
Silver, kilograms	65,871	.....

There is evidently something wrong in the statistics of the production of lead, as the exports show a much larger amount than the make. Of the two, the former figures appear to us far more worthy of belief, as in 1879 the export footed up to 100,336 metric tons: 41,371 tons seem much more likely to be true than 11,371 tons.

FLANGING STEEL PLATES COLD.

Messrs. Easton & Anderson have communicated to the British Institution of Mechanical Engineers the results of an interesting series of experiments on flanging steel plates cold by hydraulic pressure. A pair of molds were made to fit an hydraulic press, capable of exerting a pressure of about 250 tons. They were so shaped that at one operation they would make a flange both on the outside and inside of an annular steel plate, and thus produce a double-flanged annulus. A taper was given to the molds, to facilitate the removal of the plate after flanging. There was a slight hollow, ⅛ inch deep, formed on the annular face of the upper mold, and a corresponding rounding on the lower one, to flatten the face of the plate. Experience showed that in this mold, and also in the second mold, a depth of $\frac{1}{16}$ inch would have been sufficient. The plates were Landore Siemens S.S. qualtity, ⅜ inch thick. Their edges were beveled in the lathe, to an extent of ¼ inch in thickness on the inside and $\frac{1}{16}$ inch on the outside edge; after flanging, a slight bevel suitable for calking still remained. Both the outside and inside circles were cut out in the lathe. These first molds not proving altogether satisfactory, they were altered in shape, and turned on the working faces. The first plate was successfully flanged cold, with a pressure of about 250 tons. In the second plate, a little deeper flange was attempted, but it cracked on the inner flange. A plate of S. flanging quality was then annealed and tried cold; but it cracked in six places on the inner flange. A similar plate not annealed also cracked, but in one place only. Some more S.S. plates were then ordered, specially for this work, and were flanged cold and unannealed. The first one cracked in the inner flange; but this was probably due to an attempt to get a very deep flange, standing up about $2\frac{9}{16}$ inches from the under side of the plate; the next, with a flange of about 2⅜ inches deep, did not crack. The third cracked at the bend of the external flange, on the outside, showing a crack about three inches long nearly through the plate. A plate annealed for about four hours, and pressed when cool enough to be held in the hand, cracked badly at the inner flange. Two others annealed for about sixteen hours turned out quite sound. A batch of twelve, heated in a plate-furnace and cooled in ashes for forty-eight hours, were then flanged with perfectly satisfactory results, there being no sign of cracking even on the inner edge of the hole, where the best unannealed plates had shown slight signs of skin cracks, started, no doubt, by the roughness of the sharp edge. Another lot was annealed for about sixteen hours; but having had a thick layer of ashes over them, they were still warm when pressed. Out of four which were flanged two cracked, one slightly on the inner edge and one very badly. The rest of these were put back to be carefully re-annealed, and twelve out of the fourteen were sound. In all these annealed plates, the actual duration of the flanging process in the mold had been very short, from one quarter of a minute to half a minute. Another lot of 21 plates, thorough annealed, were now flanged, allowing the operation to extend over about 3½ minutes; and at the same time, the ragged edge round the hole was carefully filed off, so as to give no starting-place for a crack. The result appeared to be satisfactory, as only two cracked, and those not badly. The approximate thickness of the edge of the external flanges was $\frac{13}{16}$ inch, showing an increase of $\frac{1}{16}$ inch; that of the internal flange was $\frac{5}{16}$ inch, showing a reduction of $\frac{1}{16}$ inch. The average pressure required for the annealed S.S. plates was about 200 tons. It would seem, as a general result, that for cold flanging, involving compression only, as on the outer flange, these plates, even of the lower or S. quality are perfectly trustworthy, even unannealed; as only in one case did a crack appear in the external flange. But for flanging involving considerable stretching of the material as on the inner flange, only S.S. quality will do at all, and the slightest irregularity in the metal will cause a crack. The results showed that this might be expected in from 10 to 15 per cent of the plates.

PROGRESS IN SCIENCE AND THE ARTS.

Iridium Plating.—Mr. W. L. Dudley has announced before the Ohio Mechanics' Institute that the problem of electro-plating with iridium has been solved by employing a suitable solution of the metal and properly regulating the electric current. The solution is kept at uniform strength by using a plate of iridium as the anode. The metal is deposited in the reguline state, and takes a good polish. A buffing-wheel that will grind off nickel plating in a few moments only serves to polish the iridium. Thin platinum foil, coated with iridium, retains its flexibility; and if the coating is not too thick, it will not readily scale off. Copper plates for engravings, faced with iridium, would possess marked advantages over steel engravings.

The Transmission of Sound through Rock.—Some very interesting observations have been made in the course of mining work in the Hartz Mountains, Germany, on the distance through which sounds are transmitted in rock, the latest facts relating to the subject being recorded by Herr F. Schell, of Grund, in the *Zeitschrift für das Berg-, Hütten- und Salinen-Wesen*. In a horizontal direction, the firing of shots at the face of a cross-cut has been heard in a cross-cut driven toward it, the face of which was 447 feet distant from it. Until recently, however, no occasion has presented itself to observe how far sound was transmitted in a vertical direction. A level was driven on a vein at a depth of 538 feet below the surface, and happened to strike 187 feet distant in a horizontal direction below a stamp-mill dropping stamps weighing 330 pounds. The dropping of the stamps on the surface could be distinctly heard in the heading below, which in a direct line, the hypothenuse of a right-angle triangle, was separated by 571 feet of rock.

Coating Steel with Copper.—Experiments are at present carried on in Belgium to preserve steel, and steel gun-barrels in particular, by coating them thinly with copper by a process of which M. F. Weil is the inventor. Its peculiarity consists in the composition of the baths used, in which the usual and always dangerous cyanides of the alkalies are replaced by organic acids and glycerine. According to M. Weil, these baths require no renewal of organic elements, and can be used continuously when they are saturated with peroxide of copper. They possess, also, the advantage, owing to the property inherent in organic alkaloids of dissolving the peroxide of iron without attacking the metallic iron itself, of cleansing the steel before the commencement of the coppering process, and more perfectly than can be done mechanically. The coppering is effected by putting porous clay vessels filled with caustic soda lye, in which zinc plates have been immersed, in the basin containing the organic copper base (alkaloid) and the steel. The zinc plates are connected by a thick copper wire with the steel articles to be coated with copper. The caustic lye may be used over and over again. Should it become saturated with oxide of zinc, it is sufficient for its regeneration to treat it with sulphide of sodium, when the oxide (of zinc) will be precipitated and a by-product obtained, by which the cost of the process will be considerably reduced. The coppering process, it is said, occupies but a very short time.

Electrolytic Estimation of Zinc.—An abstract of a paper by A. Millot was given in a recent number of the *Journal* of the Chemical Society. According to the author, the process is as follows: 2·5 grams of the mineral are dissolved in 50 c.c. of hydrochloric acid, and a small quantity of potassium chlorate is added to the boiling solution in order to precipitate the iron. If the mineral contains much silica, it is previously evaporated to dryness with hydrochloric acid. The liquid is cooled, diluted, and mixed with 100 c.c. of ammonia, and 50 c.c. of a saturated solution of ammonium carbonate, in order to precipitate the lead and calcium. The liquid is diluted to 500 c.c., filtered, and 100 c.c., corresponding to ·5 gram of the mineral, and containing from ·2 to ·3 gram of zinc, are mixed with 1 gram of pure potassium cyanide and placed in a beaker, in which is suspended a cylinder of platinum gauze, which acts as the positive pole, and a platinum cone like that in Riche's apparatus, which acts as a negative pole. Two Bunsen cells or a Clamond thermo-electric pile of 150 elements may be used to effect precipitation, which is complete in about ten hours. The firmly-adhering deposit is washed with water, then with alcohol, and dried. If the mineral contains copper, the latter is deposited with the zinc. The deposit on the cone must in this case be dissolved in nitric acid, and the copper precipitated from the acid solution. If cadmium is present, it must be removed by treatment with hydrogen sulphide. The potassium cyanide should be used in the proportion given above. If more is added, the metal is deposited very slowly, while if less is added, the deposit of zinc is not adherent. Any action on the electrodes may be prevented by mixing the solution with

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ammonium acetate or nitrate. The latter, however, retards the precipitation of the zinc.

Long-Distance Telephoning.—A notable experiment in long-distance telephoning, says the *Scientific American*, was recently made on the new compound steel-copper wire of the Postal Telegraph Company, lately completed between New York and Cleveland, Ohio, a stretch of 650 miles. The compound wire has a diameter of $\frac{7}{32}$ of an inch, consists of a steel wire core, weighing 200 pounds per mile, that will resist a tensile strain of 1650 pounds, on which copper is deposited to the extent of 500 pounds per mile, with a resistance to the electric current not exceeding $1\frac{7}{10}$ ohms. The wire has seven times greater conductivity than iron wire of equal size, copper being the best conductor known except silver. It has double the tensile strength of iron wire of equal weight when strung on the lines, will last longer, permits the use of low tension currents and small batteries. Ninety per cent of the wires now in use are No. 9 iron, with a resistance of 20 ohms per mile, and the very best are No. 6 iron, with a resistance of 10 ohms, while the compound wire to be used by this company has a resistance of only $1\frac{7}{10}$ ohms. The resistance of No. 9 iron wire on a line from New York to Chicago, 1000 miles, is over 20,000 ohms, and on a No. 6 iron wire over 10,000 ohms, and on the compound wire less than 1700 ohms, thus bringing Chicago telegraphically as near to New York as Philadelphia, and San Francisco as near as Cleveland, compared with the best wires now in use. When the two compound wires are completed between this city and Chicago, their operating capacities will, it is said, be thirty thousand messages per day. The new conductor is certainly a great improvement over any land line of similar length heretofore established, and its successful completion marks the opening of a new era in the progress of electrical communication.

Mr. F. W. Cushing, the manager of the Postal Telegraph Company in this city, states that on the 7th inst. a speaking trial was made over the new line from New York to Cleveland, the transmitting telephone used being that of Mr. George M. Hopkins. The words spoken in this city were, it is said, distinctly heard in Cleveland. The success of the experiment was so conclusive as to satisfy the officers of the company that in the near future the length of the telephonic circuits may be greatly extended; and they believe Chicago will shortly be brought within hearing of New York, a distance of about one thousand miles. The peculiar feature of the Hopkins transmitter is, that one end of the carbon electrode is supported upon or floats on a liquid—mercury—the fluid serving to press the electrode into contact with the carbon button of the telephone diaphragm, without the intervention of a spring or weight. It is, therefore, a self-adjusting instrument, always in readiness for speaking, whether subject to the loudest or the softest tones, upon the longest or the shortest lines.

THE second issue of the *Water-Gas Journal* comes to us bright and attractive in appearance, and well filled with interesting matter concerning the interests with which, as its name implies, it is identified. It is published monthly in Philadelphia by Mr. Leon P. Lowe, Mr. George W. Graeff, Jr., being the managing editor.

A LARGE BLAST IN A SPANISH IRON MINE.—A report of the directors of the Marbella Iron Company, working mines in Spain, says: The attention of your directors having been called to the successful results, both as regards rapid progress and economy of labor, which had been obtained at the Argyllshire granite quarries, the breakwater works at Holyhead, and elsewhere, by the use of "monster blasts," they commissioned an experienced mining engineer, already well acquainted with the circumstances under which our mining operations in Spain are carried on, to examine into the matter, and report as to whether the system referred to might be adopted with advantage at Marbella mines, principally with a view to increasing the output. The engineer's reply was of a sufficiently favorable nature to encourage an experiment. A mine was driven under his directions, and two magazines were prepared, each containing 30 cwt. of gunpowder, which were exploded simultaneously, by means of an electric battery, during the last week of October. The immediate result was all that could have been desired. The portion of the hillside which it was intended to dislodge was heaved quietly over, not a single stone being thrown to any great distance. It was confidently expected that sufficient ore had been obtained to furnish a good output for several months with very little more expense than that of selection and transport; but in a few days, it became evident that the hill had been affected to a much greater extent than was at first apparent. Large masses of earth and limestone, which form the overburden or cap of the lode, began slowly to detach themselves, and to roll down the slope of the hill to the floor of the open cast workings, making the place so dangerous that it was necessary to withdraw all the miners. These falls continued at short intervals until nearly the middle of December, since which time a full force of men has been actively employed in clearing away the rubbish. It will be seen, therefore, from the foregoing, that the output of 18,600 tons was really raised between July and October, and that the operations of November and December, being entirely of an unproductive nature, have reduced, instead of adding to, the profits of the year. It must, however, be clearly understood that this expenditure has been unproductive merely in the sense of immediate profits, because the portion of the overburden which fell on the ore must necessarily have been removed sooner or later, and there can be no doubt that in its present loose state the rubbish is much cheaper to handle than if it had been attacked in the solid at the top of the hill.

FURNACE, MILL, AND FACTORY.

A company has been formed in Newark, N. J., called the American Electric Storage Company, to take over the Keith patent. We are informed that the system is now in working order at the office of the company, No. 792 Broad street, Newark.

At Niles, Ohio, the Arnold furnace, which was recently blown in after undergoing extensive repairs, is working satisfactorily and making a large output.

Ground was broken for a new furnace at Cranberry, North Carolina, on March 3d. Among the gentlemen present were Gen. A. Pardee, Jr., General Hoke, C. H. Nimson, John S. Wise, and George Richards, James H. Simpson, and Augustus C. Canfield, of Dover.

The Iron and Steel-Works at Ironton, Ohio, were offered at public sale recently, but no bids were offered.

The Charlotte furnace, at Scottdale, Pa., has been banked down, on account of the large amount of metal on hand and no orders. The company will not resume for at least one month, and not then if business does not brighten up. This company's ore mines at Mount Vernon, on Chestnut Ridge, five miles from the furnace, will continue work until April 1st, and, if the furnace is not put in blast at that time, will likely shut down also, which will throw about seventy-five more men out of employment.

The Allentown Rolling-Mill Company resumed work in its Lehigh mill on the 12th, giving employment to 400 men.

The new furnace of the Cherry Valley Iron Company, at Leetonia, Ohio, is completed, and will blow in soon. The new stack is seventy-five feet high, and it is expected the furnace will turn out at least 100 tons per day.

With the exception of the bar mill, all portions of the rolling-mill of Andrews Brothers & Co., at Haselton, Ohio, are running full time. No. 2 of their blast-furnaces is in, No. 1 having been blown out some time ago.

At a meeting of the Western Nail Association, on the 11th inst., it was decided to make no change in the selling price of nails—$3.40 per keg; to resume operations on the 19th, work for three weeks, and then shut down for two weeks more. The action is rather surprising to a majority of persons who think they know considerable about the trade, and is a disappointment to the 8000 workmen, who regard this as the best season of the year, and who hoped that no more suspensions would be ordered. The manufacturers justify their course on the ground that jobbers seem unable to rid themselves of the impression that they should regulate the price of nails, and that those who manufacture should have nothing to say concerning the price.

At the works of Kern & Co., in Silesia, Germany, a gas-heated furnace is used for heating iron wire. The apparatus comprises ten ovens, arranged in a circle, with a central crane for moving the pots and weights. These ovens are cylindrical in shape, and the gas is introduced underneath, having been mixed with atmospheric air while yet in the burners. The flames surround the wire pot and pass combustion products off through an opening directly in the top of the oven. The apparatus in question has been in use for about eighteen months, and has been giving general satisfaction. The pots are more thoroughly heated and last much longer than by the old system.

No. 3 stack of the North Lebanon furnaces, at Lebanon, will blow out shortly for repairs.

Oliphant furnace, owned by the Fayette Coke and Furnace Company, will soon be ready for work. Extensive repairs have been made during the stop, and several needed improvements added.

The Youngstown (Ohio) Steel Company made a test of its new plant last week, which was eminently satisfactory in every respect, a fine quality of steel being produced. At present, the company employs but 30 men, but the force will soon be increased.

A contract has been made between the Harrison Wire Company and the Marsh & Harwood Company, of St. Louis, whereby the waste acid product from the wire-works is to be utilized in the manufacture of copperas. A works for the purpose is building near the wire plant. It is estimated that the product saved hereafter will be worth several thousand dollars every year.

Stack No. 2 of the Pioneer furnaces, Missouri, has been blown out on account of low prices for pig-iron, and will be overhauled and repaired during the idleness. The force of wood-choppers has been reduced considerably.

GENERAL MINING NEWS.

ARIZONA.

PEABODY.—A copper-smelting plant, from Messrs. Fraser & Chalmers, has been contracted for by this company, located in the Dragoon Mountains.

UNITED VERDE COPPER COMPANY.—Mr. F. F. Thomas, manager of this company, has ordered a copper-smelting plant from Messrs. Fraser & Chalmers, Chicago.

EMPIRE DISTRICT.

TOTAL WRECK.—Our correspondent "Bendigo" sends us the following under date of March 10th: The Total Wreck mill has been at work since February 13th. The beginning was of necessity slow. It had to be tested, machinery adjusted, batteries and pans regulated, and interstices filled. Therefore, taking into consideration the usual delay in starting a new mill, the results, so far, have been very satisfactory. The clean-up for the first eleven days is $50,000 in round numbers, or about $5000 a day, which ought to be satisfactory to the stockholders. It certainly confirms the judgment of its friends, as heretofore expressed. This property has, since its discovery, been managed on business principles. The management, while encountering many difficulties, has pursued a steady, straightforward course, never doubting, never flagging in the prosecution of the work of opening a body of ore sufficient to justify the erection of a twenty-stamp mill, and to keep it at work constantly for at least two years, the wisdom of which is now manifest. The Total Wreck Company has now 40,000 tons of ore in sight in its mine. The battery assays give from $81 to $90.06 per ton. The capacity of the mill is sixty tons per day. The bullion is 935 fine. Developing the mine was renewed with the commencement of the reduction of the ores, and is showing larger and richer bodies of ore than those now worked. For once, enterprising New York gentlemen are to be congratulated in having one of the best paying mines in Arizona.

GRAHAM COUNTY.

From the Clifton *Clarion* we have the following:

ARIZONA COPPER COMPANY.—The Coronado group, the property of this company, consists of the Matilda, Copper Crown, Crown Reef, Coronado, Horseshoe, and Boulder, 9000 feet in length of surface ground, besides other properties. From the Matilda down to the Boulder, a distance of one and a half miles, there is a vertical difference in depth of 1000 feet, and over this entire distance the croppings are very plain. The principal work has been done on the Matilda and the Copper Crown on the eastern slope, and on the Horseshoe on the western slope running down toward Eagle River. The upper incline railroad passes through the hill by a tunnel cut on the ore-vein. This tunnel, when completed, will be 1200 feet in length. It is now in about one half of the distance. This tunnel will afford facilities for getting out the ore from the Horseshoe and other claims on the extreme west, which will be connected with the main track by means of inclined railroads, and at the same time stoping can be done at any point along its entire length with but slight interruption to the transfer of cars. The average width of the vein in these mines is four feet, and the assay averages 14 per cent copper.

CHASE CREEK.—This group consists of nine locations, six of which show good copper ore in the croppings. On three of these claims—the Lulu, Maud S., and Bon Ton—considerable development-work has been done. A tunnel has been run on the Lulu to tap the vein, which is now in 240 feet. The head of the tunnel is in iron and spar. The ore is carbonate, and assays show 20 per cent copper. The Maud S., adjoining the Lulu on the north, shows the same kind of ore. About 60 tons from this claim have been worked in the Clifton smelter, and have yielded a satisfactory percentage of copper. An incline has been run down on the vein a distance of 80 feet, and there is still an abundance of good ore in the face. It is from this tunnel that the ore which has been worked in the smelter has been extracted. The Bon Ton, the third claim which has been worked to any extent, has an incline tunnel 220 feet, which taps the vein at a distance of 100 feet. The ore in this claim, while of the same character as that in the Lulu and Maud S., is not of as good quality.

DETROIT COPPER COMPANY.—This company, which adjoins the Longfellow property on the west, and is connected with that property by a tunnel through the Yankie, owns the Copper Mountain, Yankie, Arizona Centra

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and Montezuma mines. At a distance of 200 feet from the entrance of the tunnel, the first large ore-body in the Copper Mountain was cut. Stoping is carried on from this point westward and south, on what is evidently a cross-vein or feeder of the main lode. Two winzes have been sunk to a depth of fifty feet each, both of which went down in rich ore, and large stopes are worked at present on the second level, which is 500 feet in length. In addition to the ore-bodies in the mine, there are large surface deposits of rich copper ore, and iron carrying a large percentage of copper, which makes it very valuable for fluxing purposes. The Yankie mine adjoins the Longfellow. The shaft is 150 feet deep. The first level is at a depth of 95 feet. Here large quantities of red oxide ore are stoped out. A winze to connect with the level below is sinking, which is now down 30 feet, and was sunk in solid ore from the top. Large stopes of ore are worked on the second level at a depth of 150 feet. Probably the largest body of glance ore anywhere in this section belongs to this mine, and is on what is known as the Lower Yankie. One of the shafts on the Arizona Central has been sunk 75 feet in rich carbonates and copper glance. A whim has lately been placed on No. 1 shaft, and a drift is running to connect Nos. 1 and 2 shafts. When this is through, an unlimited amount of ore can be stoped. Part of this property, called the Upper Arizona Central, has a large body of carbonate ore. It is the intention to put in a tramway to connect this part of the Arizona Central with the Copper Mountain mine. Not much is doing at present at the Montezuma mine.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—There were crushed during the past week 137 tons of ore; average assay value, $29 per ton. The east cross-cut, 1000 level, was advanced 11 feet. The north drift, 800 level, is 269 feet long. The flow of water is decreasing somewhat.

STANDARD CONSOLIDATED.—During the past week, 1266 tons of ore were milled. The south drift on the 1000 level has been connected with a winze in Bodie Consolidated. There is no special change in this or the upper levels.

SYNDICATE.—The mill will start up on March 20th.

PLUMAS COUNTY—GREENVILLE DISTRICT.

The Greenville *Bulletin* says:

GREEN MOUNTAIN.—The water supply being exhausted, the mills were forced to stop, though water has been supplied to furnish power for running the air-compressor, so that work in the tunnel has not been interrupted; the ventilating fan is in operation and the work is going on more rapidly than before.

TAYLOR-PLUMAS.—This mill is also idle for want of water in the mine. Most of the work lately done has been confined to the winze; the drift here has been steadily pushed eastward, with good prospects as the work advances. A few hands were put to work last week in the face of the main tunnel; the ground here gives indications of becoming softer, and, according to the usual experience, the ledge may be expected to widen out.

SAN BERNARDINO COUNTY—PROVIDENCE MINING DISTRICT.

The Providence *Times* reports as follows:

A new strike was recently made between the Bonanza King and Rattler. The shaft is now down some 12 feet, with every prospect of a fine body of ore. The company also, in sinking a winze in the south end of the mine, struck another body of fine mineral.

A mine has been opened north of the Bonanza King, which is showing up a considerable quantity of high-grade ore. There are now sunk two shafts, one some 50 feet and the other about 25, with several openings along the ledge. In drifting from the bottom of one of the shafts, some high-grade ore has been taken out.

BONANZA KING.—The mill is still running on second-class ore and turning out two thousand ounces of silver daily, 930 fine. The mine is looking better than at any other time during its history. The rich strike in the extreme south end of the first level continues.

LUCKNOW.—The owners have run across a ledge of about ten feet carrying mineral the full width. There are several other small openings on this claim, making a good showing of mineral.

CANADA.

It is stated that the Preston phosphate mine at St. Helen's Lake, Portland West, near the celebrated Light Rock mine, has recently been sold to a New York company for $100,000. Preparations are making to carry on operations extensively as soon as the spring opens.

NEW BRUNSWICK.

ELM TREE.—The ore has been concentrated with satisfactory results.

NOVA SCOTIA.

OXFORD.—A new vein of gold quartz, some sixty feet south of this mine, is now opening by the owners of that property. It gives prospects of turning out equally valuable with the other lead, now yielding so richly, the quartz already obtained looking very promising.

COLORADO.

We are informed by Mr. W. E. Wright, of Rome, N. Y., that a manganiferous iron ore mine has been opened in the foot-hills of the Cheyenne Range, southeast from Pike's Peak, about twelve miles west of the Denver & Rio Grande Railroad, and about fourteen miles north of the line from Pueblo to Leadville. There are three claims from which ore has been taken, containing, by analysis, 13·54 per cent of metallic iron, 35·44 per cent of manganese, 0·07 per cent of sulphur, a trace of phosphorus, 6·58 per cent of silica, 4·40 per cent of magnesia, 1·20 per cent of carbonic acid, a trace of lime, 8·70 per cent of alumina, and 2·94 per cent of moisture and organic matter. Two other analyses showed 18·59 and 28·02 metallic iron, 21·04 and 12·95 per cent of manganese. 10·59 and 14·89 per cent of silica, 0·15 and 0·11 per cent of phosphorus, and 0·10 and 0·08 per cent of sulphur. Other assays show a range of 3·99, 5·38, 7·12, and 28·2 per cent of manganese and 22·61, 30·35, 47·12, and 35·7 per cent of iron, the ore, therefore, being suitable for spiegeleisen manufacture.

SUMMIT SILVER.—This is a reorganization of the old Akron Mining Company. Its purpose is to at once sink a shaft on the territory of the company, to strike a lode that is now successfully worked in what is known as the Murray mine, near Lawson, Columbia Mountain. The Summit Mining Company was organized March 2d, by the election of five directors, namely, O. C. Barber, Frank Adams, George T. Perkins, H. E. Merrill, and N. B. Stone. The stock, $50,000, has all been taken, and as soon as snow is off, the company will begin work. On the 6th, the directors met and organized by electing George T. Perkins President, and N. B. Stone Secretary and Treasurer.

CLEAR CREEK COUNTY.

EMPIRE CITY.—This lode is worked with an adit run in on the vein from the base of the mountain, which has now reached a distance of 280 feet. Arrangements have been made to erect a stamp-mill.

MOLINE TUNNEL.—This company has lately purchased the New Boston lode and the mill belonging to it, since which time it has suspended work in the breast of the tunnel and is now drifting east on the vein. Arrangements are making for a plant of machinery to be put up in the mill, for concentrating the ore, which will be ready for operation in a very short time. The construction of a wire tram is also contemplated.

DOLORES COUNTY.

RICO PASADENA.—This company has purchased the interests of E. L. Davis and T. B. Townsend in the Leila Davis mine, and increased its capital stock to $2,000,000.

FREMONT COUNTY.

The Royal George smelter, at Cañon City, will blow in shortly. It will be of the water-jacket pattern, with two stacks, and, for its size, will be very complete.

GILPIN COUNTY.

The Central City *Register-Call* says that negotiations are pending for the sale of several mines in Independent and Central mining districts. The mines of these districts are receiving more than ordinary attention from capitalists.

CARROLL.—This mine is worked under tribute to a party of miners. In sinking the working-shaft, quite a body of pay material was left on the hanging-wall, which the miners are taking down and sending to the stamp-mill and sampling-works. A portion of the dump-pile, thrown away as worthless, was sent to the stamp-mill and yielded 3¼ ounces gold per cord. The shaft is 85 feet deep, and has good walls, the vein being a well-defined true fissure. Since the recent parties took hold of the property, they have raised mill-dirt that yielded from 4 to 6 ounces per cord. The smelting ore nets from $40 to $50 per ton.

HARD MONEY.—The lessees of a part of this mine west of the main shaft, in sinking, broke into a vein of mineral precisely of the same quality and appearance as that found in the main shaft at the depth of 130 feet. When the mineral was first struck, it had some lead; but in sinking the last few feet, it has changed materially for the better in quality and quantity.

HIDDEN TREASURE.—Arrangements have been made for running a tunnel in on the vein and under Perigo Mountain. The tunnel will be the means not only of opening up undeveloped portions of the vein, but will drain the mine to a depth of over 500 feet.

ROLLINS.—The company has its air-compressors in readiness to start up at any time, and will use power drills in driving the lower cross-cut tunnel, which will intersect the Perigo vein at a depth of 600 feet. The company will undoubtedly increase its stamping capacity by the erection of a 50-stamp mill this season.

WHITING.—Work has been begun in this mine, which has been idle for a year.

GUNNISON COUNTY.

GOLD CUP.—The Tin Cup *Banner* states that regular shipments are made. The ore shipped to Denver averages from 107 to 208 ounces. Besides the large quantity of first-class ore stored away at the mine, there is a large dump of lower grade, assays of which give not less than thirty ounces in silver per ton. The mineral body varies from three to seven feet. The new engine will soon be in working order, when more men will be employed.

LAKE COUNTY.

Late Leadville advices contain the following:

BIG CHIEF.—The pumps have been started up, and the mine will soon be free from water and ready for working. It is believed that in some portion of the mine the ore-body lies above the present workings.

DUNKIN.—The mine is now worked, and sufficient ore is shipped to yield a profit above expenses. The work is confined to the north workings, where some good ore has been found in the second level. A drift is running on the third level, to get under the ore-body, when shipments will be increased.

LITTLE PITTSBURG.—The manager expects to resume work on the north end of the property. The No. 10 shaft will be put down, and drifts run to catch the ore-bodies developed by the recent strikes in that neighborhood.

MORNING STAR AND EVENING STAR.—The Morning Star is maintaining its shipments at about seventy-five tons of ore a day. The Waterloo incline is advancing, and still carries the ore-body with it. The sinking of the McHarg shaft is progressing. The shaft has now reached and penetrated what may be called the first contact, and it will be rapidly pushed to the lower or Waterloo contact, where, from present indications, there is every prospect that the ore-body developed in the incline with which the shaft will connect will be cut.

Shipments from the Evening Star continue at about seventy tons daily. The sinking of the upper shaft to tap the lower contact will not be resumed until heavier pumping machinery is put in. The mine is looking well.

PITKIN COUNTY.

The Leadville *Herald* states that reports from Aspen show that mining operations are nearly at a stand-still in that camp, owing to the lack of a market for the ore, and the fact that the prospecting season has not yet opened. The North Texas Smelting Company, which was expected to afford an ore-market, has its smelter completed, but does not possess the necessary funds to operate it on a profitable basis. Its investigations have shown that the camp is capable of maintaining a sufficient supply of ore; but owing to its character, it will be necessary to add roasters to the present plant, in order to treat it successfully. Until this company succeeds in raising the funds requisite to enable it to go on, or the smelter passes into the hands of men with greater capital, it is probable that things will be a little dull at Aspen, as most of the larger mines are shut down or doing but little work, preferring to wait for a home market rather than ship at the present heavy expense of transportation.

In the Stevens and Leiter property, near Highland, a body of very fair-grade ore has been opened up, that runs from forty to fifty ounces in silver, and well in lead.

The Camp Bird has developed a good body of high-grade ore, running several hundred ounces in silver.

The Buckhorn has recently caught the edge of a good ore-body.

The Oakland No. 2, at the head of Queen's Gulch, is working, and has exposed some very fair ore.

The Pioneer is working, but the Spar and the Smuggler are practically shut down.

At Ashcroft, work is confined mainly to the Tam O'Shanter group, where a shaft is sinking on the Montezuma vein. The mine shows a great deal of ore.

SUMMIT COUNTY.

ROBINSON.—No shipments have yet been made from this mine, although there is ore on hand. A good body of ore has been opened up in the winze from the twelfth level, and it is proposed to sink an incline from the bottom of the winze down the ore-body. The machine drills have been taken out, and a contract let to sink the new incline fifty feet. It is expected that this work will take about a month, when more will be known in regard to the future of the mine.

DAKOTA.

Dispatches to the New York *Tribune* state that the principal mining operations in the Black Hills are confined to "the belt," a strip of land about four miles long and two miles wide, in the immediate vicinity of the Homestake, Deadwood-Terra, and other noted mines.

In the central and southern hills, the following mills are idle: Pennington, Scandinavian, Minnesota, Charter Oak, Standby, Alta, Lodi, Grand Junction, Penobscot, Hartford, Dickover, Golden Star, Cross, Queen Bell, Uncle Sam, Florence, Sitting Bull (smelter), Oro Fino, Noble Grand, and Clermont; ranging in capacity from the one-stamp Uncle Sam to the sixty-stamp Standby. A number of these mills were closed by the freezing of water-ditches, and will start up in the spring; but most of them were erected for the purpose of gulling the public, and will remain inactive unless removed to better locations.

Placer mining has seen its best days in the neighborhood of Galena; still, much gold will be taken from gravel for years to come. The principal companies interested in this branch are the Deadwood Hydraulic, Nigger Hill, Sand Creek, Estrella del Norte, Rockerville Hydraulic, Harney, Battle Creek, Castle Creek, and Fort Meade. All of these companies have spent much money preparing for thorough work, and all will resort to the bed-rock flume and ground-sluicing process almost exclusively.

Custer County mica interests have proved of great value, and will attract

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much attention to the Black Hills hereafter. The mica, of great purity, abounds in ledges of large proportions. Shipments last year were large and frequent.

CALEDONIA.—The superintendent reports for the week ended March 4th: Ore produced, 1025 tons; shipped, 600 ounces gold; value, $10,000. The lower winze has advanced 6 feet; total, 35 feet; all in very good ore. The upper winze has advanced 15 feet; total, 56 feet. Connection will be made with the chamber to-morrow.

FATHER DE SMET.—The superintendent reports as follows: Herewith express company's receipt for bar No. 153, 601·78 ounces gold bullion, the result of run of mill for the first half of February. Scarcity of water, caused by the severe cold weather, with poor ore, is the cause of this small bar. Water is now abundant, and the ore is of better quality, although the general outlook is not as promising as I wish it was. We are running the north end tunnel; also the third level header, which is in milling ore; also a cross-cut to the east from chamber on third level. I shall soon start two drifts on second level, in both of which I hope to strike good bodies of ore. Report of mine from February 22d to March 1st shows ore extracted from first, second, and third levels, 2100 tons. Ore milled, 2100 tons. Third level header advanced 3½ feet. Header in 145½ feet. North end tunnel advanced 11 feet. Tunnel in 831 feet. I have started a rise to the surface at the end of the west cross-cut tramway level. It will be known as tramway level rise, and has advanced 18 feet.

FLORENCE.—This mill, at Galena, has resumed work upon a sufficient quantity of milling ore to insure at least a thirty days' run.

GOLDEN SUMMIT.—The mill, situated in Pennington County, is working smoothly on ore averaging $25 per ton, the total expense of mining and milling being less than $2.50 per ton. Great interest centers in the Golden Summit mine, as much has been said of it within the last six months. An open cut about 50 feet long exposes a 4-foot ore-body to a depth of about 25 feet; but whether it is a true fissure-vein or simply a deposit of no great extent, remains to be determined. It is believed, however, that the mistake of the Standby Company, which erected $150,000 works on a worthless location, has not been repeated.

GREAT EASTERN.—The mill has been silent for a long time through the apathy of the directors, and prospects are unfavorable for a change.

HIGHLAND.—A dispatch from Deadwood states that a portion of the mine caved in March 12th. The miners all managed to escape uninjured, excepting one who was fatally hurt.

PORTLAND-SNOWSTORM.—The mills situated at Bald Mountain stand upon good property, but dissensions in the companies made necessary a stoppage of work. It is reported that all the differences regarding the Portland have been adjusted; that the present mill will shortly resume work; and that a 100-stamp mill will be erected the coming season.

GEORGIA.

The Dahlonega *Signal* says:

COLUMBIA.—Work has been resumed, and the 4000-foot flume will be finished shortly. This line is to extend to property recently purchased by the company on Findley Ridge, half a mile southwest of the Bast of the Consolidated. The ore is in great abundance, and of a uniform grade, the lead being from 300 to 400 feet wide. The mine can be worked to a great advantage, as the proposed flume-line, when completed, will be 5000 feet long, which will entirely wear out the slate and clay, and greatly reduce the ore.

LOUD.—Some of the ore taken out is very rough, and has the appearance of gold taken directly from a quartz vein; other ores are imbedded in iron that seems to be of an aqueous formation; and other ores carry quartz. The gold taken from this mine is different in appearance from any other found on this belt.

IDAHO.

A correspondent of the Salt Lake *Tribune*, in speaking of the Lava Creek Mining District, says: The character of the ore is free milling. First in point of development is the Park mine. A shaft of 50 feet has been sunk on the ledge, about the center of the claim, with good pay-ore from the surface to the bottom. On the southeast of the claim, a tunnel has been run, which has tapped the vein at a depth of 100 feet. The ore-body is from eighteen inches to two and a half feet, rich in horn-silver, black sulphurets, and chloride. Northwest and joining the Park, is the Elk Horn, with a shaft 30 feet; the ore the same as the Park.

Next on the northwest is the Palace, with a shaft fifty feet. A few tons of ore from this mine sampled 296 ounces in silver and a percentage of gold.

To the southwest is the Noyes mine, with a shaft seventy-five feet, and the Emily Melville, running fifty feet, each showing good ore-bodies, assaying from $200 to $300 in silver. A tunnel is to tap the vein at a depth of 300 feet.

South and east, joining the Park, is the Valley mine, with a shaft twenty feet. The ledge is four feet wide, with ore assaying $50 to $100 in silver and a percentage of gold.

Joining on the south is the Joe Wilson tunnel, in twenty feet, showing a ledge four feet in width, assaying $100 to $500 in gold and silver, the larger percentage gold.

A quarter of a mile east from the Joe Wilson are the Picayune and Golden Chariot. The Golden Chariot has shafts from 15 to 20 feet deep at intervals the whole 1500 feet. The ledge is from two to three feet wide.

The mines are easy of access from Blackfoot. The distance is 75 miles, and from the Wood River Branch Railroad 50 miles. Wood and water for all purposes are near by. What the camp needs is a good mill.

MAINE.

WINSLOW TIN MINE.—Work has been resumed; men are at work pumping out the water.

ROSIER MINE.—A correspondent of the Bangor *Journal* says that there has been but a small force employed in the mine this winter, and consequently No. 2 and No. 3 shafts, from which large quantities of ore have been taken, have remained idle. The work of development has, however, been steadily going on in No. 1 shaft, with varied success. At the depth of 200 feet, ore of a good quality was found for some days; but the vein soon seemed to undergo a change, striking off at an angle which it was impossible to follow with the shaft, and only a portion of the foot-wall remained visible and very little ore was found for several weeks. But in the last few days, the vein has become more settled and regular, and ore of a very fine grade has been taken out. The vein is fast widening and the ore-body increasing in proportions.

MEXICO.

RONCESVALLES.—It is reported that this mine, in Batopilas District, Chihuahua, is again in bonanza.

MONTANA.

COLLAR.—This mine is building a twenty-stamp mill and sampling-works, two and a half miles from Fort Maginnis, under the direction of William M. Courtis, M.E.

LEXINGTON.—In our issue of February 24th, 1883, in quoting a communication to the Salt Lake *Tribune*, we gave the average amalgamation of the new mill for the month of January at 97·7 per cent. It should have been 89·7 per cent. The month of February, as Mr. F. Medhurst, general manager of the company informs us, was the most satisfactory in the history of the new mill, the average chlorination being 86·4 per cent, and the average amalgamation 91·4 per cent. On the 400-foot level, an ore-chute has been explored for a length of 120 feet, showing a body of ore of a uniform width of three feet, which samples 100 ounces in silver from one end to the other. The average ore-production of the Lexington during February was 55 tons.

MONTANA COPPER COMPANY.—The Butte *Miner* says that this company confines its work in the Colusa strictly to that point where the copper ore contains an average of about forty ounces of silver per ton. Sufficient ore is taken out to supply the blast-furnace, and five matting furnaces. It requires the steady run of eight calcining furnaces to calcine the ores; two more calcining furnaces are in process of construction, and will be started up shortly.

NEVADA.

ALBION.—The San Francisco *Stock Report* says that the mine has been placed under the direction of Mr. Reed, for many years superintendent of the Eureka Consolidated.

EUREKA TUNNEL.—The report of the superintendent and secretary shows that work was commenced in January, 1878, and has been continuously prosecuted to this date. The tunnel is now in length 2007 feet, the face in favorable looking mineralized lime, work on which has been discontinued for the present on account of bad air. The ore-bodies now extracted are about 1100 feet from the mouth or opening of the tunnel and below its level. In addition to the work on the tunnel, about 2500 feet of shafts, winzes, drifts, and stopes have been excavated in prospecting for and the extraction of ore. Net proceeds from ore reduced at furnaces from May 10th, 1882, to March 1st, 1883, $66,258.61. The present indebtedness of the company is reported to be $47,451.60.

SUTRO TUNNEL.—At the annual meeting, the following trustees were elected: C. W. Brush, W. Johns, F. F. Low, David Cahn, Thomas P. Storey, Hugh Marshall, and P. W. Ames. The company is doing no aggressive work at present. The tunnels are kept clear and in good repair, and the flow of water is uninterrupted.

NEW MEXICO.

Mr. Magruder, of Silver City, has ordered a copper-smelting plant from Messrs. Fraser & Chalmers, of Chicago.

Considerable excitement has been caused by the discovery of gold in Hell's Cañon. Several new strikes are reported in the Floridas. Extravagant reports are circulated about heavy strikes in the Organ and San Andres ranges. There has never yet been found in either of these ranges a property that has warranted the erection of a five-ton smelter, and there is not a smelter or mill in either.

MASSACHUSETTS & NEW MEXICO.—A dispatch to the New York *Tribune* says that the 'company's mines, situated in the Hachita Range, on the line of Chihuahua and New Mexico, have closed down, and the miners have seized the property for wages.

NEW MEXICO & ILLINOIS MINING AND MANUFACTURING COMPANY.—At the annual meeting at Albuquerque, recently, the following directors were elected for the ensuing year: Benjamin L. Cook, George D. Cook, B. L. Jones, William Vannatta, and Thomas Penrose, of Chicago; William Borchert, W. E. Talbott, and A. M. Codington, of Albuquerque; and Frederick Haberland, of Rio Puerco. A smelter of thirty tons' capacity has been ordered, and will be at Chama by March 15th, and will be taken to Copper City immediately thereafter and set up. The company proposes to push its interests forward as rapidly as possible this year.

ST. LOUIS.—Another rich strike was recently made on the St. Louis mine. As the third level was driving south on a rich mineral vein, a large body of red oxide and copper glance was encountered at a distance of 70 feet. An average fire-assay across the vein runs 35 per cent copper. Within the last week, several bodies of rich mineral have been encountered in the lower workings, where none was supposed to exist.

VALVERDE MINING COMPANY.—Work has been commenced within the last week on the Centralia mine, owned by this company, of Paschal. This is one of the most promising prospects in the Burros. The work done has exposed a fine vein of black oxides, carbonate of copper and azurite, between gneiss and porphyry. Work on it will be watched with great interest, as it is supposed to be a parallel ledge of the St. Louis and Pittsburg mines. The water-jacket furnace has been in operation for several weeks.

NORTH CAROLINA.

The great mine at Cranberry is doing well, and has about 5000 tons of ore on hand. It recently shipped 1500 tons of the ore to Allentown, to be used in the manufacture of Bessemer pig.

TENNESSEE.

Zinc mining in East Tennessee is fast assuming important proportions. The old Mossy Creek mines, in Knox County, have been reopened, and are now worked successfully.

UTAH.

SAMPSON.—The Salt Lake *Tribune* speaks of this mine as follows: The mine is located in the basin just east of Piñon Hill, and the Crescent Company. The works are near the upper end of the gulch, and the lower workings are in solid ground. The original workings were located several hundred feet down the gulch, where a shaft was sunk and much work done prior to last year. When the present manager took hold of the management last season, he at once began a new shaft farther up. This shaft had a horse-power hoisting-works placed over it, and the shaft went down in a short time to the depth of 235 feet. The air becoming bad, work was suspended. In the mean time, an incline, known as the Van Praag, was run in from a much lower point, the mouth being 600 feet east of the shaft. The two have since been connected by a drift. At the mouth of the incline, a steam-engine and boiler have been put in operation, with suitable hoisting apparatus. At a point 170 feet from the mouth of the incline, a cross-cut was run to the ledge, 25 feet, and on this ledge drifting has been done each way for a distance of 25 feet, making 50 feet drift on the vein. This is 110 feet below the surface, and in ore from one to three feet wide. A winze is sinking, starting on ore eight inches wide, and in going down thirteen feet the ledge widened to eighteen inches, while the quality of ore is good and improving. This ore has been prospected for eighty feet in length on the vein, being first-class all that distance. It is the intention of the company to sink a two-compartment shaft at the mouth of the tunnel, 400 feet deep, where it will, it is thought, tap the vein. At the 200-foot level, a cross-cut will be run to tap the ledge. In the mean time, the work of mining will go on in the incline, the ore in sight being able to pay the expenses of these developments. At present, the miners are taking out from three-quarters to one and a quarter tons of ore per day, and sixteen men are employed in mining and doing dead-work. The ledge is a true fissure-vein, inclosed in walls of quartzite and porphyry. An assay of some ore shipped showed 48 per cent lead and 107·9 ounces silver, with a trace of gold. The ore from the bottom of the drift goes 42 per cent lead and 164·9 ounces silver. In sinking the shaft, at the upper end, the workmen struck ore in pockets at various points, before getting down to solid ground. As it is, they know that there is a well-defined ledge for 600 feet in the ground thus far explored.

VIRGINIA.

A corporation to be known as the Rorer Iron Company has been organized at Roanoke, with Ferdinand Rorer, of Roanoke, President; Samuel Coit, of Hartford, Conn., Vice-President; J. H. Sykes, of New York, Treasurer; Lucian H. Coke, of Roanoke, Secretary. Directors: G. M. Bartholomew, Samuel Coit, of Hartford, Conn.; George N. Gray, of Ironton, Ohio; E. G. McClannahan, G. Rorer, Roanoke. The Rorer Iron Company owns 3000 acres of land, most of which is rich in magnetic iron ore, situated in Cave Spring District, the western portion of Roanoke County, including the Joseph A. Gale property, on which a mining town known as Gale is founded. Gale is about four miles from Roanoke. The company will build a narrow-gauge railroad at once from its mines at Gale, by way of Mr. G. W. Hawbert's farm, to intersect with the Shenandoah Valley Railroad in the west end of Roanoke. On the Roanoke River, the company will erect, as early as practicable, a large furnace, which will be on the line of its narrow-gauge railroad.

WISCONSIN.

The discovery of some fine beds of iron ore on the Wisconsin Central Railroad lands, on the Penokee range, has aroused a great deal of interest in that section. It is stated that the surface ore found on the Penokee range indicates a much heavier deposit than that of the Menominee.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, March 16.

The mining market this week, like that of last, presents no features of an interesting character. The dealings have been mostly confined to a few low-priced stocks, which have no real value and which would be dear at any price. The general market has been weak, and closed to-day with a tendency to a still further decline.

Of some of the more prominent stocks dealt in, Robinson was weak throughout and to-day sold at its lowest price, 78c., closing at that figure. Sierra Grande has been irregular during the week closing weak to-day. Elko Consolidated has been manipulated up to a strong figure, the transactions being very large. Lacrosse has been very active within the last three days, and sold at strong prices. Sonora Consolidated was actively dealt in, but declined and closed weak. The aggregate number of mining shares dealt in at all the Exchanges was 456,790, as against 416,443 last week.

The Comstock shares have been very quiet and irregular. California was a little weak, selling from 11@9c., with a business of 3000 shares. Consolidated Virginia records a small business at weak prices, selling from 53@49c. Sierra Nevada was very quiet at $2.65. Union Consolidated, under small transactions, was quite strong; it sold from $4.95@$4.55@$5. Mexican developed a little strength, with a small business, and sold from $3.15@$2.75@$4. Ophir sold at $3.25, with a small business. Yellow Jacket was quiet and steady, selling at $1.63@$1.50. Best & Belcher was very quiet and sold at $4. Sutro Tunnel was quiet and irregular; it sold from 22@18@21c., with a business of 4650 shares.

The Leadville stocks record small transactions, and were generally irregular. Amie was active and irregular, selling from 26@31@22c. Chrysolite was also irregular, under a small business, and sold from $1.30@$1.45@$1.35. Dunkin was dealt in to the extent of 1300 shares, at 25@20@23c. Breece sold at 22c. Iron Silver records a small business at irregular prices, selling from $3@$2.90@$2.95. Leadville had a fair business at strong prices; it sold from 69@75@72c. Little Chief was very quiet at 38c. Little Pittsburg was quiet and strong, selling from 58@64c., with a business of 650 shares. Big Pittsburg sold at 19@20c., and Climax at 10@9c.

The Bodie stocks were quiet and steady. Bodie Consolidated was very irregular, selling from $1@75@85c. under a business of 1140 shares. Bulwer was quiet and steady, selling from 91@98c. Standard, with a small business, was very irregular, selling from $6.50@$7.25@7@$6.50.

The Tuscarora stocks were quiet and steady. Grand Prize sold at 50c. throughout the week. Argenta was quoted at 42c. with one transaction. Navajo had a small business, and was a little weak; it sold from $4@$3.35@$3.40. North Belle Isle records a moderate business at weak prices, selling from 50@43c. Independence sold at 50c. Elko Consolidated was very active and developed considerable strength; it sold from 7c.@18c., with a business of 61,700 shares.

In the miscellaneous list, Alice was quiet and irregular, selling from $3.05@$2.80@$2.90. Bassick was quiet and strong, selling from $9.50@$10. The Green Mountain stocks were almost neglected. Green Mountain was strong at 65@78c., and Rising Sun sold at 5@4c. Horn-Silver records small transactions at strong prices; it was dealt in to the extent of 695 shares at $7.50@$8. Ontario was quiet and strong, selling from $28@$25@$24. Robinson Consolidated had an active business at very irregular prices throughout, closing quite weak to-day; it sold from 90@78c. Sierra Grande was active and has been weak, selling from $2.90@$2.75, with a business of 9800 shares. Silver King, under a small business, suffered a decline, selling from $11.25@$10.50.

Bradshaw was quiet and steady, selling at 31c. Central Arizona records but one transaction, and that at 35c. Decatur had a very active business at irregular prices; it sold from 7@5@6c. Durango, under a moderate business, was irregular, selling at 10@8@9c. Eastern Oregon had a fair business, and was weak; it sold from $1@75c. Harlem M. & M. Co. has grown stronger, with a good business, selling from $1.25@$1.35, the transactions amounting to 8100 shares. Lacrosse records a very active business, and has been strong; it sold from 11@18c. Oriental & Miller was quiet and steady at 14@15c. Red Elephant sold at 6@5c., with a business of 600 shares. Silver Cliff was quiet and steady, selling at 39@40c. Sonora Consolidated had an active business at very irregular prices; it sold from 48@52@44c. South Pacific was actively dealt in and was strong, selling from 5@8c. The State Line stocks were quiet and steady; Nos. 1 and 4 sold at 3c. and Nos. 2 and 3 at 6c. Taylor-Plumas records an active business at steady prices, selling at 18@17c.

The local Montana papers speak very discouragingly of the Alta-Montana. It appears that the works have been closed down, and the product has considerably fallen off. The offices of the company in this city have been apparently given up, and no information can be obtained as to its present headquarters.

MEETINGS.

Electro Metal Refining Company, No. 41 Liberty street, New York City. Annual meeting of stockholders for the purpose of reducing the capital stock to one hundred thousand dollars, April 4th, at twelve o'clock M.

Resolute Mining Company, office of Mr. H. Hoffman, No. 629 Walnut street, Room 7, Philadelphia, Pa. Annual meeting of stockholders and election of trustees, April 2d, at twelve o'clock M.

DIVIDENDS.

The Carbonate Hill Mining Company, of Colorado, has declared dividend No. 3, of 5 cents per share, payable April 2d. Transfer-books close March 20th, and reopen April 2d.

The Homestake Mining Company, of Dakota, has declared its fifty-fifth dividend, for February, of $50,000, payable at the office of the transfer-agents, Lounsbery & Haggin, March 26th. Transfers close March 20th. Total amount of dividends paid to date $1,912,500.

The Oxford Gold Mining Company, of Nova Scotia, has declared a dividend of 5 per cent on the capital stock, payable March 17th. Books closed on the 13th, and reopen on the 19th.

The Silver King Mining Company, of Arizona, has declared a dividend of 25 cents per share.

The Smuggler Mining Company, of Colorado, has declared a dividend, No. 5, of 10 cents per share, or $6000 on its capital stock.

The Northern Belle Mining Company, of Nevada, has declared a dividend of 50 cents per share.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, No. 55 Broadway, report as follows for the week ended Friday, March 16th:

One week ago to-day, petroleum opened 88 bid, and after selling down to 86c. closed 89¼c. On the following day, prices opened 88⅝c. and closed 93¼c. On Monday, the 12th, the market opened up 95½c., or 2 cents per barrel above Saturday's closing, and with great excitement and heavy trading prices advanced to $1.00⅝ at the close. The following day, prices opened at $1.02, or nearly 2 cents above the closing of the night before. Since Tuesday, prices have fluctuated between 97½c. and $1.01, and at one P.M. to-day (Friday) were 99⅜c. The immediate cause of the advance was the rapid decline of the new wells which had been opened up on the Cooper tract, and the "running to cover" of the short interest, which was quite large.

The total production of the Cooper tract two weeks ago was 1700 barrels daily. About one week ago, it rose to 3100, but since Sunday of this week the production has fallen off 1300 barrels, and is now about 1850 daily. The spotted character of the Cooper tract would seem to preclude any heavy or continued production, and if oil is to become a glut in the market, it will come from some other region. The Sherman well is expected on soon, and as it will define the extent northward of the Cooper tract, its showing is important.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
March 10.....	$0.88⅞	$0.92⅞	$0.88	$0.92⅞	714,000
12.....	.95⅛	1.00½	.94⅝	1.00	1,052,000
13.....	1.01	1.02¼	.98½	.99⅝	772,000
14.....	.99	1.00¼	.97½	.98⅝	841,000
15.....	.98	.99½	.98	.98¾	345,000
16.....	.99¾	1.01½	.97½	1.01¼	808,000
Total sales.....					4,532,000

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been quiet and featureless. There is no change of interest in the Comstock shares, they remaining quiet and steady. The outside stocks record but a small business, and have been firm.

An assessment of twenty-five cents per share has been levied by the Tip Top Silver Mining Company, payable immediately, and delinquent April 16th.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week:

NAME OF COMPANY.	CLOSING QUOTATIONS. Mar. 9.	Mar. 10.	Mar. 12.	Mar. 1?.	Mar. 14.	Mar. 15.
Albion						
Alpha	1		1	1	1	15-16
Alta	5-16	5-16	5-16	5-16	5-16	5-16
Bechtel						
Belcher			13-32	9-16	9-16	7-16
Belle Isle			⅛	⅛		
Best & Belcher	3⅞	3⅞	3⅞	3¾	3¾	3¾
Bodie	13-16	27-32	13-16	29-3	27-32	3-16
Bullion						
California		⅛	5-32	3-32		
Challar						
Con. Virginia	½		½	9-16	9-16	½
Crown Point		21-32	21-32	21-32	21-32	21-32
Elko Cons	3-32	3-32			3-32	3-16
Eureka Con	9	9				
Exchequer	3-16	3-16	3-16	3-16	3-16	3-16
Gould & Curry	2⅝	2¾	2⅝	2½	2½	2½
Grand Prize			½	½	½	½
Hale & Norcross	2⅞	2⅞	2⅞	2¼	2¼	2¼
Independence	7-16				13-32	7 16
Martin White	¾	13-16	¾	7-16	7-16	½
Mexican	2⅞	2¾	2⅞	2⅝	2⅝	2⅝
Mono	3-16					
Mount Diablo						3½
Navajo	3½	3¾	3¾	3½	3½	3⅝
Northern Belle	9⅞	10	9⅞	10	10	9½
North Belle Isle	½	7-16			½	7-16
Ophir	3	3⅛	3	3	3⅛	3⅛
Overman						
Potosi	15-16	1	15-16	29-32		
Savage						
Scorpion						
Sierra Nev	3⅜	3⅜	3⅜	2⅞	2⅞	2¾
Silver King						
Tip Top						
Union Con	4⅝	4⅝	4⅝	4⅝	4⅝	4⅞
Wales Con	¼	¼	¼	5-16	¼	3-16
Yellow Jacket	1⅓		1⅓	1⅓	1⅓	1⅓

The following are the financial balances of the various mining companies on March 1st:

CASH ON HAND.

Alta	$24,707.10
Argenta	1,662.27
Andes	96.15
Best & Belcher	19,266.34
Bulwer	12,630.31
Benton Consolidated	7,226.36
Challar	12,056.91
Consolidated Virginia	77,594.93
California	15,036.56
Day	1,608.98
Gould & Curry	39,386.29
Hale & Norcross	46,932.80
Lady Washington	13.53
Northern Belle	82,001.50
Potosi	6,787.97
Seirra Nevada	27,301.90
Savage	6,963.38
Standard	123,804 23
Union	32,871.84
Yellow Jacket	21,249.98
INDEBTEDNESS.	
Grand Prize	9,117.00
* Star, old indebtedness, $36,839.84 overdraft	39,332.34
Ora	6,000.00
Utah	2,863.77

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, March 15.

There is a slightly improved feeling in the market for copper stocks, and prices show a small advance over the closing rates of last week. At the same time, the market is extremely dull, and orders to buy or sell are few and far between. There seems to be an entire absence of speculative feeling, and business is confined to the few stocks which are paying or are expected to pay dividends in the near future. Calumet & Hecla declined from $235@$233, but subsequently recovered and sold up to $236; the product of the mine for February (24 days) was 1454 tons. Franklin declined to $11½, with later sales at $12; the product for February was 151 tons. The annual report for 1882 shows a surplus of $244,330.37, January 1st, 1883, against $116,842.65, January 1st, 1882; but as the surplus consists largely in copper and supplies, the question of a dividend is still unsettled, although at the annual meeting the subject will probably be considered. Pewabic dull and declined from $7 to $6

The February product of this mine was 69 ton

Quincy declined from $47@46¼ in the early dealings but rallied and sold at $48½, closing $48 bid. The February product was 175 tons. An official letter from the mine confirms what has been known privately namely, that the very rich 50-foot deposit of ore encountered on the 250-fathom level extends all the way down to the 290 and 300-fathom level. The outlook of the mine is every way favorable. Osceola sold at $80½@$81, with a sale of 100 shares at $29½

seller 30; later the stock sold at $30, ex dividend $1 per share. A small sale of Atlantic is reported at $13, a decline of $1 per share from last sale. Allouez declined from $2½@$1½, with later sales at $2.

The market for silver stocks continues dull and featureless. Bonanza sold at $2½; Catalpa declined from 60@52½c., with later sales at 60c., which was bid. Crescent declined to 25c. Harshaw sold up ⅛, at 87½c. San Pedro, steady at 60@67½c. Silver Islet declined from $5@$4, at which it was offered. Another assessment of $1 per share is rumored. Sullivan sold at $15-16; Napa Quicksilver, at $3¼.

At the Boston Mining Exchange, the usual amount of business has been transacted, but without any special feature. Massachusetts & New Mexico continues to decline under persistent selling, touching 8c., seller 60, to-day assessment 5c. paid. Empire dull, at 20c. bid. Brunswick Berth declined to 47½c., seller 30, but this afternoon advanced to 57½c. regular.

3 P.M.—The market this afternoon was dull and void of interest. Franklin sold at $12. Pewabic declined to $6½. Closing prices: Allouez, $2 bid. Bonanza, $2½ bid, $2¾ asked. Calumet & Hecla, $236 bid, $242 asked. San Pedro, 65c. bid, 67½c. asked. Catalpa, 62½c. bid, 65c. asked. Pewabic, $6½ asked. Quincy, $48½ asked. Huron, $1¾ asked. Harshaw, 75c. bid, $1 asked. Sullivan, 87½c. bid.

BULLION MARKET.

NEW YORK, Friday Evening, March 16.

Owing mainly to the extreme stringency of our money market, sterling exchange has materially declined since our last issue, and has caused a corresponding fall in the price of silver, as shown in accompanying table of rates for the week.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
March 10..	51⅛	110⅞	March 14	51 3-16	111
12..	51 3-16	*	15..	51 3-16	110⅞
13..	51 3-16	111	16.	51 3-16	†

* 111@111⅛ †110¾@110⅞.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.12 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13⅛ per cent. to arrive at actual value.

MINES.	States.	For the week.	Month of February.	Year from Jan. 1st, 1883.
Alice, G. S.	Mont.		$73,864	$163,905
*Alta-Montana, G. L. S.	"			†10,625
Bodie, G. S.	Cal.			44,798
Bodie Tunnel, G.	"		7,315	18,946
*Bonanza King, G.	"		51,355	113,132
*Boston & Montana, G.	Mont.			18,053
*Central Arizona, S.	Ariz.			15,627
*Christy, S.	Utah.			23,260
*Chrysolite, S. L.	Colo.		†30,945	57,435
Contention, S.	Ariz.			88,694
Crescent, G.	Cal.			13,000
*Custer, G. S.	Idaho.			43,572
*Deadwood-Terra, G.	Dak.		38,860	84,556
*D.rbec Bl. Grav., G. S.	Cal.			8,337
*Father de Smet, G.	Dak.		27,112	69,189
*Frisco M. & S. Co., G. & L.	Utah.			22,671
*Homestake, G.	Dak.		103,670	211,348
Horn-Silver, S. L.	Utah.		276,000	479,000
Independence, S.	Nev.			10,000
Lexington, S.	Mont.		103,315	192,365
*Little Pittsburg, S. L.	Colo.		6,768	11,875
*Marguerite, G.	Cal.		15,600	25,900
Martin White, S.	Nev.		36,842	56,249
Moulton, G. S.	Mont.			41,005
Navajo, G. S.	Nev.		64,450	144,450
Northern Belle, S.	"		139,371	204,545
*Ontario, S. L.	Utah.		181,846	364,067
*Oxford, G.	N. S.		4,500	7,365
*Satemo, G.	"		700	2,500
Standard, G.	Cal.		87,843	170,802
Star, S.	Nev.		1,169	15,965
Stormont, S.	Utah.		15,440	34,570
Syndicate, G.	Cal.			9,217
Tintic M. & M. Co.	Utah.			7,632
*Tip Top, S.	Ariz.			7,976
*Tombstone, G. S.	"		51,000	123,011
Yellow Jacket, S.	Nev.		14,704	28,956
Total amount of shipments to date				$2,044,598

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended March 16th, as compiled from various sources, amounted to $348,929.75, as against $258,298.41 reported for the previous week. The receipts from January 1st, 1883, to date are $3,250,729.27.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended March 10th	$423,568
Corresponding week last year	940,408
Since January 1st, 1883	2,460,350
Corresponding period last year	12,234,748

Imports.

Week ended March 10th	$250,638
Corresponding week last year	54,757
Since January 1st, 1883	1,377,806
Corresponding period last year	700,012

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £260,000 bullion, and its proportion of reserve to liabilities was reduced from 43 to 42 3/16 per cent, against 42 7/16 per cent at this date last year. The weekly statement of the Bank of France has not been received.

METALS.

NEW YORK, Friday Evening, March 16.

Copper.—The market has been quiet but unchanged, the only feature of special interest being the beginning of an export movement of Lake copper, about 2,750,000 pounds having been contracted for at a price reported to be 16c. Whether this is to be the beginning of any movement of magnitude remains to be seen, but there is every reason to believe that small lots at least will follow. It will certainly, if developed into greater proportions, accomplish one thing which is very important, namely, restore harmony in the ranks of the Lake producers, who, it is whispered, were beginning to get a little restive. We are far from taking the gloomy view of the future of the metal which others appear to delight in. It may be frankly acknowledged that the production is heavy, and we claim to have done much toward showing what it really is; but we can not, taking all the points into consideration, indorse the opinion, persistently though quietly expressed, that we are driving toward the export point at a rapid rate. The very fact that we shall probably export copper materials heavily, and besides send out some Lake copper, will keep us fairly steady. A very large and probably the most influential class of consumers asks nothing else but that the price of the raw material be kept steady, no matter what it is. It is true there is another class which claims that all it wants is low raw material in order to "beat creation" in manufactured brass. We suspect that there is considerable exaggeration about this; but if it could be shown to be the case, we have no doubt that leading producers would accommodate them by doing, as, in the time of the export of cartridges, they placed them in a position to compete.

There is one very important point that the enthusiastic bears in copper seem to utterly forget. Many enterprises, notably in Arizona and New Mexico, were started a year ago when copper was 17 or 18 cents. Now the selling price of many of these outside brands is 15½ cents, from which must be deducted the cost of refining, interest on loans, cost of transportation, etc. With labor high, coke at $60@$70 per ton, and development-work on hand, it requires ore of very high grade indeed to pay for working, and there are, to our knowledge, a number of enterprises auspiciously begun that have at present prices no brilliant future before them.

We quote Lake Copper nominally 17⅝@17¾c., though any attempt to force sales would make it difficult to realize more than 17½c. Baltimore is nominally quoted at 16c., and outside brands 15½c. England cables Chili Bars £65 10s.@£65 15s., and Best Selected £71 15s.@£72 5s.

Tin.—There has been considerable excitement in this metal, due principally to favorable advices from Singapore and London, the quotation in the latter market having been forced up to £96 15s. to-day. Transactions here foot up to 700 or 800 tons at steadily advancing prices, spot Straits being now quoted 20¾@20⅞c.

Lead.—The market here has relapsed into absolute stagnation. The best bids obtainable are 4·65c., while holders profess to be firm at 4·70, though we hear that 4·67½c. would be met. There has not been a single wholesale transaction in the market during the entire week, and we quote nominally 4·67½@4·70c. for Common, and 4·70c. for Refined.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day:

Our market is firm. Sales for the week sum up over 90 tons of Hard lead at 4·25c. and 80 tons of Refined at 4·27½c., and 170 tons at 4·30c. Receipts were 850 tons, against 550 tons last week.

Spelter.—We are unable to note much change, although in itself this metal is very much better situated than any other largely produced in this country. We quote 4⅝@4¾c. for Domestic.

Antimony.—There has been no change worthy of mention.

Quicksilver.—The present spot price is $28.50 per flask for A, and 37@37½c. for other brands. The London price has dropped £5 15s. Here to 36½@37c.—*San Francisco Commercial Herald.*

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 16.

The British Iron and Steel Association has just published the following statistics, collected by Mr. J. S. Jeans, secretary, the unit being the gross ton:

PRODUCTION OF BESSEMER STEEL INGOTS.

District.	1881.	1882.	Increase.
South Wales	384,656	483,086	98,430
Sheffield	392,812	420,000	27,188
Cleveland	264,986	326,924	61,938
Lancashire	227,465	239,983	12,518
West Cumberland	162,775	191,326	28,551
Staffordshire	9,025	12,330	3,305
Total	1,441,719	1,673,649	231,930

The make of rails was as follows:

PRODUCTION OF BESSEMER STEEL RAILS.

District.	1881	1882.	Increase.
South Wales	305,043	367,944	62,901
Sheffield	245,469	310,000	64,531
Cleveland	216,004	265,842	49,838
Lancashire	135,543	140,708	5,165
West Cumberland	121,093	150,693	29,600
Staffordshire	588	598	10
Total	1,023,740	1,235,785	212,045

The number of Bessemer steel-works in operation in the United Kingdom during 1882 was the same as in the preceding year, namely, 23; one new works having begun to manufacture steel for the first time in that year, while another company discontinued the manufacture altogether. The number of converters in work during the year was 80, or two less than in 1881, while 24 were inoperative—three less than in 1881; and 10—or four less than in 1881—were in course of construction.

There has been a considerable improvement in the average productiveness of the converters at work in 1882, as compared with any preceding year, as the following figures show:

Year.	Average annual yield per converter. Tons.
1879	12,641
1880	13,125
1881	17,582
1882	20,920

But while the converters in work have averaged 3338 tons per converter more than in 1881, there is a large amount of variation in the yields obtained in the different districts, the averages of which have been as under:

District.	Number of converters at work.	Total production of ingots. Tons.	Average per converter. Tons
South Wales	19	483,086	25,425·58
Sheffield	26	420,000	16,153·84
Cleveland	12	326,924	27,243·66
Lancashire	14	239,983	17,141·64
West Cumberland	7	191,326	27,332·28
Staffordshire	2	12,330	6,165·00

The best result obtained at individual works was 78,202 tons with two converters—an average of 39,101 tons per converter; while at another works the average yield per converter amounted to 31,178 tons per converter. The former is believed to be the best "record" that has yet been made in the United Kingdom in Bessemer practice. With such excellent practice throughout the country, the work done last year by eighty converters might be accomplished by forty-six.

The total quantity of Bessemer steel plates manufactured in the United Kingdom during 1882 was 33,500 tons, against 21,989 tons in 1881, and 21,500 tons in 1880. Of the 23 works engaged in producing steel of this description, nine turned out in 1882 quantities of plates varying from 14 to over 10,000 tons.

As in the preceding year, a large trade was done in blooms during 1882, chiefly on American account. The total quantity produced was over 130,000 tons.

The following table gives the production of open-

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. March 10. H.	March 10. L.	March 12. H.	March 12. L.	March 13. H.	March 13. L.	March 14. H.	March 14. L.	March 15. H.	March 15. L.	March 16 H.	March 16 L.	SALES.
Alice, Mon.	3.05	2.80	3.00	.....	.....	.....	3.00	.....	2.90	.....	.....	.....	2,000
Amie Con., Co.	.26	.21	.23	.....	.23	.22	.21	.....	.21	.....	.22	.....	22,175
Argenta, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.42	.....	.....	.....	200
Bar. & Walker, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	.....	.....	10.00	9.50	10.00	.....	.....	.....	500
Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Cons., Ca.	1.00	.90	1.00	.....	.90	.85	.90	.....	.75	.....	.90	.85	1,140
Breece, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.22	.....	.....	.....	500
Bulwer, Ca.	.....	.....	.....	.....	.91	.....	.....	.....	.93	.....	.....	.....	300
California, Ne.	.11	.09	.10	.....	.....	.....	.....	.....	.09	.....	.09	.....	3,000
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribou Con., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Co.	.....	.....	1.35	1.30	1.40	1.35	1.45	1.35	1.35	.....	1.35	.....	3,100
Climax, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	.09	.....	600
Cons. Va., Ne.	.53	.50	.51	.....	.52	.....	.50	.....	.49	.....	.49	.....	2,890
Deadwood-Terra, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.22	.....	.25	.20	.23	.....	.....	.....	.....	.....	.....	.....	1,300
Eureka Cons., Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Excelsior, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dk.	2.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.....	.....	.50	.....	.50	.....	.....	.....	.50	.....	.....	.....	600
Great Eastern, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green Mountain, Ca.	.68	.65	.68	.....	.....	.....	.....	.....	.....	.....	.78	.....	1,900
Hale & Norcross, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	2.80	.....	.....	.....	100
Hall-Anderson, N. S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hibernia, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	16 00	.....	.....	.....	10
Horn-Silver, Ut.	7.63	7.50	8.00	.....	.....	.....	8.00	7.50	8.00	.....	.....	.....	695
Hukill, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independence, Ne.	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Iron Silver, Co.	.....	.....	3.00	2.90	2.90	.....	2.90	.....	2.95	.....	2.95	.....	2,500
La Plata, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co.	.75	.69	.75	.73	.72	.....	.....	.....	.....	.....	.....	.....	5,400
Little Chief, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.88	.....	100
Little Pittsburg, Co.	.....	.....	.60	.....	.....	.....	.53	.....	.64	.62	.....	.....	650
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moose, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	.....	.....	4.00	.....	3.40	3.35	.....	.....	3.40	.....	3.40	.....	1,500
Northern Belle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.50	.....	500
North Belle Isle, Ne.	.50	.....	.45	.....	.....	.....	.....	.....	.43	.....	.....	.....	1,100
Ontario, Ut.	.....	.....	28.00	.....	25.00	24.75	.....	.....	.....	.....	24.00	.....	320
Opair, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	3.25	.....	3.25	.....	500
Plumas, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca.	.....	.....	.....	.....	9.00	.....	.....	.....	.....	.....	.....	.....	100
" Com., Ca.	.04	.....	.05	.....	.05	.04	.....	.....	.05	.04	.....	.....	1,200
Rising Sun, Ca.	.87	.85	.90	.87	.89	.86	.86	.84	.86	.84	.88	.78	54,200
Robinson Cons., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sierra Grande, N. M.	2.90	2.85	2.85	.....	2.80	.....	2.75	.....	2.85	2.80	2.85	2.75	9,800
Sierra Nevada, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	2 65	.....	.....	.....	510
Silver King, Ar.	11.25	.....	11.25	.....	11.12	.....	.....	.....	10.75	.....	10.50	.....	470
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	.....	6.50	.....	.....	6.50	.....	7.00	.....	7.25	7.00	7.00	6.50	430
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.85	.....	100
Yellow Jacket	1.63	.....	1.63	.....	1.50	.....	.....	.....	1.50	.....	.....	.....	600
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. March 10. H.	March 10. L.	March 12. H.	March 12. L.	March 13. H.	March 13. L.	March 14. H.	March 14. L.	March 15. H.	March 15. L.	March 16. H.	March 16. L.	SALES.
Advance.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Albion, s. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alta-Montana, G.	.....	.....	.....	.....	.11	.....	.....	.....	.....	.....	.....	.....	400
Am. Flag, s.	.....	.....	.....	.....	.09	.....	.....	.....	.....	.....	.....	.....	300
Barcelona, G.	.18	.....	.18	.....	.....	.....	.....	.....	.....	.....	.18	.....	600
Bear Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'icher, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.00	.....	.....	50
Big Pittsburg, S. L.	.20	.....	.20	.19	.20	.....	.....	.....	.....	.....	.....	.....	700
Bradshaw, S.	.31	.....	.31	.....	.31	.....	.....	.....	.....	.31	.....	.32	1 300
Buckeye	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
" pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bye and Bye	.08	.....	.08	.....	.02	.....	.02	.....	.....	.03	.....	.....	1,800
Calaveras, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
C'lav'r's W. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. S. H., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.35	.....	.....	100
Catskill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz'na, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.35	.....	.....	400
Chapparal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherokee, G.	.....	.....	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imp'ri'l, G. S.	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Pacific, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crowell, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.04	.....	.....	1,000
Dahlonega, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.07	.05	.06	.....	.06	.....	.06	.05	.06	.05	.06	.....	53,200
Durango, G.	.09	.....	.10	.09	.09	.....	.09	.08	.09	.....	.09	.....	8,900
Eastern Oregon	1.00	.95	1.05	.95	.95	.....	.95	.....	.95	.....	.95	.75	4,400
Elko Cons.	.07	.....	.10	.08	.11	.10	.15	.11	.18	.15	.18	.17	61,700
Enterprise	.41	.35	.31	.25	.25	.15	.17	.13	.17	.14	.17	.16	97,000
Fannie Barret	2.20	.....	2.20	.....	2.25	.....	2.25	.....	.....	.....	.....	.....	700
Gold Placer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.08	.....	.....	1,000
Granville, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	1.25	1 20	1.25	1.20	1 25	1.20	1.25	1.20	1.35	1.25	1.35	1.30	8,100
Hortense, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	.....	.....	300
Lacrosse, G.	.....	.....	.....	.....	.....	.13	.11	.15	.13	.17	.14	.13	.15	37,200
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	3.13	.....	3.15	3.00	.....	.....	.....	.....	.....	2.88	2.75	4.00	3.63	1,010
Mono	.25	.22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, S.	.15	.....	.15	.....	.15	.14	.14	.....	.....	.15	.....	.15	.....	2,900
Quartz Creek.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.09	.....	.....	1,000
Red Elephant, S.	.05	.....	.05	.....	.06	.....	.06	.05	.....	.....	.....	.....	600
Ruby, of Arizona.	.33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Silver Cliff, S.	.40	.....	.40	.....	.40	.39	.39	.....	.....	.39	.....	.40	1,300
Sonora Con.	.49	.48	.52	.49	.51	.49	.50	.....	.....	.50	.46	.46	.44	14,200
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific.	.07	.05	.07	.06	.08	.07	.08	.07	.08	.07	.08	.....	23,500
State Line	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 1 & 4, S.	.....	.....	.03	.....	.....	.....	.03	.....	.....	.....	.03	.....	2,100
" Nos. 2 & 3, S.	.06	.....	.06	.....	.06	.....	.06	.....	.06	.....	.06	.....	4,000
Sutro Tunnel	.....	.....	.22	.18	.22	.21	.21	.20	.21	.20	.21	.....	4,650
Taylor-Plumas	.18	.....	.17	.....	.17	.....	.17	.....	.17	.....	.17	.....	12,700
Tuscarora, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, S.	.....	.....	.....	.04	.....	.04	.....	.....	.....	.....	.....	.....	200
Union Cons., G. S.	.....	.....	4.95	4.90	4.95	.....	4.65	4.55	5.00	4.75	5 00	.....	1,600
Vandewater	.21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Washington	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 121,490. Non-dividend shares sold, 335,300.

BOSTON MINING STOCKS.

	March 9. H.	March 9. L.	March 10. H	March 10. L.	March 12. H.	March 12. L.	March 13. H.	March 13. L.	March 14. H.	March 14. L.	March 15. H.	March 15. L.	Sales.
Allouez	2.00	.....	1.50	.....	.....	.....	2.00	.....	2.00	.....	.....	.....	450
Atlantic	.....	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & Bel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza D.	2.62½	.....	2.50	.....	.....	.....	.....	.....	2.75	.....	.....	.....	210
Bruns. Ant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hec.	234¾	233	235	.....	235	.....	235	.....	236	.....	.....	.....	100
Carbon. Hill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Catalpa	.60	.....	.60	.55	.55	.52½	.56	.....	.60	.58	.60	.....	5,550
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherryfield	.25	.....	.....	.....	.....	.....	.....	.....	.25	.....	.....	.....	1,000
Chrysolite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virginia	.....	.....	.....	.....	.....	.....	.57	.....	.....	.....	.....	.....	200
Copp'r Falls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent	.27½	.....	.27½	.27	.25	.....	.25	.....	.25	.....	.....	.....	1,200
Cumberl'd	.6	.....	.6	.....	.....	.....	.60	.....	.60	.....	.60	.....	2,900
Deer Isle	.11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Duncan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Empire	.21	.19	.21	.20	.....	.....	.21	.....	.21	.20	.21	.....	9,000
Eureka Con.	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
Franklin	.....	.....	11.75	11.50	.....	.....	11.87	.....	12.00	.....	12.00	.....	190
Gila County	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hancock G.	.....	.....	.....	.....	.....	.....	9.00	.....	.....	.....	9.00	.....	200
Harshaw	.....	.....	.....	.....	.....	.....	.87½	.....	.....	.....	.....	.....	300
Horn-Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Q'n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.60	.....	200
Mammoth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mass. & N. M.	.13	.....	.12	.....	.....	.....	.12	.11	.10	.09	.10	.09	58,000
Milton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa	.....	.....	3.25	.....	3 25	.....	.....	.....	.....	.....	.....	.....	125
National	.....	.....	.....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	100
North. Belle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.00	.....	50
Osceola	29.50	.....	31.00	30.50	.....	.....	30.00	.....	.....	.....	.....	.....	128
Penn-Breck	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewabic	.....	.....	.....	.....	6.75	.....	7.00	.....	6.75	.....	6.50	.....	275
Pine Tree	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth	.23	.....	.22	.....	.....	.....	.22	.....	.22	.....	.22	.....	800
Quincy	46.50	.....	47.00	.....	.....	.....	48.00	47.75	48.50	.....	48.50	.....	191
Ridge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Pedro	.....	.....	.....	.....	.60	.....	.62½	.....	.70	.65	.67½	.65	1,300
S'ra Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S'ra Grande	2.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.75	.....	200
Silver Islet.	4.50	4 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150
Silver King	.....	.....	.....	.....	.....	.....	11.25	.....	.....	.....	.....	.....	50
Simpson Gd	.05	.....	.....	.....	.....	.....	.....	.....	.05	.....	.05	.....	3,000
So. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.08	.....	500
Standard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, Nos. 2 & 3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.95	.93¾	200
Sutro Tun.	.23	.....	.....	.....	.....	.....	.22	.....	.22	.....	.22	.21	2,400
Sycamore	.21	.20	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	600
Twin Lead	.05	.....	.....	.....	.....	.....	.05	.....	.....	.....	.06	.....	3,000
Vizina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	March 9. H.	March 9. L.	March 10. H.	March 10. L.	March 12. H.	March 12. L.	March 13. H.	March 13. L.	March 14 H.	March 14 L.	March 15. H.	March 15. L	Sales.
American	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Argent	.24	.24	.24	.23	.22	.....	.21	.19	.20	.....	.20	.18	29,600
Arizona So.	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	.22	.....	1,100
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Battle Mt.	.3	.....	.03	.....	.03	.....	.03	.....	.03	.....	.04	.....	22,600
Black Sul.	.....	.....	.02	.....	.02	.....	.02	.....	.....	.....	.....	.....	6,700
Bodie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buena	.08	.....	.05	.....	.05	.....	.04	.....	.....	.....	.03	.....	7,400
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calista	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati	.10	.....	.10	.....	.....	.....	.....	.....	.....	.....	.09	.....	2,850
Comprom'e	.35	.....	.....	.....	.32½	.....	.....	.....	.....	.....	.....	.....	2,100
Contention	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dauntless	.....	.....	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Del Monte	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Fairview	.....	.....	.....	.....	.....	.....	.....	.01	.....	.01	.....	.01	11,000
Eureka	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Girard	.14	.12	.13	.11	.13	.....	.13	.12	.13	.....	.14	.13	40,900
Golconda	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Golden Age.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Governor	.....	.....	.09	.....	.09	.....	.10	.....	.09	.....	.....	.....	12,500
Grand Uni'n	.....	.....	.20	.....	.19	.....	.....	.....	.18	.....	.....	.....	4,000
Gunnison	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hancock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch.	.09	.....	.08	.....	.09	.....	.09	.....	.09	.....	.09	.....	31,000
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Maud	.07	.....	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	1,500
L'g & D'y Hl	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McCullough	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Magnolia	.02	.....	.01	.....	.01	.....	.01	.....	.....	.....	.01	.....	11,500
Montana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Lincoln	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Sheridan	.04	.....	.04	.....	.04	.....	.05	.....	.05	.....	.04	.....	30,100
National	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion Pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palmetto E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina	.22	.....	.22	.....	.23	.21	.21	.20	.....	.....	.20	.....	8,200
Penn-Breck	.13	.11	.13	.....	.13	.12	.13	.12	.13	.....	.13	.....	15,100
Permanent	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

hearth steel in each district of the United Kingdom during each of the last two years, with amount of increase in the latter year :

PRODUCTION OF OPEN-HEARTH STEEL.

District.	Production. 1881. Tons.	1882. Tons.	Increase.+ Decrease.— 1882. Tons.
Scotland	102,000	213,000	+111,000
South Wales	159,500	129,500	— 30,000
Sheffield	34,000	42,000	+ 8,000
Northwest Coast	24.000	17,000	— 7,000
Northeast Coast	12,200	6,000	— 6,200
Other districts	6,300	28,500	+ 22,200
Total	338,000	436,000	+ 98,000

The number of open-hearth furnaces erected in the United Kingdom at the end of each of the last three years has been :

At the end of 1880	120 furnaces.
" 1881	149 "
" 1882	163 "

The average annual production of the open-hearth furnaces actually at work in the United Kingdom during each of the last three years has been—

In 1880	2,540 tons.
" 1881	2,925 "
" 1882	3,114 "

American Pig.—The demand thus far has been a disappointment, buyers not coming forward with any alacrity to secure the season contracts, which are ordinarily pretty well closed by this time. It is conceded quite generally by producers that there is nothing to warrant the expectation of an advance, while consumers appear to argue that possibly the bottom has not yet been touched. We note sales for season delivery of about 4000 tons, an unimportant amount. We quote $23@$25 for ordinary to choice No. 1 Foundry, $21.50@$22.50 for No. 2, and $19@$20.50 for Gray Forge. Bessemer pig is quiet and dull, nominally at $21.50@$22.50, with prices slightly declining abroad. In spiegeleisen, we note sales of about 500 tons here at $32 for 20 per cent, and $27 for 10@12 per cent.

Scotch Pig.—Business drags along, although Scotch Foundry irons range considerably lower than American. Arrivals for the week foot up to 2200 @ 2300 tons, little of which has gone into store. Freights are again very low, 5s. from Glasgow to New York. We quote Coltness, $24.25@$24.50; Langloan, $24.25, 100 tons having been sold at that figure; Summerlee, $23.50@$24; Glengarnock, $22@$22.50; and Eglinton, $21@$21.50. At the Wall Street Exchange, the following cable quotations have been received, showing little change : Carnbroe, 55s. 3d.; Gartsherrie, 62s.: Summerlee, 62s. 3d.; Coltness, 64s. 9d.; Langloan, 65s.; Glengarnock, 55s. 3d.; and Eglinton, 49s. 6d.; warrants were 47s. 5d.

Rails.—Transactions footing up to about 8000 tons have been closed during the week at $39@$40 at mill, and we hear of the sale of 20,000 tons at Western mills at private terms. England is unchanged.

Old Rails.—We have been unable to verify the reports of transactions at low figures, evidently made for effect. The only sale of any magnitude has been 700 tons at $24 at Jersey City, and since then nothing has been done, although other business is pending. In Ohio, $25@$26 is asked; and at Pittsburg, $26½, which is below quotations here. There are inquiries in the market for D. Hs. at $26.75@$27, but holders decline to part with their old material below $28 net. Bridges are held at $28.25.

Scrap.—Business is restricted, and transactions few and far between. We quote $25 asked, ex ship.

Philadelphia. March 16.

The iron trade has developed no more strength than it had last week, and the sentiment among manufacturers and brokers is, that present prices are likely to continue a week or two longer.

Pig-Iron.—Between four and five thousand tons of Foundry and Forge iron have been sold during the week, mostly in 50 to 200-ton lots. Some furnace companies have been making offers of larger lots in 500 to 1000 tons, but buyers are not willing to take hold unless greater concessions can be made than makers are willing to concede. Quotations show a wider variation, but the concessions are mostly in inferior irons. The standards are maintaining their hold very well, and are selling at $25@$25.50 for No. 1, delivered; $22@$23 for No. 2. Gray Forge is quoted at $18@$19, at furnace, with some of the better brands fifty cents to one dollar higher. In the present situation of the market, consumers can not be induced to take hold very freely. Scotch iron is moving with a little more freedom in small lots among the foundries, and those who have been endeavoring to sell report the demand sluggish, prices running from $21.50@$26, and are a little weaker than heretofore. Bessemer iron is quoted at $22.50. Two or three inquiries for large lots are in the market, but terms can not be arrived at. Charcoal blooms are $64, and capacity is fairly engaged. Anthracite, $55.

Merchant Bar.—The demand for Merchant Bar is too irregular and too light to justify manufacturers in closing large contracts. A few days may change the entire aspect of affairs, and drive buyers into the market.

The merchant iron trade lacks its usual interest. Consumers decline to present any but small orders, and manufacturers are not able to attract consumers into the market except at impossible concessions. The interior mills are selling ordinary iron at about from 2@2·15c, and are not doing a very large business even at that. Refined iron has sold down as low as 2·15c. and as high as 2.30c., according to size of order. Orders could be placed to advantage at this time with little difficulty, but buyers are not easily convinced that it is to their interest to buy more than is needed for current requirements.

Nails.—The nail trade is in a more uncertain position than last week. The Western Association met on Wednesday, and made a gloomy report, reaffirming card rates, and advising continued alternate restriction. The capacity is admitted to be in excess of demand, and this policy will, it is thought, be necessary throughout the year, although this opinion is not unanimous. The Atlantic Nail Association, which held its meeting in New York yesterday, took, substantially, the same grounds, but the actual selling price of nails runs from $3.10 to $3.30, according to competition. The factories are accumulating stocks slowly; and in view of the possibilities of greater weakness, some of the larger consumers are placing orders for small lots. The trade finds itself in a very different position from that of a year ago.

Structural Iron is quoted at 2½c. for Angles : 3¼c. for Tees ; 3½c. for Beams and Channels. The business reported received this week is mostly in small orders, although there are some large specifications in sight which will probably lead to heavy transactions.

Plate and Tank.—Manufacturers of plate and tank report a favorable condition of trade and a fair supply of orders at slight concessions from card rates, which are 3½c. for Tank ; 3½c. for Shell ; 4½c. for Flange. As the spring season approaches, requirements are presented which indicate that the activity of the coming season will not fall behind that of last, although buyers are more exact as to terms.

Sheet-Iron.—Sheet-iron manufacturers are doing only a moderate business, at 4@4½c. for small orders, and are seeking large orders at sharp concessions. The uncertainty as to the spring demand is keeping prices favorable to buyers, and they are taking advantage of it.

Wrought Pipes and tubes are 67½ to 70 off for pipes to 55 for tubes. No large orders have been placed, although there is large business in sight. The hardware houses are shipping large quantities of goods this week, and the favorable weather promises an improving activity.

Steel Rails.—Quotations in small lots are reported at $39, and it is stated that $38 may be shaded for large lots, but makers decline to state lowest prices, except on inquiries from purchasers.

English Tees are dull at $25@$25.50. Inquiry has been made for Double-Heads and $27@$27.50 has been named, but no transactions have been closed as yet. Scrap sold at $25@$26 for inferior yard lots. Selected lots are moving freely at abont $27@$27.50, and in occasional instances $28.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 16.

Anthracite.

The companies have yielded to the pressure which urged full-time work, and so far as the employés in the coal regions are concerned, this move will be considered fortunate. It is not, however, so far as we have been able to gather from a careful inquiry, consistent with the promise of keeping demand and supply close together. There has not, during the past few weeks, been the slightest scarcity of coal, nor any immediate prospect of a rush in the demand. On the contrary, buyers are as conservative as ever.

Conferences between the coal companies have taken place in regard to opening prices, but as yet nothing has been done, nor is it likely that any thing will be done until the Pennsylvania Coal Company has had its say. It will go up to Newburg next week—is in fact now preparing to do so—and its circular will then be announced, followed, probably at an early date, by all the other and larger companies. The Western shippers have adjourned to the 28th inst.

Bituminous.

The period of uncertainty and to many of anxiety still continues. No one seems to know exactly where his neighbors are standing, and there is no end to the "suspicions" indulged in. So much, however, seems certain, that the Clearfield operators find the Pennsylvania Railroad intractable, while producers generally are unable to make buyers stir even by tempting offers, which it appears can only be made by many by gambling on freights.

Occasional lots of coal forced on the market are selling at a low figure. We have heard of $4.25, and quote the market for Clearfield $4.40@$4.65; and for Cumberland, $4.45@$4.75.

Those shippers engaged largely in supplying the foreign steamers with coal are considerably agitated over the prospective damage which the following clause in the new tariff will inflict upon them :

"A drawback of 75 cents per ton shall be allowed on all bituminous coal imported into the United States which is *a fterward used for fuel on board of vessels propelled by steam which are engaged* in the coasting trade of the United States *or in the trade with foreign countries*."

This will allow of the building up of a trade of Nova Scotia and English coals brought in at a low cost and supplied to steamers during the active season at a lower figure than American coals can be sold.

SUPPLIES.

Prices of Cordage.

The following new prices of cordage were adopted on the 13th inst. The prices of Manila are reduced ½ cent per pound, and those of Sisal advanced an equal amount. These prices are subject to the usual discount to the trade of 1 per cent per pound :

	Cents per pound.
MANILA ROPE.	
1¼ inch circumference and upward	16
12 thread, or ⅜ inch diameter	16½
6 and 9 thread, or ¼ and 5-16 diameter	17
Hay rope, 2, 3, 4, or 5 thread	16
Bolt and point rope	17½
Tarred rope and lath yarn	15½
Stave, leather, and hop twine	16½
SISAL ROPE.	
1¼-inch circumference and upward	11¼
12 thread, or ⅜-inch diameter	12
6 and 9 thread, or ¼ and 5-16 diameter	12½
Hay rope, 2, 3, 4, or 5 thread	11½
Tarred rope and lath-yarn	11
RUSSIA HEMP.	
White rope	17
Tarred rope and ratline	11
Spun yarn	10½
Bolt rope	18
Marline, houseline, rounding, and hambroline	15
Packing	16
AMERICAN HEMP.	
White rope	18
Tarred rope and ratline	12½
Spun yarn	12
Lath yarn	12½
Packing	17
Marline, houseline, rounding, and hambroline	16
Sash and bell cord	25@35
ITALIAN HEMP.	
Packing	20
Tarred rope	16
JUTE.	
Rope and packing	8

Horsford's Acid Phosphate

is recommended for headache occasioned by indigestion and whenever there is a general feeling of sluggishness and lack of energy.

CHEMIST, METALLURGIST, AND ASSAYER desires an engagement. Has had an extended experience in laboratory work.

P. O. BOX 450, New York.

HOMESTAKE MINING COMPANY, NO. 18 WALL STREET,

NEW YORK, March 12, 1883.

DIVIDEND NO. 55.

The regular monthly dividend of FORTY CENTS per share has been declared for February, payable at the office of the transfer-agents, Lounsbery & Haggin, 18 Wall Street, on the 26th inst. Transfer books close on the 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

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THE ENGINEERING AND MINING JOURNAL

VOL. XXXV. WITH SUPPLEMENT. No 12.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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Advertising Rates.—See page xv.

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ON Thursday, the conference committees of the two iron and metal exchanges in this city agreed on a plan for their consolidation. As yet, their formal report has not been made, and the details of the arrangement arrived at are not known.

IT is reported that Messrs. CARNEGIE Brothers, the Pittsburg steel and iron manufacturers, have made an agreement with the Ontario Central Railroad, and other parties interested, to carry out prospect-work on two iron ore deposits at Wallaston, Ontario. The CARNEGIES have paid $5000 cash, and are allowed to make explorations with the diamond drill, with the option of buying one mine for $700,000, and the other for $100,000, figures which seem very high.

MR. HENRY G. PEARSON, Post-Master, announces that, under arrangements recently made, letters directed to this city are separated in transit, and those on which the box-number forms part of the address are placed in separate packages, so that time in distributing them is saved. In order to secure proper attention, and in many instances enable us to save a week in publication, we would beg our correspondents to address, in the future, all letters to our Post-Office Box, **1833.**

* WE regret to announce the sudden death, at San Luis Potosi, Mexico, of Mr. FRANCIS A. LOWE, a frequent and valued contributor to the pages of the ENGINEERING AND MINING JOURNAL. Mr. LOWE was a graduate of the Sheffield Scientific School, and completed his education as a mining engineer and metallurgist at Freiberg. He was for years at Silver Islet, Lake Superior, and later at Batopilas, Mexico. He died at the age of thirty-seven, when on a professional trip, at a time when his accumulated experience was beginning to open out to him a promising career.

SWANSEA, too, is invaded by the corporation craze, two of the smelters of that great metallurgical center passing out of the hands of a private firm into those of a company. VIVIAN'S nickel and copper works, with the Norway mines, were capitalized at £320,000 some weeks since; and now the spelter works of Messrs. RICHARDSON & Co., with mines at Bergamo, Italy, follow with a capital of £105,000. Have Swansea smelters been getting too rich, or do they imitate the way of many of our Western operators, of "getting out" at the first intimation of hard times ahead?

A SIGNIFICANT statement was recently made at a meeting in London of the La Plata Mining Company, of Leadville, which does a considerable share of the smelting of ores in that district. The chairman reported that during the last three months the company has been losing 10 shillings, or nearly $2.50, per ton, a result that is attributed to mismanagement. It is well known that at least one of the smelters, conducted by a gentleman of great experience, is working at very low figures, the cost being rumored to be below $7 per ton. The management professes to have assurances that there is not any discrimination in freights against Leadville smelters.

THE Bethlehem Iron Company has struck out in a new direction. It has acquired mines, reported to be very great deposits of pure and uniform specular ore, in the island of Cuba, at a distance of four miles from the coast, and, by a line to be run, fifteen miles from Santiago, a good port. The ore is so readily accessible that it can be mined by open-cut work, and can be loaded directly into the cars. Until the railroad has been built to the port in question, the ore will be transferred by lighters at the nearest point on the coast to the vessels. With striking short-sightedness, the Spanish government promptly proposed to put on an export duty of 40 cents per ton; but we understand that this has been abandoned. If the deposits are all that we hear them reported to be—and our information comes from a trustworthy source—then these Cuban mines may be expected to rival the famous Bilbao mines. It is estimated that the ore can be put on board cars at mines at a maximum cost of 50 cents per ton.

IF the rumors are true that the lake producers have made contracts for additional shipments abroad, carrying the total, including the 2,750,000 pounds noted in our last, to 10,000,000 pounds, the metal is destined to take a firmer position. As yet the statement that such heavy transactions have taken place is not confirmed, but we are in a position to state that negotiations have certainly been going on. Rumor places the price at 16 cents; but it is a little doubtful whether some concessions would not be exacted by buyers of such large lots. So far as we are able to learn, no Western producers have this time entered into the pool, though ultimately probably some of the largest will find it expedient to co-operate with the lake producers in some way. As we pointed out in our last issue, heavy export sales put quite a different face on the status of the metal. They effectually put a quietus on all such talk as we have been hearing of late, that the great lake companies would kill off the small ones, or that they would put prices to such a figure that the new Western enterprises would be crowded to the wall. They have adopted the conservative policy which their relations with consumers seem to dictate. By clearing away their surplus, the lake companies will be in a position to make a price for their next home contracts, which will not be much, if any, lower than those made at the beginning of the year. The coming months will show to what extent other brands have succeeded in gaining a foothold among consumers, and this will be reflected by lesser requirements of the standard brand. The inducement as held out during the past months of a difference in price between lake and other brands, ranging from one to two cents per pound, is alone responsible for the steady appearance on the market of small lots of Lake copper, which have been selling down from 18 cents, until this week we hear of transactions based on 17⅛@17¼ cents, it being difficult to place copper at the latter figure. In the aggregate, this movement must have been quite important, and the early future will show whether or not it has injured the quality of manufactured goods to any appreciable extent. Our manufacturers have been spoiled by the good quality of Lake, and in rolling have become accustomed to subjecting the metal to the severest treatment without any fear of disastrous results. They can not do this with other copper, and we have reason to believe that it will take some time before our rule-of-thumb foremen know how to handle other grades. With such a difference in prices, we are convinced that it must be profitable to use phosphorus, manganese, and other compounds whose action in promoting density of casting and in improving the mechanical qualities of the metal is well established. The

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exceptional quality of our raw material has aided our manufacturers wonderfully. They must now learn how to use for many purposes copper which anywhere else would be rated very high, but which does not quite come up to Lake. Upon our refiners devolves a very important duty—that of watching ceaselessly over the uniformity of their product, so as to gain the confidence of consumers. They have made strong and well-directed efforts in this direction, and some of them are so anxious to avoid all possibility of danger to their product that they decline to allow raw material containing certain impurities, notably arsenic, to enter their works. Smelters in the West should thoroughly understand this. It is largely their fault when, by undue anxiety to reach a high-grade shipping product by as few smeltings as possible, they render its quality almost irremediably bad.

Nothing but earnest co-operation on the part of smelters, refiners, and manufacturers can place the new brands of copper on the footing which they deserve to occupy, and prevent a depreciation in the quality of manufactured goods, the consumers of which are accustomed to so high a standard.

OFFICIAL STATEMENTS AND REPORTS.

FRANKLIN, LAKE SUPERIOR.

The annual report of Treasurer D. L. Demmon for 1882 shows a surplus of $244,330.37 January 1st, 1883, against $116,842.65 January 1st, 1882, including the rock broken in the mine, which, although valued at say $30,000, is not reckoned this year. Since January 1st, the loan account, $20,000, has been paid from sales of copper, and the company is now, for the first time since given up by tributers, entirely free from debt for borrowed money, owing only its regular business drafts for labor, supplies, etc. The question of a dividend has been considered; but so far the directors have refrained from paying one, because to do so would necessitate the borrowing of the entire amount paid, as the surplus consists mostly of copper and supplies, the amount of cash on hand being only about sufficient, with receipts from present sales, to meet the regular running expenses of the mine. The unsettled condition of the tariff at the time the report was written also acted as a deterrent. Further consideration of the matter will probably come up at the annual meeting. While no dividends have ever been paid, the treasurer congratulates the stockholders on an appreciation of the stock since operations were commenced, eight years ago, from $3@3.50 to $12@$12.50 per share, besides interest at 12 per cent per annum on the amount invested, "which investment," the report says, "surely is not a bad one, considering that no money has ever been called from the stockholders, and that the mine was considered played out at the time work was commenced." During the year, 148,042 tons of rock were hoisted and treated, at a cost of $2.35 per ton; number of pounds of mineral per ton, 26·86; number of pounds of ingot per ton, 22·02; average yield of ingot from mineral, 82·22; amount of ingot produced, 3,264,120 pounds, or a gain over 1881 of 585,323 pounds; yield per ton of rock, 1·168 per cent mineral, being a gain over 1881 of 0·26 per cent in richness of ore. The cash receipts and expenses for 1882 were:

Cash on hand January 1st, 1882	$25,588 58
Sale of copper in 1882, 2,773,714 pounds, at 18·174c	505,007.61
Loans	219,135.37
Sale of silver	880.04
Sale of supplies at mine	736.32
Interest account	523.19
Rebate on freight	659.35
Total	$752,530.46

CONTRA.

Cash paid loans	$295,855.54
Drafts	364,924.93
Smelting	38,241.10
Freight and storage	14,310.02
Brokerage	2,619.09
Interest	5,554.44
Expense, insurance, taxes, etc	8,418.52
Mine account, Nashua Iron and Steel Company (old claim)	604.16
Cash on hand January 1st, 1883	21,912.66
Total	$752,530.46

The assets and liabilities January 1st, 1883, were:

ASSETS.

Copper on hand, 1,315,858 pounds, at 18c. (840,000 pounds of which have been sold for early deliveries.)	$236,854.44
Cash on hand	21,912.66
Total	$258,767.10

LIABILITIES.

Loans, bills payable	$20,000.00	
Drafts outstanding	27,474.30	
Due for smelting	7,659.57	
Due for freight	2,771.73	57,905.60
Surplus assets at Boston		$200,861.50
Supplies at mine	$79,880.55	
Less liabilities at mine	36,411.68	43,468.87
Entire resources over liabilities		$244,330.37

The report of Superintendent J. Vivian notes the progress of development and improvements of the year, and calls attention to the necessity of soon providing coal for fuel, wood having become scarce. The prospects of the mine are as good for 1883 as they were January 1st, 1882.

CONGLOMERATE, LAKE SUPERIOR.

Under date of March 12th, Mr. Henry C. Davis, President of the Conglomerate Mining Company, of Philadelphia, reports that during the year 1882 the company did 2001·5 feet of sinking of shafts and winzes, extended the levels of the mine 3253·4 lineal feet, and stoped 2699·82 fathoms, the total openings to the end of the year being 10,943 feet. The ground on the lower levels of No. 2 shaft looks promising and in other parts of the mine the prospects are encouraging. The average wages have been as follows:

	1882.	1881.
Contract miners (per month)	$56.68	$56.42
Company miners (per month)	45.00	46.54
Underground laborers (per month)	38.74	37.31

Average cost of underground work:

	1882.	1881.
Sinking, per foot	$12.31	$14.75
Drifting, "	10.52	11.11
Stoping, per fathom	9.23	17.63

The Conglomerate, which is now the most conspicuous in Keweenaw County, is rapidly approaching the time when the heavy outlay for development-work and surface improvements will be completed. The heaviest expenditure was for the new mill, the stamps of which are now erecting, and for the railroad to it, and the last of the heavy items of new construction account, the permanent hoisting plant, is now contracting for. During the year, the company has stamped in its old mill 41,104 tons of rock, at a cost of $1.06¼ per ton. Mr. Davis says: "The yield of mineral copper was 991,375 pounds, equal to 1·20 per cent, a very satisfactory result, considering that the large proportion of rock stamped was from openings. In my last annual report, $3 was taken as the maximum cost per ton of rock. The experience and expenses of the past year, considering the thorough equipment we are making, justify the statement that the rock can be handled for $2.25, and may be handled for $2 per ton."

The expenditures for the year were:

Underground cost		$142,764.68
Surface and incident to the mine		110,673.12
Construction account		134,668.41
Debit of team account		1,712.23
		$389,818.44
Credited by		
Merchandise profit	$14,322.85	
Supplies profit	10,963.14	
Wood account profit	740.10	
Repair account profit	1,358.82	27,384.91
Total for 1882		$362,433.53
Before reported for 1881		360,467.98
Total to December 31st, 1882		$722,900.91
Less copper produced		173,132.98
Making net cost of openings and equipment		$549,767.93

The resources of the company include cash, $50,311.42; balance of last installment, $71,846; copper at mine, $20,000; merchandise, supplies, etc., at mine, $72,906.44; a total of $215,063.86. The liabilities, including bills payable, $10,895; loans, $7000; agent's drafts, $4703.72; wages, $7000, and unpaid bills, the whole aggregating $34,976.23, leaving a balance of resources of $180,087.63.

PEWABIC, LAKE SUPERIOR.

The annual report of the Pewabic mine, which adjoins the Quincy on the south, is not encouraging. During the year, a large amount of development-work has been done in the 26th, 27th, 28th, 29th, and 30th levels, uncovering hardly any thing but poor ground, the expenditure in this work being $47,950.91, including 1500 feet of drifting on the main lode at $15.80 per foot, 55 feet of drifting on the west lode at $12, 126·5 feet of cross-cutting at $13.50, 375 feet of winzes at $15.80, and 375 feet of shaft sinking at $18.22 per foot. In the deepest workings, the 30th level, south, the ground has been improving and the mine is showing better.

The agent, Mr. J. Vivian, says of the future: "At this writing, it is impossible to predict, with the least degree of certainty, what can be done for the ensuing year in the way of product; for as you are aware, our productive ground, that will pay to stope, is getting very short, and unless we find in some of the lower levels remunerative ground, I can not see how the present product can be kept up. You can not fail to notice in the map of the mine, that there is a large amount of ground opened. If it was all as productive as what we had above the 25th level, it would be sufficient to supply our present hoisting facilities for over two years, without opening another foot in any direction. When the company purchased the new territory, it was the opinion of every body that knew any thing about such matters, that it was a prize, and nothing short of large dividends would be in order at an early day; and had the lode continued to be as productive as it was when we started on the new ground in November, 1879, long ere this these expectations would have been realized. Being fully persuaded that the lode in the new territory would be at least as productive as it has been in the old ground for many years past, we started to put the mine, mill, machinery, and surface in the best possible condition for economical working; to do this, it has cost a large amount of money; but, had the mine continued to yield as in former years, all these improvements, repairs, etc., would have been paid for out of the profits made, and the last assessment never heard of."

The mine is fairly well equipped. During 1882, $18,193.77 were expended in buildings, $6353.40 in surface improvements, $12,206.30 for the stamp-mill, including $2036.45 for a duplex pump with a capacity of 2000 gallons per minute, and $45,920.81 for tools and machinery. This includes $6723 for 17 Rand drills, $5738.72 for a duplex air-compressor, $4575 for air-pipe and labor, etc., $2525 for two Blake crushers, and $14,163.85 for repairs to the man-engine, which is in operation to the 16th level. Considerable change and improvement have been made in the hoisting-engine, by sliding the pinion-wheel on the side which detaches the engine from the hoisting-drum and putting two band-brakes on said drum, by which the skip is lowered while the engine is standing still. With this arrangement, the hoisting capacity has been greatly increased and the engine has been saved from more than half of its usual wear and tear. The total of extraordinary expenditures, including the dead-work in the mine, has been $130,625.22.

The following is a statement of the production and cost of stamping:

Number of tons of rock hoisted in 1882, 74,042.
Number of tons of rock stamped, 63,592.
Cost per ton, entire treatment, $3.03.
Pounds of mineral, per ton hoisted, 24·16.
Pounds of ingot, per ton hoisted, 20·02.
Percentage of ingot in mineral, 82·88.
Total amount of ingot produced, 1,482,664 pounds.
Tons of rock stamped, per cord of wood, 10·84.
Cost of stamping, per ton of rock, 0·64·97.

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In 1881, 60,427 tons were stamped, giving a yield of 1,872,878 pounds, or 1·92 per cent.
In 1882, 63,592 tons were stamped, giving a yield of 1,482,664 pounds, or 1·51 yield, showing a decrease of 0·41 per cent in yield, and an *increase* in amount stamped of 3165 tons.

The cash receipts foot up to $678,928.14, including cash on hand January 1st, 1882, $26,557.97; sale of 1,328,496 pounds of copper at a price of 18·35c., $243,777.05; loans, $349,441.53; and assessments, $57,528. The payments were $358,916.53; agent's drafts, $254,802.66; smelting and freight, $28,324.19; and other miscellaneous expenditures, leaving cash on hand January 1st, of $16,246.96.

The assets include 572,509 pounds of copper, valued at 18 cents, or $103,051.92, and assessments uncollected, $22,472. The liabilities include loans of $89,500, outstanding drafts, etc., aggregating $114,088.10, leaving a balance of assets at Boston of $27,682.48, to which are added excess of supplies at mine over liabilities of $32,841.52, making the total balance of assets over liabilities $60,524.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

RECENT RULINGS AND DECISIONS OF THE GENERAL LAND-OFFICE.

Oil Lands.—Oil lands may be located and patented under the placer mining laws.

Expenditures on Mining Claims.—The value of expenditures upon mining claims is to be measured by the ruling prices of labor and material in the locality where the claims are situated.

Rehearings.—The rule of law is well settled that a new trial will not be granted on the ground that the verdict was against the weight of evidence, if there was evidence on both sides which was contradictory. This rule was applied in a mining case upon an application for a rehearing.

After a witness in the hearing of a mining contest has given his testimony, taken by consent by a short-hand reporter, and by stipulation it has been agreed that the testimony shall be considered the same as if it had been reduced to writing and signed, and after the testimony has been taken at the local office and has been considered and the case decided in the General Land-Office, it is not competent, on a motion for a rehearing, to introduce affidavits to show that the witness testified differently from what the record shows, or that he did not make certain statements which the record shows he did make.

Newly Discovered Testimony.—After a party has had a fair and full hearing before the local land officers, and the testimony has been considered and the case decided in the General Land-Office, affidavits which contain statements of facts on a point which was material, and which statements are merely cumulative, and no sufficient reason is shown why the makers of such affidavits were not produced at the hearing before the local office, such affidavits will not afford a basis for a rehearing on the ground of newly-discovered evidence.

Publicity of Surveyor's Reports on Placer Claims.—Under circular issued originally under the date of September 22d, 1882, with special reference to placer claims, by the Commissioner of the General Land-Office and approved by the Secretary of the Interior, no placer claim is granted unless favorably reported upon by a deputy surveyor, and approved by a surveyor-general. The Commissioner of the General Land-Office now rules that an attorney interested in a case can not see this report of the deputy surveyor, with which ruling much fault is found by attorneys practicing before the department, because it leaves them in the dark as to any errors that may have been found; and to obtain this necessary information causes unnecessary delay and additional expense.

The Conformity of Placer Claims with Public Land Surveys.—The following points were made in a case where parties attempted to secure a placer patent for a location upon surveyed land of twelve thousand feet, nearly all of which is the bed of a river, and includes only a small quantity of surface ground along its banks:

The first law authorizing the patenting of placer claims was the act of July 9th, 1870, which expressly states that the location made thereunder shall conform to the United States surveys. The act of May 10th, 1872, which is incorporated into Section 2331, United States Revised Statutes, provides, among other things, that all placer mining claims thereafter located upon surveyed lands "shall conform as nearly as practicable with the United States system of public land surveys, and the rectangular subdivisions of such surveys; . . . but where placer claims can not be conformed to legal subdivisions, survey and plot shall be made as upon unsurveyed lands. . . ." There were many tracts of surveyed land which could not be taken as placer claims so long as the locations had to conform to the public surveys, on account of the prior rights of other persons, especially lode claimants, to portions of the legal subdivisions embracing such tracts, and the purpose of the provisions of the act of 1872 was evidently to enable qualified parties to locate and obtain patents for the portions not previously appropriated or reserved. The privilege granted to lode claimants of taking their surface ground without regard to the public surveys, was never extended to placer claimants. The division of 40-acre tracts into 10-acre lots was authorized for the purpose of enabling the placer locators to conform to the surveys. The Commissioner says: "It can not be claimed that a location of a narrow strip of land, 12,000 feet long, extending through three sections (as this does), conforms 'as nearly as practicable' to the rectangular subdivisions of the public surveys, unless the adjoining land had been previously appropriated or reserved, which is not the fact in the present case. If such a construction was given to the provisions of the act of 1872, under consideration, they could in nearly every case be disregarded and rendered ineffective by the placer claimants. The locations would be made so as to cover only the valuable lands, and leaving the adjoining tracts in such a condition and situation as to make it impossible, in many cases, to dispose of them. In another case, this office says to a surveyor-general, after quoting the above-mentioned provisions of the act of 1872, that 'the location of a placer mine upon surveyed public lands made after May 10th, 1872, should embrace legal subdivisions of the public land, where the same can be done without interfering with the rights of other *bona-fide* mineral, agricultural, or other claimants in the same tract.' The only construction of the language referred to which is consistent with the context of the act and the general intention of Congress, as expressed in the laws upon the same subject, is, that the placer locations upon the conveyed lands shall conform to the public surveys in all cases, except where this is rendered impossible by the previous appropriation or reservation of a portion of the legal subdivision of ten acres upon which the claim is situated.

"There appears to be another serious objection to the location in question. It covers the bed of a river for a long distance; and should the applicant obtain a patent, he would acquire the right to and control over the water in that portion of the stream lying within his claim. It has been the policy of the government to withhold patents for water rights, and leave them to be determined and protected by the local courts. It was clearly not the intention of Congress to allow a large river for two or three miles, with only a few feet of ground along its banks, to be patented as a placer claim."

THE NEW WYOMING VALLEY SALT REGION.

So much has been written and said during the past few months by persons not familiar with the salt industry on the Wyoming Valley salt deposits that the following extracts from a letter by Mr. Sylvester Lewis, of Wyoming, to the Rochester *Morning Herald*, will be perused with more than passing interest:

In the first place, I will state that there is an inexhaustible bed or rock of salt extending through the entire valley at an average depth of about 1200 feet. The rock or deposit has an average thickness of about seventy feet, and is known to be perfectly pure, and in regard to the purity of the brine procured from this deposit, it will depend in a great measure upon the condition and purity of the fresh water which is run into the wells for the purpose of dissolving the rock. In regard to its strength, it can be procured and brought to the surface of a uniform strength or at complete saturation provided the water is allowed to remain in the wells a sufficient length of time to become saturated. The advantages the valley possesses over other salt-producing localities are many, and the first and the one most to be relied upon is the strength and purity of the brine. In order to give the reader a more perfect knowledge of the subject, I will make a comparison of the brine produced at Syracuse with that of the Wyoming Valley. Hon. George Geddes, superintendent of the Onondaga salt springs, as far back as 1867, when the brine of those springs was known to be much stronger and purer than now, said, as can be seen on page three of his answers to interrogations of the constitutional convention which assembled at that time, that it required an average of fifty gallons of brine to make a bushel of salt of fifty-six pounds weight. Professor Lattimer, of the University of Rochester, in 1879 made an analysis of brine taken from the first well put down in the Wyoming Valley, which is situated one half-mile south of the village of Wyoming. The professor, in closing his report, says that twenty-four gallons of this brine will make a bushel of salt of fifty-six pounds weight. In regard to solar evaporation, Mr. Geddes, in his report to the constitutional convention, says that a vat sixteen by eighteen feet was capable of making fifty bushels or ten barrels of salt in an average season; whereas the Wyoming Valley Salt Company made in the season of 1881 twenty-two barrels of salt under cover of sixteen by eighteen feet. The size of salt-vats is known by salt manufacturers by the size of the cover, and is generally spoken of as so much salt having been made to the cover. Now, in regard to the manufacture of salt at Saginaw compared with that of the Wyoming Valley, I will refer to a statement of the Hon. Thomas G. Alvord, made to a joint committee of the Legislature February 17th, 1876. In answer to a question put by the committee, "How does the purity of the Godrich wells compare with that of the Saginaw wells?" Mr. Alvord says, "The Godrich water is very nearly both pure and saturated; ours is impure, and measures less than seventy degrees of salinometer. The Saginaw wells are very much inferior to ours." So that, if we are to take the statement of Mr. Alvord as correct, the same difference exists in regard to the strength and purity of the brine at Saginaw, compared with that of Wyoming, as exists between the Onondaga salt springs and the brine of the Wyoming Valley. The only difference in the expense of manufacture of salt at Saginaw and Syracuse is, that the Saginaw manufacturer is using the refuse from the manufacture of lumber; but the timber of Michigan is fast being used up, and as soon as Saginaw has to fall back upon coal as a fuel, it will be in the same predicament that Syracuse is now in, and both in time will have to succumb to the rich saline deposit of the Wyoming Valley. It can not be otherwise, as the same amount of fuel and labor that would make one bushel of salt at Saginaw or Syracuse will make two bushels at any of the works of the Wyoming Valley, and of a much superior quality. In regard to the salt-fields of Canada, compared with those of the valley, there is no difference in strength or purity of brine, and the Canadian manufacturer has to depend wholly upon wood.

The strongest proof that the Wyoming Valley is to be the great salt center of the world is the fact that the manufacturers of salt from all parts of the world are making tracks toward the valley. One large manufacturer of salt in Canada has already purchased a site on the line of the Rochester & Pittsburg Railroad, near the depot at Warsaw, and will soon begin the erection of large works. This is evidence that the salt manufacturers of Canada are satisfied that the Wyoming Valley is to supersede all other salt-producing localities. In regard to available places for putting down wells, there are hundreds of them in the valley, many of them superior to any yet located in regard to water and fuel supplies The Rochester & Pittsburg Railroad will soon be extended to its large coal-fields, and I am warranted in saying that in a very short time coal will be laid down in the valley for $2.50 a ton. In regard to transportation, we need have no fear, as the Rochester & Pittsburg Railroad traverses the entire length of the valley, and the Lackawanna road crosses the valley only a few miles north of the center of the great salt-deposit. These roads have connections east, west, north, and south, and have ample facilities for the transportation of our salt. The interests of the railroad companies are identical with the interests of the salt manufacturers. Both of these companies are owners of large coal-fields, and they want to sell their coal and carry our salt; and if the managers of these roads are the smart men I take them to be, they will put such low figures on coal and such reasonable rates on freight as will prevent any judicious capitalist from putting money into competing lines. The Rochester & Pittsburg Company, to my knowledge, has done all that could be reasonably expected to assist in developing the salt interests of the valley.

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OUR PRODUCTION OF PIG-IRON IN 1882.

Mr. James M. Swank, Secretary of the American Iron and Steel Association, has just published the complete statistics of the production of pig-iron, his figures standing as follows:

PRODUCTION OF ALL KINDS OF PIG-IRON IN 1880, 1881, AND 1882, BY STATES.

States.	Net tons. 1880.	(Tons of 2000 pounds.) 1881.	1882.
Maine	3,578	4,400	4,100
Vermont	1,800	2,796	1,210
Massachusetts	19,017	18,318	10,335
Connecticut	22,583	28,483	24,342
New York	395,361	359,519	416,156
New Jersey	170,049	171,672	176,805
Pennsylvania	2,083,121	2,190,786	2,449,256
Maryland	61,437	48,756	54,524
Virginia	29,934	83,711	87,731
North Carolina	.....	800	1,150
Georgia	27,321	37,404	42,440
Alabama	77,190	98,081	112,765
Texas	2,500	3,000	1,321
West Virginia	70,338	66,409	73,220
Kentucky	57,708	45,973	66,522
Tennessee	70,873	87,406	137,602
Ohio	674,207	710,546	698,900
Indiana	12,500	7,300	10,000
Illinois	150,556	251,781	360,407
Michigan	154,424	187,043	210,195
Wisconsin	96,842	102,029	85,859
Missouri	105,555	109,799	113,644
Minnesota	3,520	7,442	8,126
Utah	.....	.....	57
Colorado	.....	6,396	23,718
Oregon	5,000	6,100	6,750
California	.....	4,414	987
Washington Territory	.....	1,200	.....
Total	$4,295,414	$4,641,564	$5,178,122

This output was distributed, as to the fuel used, as follows:

Kinds of fuel.	Net tons. 1880.	(Tons of 2000 pounds.) 1881.	1882.
Anthracite	1,807,651	1,734,462	2,042,138
Charcoal	537,558	638,838	697,906
Bituminous	1,950,005	2,268,264	2,438,078
Total	4,295,414	4,641,564	5,178,122

In the following States and territories, more than 20,000 net tons of harcoal pig-iron were produced annually:

CHARCOAL PIG.

States.	Net tons. 1880.	(Tons of 2000 pounds.) 1881.	1882.
Connecticut	22,583	28,483	24,342
New York	27,844	30,467	30,716
Pennsylvania	43,374	51,908	49,975
Maryland	33,050	27,626	28,277
Virginia	14,043	19,038	26,133
Alabama	37,737	44,221	55,541
Kentucky	21,174	16,778	17,165
Tennessee	16,675	19,046	37,611
Ohio	69,190	66,169	58,654
Michigan	154,424	187,043	210,195
Wisconsin	42,913	47,702	55,369
Missouri	15,769	43,241	54,327

Of pig produced with bituminous coal or coke, the following States were producers:

BITUMINOUS COAL AND COKE PIG.

States.	Net tons. 1880.	(Tons of 2000 pounds.) 1881.	1882.
New York	.....	6,703	.....
Pennsylvania	801,817	925,525	945,635
Maryland	5,387	.....	.....
Virginia	15,891	64,673	61,598
Georgia	20,044	24,000	26,875
Alabama	39,453	53,860	57,224
West Virginia	67,093	65,209	73,220
Kentucky	36,534	29,195	49,357
Tennessee	54,198	68,360	99,991
Ohio	605,017	644,377	640,246
Indiana	10,500	7,300	10,000
Illinois	150,556	251,781	360,407
Wisconsin	53,929	54,327	30,490
Missouri	89,786	66,558	59,317
Colorado	.....	6,396	23,718
Total	1,950,205	2,268,264	2,438,078

The make of anthracite is naturally much more restricted in territory, as the following table shows:

ANTHRACITE PIG.

States.	Net tons. 1880.	(Tons of 2000 pounds.) 1881.	1882.
Massachusetts	9,155	5,958	.....
New York	367,517	322,349	385,440
New Jersey	170,049	171,672	176,805
Pennsylvania	1,237,930	1,213,353	1,453,646
Maryland	23,000	21,130	26,247
Total	1,807,651	1,734,462	2,042,138

The production in some of the principal districts was as follows:

		1880.	1881.	1882.
Pennsylvania.	Lehigh Valley	544,987	560,190	609,338
	Schuylkill Valley	306,926	309,049	342,701
	Upper Susquehanna	168,128	125,785	201,367
	Lower Susquehanna	217,889	218,329	300,240
	Shenango Valley	215,313	198,968	264,078
	Alleghany County	300,497	385,453	358,840
	Miscellaneous coke	286,007	341,104	322,717
	Charcoal	43,374	51,908	49,975
Ohio.	Hanging Rock coke	60,316	77,500	77,364
	Mahoning Valley	226,877	245,737	258,478
	Hocking Valley	85,719	88,146	78,770
	Miscellaneous coke	232,105	232,994	225,634
	Hanging Rock charcoal	64,854	61,487	55,546
	Miscellaneous charcoal	4,336	4,682	3,108

QUICKSILVER IN BLENDE.—*Die Oesterreichsche Zeitschrift für Berg- und Hütten-Wesen* announces that an interesting discovery has just been made at the zinc-works of the Vieille Montagne Company, at Oberhausen. It has been found that quicksilver was conveyed by the gases which passed from the Hasenclever furnace into the lead chamber. A special furnace was built for extracting the quicksilver, and during 1882 several tons were obtained. It is believed that all the blendes of the Rhine district contain quicksilver, which may be extracted in paying quantities.

THE ELECTRO AMALGAMATION OF GOLD ORES.

English technical journals have, during the past few weeks, published a good many statements, wild on the face of them, about a new gold amalgamating process. The first fairly intelligent and critical account has just been given by *Engineering*, which therefore deserves consideration:

In gold mining from quartz reefs, the rock is, as is well known, reduced to powder by means of stampers, and is then carried by a stream of water over the surface of mercury. In consequence of the strong affinity between gold and mercury, as soon as a particle of the former comes into contact with the latter, it is absorbed and amalgamated, while the quartz fragments with which it is associated float on the surface of the metal, and are carried away by the stream of water. But besides gold, many other substances, such as oxygen, sulphur, and arsenic, have an affinity, more or less active, for mercury, and many if not all of them are found mixed with the gold in certain deposits. When an ore containing these elements is passed over mercury to eliminate the gold, the other bodies are also retained, and being of much less specific gravity than the mercury, they float on its surface, combining with its upper stratum, and adhering with a persistence that can not be overcome by any stream of water that is not of sufficient force to carry off not only the quartz, but also the gold and part of the mercury. This result is termed by the miners "sickening," and involves great loss of gold, because, as soon as the surface of the mercury becomes "sick," the gold no longer comes actually into contact with it, and the greater part escapes. The remedy hitherto employed has been to remove the sick mercury at frequent intervals and distill it, exactly as water is distilled; but this of course involves additional expense, and in many mines the extra cost, and the loss which takes place, in spite of all care, are sufficient to convert a profit into a loss.

Lately, Mr. Richard Barker, F.G.S., has brought out a new method of recovering sick mercury, or rather, of preventing it from becoming sick. According to his process, he connects the mercury with the zinc pole of a galvanic battery or of a dynamo machine, and the water flowing over it with the copper pole of the same generator. Thus he gets a current of electricity flowing from the water to the mercury. The result is certainly very surprising: as soon as contact is made, the black scum accumulated upon the surface of the mercury retreats from the electric terminal as if driven by a steady blast of air, and the bright surface of the metal is exposed to view ready to receive any thing that passes over it.

This is by no means the first time that attention has been called to the peculiar behavior of mercury when acting as an electrolytic surface. In the early part of the century, Gerboni, Herschel, and Davy noticed it. In 1875, Sir Charles Wheatstone patented a telegraphic instrument in which the indications resulted from the motions of a column of mercury under varying currents; and a little later, Mr. Robert Sabine made a thorough investigation of the subject. He found that when water is placed upon the surface of mercury, the latter immediately becomes converted into suboxide, if it be not already so. If the water and mercury be then connected with the battery in the manner described above, the suboxide is reduced and the surface becomes metallic. With powerful currents, this action, owing to the difference in bulk of the metal and the oxide, is accompanied with rapid circulation of the metal. If a globule of mercury be placed in a narrow groove filled with water so as to divide it into two parts, and a current be passed lengthwise through the groove, one end of the globule will be continually converted to suboxide and the other deoxidized. Now as the atomic value of the mercury is 14·7 and that of the suboxide may be taken at 38·9, there is a great expansion at one end of the globule, causing a mechanical circulation of its molecules from the larger to the smaller end, and a rolling action which carries the mercury bodily forward in the direction of the current.

Applying these facts to the explanation of the action of Mr. Barker's electro-amalgamator, it will be seen that there is a constant electrolytic action going on at the surface of the mercury, and that, when this is exposed to water only, the process is simply a deoxidizing one. When, however, sickening ores are passing over the mercury, the action of the current will be to break up any combination that may take place between the mercury and such of their elements as are included in the list of substances which, under the influence of electrolysis, are carried to the anode. These are the metalloids, such as oxygen, sulphur, chlorine, boron, carbon, and perhaps arsenic. It is not distinctly known what is the exact cause of the sickening of mercury, but there is good reason to believe that sulphur and arsenic are the most potent agents in the matter. Hence, while their chemical affinity would cause them to combine with the mercury, their electro-negative condition prevents their union with its electrolytic surface, when a current is passing through them. On the other hand, the combination with the mercury of all the negative metals, gold, silver, copper, tin, lead, nickel, zinc, etc., would be favored by the current.

It will thus be seen that the action of the electric current in an amalgamating riffle tends to prevent the combination and adhesion of any electro-positive elements to the mercury, and to leave the quartz, with the sickening ores, floating mechanically on its surface, ready to be carried off by the current of water. This effect is exhibited by the Electro-Amalgamation Company, Limited, No. 37 Lower Chambers, Moorgate, London, on a considerable scale. The company has fitted up several amalgamating apparatus, consisting of inclined tables about six feet wide, with riffles or baths of mercury placed at intervals. The bottom of each riffle is of copper, and is connected with one pole of an Elmore dynamo machine; while over the top, separated from the mercury by a space of about half an inch, is another plate of copper, connected with the other pole of the generator. A stream of water carries the pulverized ore down the table and between the mercury and the upper plate, the dirt being carried forward by the current, and the gold retained by the bright, clean surface of the mercury. In some cases, stirrers and rakes of various kinds are adopted in place of the upper pole plate, according to the nature of the rock treated.

But the attainment of a clean mercurial surface is not all that stands between the gold miner and success in amalgamation. Much gold is "rusty," that is, it is coated with a skin or pellicle of sulphuret, probably from contact with sulphureted hydrogen. A piece of such gold may be immersed in perfectly pure mercury without any amalgamating

action whatever, and consequently the mercurial process has hitherto been useless for its recovery, and rusty ores have been smelted. This raises the cost of milling in Colorado from $1.50 to $15 per ton of dirt—a notable difference. The company claims that the new process is effectual for causing the amalgamation of rusty ores, but it does not offer any satisfactory explanation of the action by which it operates beyond stating that "by electric action the gold and silver are driven to the negative pole, and . . . . it is obvious that the natural gravitation of the gold and silver is so assisted by the attraction of the electric force as to allow but few if any of the particles to escape." This can scarcely be called a scientific explanation, but we understand that a considerable consignment of rusty ore is on its way, and then the result may be determined by actual experiment. If successful in this respect, Mr. Barker's invention promises to be extremely valuable, while, under any circumstances, its power of maintaining the surfaces of the riffles free from contamination, if found to be as effectual in actual practice as in experiment, must open to it a wide field of usefulness.

DESTRUCTION OF THE LOISEAU FUEL-WORKS.

Care might have prevented the destruction of the Loiseau Patent Fuel-Works at Linden and Bath streets, Port Richmond, which were almost entirely swept away by the flames shortly after two o'clock on the afternoon of the 8th. The works comprised three adjoining structures arranged in the shape of an L, and were devoted to the manufacture of fuel from coal-dust and tar. The fire was caused by gas generating in the large iron vessels in which the tar is heated preparatory to mixing the coal-dust. It appears that one of the employés was negligent in not taking precautions to let the gas find an exit; and when he endeavored to open a valve attached to the apparatus, it is supposed that the accumulation of gas was ignited by a fire under the boiler, and a slight explosion followed. The flames burst out all around the machine, and in an instant the entire room was on fire. Owing to the highly inflammable character of the contents of the place, the fire spread with alarming rapidity. Great columns of black smoke rolled up from the burning tar so thickly at times that the entire works were obscured from view, and put the firemen to serious inconvenience. The fire soon communicated from the pitch-house to the finishing-house, a large frame building where the artificial coal is dried, which, together with the other buildings, was entirely destroyed. The third building, a brick structure adjoining the finishing-house, was considerably damaged. A large shed, a few yards from the pitch-house, also fell a prey to the devouring element. The works were erected about eight years ago, but operations were suspended until a year or so ago. The building in which the fire originated was thought to be fire-proof. The buildings were owned by the Philadelphia & Reading Railroad Company, which was also the owner of about $30,000 worth of the machinery in the establishment. Recent improvements were made by the Fuel Company, which put in machinery valued at about $12,000.

RECENT EXPERIMENTS IN LEAD SMELTING IN THE HARTZ MOUNTAINS.

At one of the smelting-works of the mining district of the Upper Hartz Mountains, at Altenau, lead ores are smelted which, in their composition, differ from most of the ores of the district in being lower in lead and higher in quartz and blende. These could be readily worked by the ordinary Hartz smelting process in cupolas, with fluxes containing iron, while the supply of copper slags from Oker, containing a high percentage of iron, were still available. When, however, that supply had been exhausted, and "blue billy" obtained in the wet extraction of copper from low-grade pyrites had to be substituted for the slags, the fact that the "blue billy" was a powder and contained from 15 to 20 per cent of water increased the difficulties in working and ran up the cost. In 1877, the order was therefore given to begin a series of experiments with the roasting and reducing process, as a substitute for the "precipitation" process. The results of these experiments have now been published by Herr Cramer von Clausbruch, of Altenau, in the *Zeitschrift des Berg-, Hütten- und Salinen-Wesens*. The ores worked contain from 54 to 55 per cent of lead, 0·08 per cent of silver, 0·9 per cent of copper, from 7 to 8 per cent of zinc, and from 14 to 18 per cent of silica. They are roasted in a single-hearth reverberatory furnace, 19 meters (62·3 feet) long and 3 meters wide (9·8 feet) in the clear, and provided with a series of condensation-chambers. It has 14 working-doors on both sides, and two fire-doors. Near the fire-bridge, the hearth is shaped into a shallow sump, to be used for containing the roasted charge when melted down. The ore is charged at the point farthest from the fire-bridge, and is gradually conveyed toward it. The bulk of the sulphur oxidized escapes as sulphurous acid, a small proportion forming sulphuric acid, which combines with oxide of lead to form a sulphate which, at a greater heat, is converted into a fusible silicate. The best results in roasting were obtained with ore running from 55 to 60 per cent of lead, and 15 per cent of silica. The ore must be as fine as possible, not exceeding 2 millimeters (0·08 inch). With a smaller amount of silica, a part of the sulphate of lead is not decomposed, and leads to the formation, in the final heat, of a matte, which is not unfavorable when there is copper in the ore.

The furnace at Altenau takes four charges of 30 cwts. per day of twenty-four hours, the consumption of coal being 22 cwts., or 18·3 per cent. The yield from 100 parts of ore is 85 parts of well-slagged material, ten parts of a mixture of slagged and so-called "raw" material, from 2 to 3 per cent of "raw" stuff, and from 2 to 3 per cent loss of weight in roasting, etc. The slag is almost entirely free from sulphur, contains only traces of the copper in the ore, and runs about one half of the percentage of silver in the ore, almost all the copper and the bulk of the silver apparently going with the sulphur.

The roasted and slagged ore is smelted in blast-furnaces, having two tuyeres and a water-jacketed back wall, and, in view of the basic character of the charge, not provided with a siphon-tap or a closed front. The object of the smelting is to reduce the lead in the silicate and to reduce so much iron from the charge as is necessary to decompose the sulphide of lead. At present, 80 cwts. of roasted ore are mixed with 20 cwts. of raw ore, preferably those grades running higher in pyrites, and to this charge of 100 cwts. are added, according to the percentage of silver and zinc, from 20 to 25 cwts. of puddling cinder, from 20 to 25 cwts. of Oker blue billy, practically iron ore, from 15 to 30 cwts. of lime, and from 32 to 34 cwts. of coke. From 176 to 187 cwts. of charge are put through in twenty-four hours, the pressure of the blast ranging from 14 to 20 millimeters of quicksilver. The furnace is run by three shifts of men, including one furnace-man, one slag-man, and two chargers.

In examining the charge, the addition of raw ore will appear strange; but it is considered necessary to make a matte for the sake of the copper left in the blue billy and the percentage of that metal in the ore. It might be suggested that the roasting process be so conducted that the quantity of sulphur necessary to make matte be left in the ore at once. This, however, would make it necessary to roast the raw ore now charged directly, and besides would not make it possible to conduct the roasting process in the proper way. It was thought that lime could be largely used as a basic flux, as it is cheap and would make light slags. It was found, however, that the quantity is limited by the presence of zinc.

In the assay of the slag, fine silver is added; and by this means, the returns are one quarter of one per cent higher than with ordinary assays. The percentage of lead thus found in the slags ranges from 0·5 to 0·75 per cent, all lots containing more being returned to the furnace. An analysis made of the slag produced in the first quarter of 1882 gave the following result:

	Per cen
Silica	30·32
Sulphate of baryta	0·19
Lead	0·13
Copper	0·18
Silver	0·0007
Antimony	0·09
Protoxide of iron	35·72
Alumina	3·20
Oxide of zinc	7·27
Oxide of manganese	1·66
Nickel and cobalt	Trace
Lime	16·15
Potassa	0·67
Soda	0·61
Sulphur	1·47
Phosphoric acid	2·04

Contrary to opinions expressed, the cost of the process is not much less than the old precipitation process. It is more costly so far as labor and fluxes are concerned, but lower in fuel, the net gain for Altenau being 6·51 marks per 100 cwts. of ore.

The percentage of lead contained in the ore, as found by fire-assay, is fully recovered on a large scale, 98·5 per cent being obtained at once in the base bullion. The yield of silver is larger than the returns by fire-assay.

THE MECHANICAL ENGINEERING OF COLLIERIES.*

Compared with the elaborate and accurate text-books which English literature possesses on metallurgy and on many branches of civil and mechanical engineering, the great field of the mining engineer here has been sadly neglected by writers. British students and engineers are very much better off than those interested in the subject of mining in this country. We do not possess a single manual, a single text-book or work of reference representative of American practice, and those who want to "read up" must hunt over large libraries, through the files of technical journals, the transactions of engineering societies, and the reports of State surveys to cull the few fragments of experience put on record. There is much that is characteristic in American practice, developed by the special exigencies of the cases met with here; and without careful study and quite extensive travel, it is unfortunately impossible to get a fair insight into our methods. We know of many interested in coal mining in widely separated sections of our country who have spent weeks in watching the works in the anthracite collieries of Pennsylvania, and we have no doubt that to them the widely different methods in use in English collieries will prove a subject full of valuable suggestions.

A very large proportion of the coal mined in this country is brought to the surface through tunnels driven on the vein, and, with the exception of a few slopes and one deep shaft in the anthracite regions, nothing but comparatively shallow pits, rarely exceeding 300 feet, are used. In almost every particular, the mechanical appliances we require are not of such gigantic dimensions, nor are they called upon for such a high duty, as the equipment in scores of collieries in England and Scotland. Yet the work before us is, we believe, one that is entitled to, and will undoubtedly receive, a place of honor in the library of every one who is engaged in coal mining. It is the first of two volumes, a considerably enlarged republication of a series of articles published by Mr. C. M. Percy, of Wigan, in the *Colliery Guardian*. Mr. Percy needs little introduction to those who have closely followed the literature of coal mining for years. He has been for a long period engaged in every-day practical work in the management of English collieries, is apparently a keen, progressive observer, and has the rare gift of presenting what he has seen and experienced in clear, plain language. Mr. Percy has not cared to startle his readers with numerous quotations from a wide range of literature. He writes what he has gleaned in an active business life, and warns his students against many an error the disastrous results of which he has had occasion to observe. He does not embarrass by an undue attention to details, and yet we have noticed in the pages of hi book many of the little "points," one alone of which we have often considered an ample reward for a day's persistent "pumping."

In the first volume, now before us, Mr. Percy deals with the laying out of surface plant, a work which, of course, is directly applicable to only a few American mines, the conditions being so widely different. Still, the chapter contains many suggestions of value. The second, third, and fourth chapters on winding or hoisting engines, with a series of notes on their various parts, fully illustrated with a number of plain outline cuts, will be fully appreciated. The fifth chapter gives an example of a horizontal hoisting-engine which probably would meet with more favor in this country than the single vertical engine at Monkwearmouth, described in the next chapter, which nevertheless, according to Mr. Percy, is doing excellent work. The Burns brake next engages Mr. Percy's attention, the principal points of this appliance to which

**The Mechanical Engineering of Collieries.* By C. M. Percy, Wigan. Volume I. Published by the *Colliery Guardian*, London.

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Mr. Percy appears to attach much value being that a comparatively small brake-shoe is used. It is simply a block of pitch-pine, into which a number of holes have been drilled, filled with sand.

The important subject of ropes and drums, their cost, their safety, etc., is discussed at length in the eighth chapter; while the kindred subject of conductors and cages is taken up in the next. Mr. Percy gives some good points on head-gears and their construction; on detaching-hooks, screens, and tipple arrangements; and then goes, with considerable detail, into a description and discussion of underground and surface boilers.

In speaking of mechanical ventilation, Mr. Percy is rather non-committal, so far as the merits of various types of machines are concerned; but he does not hesitate to express his convictions on the question furnace *versus* fan, strongly advocating the latter.

Mr. Percy's work is now the best we have on the mechanical engineering of collieries, and, in the absence of any strictly American work, to a certain extent fills a want severely felt. It does not pretend to give working drawings of plants erected in England, and those seeking models will be disappointed. We heartily recommend the book to our readers.

THE AMMONIA INDUSTRY AND THE SCOTCH IRON MANUFACTURE.

Mr. Robert R. Tatlock, chemist, of Glasgow, gives some interesting details in regard to the manufacture, in Scotland, of ammonia from blast-furnace gas. It must be remembered by American readers that, unlike the greater number of our blast-furnaces, those of Scotland use raw coal. It had long been known that ammonia existed to an appreciable extent in the waste gases of blast-furnaces, as it does in the gaseous products of combustion from all coals; but the mechanical difficulties in the way of recovering it were so great that it was not attempted until quite recently, when Messrs. William Baird & Co., of Gartsherrie, Scotland, erected large and costly apparatus for condensing it in the form of ammonia liquor, as well as the tar which distills off from the coal in the upper part of the blast-furnace. When it is considered that an average furnace will consume 50 tons of coal per day, and each ton of coal burned gives 130,000 cubic feet of waste gases; that these have an initial temperature, after leaving the furnace, of about 500 degrees Fahr.; and that this enormous amount of hot gas, weighing about four tons, contains only about six pounds of ammonia, the difficulties with which the pioneers of this new industry had to contend can be realized. The result is, that at present about one ton of sulphate of ammonia per day is made at the Gartsherrie Iron-Works, with less than the waste gases from two furnaces; and it is said that the whole of the other furnaces belonging to the firm are, as quickly as possible, to be adapted to the production of ammonia. But while the erection of the enormous plant was going on, certain of the other Scotch iron-masters were not idle, and sought means of recovering the ammonia in other ways. More than one of them has experimented largely, and it is believed successfully, with the object of obviating the necessity of cooling such a large volume of gas, their method consisting in scrubbing the hot gases with a shower of sulphuric acid, producing sulphate of ammonia at once, which, however, is of a dark color unless much care is bestowed upon it in order to keep it clean. The latest, however, with regard to the recovering of ammonia from furnace gases is, that a celebrated firm of iron-masters in the neighborhood of Glasgow has secured full patent rights for fixing the ammonia by means of a sulphurous or other acid in the form of vapor or gas, which, meeting with the gaseous ammonia, forms at once a salt easy of condensation, and easily scrubbed with water, yielding a solution of some 60° Twaddle, instead of about 4° Twaddle, as in the condensation method. The product consists of a mixture of hypo-sulphite, sulphite, and sulphate of ammonia; but it must be borne in mind that for some purposes it is not necessary that the ammonia should be in the form of sulphate at all. For the Brünner and Mond ammonia-soda process, for instance, the less sulphate there is the better, as, when distilled with lime, in order to obtain the free ammonia, the residue in the stills will consist of a solution of the soluble hypo-sulphite and sulphite of calcium, instead of nearly insoluble sulphate. At present, the annual consumption of sulphate of ammonia in England is nearly 3000 tons for the ammonia-soda process alone, and the quantity will certainly increase. One great advantage of this method is, that it requires no sulphuric acid, the sulphurous acid being obtained by burning, in a suitable kiln, by means of the cold blast, the waste sulphurous "blues," which can be had in Scotland by the hundred thousand tons for the lifting. In any case, if it is required to produce the ammonia in the form of sulphate, that can easily be done by distilling with lime and receiving the evolved ammonia in sulphuric acid, as usual.

It is not difficult to make an estimate of the prospective amount of ammonia from this source, at least so far as Scotland is concerned, where there are probably as many as 130 blast-furnaces capable of being adapted to the recovery of the ammonia without injury to the gases for heating purposes, such as firing boilers and heating the blast. Each furnace consumes, say, 50 tons of coal per day, and each ton of coal is capable of yielding ammonia equal to about 25 pounds of sulphate. This gives for each furnace 1250 pounds of sulphate in 24 hours, or 72½ tons per day for all Scotland, or, for a year of 350 working days, 25,375 tons, the value of which, at present rates, is nearly two and a half million dollars; and probably the blast-furnaces working on coal in England are capable of producing quite as much.

FORMING SECONDARY BATTERIES.

From the English patent specification of Mr. C. Brush, the well-known Cleveland inventor, *Engineering* extracts the following interesting account of the difficulties experienced in forming secondary batteries: The most common form of secondary battery consists of two sheets of lead placed near together, but not in contact, and immersed in dilute sulphuric acid. When an electric current is passed through such an apparatus, water is decomposed; hydrogen is occluded by, or combines with, one of the lead plates, while oxygen combines with the other and forms a coating on it of peroxide of lead. This oxide of lead, not being capable of combining with any acid, is not affected by the presence of the sulphuric acid employed. Now, if the exciting current be removed, it will be found that the apparatus has become a powerful battery, giving a current in a direction opposite to that of the exciting one. But this current is of short duration. If, however, the charging current be reversed from time to time, frequently during the first few days and more rarely afterward, the capacity of the apparatus will be greatly increased. This constitutes the customary process of "forming" the plates of a secondary battery.

The formation of peroxide of lead on one of the plates continues indefinitely as long as the exciting current is maintained, becoming constantly slower as the metallic surface acquires an increasing protection against further action by the constantly increasing thickness of the coating of peroxide of lead. This coating is a good conductor of electricity, and free oxygen is evolved at the surface of the coating. Now, if the exciting current be stopped, local action, somewhat similar to that in galvanic batteries, commences between the peroxide of lead and the backing of metallic lead with which it is in contact. By this action, the peroxide is gradually reduced to a lower state of oxidation, while more of the metallic lead of the plate is oxidized by the oxygen thus made available. The fresh lead thus oxidized doubtless acquires the same condition of oxidation as the original protoxide finally assumes. But the peroxide is never by this action reduced to a state of protoxide, as is proved by the color of the coating and by the non-action on it of the sulphuric acid. When peroxide of lead is thus reduced to a state of lower oxidation, it becomes useless for the development of a secondary current until freshly charged or reoxidized. Thus is explained, as far as the oxygen plate is concerned, the cause of the gradual loss of charge observed in lead secondary batteries. Further, since the conducting power of peroxide of lead rapidly decreases as its oxygen is removed, the reason of the high electrical resistance of the oxidized plates, after long standing uncharged, is also explained. When a plate that has lost its original charge by local action is recharged by an electric current as at first, it will hold a larger charge than before, because all the lower oxide will be raised to the condition of peroxide, and thus more of the latter will be present than at the previous time of charging. This explains why the oxygen plates of secondary batteries constantly increase in capacity, even though the exciting current be applied at long intervals.

At the opposite side of the battery, hydrogen appears as the result of the charging current. This is absorbed at the surface, being simply occluded, or more probably forming a definite but feeble chemical combination with the lead. If such a combination exists, it is probably a stable one as far as local action is concerned. At any rate, the capacity of the hydrogen plate never becomes at all considerable when it is subjected to this action alone. Hence in practice the oxygen plate soon acquires the greater capacity, and the charge must be reversed to cause the oxygen to act upon the hydrogen plate to bring it into a spongy condition, in which it can retain an amount of hydrogen equivalent to the oxygen stored in the opposite plate. Thus it is the oxygen plate for the time being that receives all the improvement from the charging action, the hydrogen plate remaining almost unaltered. This is the reason for the frequent reversals of the charge in forming batteries. When a previously excited secondary battery is discharged, the peroxide of lead is thereby reduced to a state of lower oxidation, as already explained. Thus what was at first a good conducting envelope on the metal plate is now reduced to a poor conductor, while at the same time pure water is formed within the mass of lead oxide, and presents a further barrier to the passage of the current. These two causes account, so far as the oxygen plate is concerned, for the increase of resistance in secondary batteries during their discharge, and especially toward the end of the process. Water is also formed in the pores of the hydrogen plate.

The difficulties of forming batteries by this process arise from the fact that the coating of peroxide of lead on one of the plates necessarily occupies more space than the metallic lead did. The covering must then expand in all directions in forming; and to accommodate this, the structure of the deposit must be more or less broken up, or else the lead plate must expand. When the direction of charge is reversed, the previously expanded mass shrinks. Both the expansion and contraction may be rendered manifest by treating one side only of a plate, the other side being protected by varnish. When such a plate is oxidized, the exposed side becomes convex; and when the oxide is subsequently reduced, the same side becomes concave. During the processes of charging and reduction, the expansion and shrinking do not occur in all parts of the mass at once, hence a disintegrating action is set up, and the coating eventually peels off. Again, every time the deposit of lead is reduced, a notable quantity of sulphate of lead is formed within the mass, and exercises a very deleterious influence, stopping the pores, and aiding the disintegration by its superior volume.

The Büttgenbach System of Separating Blende and Pyrites.—We have repeatedly referred to Franz Büttgenbach's method of separating zinc-blende from iron pyrites as practiced at Lintorf, Westphalia. The separation of intimately intermixed minerals from each other has been effected hitherto mainly by taking advantage of differences of density, structure, or capacity for being rendered magnetic by calcination. Herr Büttgenbach makes use of the properties of minerals evinced in differences of cohesive strength. The separation of minerals of unequal hardness, by reason of their greater or less susceptibility to break down into fragments of different sizes, is not possible with the ordinary crushing or stamping mill; but it is different when the mass is thrown violently against a hard, resisting surface, in which case, if the velocity is properly proportioned, only the more brittle substances are broken. In order to obtain a proper separation of iron pyrites and zinc-blende, Herr Büttgenbach has been led to experiment on the use of Vapart's centrifugal breaker, not only as a crusher but as a separating machine. The ore is passed through it and is then simply screened. At a speed of 800 revolutions per minute, in the Vapart crusher, lumps of iron pyrites of from 20 to 25 millimeters diameter will leave it either as dust or grains of from 1 to 1½ millimeters; whereas, with 400 revolutions, they will come out of it but little touched. With 800 revolutions, however, zinc-blende is crushed to the finest dust: while with from 300 to 400 revolutions, it leaves the apparatus partly as dust and partly in grains of ½, 1, 2, and 3 millimeters. If, now, a mixture of pyrites and blende is put into the apparatus and passed through it at a speed of 400 revolutions per minute, the pyrites leave it in almost the same state in which they entered it, while the blende is very finely reduced, and the separation of the two minerals may then be easily effected by a simple sifting process.

THE GRANT SMELTING-WORKS.

Written for the Engineering and Mining Journal by O. J. Frost, Argo, Colorado.

(WITH SUPPLEMENT.)

The Grant Smelting-Works are situated about two miles from the central business portion of Denver, in the northeastern part of the city. They are the most recently erected and the largest silver-lead smelting-works in the country, as well as the combined result of a full knowledge of the best processes the world over and of an experience ripened by several years in the smelting of Colorado ores at Leadville.

The history of the Grant works furnishes a typical example of the growth of Western industries. When the extensive resources of Leadville were proved, the foundation of the present smelting establishment was laid by the erection of a single blast-furnace. From time to time, others were added, until, last spring, when the works were completely destroyed by fire, it was the foremost smelter in Leadville. It was desirable to rebuild at a more central point. After a careful consideration of the railroad facilities for the transportation of ore, and the abundance and quality of fuels and fluxes obtainable at various centers, Denver was chosen as best answering the requirements. The new works are owned by Eddy, James & Grant, Messrs. Eddie and James having bought an interest owned in the old works by Judge Grant, an uncle to Mr. J. B. Grant, the present partner. Mr. J. B. Grant is a metallurgist of both high theoretical and practical attainments, having supplemented an American college education by three years of study at the Royal School of Mines, Freiberg, Germany, to which has since been added his smelting experience at Leadville. At present, he is Governor of Colorado, having been elected last fall to that position. Messrs. Eddy and James are business men of wide and successful experience. The metallurgist is Dr. Malvern W. Iles, a graduate of Columbia School of Mines, who has gained a thorough knowledge of Colorado ores in his position of chemist for the former company at Leadville. A young man, he is an enthusiastic devotee of science, and to its records he has already made a number of valuable contributions.

The site chosen for the works was a terrace next the bottom of the Platte River. On one side, it affords facilities for the delivery of ore, fluxes, and fuels by the cars on a level with the charging-floor of the works, while it also gives an unlimited slag-dump on the other side from twelve to fifteen feet below the furnace hearths.

The works consist of a large brick building (represented in plan and section by Figs. 1 and 2 on accompanying plate) and an addition at the southwest end, not shown. This building is 230 feet long and 100 feet deep. The end walls are 22 inches thick, strengthened by four abutments, each four feet wide, which project two feet at the base, but at the roof recede to the level of the wall. The front wall is 13 inches thick, and has twelve eight-foot openings for easy access to the ore-bedding floor. Between these openings or doors, strengthening abutments project outward two feet, and inward 11 inches. The rear of the building is supported at the corners by two brick piers eight feet square, and between by eleven square iron pillars. The roof is of iron supported by truss-work. The front side of the building is taken up by the ore-bedding floor, which is of planks resting on timbers imbedded in the solid earth, furnishing an unyielding support for any weight of ore. Along the rear of the works are the furnace-floor and the feeding-floor. Between these floors and the ore-bedding floor, leading to the stack, is the dust-chamber. It is 6 feet wide and 15 feet high internally, and is built with 18-inch walls. The roof is arched, and the side next the ore-bedding floor is provided with a projection (*a*, Fig. 2). Access to the chamber is had from the furnace-floor by means of doors, one of which is represented in Fig. 2. The stack is octagonal outside, each side being 8½ feet at the base, but slightly tapering upward. The interior is square, 12 feet on a side, and is provided with iron bar straps. Its hight is 155 feet. The furnaces, eight in number, stand in a row on the furnace-floor at distances varying from 23 to 27 feet from center to center. They are numbered 1, 2, 3, 4, 5, 6, 7, and 8, each having a special name given it by the workmen. An additional furnace, 9, is in process of construction. It was originally intended to erect another, but the space for the tenth has been taken up by a tramway (represented in Fig. 1) for raising slag used as a flux. The furnaces are a rectangular modification of the Pilz Freiberg furnace, all being of the same construction. The automatic siphon-tap used is a distinguishing feature from the Pilz; another distinction is the use of ten instead of eight tuyeres. Like the Pilz, the slag is tapped through a tap-hole in the closed breast. The lower portion of the furnaces is provided with water-jackets, and the fumes are conducted by a flue leading from the upper portion of each furnace to a dust-chamber and thence to a common stack. On the furnace-floor next the dust-chamber is a tramway for removing the bullion to cars on the broad-gauge track (railroad, Fig. 1) by which it terminates. In front are two narrow-gauge tracks (*r r*, Fig. 1), from which the ore is bedded. Several other tracks, not represented in the plan, lie farther in front. A switch-engine owned by the company is in use for convenience in handling the cars. At the ends of the building are dumps of charcoal, coke, and limestone, four furnaces being furnished with these materials from each end. The addition mentioned above at the southwest end contains the engine, blowers, and electric light machine. The assay-office and the general office are each in a separate building to the front of the works proper.

The details of the construction of a furnace are as follows: The hight from the furnace-floor to the upper surface of the charging-floor is 18 feet 2 inches. The hearth or crucible, 30 inches in hight, is built of fire-brick, without tamping, and is inclosed in cast-iron plates 1¼ inches thick. The brick-work is underlain by a plate of boiler-iron, to prevent any molten lead which penetrates the brick getting beyond the limits of the hearth. The hearth is 10 feet long and 6 feet 3¾ inches wide externally. The hearth cavity (*b*, Figs. 5, 6, and 7) is 80½ inches long and 36 inches wide at the top, but one foot smaller each way at the bottom. Its depth is 22 inches. The automatic tap consists of a retangular passage left in the brick-work of the hearth, leading from one side of the hearth cavity to a small lead well (*c*, Figs. 5 and 7) in the upper portion of a column of fire-clay, inclosed in sheet-iron, which is bolted to the cast-iron hearth-plates. The water jackets (*e, e, e*, etc.) are 3 feet 5 inches high, 6 inches thick, and are cast in fifteen pieces—five on each side, two on the back, and three on the front end. They are hollow shells of cast-iron five eighths (⅝) of an inch thick. They rise on a line with the hearth cavity, 18 inches to the boshes, then slant outward 6 inches in the remaining 23. On the outside of each jacket, 17½ inches from the bottom, begins a projection (*f, f*, etc.) 8 inches wide. It runs 3 inches above the top of the jacket and extends at the upper portion 4 inches. It gives on the interior a channel (*f'*, Fig. 7) for the entrance and exit of water. Water is supplied cold to the interior (*e'*, Fig. 7) of the jackets by means of the small pipes (*h, h*, etc., Figs. 3, 4, and 7), one to each casting of the jacket. These pipes branch from a supply-pipe (*g*, Figs. 3, 4, and 7) running around the furnace, which in turn is itself a branch of the main delivery-pipe (*x*, Fig. 4). The heated water runs out at the openings *i, i*, etc., into galvanized iron troughs (*j, j*, etc). From these troughs the water is conducted by a cast-iron water-pipe (*k*, Fig. 4) to a common pipe for waste water beneath the furnace-floor. Although the entrance orifice is near the exit, no special device is needed to keep the water mixed, simple connection being sufficient to maintain a uniform temperature. At the front end of the furnace, the water-jackets are so cast as to leave room at the middle for a breast (*l*, Figs. 3 and 6) of fire-brick, 5½ inches high and 16 inches long. The tap-hole (*m*) for slag is in the lower portion of this breast. Above it is a small jacket (*n*), 9 by 16 inches, for the front tuyere. The tuyeres (*o*) enter the furnace 8 inches above the hearth. They are of brass, fitting the openings in the jackets closely, 4 inches in diameter at the outer end and 3 inches at the inner. Their axes are horizontal. The blast-pipes are of galvanized iron above and below (*p, p*, etc.) with strong, closely woven canvas bags, soaked in silicate of soda, connecting them with the tuyeres (*q*). They branch from the blast-main (*r*) for each furnace. This itself branches from the common blast-main (*s*, Fig. 2). At the tuyeres, the internal dimensions of a furnace are 80½ by 36 inches. A furnace of larger size was built in Leadville at the old works; but it was found not to work well, on account of a wedge of ore in the center of the furnace which the blast did not reach. The shaft of the furnace is 12 feet 3 inches above the water-jackets. It is common brick, lined with fire-brick. The brick-work is supported by a cast-iron collar or supporting-plate (*t, t*) extending around the furnace, and resting on the tops of four iron pillars, one at each corner. Arches in the common brick from corner to corner give strength to the shaft. The shaft is bound by five tie-rods on each side and end, secured in vertical castings at the corners. A round sheet-iron flue (*v*, Figs. 2, 4, and 6), 30 inches in diameter, conducts the fumes downward into the dust-chamber, as shown in Fig. 2. The charge is introduced through a rectangular sheet-iron curtain (*w*, Figs. 3 and 4), 34 by 70½ inches. It leaves a space covered over tightly with sheet-iron, 12 inches wide on the sides, and 16 inches on the ends, not filled by ore, into which the fumes rise before passing down the flue. At the front end of the furnace for conducting away the fumes rising from the slag at the time of tapping, is a sheet-iron hood (Figs. 2, 3, and 4). Its stack slants forward in the lower portion to the shed, through the roof of which it rises vertically.

The power for the works is supplied by an eighty-five foot horse-power Corliss engine, made by Fraser & Chalmers, of Chicago. It drives the blowers, runs the pumps, works the electric light machine, and raises slag to be mixed with the charge for flux.

The blowers are Baker's rotary pressure, No. 7½. The works are provided with three, two being in constant use, and the third in reserve. They supply the blast to the furnaces by the blast-main (*s*, Fig. 2), 3 feet in diameter, made of galvanized iron, running the length of the furnace-room next the dust-chamber. At present, cold blast is used; but it is proposed to heat it by changing the position of the main to the inside of the dust-chamber. The blast-pressure is denoted by Wilbraham mercury-gauges, one to each furnace.

There are two pumps to supply water to the jackets, engine, and other needs of the works. One pump only works at a time; the other is in reserve in case of breakage of the first. The water is pumped into a large tank outside the works above the level of the water-jackets. From this tank, it is supplied to the furnaces by means of the 6-inch iron water-pipe (*x*, Fig. 4) running the length of the works in front of the furnaces.

Light is furnished by Weston's electric light machine. There are ten lights distributed to perfectly light the dumps outside as well as the inside of the works. All the rest of the iron-work and machinery was furnished by the Colorado Iron-Works, of Denver, Colo.

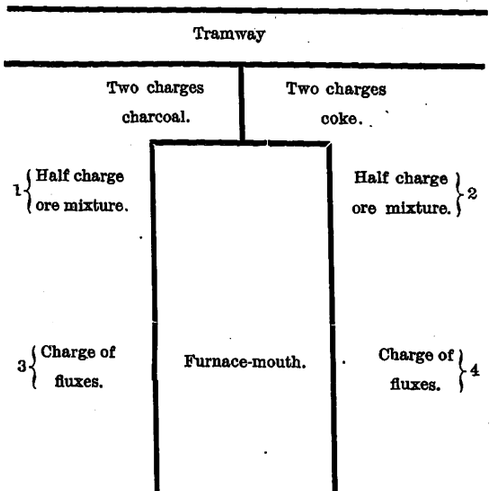
At least seven tenths of the ore smelted is carbonate ore from Leadville. The rest comes from various other parts of Colorado, as well as from New Mexico, Arizona, and Idaho. Previous to smelting, the ore is mixed on the ore-bedding floor (Figs. 1 and 2). It is wheeled on to the bed with barrows run on planks which are shifted as the bed rises. The ore is spread in layers covering the whole bed, each layer being of uniform thickness throughout, but different layers varying in thickness with the mineral character of the ore as determined by chemical analysis, and its richness as determined by fire-assay. A bed, when finished, is five or six feet high, and contains from six hundred and fifty to eleven hundred and fifty tons. In richness, the beds range from 17 to 40 ounces in silver, and from 16 to 22 per cent in lead. The charge consists of ore, 500 pounds; limestone, from 75 to 100 pounds; slag, from 60 to 70 pounds; coke, from 60 to 80 pounds; charcoal, from 30 to 50 pounds. The ore is shoveled from the bottom of the ore-bed, the upper layers falling to the floor and mixing well, into iron barrows or "ore-buggies," weighing 75 pounds each. The barrows, when loaded with about half a charge, are run on to the ore-scales, an exact half-charge is weighed by adding or throwing off ore, and the ore is then wheeled to the mouth of the furnace and dumped on the charging-floor. There are two pairs of ore-scales, one of the Howe and one of the Fairbanks make. Each scale has several beams which may be set and locked out of sight of the workmen, and the ore weighed on any one of them as set, without the trouble of changing weights—insuring both secrecy and accuracy.

The limestone used as flux is from near Morrison, Colo., and is of a very pure variety, as shown by the following analysis: $CaCO_3$, 94–96 per cent; SiO_2, 1½–2½ per cent; $Al_2O_3+Fe_2O_3$, 2½ per cent; $MgCO_3$, trace; organic matter, trace. The use of magnesian limestone is particularly avoided. The limestone, first crushed into moderately small pieces, is brought in iron "flux-buggies," weighing 65 pounds each, to the flux-scales, where the charge is weighed, and then the charge of slag is added from a pile that has been elevated from the slag-dump by the tramway, Fig. 2. The fluxes (a full charge) are then

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dumped on the half-charge of ore at the mouth of the furnace, after which another half-charge of ore is dumped on the fluxes. The fuels, coke and charcoal, are brought on a tramway (*y*, Fig. 2) from the dumps outside the works, and weighed on appropriate fuel-scales before dumping at the furnace-mouth. The coke used is from the coke-ovens of El Moro, Colo. The charcoal comes from Selida, Colo.

The following diagram will clearly represent the method of charging:



(The figures denote the order in which the materials are brought.) In charging, the "feeder" first spreads half the pile of charcoal (or one charge) on the top of the furnace; next, half the pile of coke; and lastly, he adds the ore and fluxes dumped on one side of the furnace-mouth. He then repeats the process, keeping the mixture of ore, fluxes, and fuels a little above the bottom of the curtain (*w*, Figs. 6 and 7). In regular working, no smoke or fumes come out of the mouth of the furnace, the draught being strong enough to convey them all down the flue to the dust-chamber; but for extraordinary cases, such as repairs to the dust-chamber or the common stack, each furnace is provided with a counterpoised stack of sheet-iron (Fig. 2). When needed, it can be instantly lowered to the furnace. On each side, it has an opening (*z*) for feeding. A damper in the flue of each furnace serves, when desired, to turn the draught from the dust-chamber up each furnace-stack. The damper can also be regulated so as to turn off one half or one quarter of the draught. The amount of blast used is regulated by a slide in the branch blast main to each furnace. The pressure varies from seven to ten ounces per square inch. The supply of water to the jackets is regulated by a screw cut-off in the pipes *h*, *h*, etc. The surface of the lead in the well is kept just below the top. It stands higher in the well than in the hearth or crucible, by the amount of blast used. The molten lead is dipped by the "furnace-man" and cast into bars of bullion weighing from 107 to 108 pounds. Two chips —one from the bottom and one from the top—are taken from each bar of bullion, for assay. The bullion runs from 100 to 200 ounces of silver and from 0·25 to 4 ounces in gold. It is shipped in car-load lots of 220 bars each to the Omaha Refining Company, where the precious metals are extracted from the lead by Balbach's modification of Parkes's process.

The slag is tapped in the ordinary way by the "slag-tapper" breaking the clay plug to the tap-hole with an iron bar. It runs into an iron slag-buggy standing under the spout; and when the outer portions solidify, it is drawn out by the slag-tapper and tipped over the dump. The nature of the slag is regulated by the price of fluxes and the requirements of the silver and lead markets; but none of it ordinarily needs re-smelting, except what is added to the charge as flux. From 55 to 65 pots or buggies of slag, weighing 270 pounds each, are tapped from each furnace per shift of twelve hours. A series of experiments on the specific gravities of the slags was conducted for a number of years at the old works in Leadville, without arriving at important metallurgical data. These experiments have now been discontinued.

Daily and nightly furnace reports are made, giving the following data:

GENERAL REPORT—GRANT SMELTING COMPANY.

No. of furnace.	No. of ore mixture.	When charge changed	No. of Pounds per Charge.						No. of charges at change.	No. of Lbs. per Furnace.		Pigs added.	Per Furnace, No. of		Remarks.
			Ore mixture.	Limestone.	Iron flux.	Slag.	Coke.	Coal.		Coke.	Coal.		Charges.	Pigs.	
1 to 10															
Grand Totals...															

Coal... Engine.....
Stoves.....

Denver.....1883.....Shift.

Signed.....

The dust deposited in the dust-chamber is mixed with 8 per cent of caustic lime and re-smelted, either first mixing on the ore-beds or adding directly a shovelful to each charge. (Rich grades of ore are also mixed with 8 per cent of caustic lime before spreading on the ore-beds.) The dust from all portions of the chamber contains bromo-chloride of lead—a compound first discovered by Dr. Iles when chemist at the old works in Leadville. The metallurgical importance of the addition of caustic lime in re-smelting depends upon a double decomposition between the caustic lime and the bromo-chloride of lead. The probable furnace reaction is as follows: $PbBrCl + Ca(OH)_2 = Pb(OH)_2 + CaBrCl$.

The projection *a* in the dust-chamber gives the fumes a whirling motion and largely confines the draught to the upper portion, so that, together with a careful regulation of the dust-chamber doors, a stratum of pure air is left below in which combustion of carbonaceous matter takes place, concentrating the flue-dust and making it less disagreeable to handle. The flue-dust is removed from the chamber in barrows, the assay sample being obtained with a Spitz divider from every tenth barrow. A sample from eighty-one (81) tons—the dust deposit of the first four months' run—carried 32 ounces of silver to the ton, a trace of gold, and 26 per cent of lead. The roofs and windows of all adjoining houses have been examined for flue-dust and none has yet been detected. Some, however, has been found on the sheet-iron roofing of the smelter itself. It contained but one ounce of silver to the ton, and singularly, but a trace of lead.

Speise and matte are occasional products, and are saved in one large pile. A sample of 1800 pounds taken from all portions of the pile run 30·75 ounces of silver to the ton, a minute trace of gold, and 9 per cent of lead. None of it has yet been treated. It will probably be roasted in a reverberatory furnace before re-smelting.

The men work in twelve-hour shifts. Every two weeks, at noon, the shifts change from night to day. This bi-weekly change of shifts at midday gives opportunity to shut down the engine and make any needed repairs in the shortest possible time, as all the force is at hand to help at the time when the light is best. The number of men employed about the works is 130, as follows:

8 furnace-men to each shift	16	Cart-men	3
8 slag-tappers " "	16	Cart-helpers	2
8 feeders " "	16	Roustabouts	3
8 ore-wheelers " "	16	Flue-dust men	2
4 flux-wheelers " "	8	Speise man	1
2 fuel-wheelers " "	4	Blacksmith	1
Total about 8 furnaces	76	Carpenter	1
1 weighing-master to each shift	2	Bullion-loaders	3
1 engineer " "	2	Foremen	2
1 fireman " "	2	Bookkeepers	2
Ore-bedders (day)	15	Assayer, chemist, and metallurgist (each)	3
Ore-bedders (night), or relay night men.	5		
Timekeeper	1		130
Unloaders of fuel	4		

Construction of the works began in July, 1882. They were completed so that the furnaces were blown in as follows:

No. 1	October 7th, 1882.	No. 5	October 12th, 1882
" 2	" 10th, "	" 6	" 15th, "
" 3	" 11th, "	" 7	" 28th, "
" 4	" 10th, "	" 8	November 1st, "

The eight furnaces smelt from 211 to 250 tons of ore a day, 230 being about the average. This makes the actual working capacity up to date, of a single furnace, a little less than 30 tons. The production up to January 1st, 1883, here follows:

State or Ter.	Gold.	Silver.	Lead.	Totals.
Colorado	$27,900	$617,200	$533,000	$1,178,100
Arizona		123,000	3,000	126,000
New Mexico	20	10,000	600	10,620
Idaho		500	200	700
Other sources	1,500	16,000	4,300	21,800
Totals	$29,420	$766,700	$541,100	$1,337,220

The writer is under obligations to Dr. Iles, superintendent of the works, who was very kind in imparting information and considerate in offering facilities needful in collecting the material for the foregoing paper. He is also indebted to Mr. Nasmyth, of the Colorado Iron-Works, where the water-jackets were cast and all other iron-work for the smelter, roofs, etc., included, was manufactured, for information regarding the construction of the water-jackets.

IT is announced that a syndicate of capitalists in this country has purchased the patent for the Bull direct process of iron manufacture in this country on a favorable report made by Herr A. Hansen, of Dortmund Germany.

COAL RAISED IN THE UNITED KINGDOM IN 1882.—It appears that the quantities of coal brought to bank in the United Kingdom last year reached no less a quantity than 156,500,000 tons, thus exceeding the extraordinary production of 1881 (154,184,000 tons) by upward of 2,300,000 tons. As compared with 1880, the excess is as much as 9,700,000 tons, and as compared with 1879, it is 12,500,000 tons. This shows a progressive expansion in the production of coal that is really startling. The miners employed in the production of this mass of fuel numbered 501,000, so that each man, on the average, won 312 tons in the course of the year.

LIGHT GOLD COIN.—At a meeting of the British Institute of Bankers, a paper on light gold coin was read by Mr. R. H. Inglis Palgrave. Recent inquiries into the condition of the gold coinage of Great Britain showed that about eighteen years' wear would render a sovereign illegally light, and that 55 per cent of the gold coins now circulating were below the legal currency. The amount of English gold coin in circulation Mr. Palgrave estimated at about £100,000,000, the estimated cost of recoining which would be £786,000. Withdrawal of light coin must, he argued, proceed side by side with the issue of the full-weight coin, and the cost must necessarily fall either on the government or on the last holder of the coin. If the charge were to fall upon the last holder, injustice would be done, because the circulation of light gold was unequally divided over the

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whole of the country; and Mr. Palgrave considered that the most desirable method of withdrawing the light coin would be by the government, acting through the Bank of England, exchanging light coins for new ones of full weight under certain conditions, including an allowance for maximum wear on each parcel, which would increase according to the age of the coin. A short discussion followed, in which the balance of opinion coincided with the views expressed in the paper.

WEIGHT OF ANTHRACITE COAL.—Mr. Heber S. Thompson, Engineer of the Girard estate, has been at some pains to ascertain the weights of anthracite coal in place. Samples were secured from the Mammoth, Seven-Foot, and Buck Mountain seams at the Kehley's Run colliery, and having been formed into perfect cubes, they were weighed on accurately adjusted scales. The weight of a cube containing 100 cubic inches having been ascertained, the weight of a cubic yard was simply a matter of calculation. The following results were obtained:

Mammoth Seam: 102 pounds per cubic foot and 2754 pounds or $1\frac{33}{800}$ tons of 2240 pounds per cubic yard.

Seven-Foot Seam: $99\frac{66}{100}$ pounds per cubic foot and $2688\frac{30}{100}$ pounds or $1\frac{30}{100}$ tons of 2240 pounds per cubic yard.

Buck Mountain Seam: $103\frac{68}{100}$ pounds per cubic foot and $2799\frac{36}{100}$ pounds or $1\frac{35}{100}$ tons of 2240 pounds per cubic yard.

Mr. Thomas proposes to find the weight of the coal in place in all the collieries on the Girard estate.

A REMEDY FOR BURNS AND SCALDS.—It is now many years ago, says Mr. F. Peppercorne, in the *Popular Science Monthly*, while engaged in some investigations as to the qualities and effects of the alkalies in inflammations of the skin, etc., that he was fortunate enough to discover that a saline lotion, or a saturated solution of bicarbonate of soda in either plain water or camphorated water, if applied speedily, or as soon as possible, to a burned or scalded part, was most effectual in immediately relieving the acute burning pain; and when the burn was only superficial or not severe, removing all pain in the course of a very short time; having also the very great advantage of cleanliness, and, if applied at once, of preventing the usual consequences—a painful blistering of the skin, separation of the epidermis, and, perhaps, more or less of suppuration. For this purpose, all that is necessary is to cut a piece of lint, or old soft rag, or even thick blotting-paper, of a size sufficient to cover the burned or scalded parts, and to keep it constantly well wet with the sodaic lotion so as to prevent its drying. By this means, it usually happens that all pain ceases in from a quarter to half an hour, or even in much less time. When the main part of a limb, such as the hand and forearm or the foot and leg, has been burned, it is best, when practicable, to plunge the part at once into a jug or pail, or other convenient vessel filled with the soda lotion, and keep it there until the pain subsides; or the limb may be swathed or encircled with a surgeon's cotton bandage previously soaked in the saturated solution and kept constantly wet with it, the relief usually being immediate, provided the solution be saturated and cold. What is now usually sold as bicarbonate of soda is what he has commonly used and recommended, although this is well known to vary much in quality according to where it is manufactured; but it will be found to answer the purpose, although probably Howard's is most to be depended on, the common carbonate being too caustic.

EXTRACTION OF PRECIOUS METALS BY ELECTROLYSIS.—In a recent number of the *Chemical News*, Messrs. Blas and Miest described several methods for the extraction of the precious metals from all kinds of ores by electrolysis. The following abstract of this paper was given in the *Journal* of the Chemical Society for January: "The authors have discovered that if, in electrolysis, compressed ores are used as anode in a bath of an electrolyte containing the same metal as the metal of the ore, on the passage of the current the ore is decomposed, the sulphur, etc., being precipitated at the anode, while the metal collects at the cathode. Thus, with pure galena in a lead nitrate bath, the separation is complete and easy. If the ore contains silica as well, then the silica remains at the anode. Antimony and arsenic, if present, behave in a similar manner, being precipitated as insoluble oxides. They are easily separated by a subsequent electrolysis. When large quantities of arsenic are present, a part of it combines with the sulphur, and forms realgar or orpiment. When ores containing several metals are operated on, the precious metals, being most easily precipitated, are thrown down first in the metallic state at the cathode under the action of a moderate current. The final separation of these metals requires very little battery power; for the mass of metal, when dissolved under the action of the current, regenerates sufficient heat for the ulterior separation of each metal separately. The products at the anode are extracted and purified by treatment with carbon bisulphide, and afterward by separate electrolysis. The decanted carbon bisulphide solution of sulphur is distilled, the latter being left pure. If the ore is a polysulphide, and is mixed with much iron, sulphur and iron oxide are obtained in the first operation. These are best separated by electrolyzing in a dilute sulphuric acid bath; pure sulphur is obtained at the anode, and basic iron sulphate at the cathode. By this process, 1¼ horse-power is required to produce one kilo of copper from a sulphurous ore in one hour. As an example of the working with a complex ore, they describe the treatment of an argentiferous lead ore containing iron, copper, and zinc. The current being sufficiently strong, the iron and zinc will dissolve as readily as the other metals, but will not be precipitated so easily, therefore the solution will gradually become saturated with iron and zinc; the current is then regulated so that only the lead, silver, gold, and copper are precipitated on the cathode, while the zinc remains dissolved as nitrate. As the bath becomes saturated, the iron yields to the zinc, and is precipitated to the bottom as ferric oxide, and as soon as the solution is nearly saturated with zinc nitrate, it is siphoned off; the metals are then removed from the cathode, the sulphur and silica from the anode, and the iron oxide from the bottom, of course all separately. The sulphur, etc., and the metals are treated as above described. The zinc nitrate solution is treated with a small quantity of zinc oxide, which throws down the iron; the lead, copper, and silver retained are precipitated by passing a current through the solution, using a zinc anode. The pure zinc nitrate may be treated by a stronger electric current if metallic zinc is required, or if chemically, zinc oxide is wanted."

FURNACE, MILL, AND FACTORY.

The Phosphor-Bronze Smelting Company, of Philadelphia, has improved the quality of its wire recently, by obviating the tendency to kink. It is remarkable for its resistance to the corrosive action of smoke, acid fumes, or mine water, is claimed to possess a tensile strength equal to four times its weight per mile, which is 40 pounds for No. 18 gauge, or 0·049 inch diameter. Mr. W. D. Sargent, electrician, reports its electrical resistance to be about one half of that of iron wire of equal weight.

The heaviest iron ever worked in the Trenton rolling-mill was turned out recently. It consisted of two 15-inch girders, each weighing 4100 pounds before being charged. Twenty-two men were required to put them in the furnace, and double that number to roll them. When taken from the furnace, the girders measured each 54 feet long.

Benjamin, Fischer & Mallery's new works at South Chicago are completed and in operation. The main building is 210 feet long by 55 feet wide, and two stories high. The foundation is 48×102, with cupola outside having a capacity of thirty tons a day. The blacksmith-shop is 40×40, and contains four fires. The power for the works will be supplied by a 40 horse-power Atlas engine and a 60 horse-power boiler. From 150 to 200 men will be employed.

Several very important decisions were reached at the recent meeting of the stockholders of the South Tredegar Iron and Nail Company. The mill, after being considerably enlarged, will be run day and night. One thousand hands will be employed. Great improvements are destined to take place in the nail department, and 1200 kegs of nails, 500 kegs of spikes, and 100,000 pounds of splice bars will be the daily output. These enlargements will doubtless result in the building of a blast-furnace near the plant very soon.

It is said that the old Otis Tube-Works, Cleveland, O., will be started up as a branch of the National Tube-Works Company.

It is said that a stock company is soon to be formed which proposes erecting a large rolling-mill just east of Winooski, Vt.

A citizen of Connellsville, Pa., has offered to furnish any manufacturing company that will locate there a sufficient number of acres on which to operate its works. It is also understood that another property-owner will make a like offer.

A Hartford concern has recently received an order for a self-steering, traction, portable steam-engine, with a portable circular saw-mill, to go to Antuco, Chili. It is also negotiating for the shipment of a similar engine to Australia.

The Harlan & Hollingsworth Company, Wilmington, Del., has cast a condenser weighing 17,000 pounds, for the steamship Pensacola, now building at its yard.

Henry Disston & Sons, manufacturers of the Keystone saws, tools, etc., report consumption of raw materials for the year 1882, at their principal works at Philadelphia, as follows: 21,000 tons of coal and 10,000,000 feet of lumber. They made and worked into edged tools 80 tons of steel per week, besides 450 tons of bar steel for files. They turned out 1,692,000 single saws, 3810 large and 39,000 small circular saws, 1,250,000 long saws, 201,509 dozen files, besides a large quantity of miscellaneous tools which were made in the jobbing department. In this establishment are employed 1300 men, whose aggregate wages amount to over $18,000 per week.

George Felber, of St. Louis, manufacturer of machinery, is furnishing the St. Joe Lead Company, Bonne Terre, Mo., with eccentric jigs, screens, tanks, etc., for its new works now building. He is also doing considerable repair work for the same company.

D. M. Dillon, boiler-maker, Fitchburg, Mass., is making a five-foot steel tubular boiler for Lee, Blackburn & Co., woolen manufacturers, of Lawrence, Mass. This boiler will be set with the Jarvis patent furnace, and use the Sheffield grates, burning screenings and soft coal for fuel.

A combination has been formed in the South, composed of all the coke iron furnaces in the States of Tennessee, Alabama, and Georgia, with the exception of the Oakdale (Tenn.) furnace, to be known as the Southern Coke Association. The object of the association is to obtain and maintain a uniform scale of prices, and prevent indiscriminate competition. A uniform scale of prices has been agreed upon, and agents are required strictly to abide thereby, allowing concessions to no one, no matter how large his order for iron may be. It places all brands of iron on the same platform, so that the furnace making an iron of low standard will get the same price as for the high standard.

The latest achievement of the great 17-ton steam-hammer at the Black Diamond Steel-Works of Park, Brother & Co. was the manufacture by it of a large roll for the sheet mill, the ingot weighing about seven tons. This is said to be the first hammered roll ever made in this country. Heretofore they have been cast.

Alfred Box & Co., Philadelphia, have completed and put in operation in their works an exceedingly ingenious and successful special milling machine, which cuts the threads in the concave screw pinion used in the Box patent screw hoists. The arrangement of this machine is so perfect that, without any changes, save of motion and adjustment, any of the various sizes of pinions may be cut with equal facility. Both the cutter-shaft and shafts revolving the pinion have a separate and positive motion. The cutter-shaft has an automatic feed with a stop motion when the proper depth of cut has been made.

The new vitriol works erecting at St. Louis will produce daily about 300 barrels of copperas, sulphate of copper, and sulphate of zinc. The raw materials used will be the waste acid products from the Harrison Wire-Mills, together with wire and sheet scrap, which have heretofore been counted worthless, but which, under a new system, will be turned into a product worth about $100,000 annually.

The resumption of operations at the rail-mill of the New Jersey Steel and Iron Company, at Trenton, N. J., gives work to about 150 men. Several hundred men in other departments of the mill will continue idle till the puddlers resume work.

The capacity of the Henry Clay Furnace, at Reading, Pa., has been increased from 150 to 200 tons, by raising the furnace twelve feet. It has been blown in.

The Alton Rolling-Mill Company, Alton, Ill., has been incorporated; capital stock, $25,000. The incorporators are James T. Drummond, Charles H. Randal, James W. Kerr, John Haynod, Frederick W. Drury, and W. Pierce.

The union men locked out of the Vulcan Works at St. Louis, think that they will ultimately win. All of the Indianapolis men brought on to St. Louis have returned, and the union men seem confident that they can keep others away.

The Lanesboro' (Mass.) iron furnaces, which have been lying idle awaiting the decision of Congress on the tariff, are to be started up.

Among the recent improvements at the Girard furnace is a new hot-blast, large steam cinder crane air-hoist for lowering and raising the bell, and an addition to the casting-house. It is expected the furnace will have a capacity of 120 tons per day.

The Mahoning Valley Iron Company this week placed in operation one of Caddick & Co.'s patent puddling-furnaces. It is claimed for this furnace that there is a saving of 40 per cent in fuel used over the old furnaces, that the iron is improved, and but a small amount of scrap used.

The Edgar Thomson Steel Company is testing the limestone on Isaac Sherrick's farm, two miles northeast of Mount Pleasant, with a view of purchasing the farm. A $82,000 blowing-engine is building in Milwaukee, Wis., for the works of this company.

During the month of February the Aurora, Ill., smelting-works received thirty-one cars of bullion from the mining regions, and thus far this month their average receipts have been four car-loads daily.

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GENERAL MINING NEWS.

ARIZONA.

The latest dispatches state the following: The jury has disagreed in the suit of the Knoxville against the Christmas Company.

BENSON.—The smelter has been running steadily for some time on ore from the Santa Rita Mountains.

TRANQUILLITY.—It is said that a body of $400 ore was struck in the mine recently.

CALIFORNIA.

SIERRA COUNTY.

BALD MOUNTAIN EXTENSION GRAVEL MINING COMPANY.—A telegram from Forest City, Cal., says: This company has struck gravel in its tunnel, with the channel well defined and extending up the ridge northeasterly. This is regarded as very favorable to the region, as there is no doubt a great extent of unworked channel in that direction underlying the deposits of lava.

CALAVERAS COUNTY.

HOOSIER.—The mill started up last week, and after a short run, a clean-up was made which far exceeded expectations. The rock which was crushed was taken from the dump as it came, and yielded $7 per ton. This was considerably more than it was calculated the rock would pay.

ROUGH DIAMOND.—Some more gravel was struck in this mine in Chili Gulch. Twenty-three car-loads were put through the mill recently, which yielded $2 to the car-load. This gravel was near the rim, and was extracted with greater facility than a great deal of the other which requires farther transportation to get it to mill.

INYO COUNTY—BEVERIDGE DISTRICT.

ELGIN.—This mine is situated eight miles north of the Keynot mine, and about sixteen miles from Independence. No work of any consequence had been done on the claim until a short time ago, when operations began. The vein is favorably situated for working both the mine and ore, being within one and a half miles of plenty of water and wood. The ledge shows itself on the surface for a distance of 1000 feet, and at the point where work has been commenced, the vein shows a width of three feet of rich gold quartz. Average samples assayed give from $80 to $120 per ton in gold.

GOLDEN STAR.—The shaft has reached a depth of 100 feet, showing a fine vein of ore in the bottom, twenty inches wide. It is the intention to sink 30 feet more, and then begin drifting on the ledge. The ore will be hauled and worked at the Brown Monster mill. Three average assays made lately gave, gold, $77; silver, $43 per ton.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended March 10th shows: Tons of ore crushed, 138·78; average assay value of pulp, $41.65 per ton; of tailings, $4.87. The east cross-cut, 1000 level, is 280 feet long. The inflow of water is unchanged, the pumps making about 8¼ strokes per minute. North drift, 800 level, is 277 feet long. A small station 5 feet deep was cut out on the west side, in which to place a fan to supply air to the men in this shaft. South drift, 770 level, is in 57 feet. From winze No. 6, at the 672-foot level, a drift was started on the 3d instant, to open another block of ore between this and winze No. 9, lying about 70 feet north. The drift has advanced 14 feet, and is opening up some good ore.

STANDARD CONSOLIDATED.—The official report for the week ended March 10th shows: East cross-cut, 1000 level, in 1256 feet. South drift from east cross-cut, 700 level, in 534 feet, showing the vein 3 feet wide. The west cross-cut from north drift is 92 feet long, and is in hard blasting rock. North drift No. 1, 500 level, is in 540 feet; the vein is 12 feet wide. The total length of north drift from south uprise No. 1 is 86 feet, and the vein is 7 feet wide. South drift No. 2, 385 level, is 349 feet long, and shows the vein 5 feet wide. Uprise No. 4 has reached a hight of 101 feet, where the vein is 6 feet wide.

SYNDICATE.—The east and west workings have been connected, and the mill will start up on the 24th for a long run.

CANADA.

NOVA SCOTIA.

The report of the Inspector of Mines has been presented in the House of Assembly. It shows that the total yield of gold during the year was 14,107 ounces 3 pennyweights 20 grains, against 10,756 ounces 18 pennyweights 2 grains during the preceding year. This is the largest yield since the year 1871, except during 1877, when production rose to 16,882 ounces. Discoveries of copper ore were reported from Malagash, Digby, and Dalhousie, and some prospecting was done at Seal Island, Bras d'Or, and St. Ann's, C. B. The mines of the Steel Company of Canada, at Londonderry, were kept in full operation during the summer. The No. 7 level has opened up a valuable range of ore. In the West mine, in Cumberland, and in the Cook's Brook mine, a small extraction of ore was made. Some ore was also taken from the North vein. A compact red hematite of good quality was found near the village of Maitland, and at several points farther west. Specular iron ore is reported to have been found at Roman Valley, Guysboro'. The Crane Iron Company, of Philadelphia, has taken out 3000 tons of ore from its mine at Salmon River Lakes, Guysboro'. At present, the best means of transporting ore to a good shipping place in Chebucto Bay is under consideration, and mining has been stopped. The ore is said to be of good quality, and the deposit appears to be of unusual size. The work, so far as carried on, has proved that the lead is from 25 to 35 feet wide, and that these dimensions hold good to a considerable depth.

COLORADO.

BOULDER COUNTY.

THE TELLURIDE ORES.—A reliable correspondent sends us the following: The most extensive district where mineralized veins of rock carry these kinds of ores, so far as known, is located in Boulder County, Colo., with the vicinity of Gold Hill as its discovery place and approximate center. The location of this town is upon a divide between Left-Hand Creek on the north and Four-Mile Creek on the south, the former an affluent of St. Vrain's, and the latter a branch of Boulder Creek, into which it merges three miles above Boulder City, and nine miles from Gold Hill by the water-grade road down Gold Run ravine. Boulder City is located at the base of the Rocky Mountains, on Boulder Creek, at an elevation of 5600 feet above the sea. Gold Hill is within fifteen miles of the summit of the Rockies; elevation, from 8600 to 9300 feet.

The mineral veins or lodes have a general trend from northeast to southwest, while the main chain of mountains runs nearly south. Some lodes run nearly east and west, carrying iron pyrites and free gold. Three very heavy lodes run nearly north and south across this belt, at intervals of three or four miles, and are charged with silver ores, such as gray copper and antimonial silver. Tellurides are mainly found in chimneys of from 30 to 200 feet in length, in the southwest veins mostly, accompanied with seams of pyritous iron and a sparry or hornblende gangue; indeed, softer hornblende is a main characteristic of all telluride veins, especially in surface rock or blossom.

The geological formation is mostly granite, though there are some rich telluride veins in the gneiss or serpentine. The old red sandstone lies from one to two miles within the east border of the mountains, and from thence westerly there is a north and south belt of granite in this county over six miles wide, reaching to the town of Gold Hill. Farther west, the serpentine sets in for about six miles, when another body of granite begins, reaching to and over the mountain summits. The veins in the main range granite carry galenas, native silver, gray copper, etc. The first of the large cross-veins, going westerly, crosses Gold Hill along the west border of the granite, and is known as the Hoosier, though there are many locations upon it, one of the best being the Yellow Pine, on the divide between Four Mile and Boulder creeks—a great chimney of $600 ore in gray copper form. Some of the telluride veins cut through this cross-vein: it is not known yet whether all the strong ones do. But few of the southwest lodes pay after passing west into the gneiss; and where they do, the veins carry silver largely, and less gold. The camp called Magnolia, six miles south-southeasterly of Gold Hill, at the apparent south end of the Hoosier vein, and south of Boulder Creek, has many rich telluride lodes, mostly in gneiss, while there are several more such veins near Boulder Falls and around Sugar Loaf Mountain, five or six miles west of Magnolia, also in gneiss. Again, the John Jay, Last Chance, and Smuggler lodes, from five to eight miles north of Gold Hill, rich in tellurides, are also in gneiss, as are the Bondholder, Prince, and some others two miles north. The Golden Age, however, and contiguous veins beyond the Seltzer Springs at Jamestown, and others near those springs, are in granite; likewise, the numerous lodes at Sunshine and at Salina, and others down within four miles of Boulder City, quite as rich as any. This mineral belt at present extends about fifteen miles in length by from six to eight in breadth.

There are probably not less than three hundred mineral veins in this belt that carry telluride ores: about one third of them have been patented. Hardly a week passes during the summer season but some old, worthless vein, by such gradual development as its owners are able to bestow upon it, proves up its worth by a showing of rich telluride ores; not in one particular camp in this belt, but in different portions, showing that what is wanted to make it one of the best localities for investment in the country is capital judiciously spent in developments. There have been, during the past twenty or more years, a few men of means here, on flying visits of a day or two; but very few came with any intention of careful examination for the purpose of working veins, like the owners of the Cold Spring and the Slide; and when most strangers do come among us, they come in tow of some middle-man who is seeking to swindle them in a trade by outrageous brokerage. If capitalists desire to invest in good mines, common discretion ought to teach them to employ a mining expert in these ores as well as in general mining; and, after making careful examination and assays, buy from first hands—the original owners. There is hardly one of these but will extend all due courtesies, and either bond, lease, sell, or give an interest in his property for a specified amount of work in development; but he is afraid of stock operations, and does not wish to stock mines unless the amount is limited, and it is made unassessable. More than one million of dollars could be judiciously invested in this belt of mines, chiefly by running tunnels on some vein that would cut many others, and at the same time drain the lodes, and allow the stoped ores to be brought out where they could be worked or carried away easily and cheaply.

Few persons outside of this immediate section have any idea of the richness of these tellurides. They go by various names, each of which to the expert suggests its commercial value, from telluride of lead (altaite), worth $100 a ton, to common tellurium, valued at from $8000 to $6000 a ton, and so on up to sylvanite, petzite, and calavarite, containing, according to Dana's *Mineralogy*, from forty to eighty per cent of gold by weight. As gold is usually held by miners at $20 an ounce, or $240 a pound, it will be readily seen that sylvanite (a common ore here) is really worth (60 per cent of gold) $140 a pound, when free of rock. I saw a sack of such ore from the Ingraham mine at Salina, last summer, which was taken to the Exhibition at Denver, that was four inches thick of solid sylvanite—worth not less than 50 per cent of gold, and yet could not be sold for over $18.60 a pound. Why? Because the assayers in Colorado do not use more than twenty grams of flux to one of mineral in assays. While it is true that twenty to one would be sufficient to flux all the gold in $100-ton ores, it is also true that the quantity of flux should be doubled for every two hundred more of value shown by the first test, in order to approximate the true value. For instance, if tellurium or sylvanite shows $1000 a ton with twenty grams of flux, the check-assay should be with five times the flux, or one hundred to one, and the result, instead of $1000, would probably be $10,000. The Cold Spring owner sold to Professor Hill, some few years since, about 600 pounds of petzite for $10,400 per ton on a thirty to one flux; according to Dana, that ore was 60 per cent gold, or $140 a pound, or $84,000 for 600 pounds. It was carefully hand-dressed, and if half its weight was stone, still there was a great loss in assay. A professor of the Smithsonian Institution, experimenting on "American" ores at Sunshine, a few years since, demonstrated these facts to the manager, Prof. J. Alden Smith, so satisfactorily, that Smith would not afterward sell any first-class ores to smelters in Colorado, but shipped them East or to Europe.

The Colorado smelters have made fortunes out of Boulder County tellurides in this manner, and the only possible remedy I can see would be a combination of the mine-owners to get up a smelter to treat their own ores; but the miners are so poor that few of them have any surplus from their more expensive mining, as greater depth is attained, to invest in smelters, however profitable it might be afterward. I might add here, that Professor Sewall, of Boulder University, told my informant that "the telluride miners got but 12½ per cent of what was in their ores when sold."

There ought to be a smelter located at or near Boulder City, built expressly to treat this class of ores, and it ought to be run by or in the interest of the mine-owners—not one mine, or half a dozen, but a custom-mill or works for this section exclusively. In a few years, it would save millions that are now coveted by a few, or sent to the winds in vapors. Tellurium will evaporate almost as easily as quicksilver, and the gold therein goes along. I have seen a muffle that had been used but three times in assaying about one dozen samples of ore in scorifying-cups, whose inside was liberally sprinkled with condensed gold sent off by evaporation, and this while both ends of the muffle were open part of the time, from the open air into the furnace-flue. Custom assayers keep their furnaces too hot. Gold melts at about 2000 degrees Fahr., and the litharge flux at 700 degrees or less; combined, 1500 should suffice for fluxing; but a rod of iron will melt readily in any assay-furnace in constant use, and it takes 4000 degrees to melt wrought-iron: no wonder there is such waste of gold. The smelters, however, lose nothing; for in treating rich ores, they melt them under a bath of cheaper metals, such as galena, and so save wastage.

One great advantage in mining in this section is owing to the mildness of the climate. Snow rarely falls as deep as three feet, and then soon goes off before warm west winds or a warmer sun. About half the winter, the ground is bare most of the time, and seldom does the thermometer run down to 20 degrees below zero; much of the time it is between 30 and 50 degrees above. The past January has been one of the coldest known here—several days from zero to 36 degrees below; and a snow-fall of three feet, the greatest ever known here in January. There is about one foot at present—February 16th—with the air at 50 degrees above. Such a thing as a snow-slide was never known in the mines of this county, not even at Caribou, at the timber-line, five miles from the range summit.

Transportation facilities may be called good for a mountain country, there being two water-grade wagon-roads, one down Left-Hand Creek, and the other, mentioned before, down Gold Run, Four-Mile, and Boulder creeks, besides a third along the dividing ridge between the two. The Union Pacific Company last season graded a narrow-gauge road up Four-Mile, and so on toward Caribou, and is now laying rails and building bridges. This road will be opened in the spring, and will come within three miles by the present road, near Salina on

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Gold Run. Another narrow-gauge road is completed in grade from Longmont into the opening of Left-Hand Creek at the plain's edge, and is designed to be built up that creek to Ward District, passing Gold Hill within one mile. The grade is easy, and it cuts clear across the telluride belt, as does the other road, near its geographical center. They are coming none too soon for the fuel question, as wood is scarce at $5 a cord, while coal at Boulder is but $3.50 a ton.

CLEAR CREEK COUNTY.

DIAMOND TUNNEL.—This company is putting up a plant of machinery to furnish ventilation in the Corry City lode, which has been lately intersected in the tunnel, a distance of 2100 feet, and at a depth of 1500 feet.

WOLVERINE LODE.—This mine, situated at the junction of Democrat and Republican mountains, is worked at present by two men. They are working a rise from the adit-level, which is now in 430 feet and is 150 feet in depth from the surface. The ore shows some fine specimens of native and wire silver.

DOLORES COUNTY.

With the opening of spring, extensive preparations are making by many companies at Rico to work their properties the coming season.

GRAND VIEW MINING AND SMELTING COMPANY.—The furnaces at the smelter have been steadily running all winter, supplied largely by ore from the company's mines, the Grand View, Yellow Jacket, Phœnix, etc.

UNCLE NED.—Steady shipments are made to the Grand View smelter. The mine is under lease until May 1st, when the owners will make extensive developments.

ZULU CHIEF.—Work for the season has been begun with a fine outlook.

NEWMAN GROUP.—This group, including the Newman, Chestnut, and Swansea, has been leased for four months, and work already commenced.

BOWEN.—A suburb of Rico, first opened up last year, has lately developed most favorably. A large quantity of high-grade ore has accumulated on the dump of the Little Susie, which will be shipped to Rico for treatment as soon as the trail now building is completed. LINWOOD O. TOWNE.

GILPIN COUNTY.

FOOTE & SIMMONS.—The main shaft is 515 feet in depth. Work is prosecuted in the lower east and west levels. In the east level, a good ore-body is being passed through. But little ore has been removed below the 300-foot level. This will afford a good ore-reserve for stoping as soon as the present lower levels are driven to a greater distance. The mill-dirt is crushed at the Empire Mill in Black Hawk, but no clean-up has been made since the present manager took possession of the mine.

UNITED GREGORY.—The company is raising 9-ounce ore through No. 2 shaft, taken out at a point as far west as No. 11.

HINSDALE COUNTY.

CROOKE SMELTING-WORKS.—The works are running to their full capacity.

LAKE COUNTY.

BIG CHIEF.—Work will be resumed at this mine.

BROOKLAND.—The company is overhauling the pumping machinery preparatory to beginning active operations, strengthening the foundations of the plant, putting in a new driving-wheel, and making excavations for a new balance-bob half-way down the shaft, to lighten the weight of the rods. This is a ten-inch pump, and as soon as the improvements noted are completed, which is expected by the 20th instant, the water, which stopped all further progress last fall, will be placed under control. At the time work was shut down, there were thirteen feet of ore in the bottom of the shaft, running from fifteen to forty ounces in silver, and sixty per cent in lead. The extent of the ore-body had not been demonstrated.

CLONTARF.—The mine has spent $30,000 in vain endeavors to control the water, will commence work early in the summer.

IRON SILVER.—A strike is reported to have been made in the Lime claim of this group, which is worked under a lease by Fred Beaudry and others.

OURAY COUNTY.

Six stamp-mills with a total of seventy-five stamps will be on operation on the San Miguel the coming season, namely, the Pandora & Oriental, 20 stamps; Andrus's stamp-mill and concentrator, 10 stamps; Golden Group, 10 stamps; Strout's sampling-works and concentrator, five stamps; Gold King, 20 stamps; Church's mill, 10 stamps; the last two named are on Turkey Creek. The Upper San Miguel Company, whose machinery is all on the ground, will in all probability have its mill in operation before fall.

PARK COUNTY.

NESTOR.—The company is pushing development-work on all its property with a large force of men. It has a large amount of ore now mined ready for shipment. The properties consist of the Robert Keeley, Montgomery, Silver Leaf, Gold Leaf, Winchester, Illinois, and Ensign. The development is doing principally through the Keeley shaft No. 2, which is about 120 feet deep. At a depth of twenty-five feet, a cross-cut was run in to cut the vein, which was found to be about nine feet wide. At a depth of sixty-five feet, another cross-cut was driven, and the vein was found to be about five feet wide. The shaft will be sunk to a depth of 180 feet, and a third cross-cut will be run in.

WYANDOTTE.—At present only one shaft is at work. As soon as the president of the company arrives at the mine, extensive operations will be commenced.

SAN JUAN COUNTY.

ROGER LODE.—A rich copper strike was made in this lode recently. This mine already shows a big body of galena. The mineral runs 30 per cent copper.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—The financial statement for the year ended March 1st, 1883, just received, shows that 5983 tons of ore were shipped during the year, which yielded about $108,000. The royalties from lessees amounted to $16,514.57 and the balance on hand March 4th, 1882, was $29,614.86. Among the disbursements are: Mining expense, as per superintendent's reports, $81,482.10; general expense, as per superintendent's reports, $21,908.82; legal expense, as per superintendent's reports, $12,449.60. The balance on hand at New York office, March 1st, 1883, is reported at $9729.87, and the balance at the mine on February 1st at $4354.36.

DAKOTA.

FATHER DE SMET.—The superintendent's report for the week ended March 18th shows: Ore extracted from first level, 800 tons; second level, 700 tons; third level, 375 tons. Ore milled, 1925 tons. North end tunnel in 839 feet; third level header in 153½ feet; tramway level rise up 24 feet. Golden Gate header running north advanced 19 feet.

HOMESTAKE.—This company's property consists of five mines under one local management, each owning its mines and mills. There is nothing new to report other than semi-monthly clean-ups and shipments, which, by careful sampling of ore, maintain an almost unvarying average. Superintendent McMaster has so thoroughly systematized all work pertaining to the mines that although over 700 names are on the monthly pay-roll, miles of water-ways to be kept in repair, twenty miles of railroad to be protected from obstruction, a vast wood and timber supply secured daily, and over 2000 tons of ore delivered at the mills every twenty-four hours, there is never a hitch and very seldom an accident. Every thing moves as if by clock-work, and not an employé holds a sinecure or is superfluous.

ORO FINO.—It is stated that this mine never looked better than at present. The ledge is vertical, and has a known width of 80 feet, every portion of which will pay handsomely. There is no waste-dump, every thing passing through the mill.

GEORGIA.

The Dahlonega *Signal* says that considerable prospecting is going on in different parts of the mining districts and many discoveries made. The prospects at the various mines continue to be favorable.

IDAHO.

QUIMBY HILL.—These mines were sold to a New York syndicate recently. The mines are forty miles north from Hailey, on the mountain summit two and a half miles northeast of Galena, and are above the timber-line. Considerable very rich ore has been extracted, and some shipments made last year to the Hailey sampling-works prove it high grade.

SENATE MINING AND SMELTING COMPANY.—The mine is opened by a tunnel to the vein, and a shaft to a depth of 250 feet below the croppings. One hundred tons of ore were packed down last fall to the company's smelter, near Galena. The smelter made a short run before being closed by severe weather, which prevented the hauling of flux to complete the run. The ore averages over 100 ounces silver, with a five-foot vein, which looks better as depth is attained. A large force of men will be employed in the spring in active development of the property.

MEXICO.

Dr. Allen, with a party of Indianapolis capitalists, has gone to Mexico for the purpose of examining mineral property.

CABORCA.—The superintendent reports that he believes there is sufficient water on hand in the wells to enable the mill, which is now running, to turn out from $15,000 to $20,000; and that the pulp-assays of the ore now worked average over $40 per ton.

EULALIA SILVER MINING COMPANY.—The work done in the mine shows a tunnel 760 feet long, eight feet high by seven wide, which is intended to tap several mines; and on the opposite side of the ravine from this tunnel, is another called the Adventure, 275 feet long, which opens out some exceedingly rich ore. Both of these tunnels are rapidly pushed forward while a large force of men is busily engaged in taking out ore from the different mines. The company has planned the construction of a narrow-gauge railroad from the mines to the mill, which is to be built on the Chihuahua River, close to Chihuahua, by Messrs. Fraser & Chalmers. It is stated that the cost of the erection of the mill will be about $80,000. It will be able to treat from seventy-five to one hundred tons per day, and is expected to be in full operation by May next.

PACHUCA DISTRICT.

A correspondent of the Mexican *Financier* writes as follows:

A general meeting of the shareholders of the Estrella and Alta Gracia mines was recently held in Pachuca. A vote of thanks was given to the retiring board, and the following were elected a Board of directors for the present year: Messrs. Horncastle, Foote, Jackson, Petheric, and Gorgollo.

A special meeting of the stockholders of the Santa Gertrudis mine was held in Pachuca during the week, having been called by a majority of the stockholders who had lost faith in the capabilities of their board of directors. The meeting, which was rather stormy, appointed a supervisory committee, consisting of Messrs. Rule, Brockman, and Thomas, passed a vote of censure on the directors, and determined to hold a meeting every Friday, to receive the reports of the committee appointed to supervise the working of the mine. A correspondent writes that the board of directors says that there is no Englishman in Pachuca capable of working the mine, and the English shareholders say that none of the Mexican miners can work the ores. So they seem to have compromised the affair by appointing a Mr. Bolland, about whom both Mexican and English shareholders agree that he is the best person to manage nothing. There is much dissatisfaction at the management of the mine, which is admitted by all to be rich and capable of yielding good dividends.

The Real del Monte Mining Company, probably in deference to public opinion, so forcibly expressed of late, announces that it will resume work in the mines named Ompaques, Santa Clara, San Juan el Alto, Tejocote, Registro de San Rafael, Rincon Grande, and San Luis, of Real del Monte District; and in the Balcon, Xomulco, La Llave, Santa Gertrudis, Milanesa, San Nicanor, and Fortuna, of the Pachuca District. The company has long held these mines under bond, and recently offered to return them to the owners. These, however, refused to accept them without indemnity, alleging that the company had held them idle for many years, for the purpose of monopolizing control of the mining industry. The public is anxious to see whether the activity now promised will be for the purpose of really opening these mines, or of merely complying with the necessary terms of the bond.

MICHIGAN.

The following are the products of the reporting mines for the month of February:

	Tons.	Lbs.
Calumet & Hecla	1453	1720
Quincy	175	350
Atlantic	153	530
Franklin	151	120
Allouez	80	35
Pewabic	69	100
Grand Portage	41	447

HURON.—The bottom of No. 8 shaft is exposing an exceedingly rich run of copper ground in the shape of barrel and stamp work.

OSCEOLA.—At the annual meeting held in Boston recently, the old board of directors, consisting of Joseph W. Clark, Horatio Bigelow, Thomas H. Perkins, George F. Bemis, Charles Van Brunt, John N. Dennison, of Boston, and John Daniell, of Michigan, was re-elected, and at a subsequent meeting of the board Mr. J. W. Clark was elected president and A. S. Bigelow secretary and treasurer.

VALLEY CITY.—According to the Iron *Agitator*, this company has been experiencing trouble with quicksand in sinking its shaft. It has sunk through 40 feet of this troublesome ground, by resorting to iron caissons driven as fast as sinking progressed, and had but a foot farther to drive to reach the ledge, when a vein of water was struck which prevented further progress of sinking for the time being. Added pumps were set at work, and the ledge has probably been reached ere this.

MISSOURI.

The Harris Copper-Works have stacked up at their warehouse in St. Genevieve, 10,420 ingots of refined copper, weighing 135,000 pounds. This is Arizona copper, which they have refined for the Long Island Company, of Globe, Arizona.

MONTANA.

BELL.—Work on the new three-compartment shaft is progressing very rapidly, three frames, or fifteen feet per day, being the average advance. The contractor is under agreement to reach the 400-foot station in one hundred days, when connections will be run with the old workings and the mine explored and developed below.

MOULTON.—After a thorough overhauling, the mill started up for another lon

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run. The mine is looking well, particularly in the west drift from the 300 north cross-cut, where some very fine ore is extracted.

SHONBAR.—The shaft has reached a point fifty feet below the 185-foot level. The stopes of the east 185-foot drift are showing up better than ever, and the mill returns last week were forty per cent better than in any previous week since the mine became a producer. The first work in the Shonbar was commenced a year ago. During the year, $30,000 have been expended in improvements and machinery. The mine is now running at a profit.

NEVADA.

GEDDES & BERTRAND.—This company's mines, situated near Eureka, continue their output of about $30,000 per month. The leaching process obtains as high a percentage of the gold and silver in the ores as is usual in chloridizing and amalgamating. There is a loss in chloridizing, whether the pulp is thereafter leached or amalgamated. Aside from this loss, which is never taken account of, the leaching treatment of the Geddes & Bertrand mill saves about 85 per cent.

HALE & NORCROSS.—At the annual meeting, held in San Francisco recently, the following directors were elected: H. M. Levy (President), Gustav Reis (Vice-President), George Congdon, S. Heydenfelt, W. S. Hobart, M. Hoeflich, J. B. Russell; Secretary, Martin H. Levy; Superintendent, R. P. Keating; Treasurer, Bank of California; Attorney, S. Heydenfelt.

NEW MEXICO.

MASSACHUSETTS & NEW MEXICO.—Pending the collection of an assessment of 5 cents a share on the stock, this company discharged and paid nearly all its men, retaining only four or five who are now setting boiler and steam-pump, and putting up hoisting-works at the King mine, preparatory to the resumption of active operations at the mines in April. It is not true that the miners have seized the property for wages.

SILVER HILL DISTRICT.—A correspondent of the New York *World* says: This district is situated in the county of Dona Ana. The lodes generally extend north and south, with only slight variations. The capping of the peaks is mostly iron, running from $5 to $8 in silver. In most of the gulches on the eastern slope, placer gold is found in small quantities. In the Rincon, on the eastern slope, copper ore running from 15 to 20 per cent is found as croppings, and the indications are, that the whole place is underlain by an immense copper deposit. In this Rincon is situated the James Fisk group, consisting of the James Fisk, Golden Rule, Providence, and Passaic mines, all showing well for the small development. None of the mines in the southern belt has been developed, 8 to 10 feet being the greatest depth obtained. Select specimens from the Fisk will run 55 per cent copper, and an average assay of ore from all portions of the 10-foot shaft gave a return of 18½ per cent and 6·1 ounces silver; the vein is over seven feet wide, and the shaft all in ore in a lime and porphyry contact. The Passaic assays 20·4 per cent copper, 4·8 silver. South of the Fisk group are the Diantona and Guadalupe mines. They are on the same belt of mineral, and, being the only mines with any work at all done on them for years, have attracted the most attention, and have been considered the representative mines of the district. Experts report them as fine prospects as any ever seen, and probable rivals of the Lake Superior mines. Surface copper is found all over both claims, running from 15 to 33 per cent. Fifteen feet is the greatest depth obtained on either, and Guadalupe has had silver assays as high as 242 ounces silver. West of the Guadalupe is the Paul Jones group; deepest work, 8 feet; assays, 30 per cent copper, 38 per cent silver. South of the Guadalupe is the Refugio, a Mexican claim, the lode running across the main formation from the northeast to the southwest. The ore is lead carbonate, running as high as 200 ounces in silver.

On the high peaks west of the Rincon are situated the Orphan Boy group, Hobart, Iron Duke, Rattler, and Jarrilla King.

Assessment-work is now progressing on the Hobart and Iron Duke. Throughout this belt are found old workings and numerous dumps of rejected ore that could not be packed the long distance necessary in the days the mines were then worked. There is no authentic history of the working of these mines; but the evidence is, that the work was carried on extensively, one dump alone proving that the shaft must have been down hundreds of feet. The shafts are filled with *débris*, and the dumps partially covered with the wash from the mountains. Most of these shafts are in the Rincon, before mentioned. In the northern end of the mountains are the properties of Knowlton & Co. and Noble & Dougher, consisting of the Jarrilla Queen, owned by Noble & Dougher, down twenty-six feet and showing well in copper—37 per cent copper and nine to eleven ounces silver. It is a very flattering prospect. About 1500 feet west is the Isabella, down fifty feet, showing well in copper, but still badly broken up. Depth is necessary to prove this mine. About four miles southeast is the Egyptian group and the Savage and Lone Star mines. The Savage has the assessment-work done, and telluride ore running 82 per cent has been found. The lode runs nearly north and south through the two locations. The work now progressing on the Lone Star is about fifty feet from the shaft of the Savage. The lead has every indication of a true fissure. There are no blow-outs, but it is a lime contact.

There are many other good prospects—the Three Bear mines, the Juliett, Homestake, Vulcan, Eureka, Little Page, Hope, Lincoln, Honest Indian, Constitution, etc.—in the southern end. The Constitution is a lime and granite contact, the only one thus far discovered in the mountains. Native copper is found in the lead, and the owners are now at work, expecting to sink forty or fifty feet.

SOLID SILVER.—The discovery-shaft on the Black Hawk, the property of this company, is down 60 feet, with levels running east and west at 52 feet. On the east level, there is a winze sunk to a depth of 70 feet, with a level running to the east a short distance. The second shaft is known as the Huneke shaft, and has been sunk to a depth of 115 feet, with a level at 50 feet extending but a short distance to the east. Large bodies of ore have been unearthed in this shaft. Another shaft, called the Josephine, has been sunk on this, the southern vein, to a depth of 42 feet, making three shafts on the vein. The northern or Gopher vein has two shafts upon it, besides levels running to connect them. The shafts are down 42 and 43 feet, respectively. There are two parallel veins upon the Black Hawk claim, on which the work has been done, and both are true fissures. The mines are in excellent shape to begin extensive work upon them, and better mineral than that taken out can not be found—native, horn, and argentite silver. The present development-work justifies the erection of reduction-works.

TORRENCE.—This mine, situated at Socorro, is to be worked to a depth of 500 feet under new auspices.

NEW YORK.

Messrs. Cooper, Hewitt & Co., owners of the iron mines at Toadt Hill, Staten Island, have purchased the Townsend property at Clifton for $21,500.

NORTH CAROLINA.

A large bed of phosphates has been discovered in Brunswick County, on the line of the Carolina Central Railroad, and about eleven miles from Wilmington.

UTAH.

EMPIRE.—The Salt Lake *Tribune* says that it appears McCormick & Co. had the first claim against this company, and some weeks ago secured their claim by attachment on the machinery for a stamp-mill. At the sale of this mill recently, Mr. McCormick bid the property in for the amount of his claim, which aggregates about $10,000. As we understand it, the sale is positive and beyond redemption on the part of the company. This machinery cost at the factory in the East $49,000, and there was paid for freight on it to Park City $17,500 more, making a total of $66,500. The engine has a capacity of 500 horse-power and the machinery is complete for a 30-stamp silver mill, while the power is ample to double that number of stamps and pans.

HORN-SILVER.—A dispatch to the New York *Tribune* states that a part of this mine has caved in. A settling down on the slope of the foot-wall of the old cave of two years ago has occurred. No one was hurt. It has not yet interfered with the working of the shaft.

NEW YORK & UTAH.—This company is about to resume operations. Mason M. Hill, manager of the affairs of the company in Utah, lately arrived from the East, and is perfectiug plans to start the smelter belonging to the company. This smelter is located in the valley at the foot of Bingham Cañon.

OLD TELEGRAPH.—It is stated that the works of this company are about to start up, at least in part and experimentally, to see if something can not yet be made out of the Old Telegraph ores, particularly those which are found in a chloridized condition, and therefore adapted to treatment by leaching.

ONTARIO.—At shaft No. 3, drifting both ways is done on the ledge, and good ore is taken out. The shaft is sinking to the seventh level. After reaching a depth of 700 feet, the huge pump will be put to work, which will greatly reduce the cost of freeing the mine of water. Work is also going forward rapidly on the tunnel. At the intermediate shaft, the tunnel is extending both ways, while from the lower end, now in nearly half a mile, good progress is made.

STORMONT.—Mr. Schuyler Van Rensselaer, the secretary, has sent us the following: Our ore, which ran low grade during the past four months, has lately greatly improved, and now averages about $23 per ton. We have been working the Buckeye and Last Chance claims only. Lately very good ore has been struck just north of the Stormont claim, which has not been worked for years. There is every reason to believe that the vein runs into the northern and undeveloped part of the Stormont claim. This will give us a new ore-supply. The Thompson & McNally claims are yet undeveloped.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

CALIFORNIA.

SACRAMENTO CITY DISTRICT.

William F. Hanley, Hanley quartz mine. Nevada City, Gold Quartz Mining Company, Nevada City Extension gold quartz mine.

SAN FRANCISCO DISTRICT.

A. S. Roney, Richard Johnson, and R. C. Simmons, Mountain View quicksilver mine.

COLORADO.

CENTRAL CITY DISTRICT.

Harvey Bradley and Franz Hartman, Edinborough lode. Charles F. Baldwin, Highland Laddie lode. Harvey Bradley, Mary P. Gray, James E. Banta, and Mab A. Banta, White Pine lode. J. S. Barker, Hercules lode. George W. Hall, Crocus lode. R. P. Dewey, Jeph Lee, and George W. Hall, Great Republic lode. George W. Hall, Hartwell lode. Heneage M. Griffin, Dividend lode and mill-site. J. G. Pohlé, Mammoth lode. Charles F. Wells and W. H. Shigley, Alert and Tippecanoe lodes. Springfield Silver Mining Company, Snowy Range lode. John Turner, E. H. Fontaine, William Scholl, and Otto Sauer, Susan Mary lode. Jacob J. Elliott, Dewitt C. Barker, and Louis F. A. Hellman, Donna Juanita lode. Rara Avis Gold and Silver Mining Company, mill-site. William H. Burge, Hayes & Wheeler lode. Charles W. Pollard, Amy lode.

DURANGO DISTRICT.

San Juan Consolidated Mining and Milling Company, Little Giant lode. John Monroe and Dempsey Reese, Many Spur lode. Charles N. Cox, Harriette lode. Lucille Consolidated Mining Company, Lucille and Protection lodes. Charles F. Blossom and John H. Leary, Shetland lode.

LAKE CITY DISTRICT.

Charles E. Schoellkopf and Charles Counselman, Silver Blossom lode. Allied Mines, Crusader lode. Peter P. Kennedy, William J. Edgerton, George L. Waters, and Henry G. Cole, Gilmore lode.

LEADVILLE DISTRICT.

O. H. Harker, George Summers, Daniel Hanley, C. F. Thomas, and E. L. Campbell, Hancock lode. Clifton Consolidated Mining Company, Ouray and Black Bess lodes. John D. Murphy and John Parry, Belle Vernon lode. H. R. Morris and George W. Riley, J. W. Manning lode. Frederick W. Rose, Frederick J. Mathias, John Knodel, Joseph Reither, and William H. Deckschmidt, St. Louis Bay lode. Ruby Silver Mining and Smelting Company, Buckeye lode. Charles Markell and James McLaughlin, Jay Gould lode. George V. Brunk and Freeman Webster, Mammoth lode. George W. Brunk and William Bremrose, Second Advent lode. S. R. Gay, H. J. Stephens, Jr., D. F. Lahman, Finley McMartin, William A. Edwards, and Andrew H. Johnson, Mary Adair lode. Beecher Consolidated Mining Company, Grace Greenwood and Hector lodes, Jacob Houghton, Crown Reliance and Esmeralda lodes. Seth A. McLean, Mud Sill lode. A. McLean, Little Johnny and Revenue lodes. Sundown Consolidated Mining Company, St. Mary's and Little Harvey lodes. Abingdon Mining and Smelting Company, Lizzie Abingdon lode. John Thompson and William Jesse, Brown Queen lode. William D. Sanders, Elk Horn lode. Daniel B. Webster, R. J. Tabley, William B. Tabler, Philip H. Tompkins, O. P. A. Mayers, and Richard C. Tabler, Crockett lode. Lombard Mining Company, Excelsior lode. Charles Markell, Luther A. Casey, Hugh Cowen, John Jordan, James Rush, and Patrick McKenny, Washington No. 2 lode. James Joslin, Boyd Park, William C. Hyde, William B. Stevens, William K. Smith, and Edward F. Roberts, Belle Peabody lode. Virginia City Mining and Smelting Company, mill-site. William H. Eckbert, Henry J. Meixell, Daniel W. Marshall, and Michael M. Howe, Saw Log placer mine. Oliver C. Obey *et al.*, Sierra Nevada lode.

DAKOTA.

DEADWOOD DISTRICT.

Little Grant Gold Mining Company of Dakota, Little Grant lode.

MONTANA,

HELENA DISTRICT.

Sarah F. Murray, Laura Clark, and Michael J. Connell, Arctic lode. William H. Young, Hezekiah Roundebush, James E. Dickey, and Alexander W. Pike, Badger State lode. John M. Stewart and Edward Hickey, Rock Island lode. Myron Hutchinson, Travonia lode. James R. Clark and John A. Leggat, Washington lode.

NEVADA.

CARSON CITY DISTRICT.

New York & Palmetto Mining Company, Pearl, Treasurer, Diamond, and President lodes. H. M. Clemens, Santa Rita lode.

UTAH.

SALT LAKE CITY DISTRICT.

Charles C. Woodhouse and Louis Klein, Esmeralda lode. John J. Daly, Ottawa lode.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, March 23.

There is very little to say in relation to the mining market this week. Business has been very flat, and has been confined almost entirely to the low-priced fancies. In fact, the whole market has been between the brokers themselves, and has been manipulated to suit their requirements. Below will be found a complete summary. The total sales of mining shares at all the Exchanges aggregate 323,960, as against 456,790 last week.

The Comstock shares have been very quiet and about steady. California, with a small business, was weak, selling, assessment unpaid, from 6@4c. Consolidated Virginia has been quiet and irregular, selling from 50@45@48c., with a business of 3775 shares. Sierra Nevada sold at $3 under one transaction. Union Consolidated has been quiet and irregular, and sold from $5.50@$4.70. Mexican was a little weak, but was fairly dealt in; it sold from $4.13@$3.60. Consolidated Imperial sold at 8c.; it was quiet. Yellow Jacket was quoted at $2.25. Best & Belcher was very quiet, and sold at $4.13. Sutro Tunnel has been almost forgotten; it was very quiet at steady prices, selling from 21@20c., with a business of only 1500 shares.

The Leadville stocks record a small business and have been steady. Amie was active and irregular, selling from 23@26@25c., the sales aggregating 14,400 shares. Chrysolite had a small business at steady prices; it sold from $1.30@$1.35. Dunkin sold yesterday at 28@30c. Hibernia records one small transaction at 3c. Iron Silver had a small business and was very irregular; it sold from $3@$2.75@$2.80. Leadville was quiet and steady, selling from 73@70@72c. Little Chief records a small business and was steady, selling from 39@38c. Little Pittsburg sold at strong prices, under a moderate business, selling from 65@71@70c. Big Pittsburg declined from 17@11c., closing at 14c., with a business of 1000 shares. Climax records a small transaction at 9c.

The Bodie stocks were quiet, and prices were on the decline. Bodie Consolidated, with a business of 1260 shares, was irregular, selling from 90@80@85c. Standard was quiet and a little weak; it sold from $6.88@$6.50. Bulwer records a small business at declining prices, selling from 95@85c. Goodshaw was quiet and steady at 4@5c.

The Tuscarora stocks were very quiet, and record no material change in price. Grand Prize sold at 45c. Belle Isle was quiet and steady, selling from 52@55c. Navajo was also steady, selling from $3.40@$3.50, with a business of 625 shares. Independence was quiet and steady, selling at 40@43c. Elko Consolidated has been very quiet and very irregular; it sold from 16@10@13c.

In the miscellaneous list, Alice has been very irregular under a small business, selling from $3@$2.70@$2.95. Bassick has suffered a decline, and has sold from $11⅛@$10⅝ under a small business. Eureka Consolidated has been quite weak, declining from $7.25@$5.50; the sales amounted to 1040 shares. The Green Mountain stocks have been very quiet, and record no change in price. Gold Stripe sold at 7@8c. Green Mountain sold yesterday at 78@79c. We learn that the taxes on this property have been paid, the mill has resumed work, and that a loan has been effected of $7500, relieving the company from financial embarrassment. In addition to this, all but five of the bonds have been taken. Rising Sun was quoted at 5c., and Cherokee at 3@5@4c. Horn-Silver has been almost neglected, and has been steady; it sold from $7.88@$8 Northern Belle was dealt in mostly on time sales; it was irregular, selling from $9.50@$9.75. Robinson Consolidated records a very active business, but continues to grow weaker; it sold from 78@62c., then up to 75c. yesterday, and closed at 71c. Sierra Grande has also been very active and has been very irregular; it sold from $2.45@$2.75@$3.40, closing at $2.50 yesterday.

Central Arizona has been quiet and steady at 37@35c. Decatur records a very active business at steady prices, selling at 6@8@7c. Durango was quiet and steady at 9@8c. Eastern Oregon, with one transaction, sold at 75c. Harlem M. & M. Co. has been active and strong; it sold from $1.35 $1.40. Lacrosse records a very active business, but has suffered a slight decline, selling from 18@14c Oriental & Miller has been active and strong, selling from 13 17c. Sonora Consolidated has also been very active at very irregular prices; it sold from 45@34@41c. South Hite, new, was active and strong at 9@14c. South Pacific has had an active business at steady prices, selling at 7@8c. The State Line stocks have been quiet and steady; Nos. 1 and 4 sold at 4c., and Nos. 2 and 3 at 7@6c. Taylor-Plumas records an active business at steady prices, selling from 17@18c.

A suit is about to be begun by several prominent members of the American Mining Stock Exchange against the Mutual Trust Company for an accounting of the funds placed in the hands of the Trust Company upon the organization of the Mining Exchange. The Trust Company was organized by Milton S. Latham, ex-Governor Safford, Drake De Kay, and other promiuent Western mining capitalists, three years ago, and under its auspices the Mining Exchange was organized and begun business in June, 1880. Memberships in the Exchange were sold for $1000 each, and it is claimed that this money was to be held in trust for the Exchange by the Trust Company. The Mutual Trust Company (then known as the Mining Trust Company) received $171,000 from this source, as well as other sums from dues, fees for listing mining stocks, and transfer and registry fees, amounting in all to about $200,000. The Exchange members claim that, in a circular issued at the time of the organization of their Board, the Trust Company promised to hold a $1000 government bond against each $1000 Exchange membership. They deny that they were given any notice of the rescinding of this action, as is claimed to have been done by the Trust Company. Vain attempts have been made, it is said, to obtain from the Trust Company an account of the expenditure of this $200,000. The managers of the Trust Company are charged by the mining brokers with having diverted it to their own speculations. About a year ago, the Trust Company increased its capital stock from $50,000 to $2,000,000, and $1000 stock each was issued to the members of the Exchange. Subsequently, this increase was decided in the courts to be illegal. There have been frequent changes in the management of the Mutual Trust Company, the original directors having been ousted from office before a year had elapsed. Since that time, there have been frequent quarrels between the company and the American Mining Exchange over the funds raised for the organization of the latter institution.

The trustees of the Columbia Consolidated Gold and Silver Mining Company recently applied to Judge Truax, of the Superior Court, for the appointment of a receiver and for the dissolution of the company, on the ground that the mines owned by the company could not be profitably worked. The application was granted, and Mr. Franklin H. Smith was appointed receiver. The value of the company's property is said to be not more than $10,000.

MEETINGS.

Colorado Coal and Iron Company, Colorado Springs, Colo. Annual meeting of stockholders and election of trustees, April 2d, at twelve o'clock M.

Legal Tender Gold and Silver Mining Company, No. 7 Nassau street, Room 8, New York City. A special meeting of stockholders, March 29th, at one o'clock P.M.

Lucky Boy Gold and Silver Mining Company, 18 Wall street, New York City. Annual meeting of stockholders and election of trustees, April 10th, at three o'clock P.M.

Peru Steel and Iron Company, 115 Broadway, New York City. Annual meeting of stockholders and election of trustees, April 5th, at three o'clock P.M.

DIVIDENDS.

The Bassick Mining Company, of Colorado, declared a dividend (No. 2) of $100,000, or $1 per share, payable April 2d. Transfer-books close March 28th, and reopen April 3d.

The Contention Consolidated Mining Company, of Arizona, has declared a dividend (No. 14) of twenty-five cents per share, payable March 28th. Transfer-books closed March 17th.

The Sierra Grande Mining Company, of New Mexico, has declared a dividend (No. 6) of twenty-five cents per share, payable April 2d. Transfer-books close March 24th, and reopen April 3d.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, No. 55 Broadway, report as follows for the week ended Thursday, March 22d, one P.M:

The decline in production of the Cooper tract which was mentioned last week continued, and upon the strength of this the market during the past week touched the highest point this year.

Oil opened Saturday at $1.03, declined to $1.00⅞ closing about $1.01½. Monday morning, it opened $1.02⅝, touching $1.06, at which it closed. Tuesday it opened $1.07⅛ and climbed up to $1.10, from which it reacted to $1.05¼ at the close in New York, though $1.06 was at the same time bid in Oil City Wednesday it opened $1.06⅛ bid, sold up to $1.07¾ and down to $1.03.

During the recent sharp advance, the New York market has generally been from ⅛ to ¾ lower than Oil City, as the sentiment here was hardly so bullish as there.

On the 22d, it opened at $1.05, sold down to $1.03, up to $1.05¼ here, though $1.04¾ was the highest in Oil City, at which price it closed for the noon session.

Thus it would seem that brokers here are becoming more bullish. The Cooper tract is falling off in production, which is only about 1200 barrels daily.

It appears that a greater significance is attached to the Cooper tract than facts would seem to warrant; for during the extreme fluctuations of this year, namely, from $1.06 down to .86 and up to $1.10, the fact was always clear that the Cooper tract territory is unreliable, that many wells come in dry, and that those in which oil is found decline rapidly in production after being opened. Thus no reliance could properly be placed upon its continued production, and no reason appeared for any important production in that quarter. The total production of that tract during the last eighty days would not equal 200,000 barrels, yet the surplus stock in the custody of the United Pipe Line Company has increased over 1,400,000 barrels during that time. Deduct the production for this period of the Cooper tract, and the fact remains that the increase has been 1,200,000 barrels from the old districts. This is not a bullish showing; for it means 15,000 barrels daily increase in stock on hand. Oil may advance to higher figures, but there is no scarcity of the commodity, notwithstanding all the "bull" talk, which claims that consumption will soon outrun production. The above figures do not lend much credence to such statements.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
March 17....	$1.02¾	$1.02¾	$1.00⅞	$1.01⅞	534,000
19....	1.02	1.05½	1.02	1.05½	482,000
20....	1.06¾	1.09½	1.05½	1.05½	601,000
21....	1.05⅛	1.06⅞	1.03⅛	1.04	428,000
22....	1.04	1.04⅝	1.02⅝	1.02⅝	808,000
23....	....	.. ..	.....	.....	.....
Total sales.					2,853,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, March 22.

The market for copper stocks has lapsed into a chronic state of dullness and inactivity; the sales the past week hardly warranting the name of a market. Prices, however, are firm, and Calumet & Hecla shows an advance of $4 per share over last week, all the sales being at $240. The reported sale of 10,000,000 pounds of ingot copper for export has created a better feeling among dealers, and has no doubt tended to influence the advance in Calumet & Hecla, that mine being the largest producer in the country. Franklin was exceptionally weak in the early dealings, and declined from $12 to $11, but later it recovered and was in good demand to-day at $12@$12⅛. In Pewabic, there was nothing doing; the reports from the mine are not encouraging; the stock is offered at $6 without takers, the best bid being $4⅛. Quincy very dull; sales at $48@$48⅛; a lot of five shares only sold at $49⅛. Osceola declined to $29⅛, ex dividend. National sold at $1. The annual report of the Huron Copper Company, just published, shows an indebtedness of about $21,000, and another assessment is among the probabilities of the near future.

In silver stocks, the market is dull, and prices generally lower. Catalpa, which is the most active stock on the list, declined on the unfavorable report of the mine for February from 60@45c., with later sales

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at 47⅛c. Crescent also declined from 27½@22½c. Bonanza, steady at $2½. Silver Islet sold at $3. San Pedro declined from 62½@55c. Sullivan sold at $1⅛. Indian Queen, at $1⅝.

There has been but little doing at the Mining Exchange the past week, and the market is without any special feature.

3 P.M.—At the afternoon Board, Calumet & Hecla sold as before, at $240. Osceola, at $29½. A small lot of Pewabic, at $6. Franklin, $12 bid, $12½ asked. Quincy, $48 bid, $49 asked. Atlantic, $10 bid, $13 asked. Catalpa, 45c. bid. Huron, $¾ bid. National, $1 bid.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has displayed more activity and strength than for the past few weeks. The Comstocks have come in for a good share of the business and have shown some strength. There is no news of importance from the mines. The outside stocks remain quiet and firm.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Mar. 16.	Mar. 17.	Mar. 19.	Mar. 20.	Mar. 21.	Mar. 22.
Albion	...	...	...	...	...	...
Alpha	1¼	1¼	1¼	1⅛	1¼	1¼
Alta	7-16	11-32	7-16	7-16	11-32	13-32
Bechtel	...	...	...	...	...	...
Belcher	¾	11-16	11-16	29-32	19-32	¾
Belle Isle	⅛	⅛	9-16	19-32	9-16	11-16
Best & Belcher	3⅛	...	3⅞	3⅞	3¾	3¾
Bodie	27-32	27-32	13-16	13-16	29-32	1
Bullion	...	...	...	...	...	...
California	1-16	3-32	7-16	1-16	3-32	1-16
Chollar	...	...	...	...	...	...
Con. Virginia	⅛	⅛	⅛	7-16	⅛	⅛
Crown Point	15-16	27-32	15-16	1¼	15-16	15-16
Elko Cons	3-16	...	...	...	...	...
Eureka Con	9	7½	...	5½	6	...
Exchequer	¼	...	...	11-32	¼	5-16
Gould & Curry	2⅛	2⅛	2⅛	2⅛	2⅛	2¼
Grand Prize	7-16	...	7-16	7-16	⅛	9-16
Hale & Norcross	2¾	2¾	2⅞	2¾	2⅞	2¾
Independence	13-32	13-32	...	...	7-16	...
Martin White	7-16	⅛	7-16	11-32	¼	¼
Mexican	3⅞	3⅝	3¾	3¾	3⅛	3⅛
Mono	3-32	...	...	...	...	...
Mount Diablo	...	...	...	...	3½	...
Navajo	3⅝	3¼	3⅛	3⅛	3¾	...
Northern Belle	...	1⅛	9¼	9⅛	9⅛	9⅛
North Belle Isle	7-16	7-16	⅛	...	⅛	⅛
Ophir	3⅛	3	3⅛	3	3	2⅞
Overman	...	...	...	...	...	...
Potosi	29-32	15-16	1	15-16	27-32	15-16
Savage	...	...	...	...	...	...
Scorpion	...	...	...	...	...	...
Sierra Nev	2⅞	2⅞	2⅞	2¾	2⅝	2¾
Silver King	...	...	11	10¾	...	...
Tip Top	...	...	...	...	...	...
Union Con	5¼	4⅞	5	4⅞	4¾	4¾
Wales Con	...	¼	¼	3-16	3-16	3-16
Yellow Jacket	2	1⅞	2⅛	2⅛	2⅛	2¾

BULLION MARKET.

NEW YORK, Thursday Evening, March 22.

Owing to a decline in exchange on India in London, and in sterling exchange here, the price for silver in our market is materially lower than the rate of our previous weekly issue.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
March 17	51 3-16	110¾	March 21	50¾	109¼
19	51	110⅞	22	50¾	109¾
20	50¾	110	23	...	...

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended March 23d, as compiled from various sources, amounted to $184,334.47, as against $348,929.75 reported for the previous week. The receipts from January 1st, 1883, to date are $3,435,563.74.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended March 17th	$765,995
Corresponding week last year	262,235
Since January 1st, 1883	3,226,346
Corresponding period last year	12,496,983

Imports.

Week ended March 17th	$204,110
Corresponding week last year	130,056
Since January 1st, 1883	1,581,916
Corresponding period last year	880,068

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the rate for discount, which remains at 3 per cent. The bank lost during the week £67,000 bullion, and the proportion of reserve to liabilities was reduced from 42 3/16 to 40 13/16, against 45 11/16 in the corresponding week last year. The Bank of France gained 2,400,000 francs gold and lost 5,975,000 francs silver during the week.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	For the week.	Month of February.	Year from Jan. 1st, 1883.
Alice, G. S.	Mont.	...	$73,864	$163,905
*Alta-Montana, G. L. S.	"	...	...	†10,625
Bodie, G. S.	Cal.	...	...	44,798
Bodie Tunnel, G.	"	...	10,471	22,102
*Bonanza King, G.	"	...	51,355	113,132
*Boston & Montana, G.	Mont.	...	16,883	34,936
*Central Arizona, S.	Ariz.	...	...	15,627
*Christy, S.	Utah	...	...	23,260
*Chrysolite, S. L.	Colo.	...	†30,945	57,435
Contention, S.	Ariz.	...	...	88,694
Crescent, G.	Cal.	...	...	13,000
*Custer, G. S.	Idaho	...	...	43,572
*Deadwood-Terra, G.	Dak.	...	38,860	84,556
*Derbec Bl. Grav., G.S.	Cal.	...	...	8,337
*Father de Smet, G.	Dak.	...	27,112	69,189
*FriscoM.&S.Co.,G.S.L.	Utah	...	21,252	43,923
*Homestake, G.	Dak.	...	103,670	211,348
*Hope, S.	Mont.	...	...	20,574
Horn-Silver, S. L.	Utah	...	276,000	479,000
Independence, S.	Nev.	...	...	10,000
Lexington, S.	Mont.	...	103,315	192,365
*Little Pittsburg, S. L.	Colo.	...	6,768	11,875
*Marguerite, G.	Cal.	...	15,600	25,900
Martin White, S.	Nev.	...	55,675	75,082
Moulton, G. S.	Mont.	...	...	41,005
Navajo, G. S.	Nev	...	64,450	144,450
*Northern Belle, S.	"	...	155,916	221,090
*Ontario, S. L.	Utah	...	181,846	364,067
*Oxford, G.	N. S.	...	4,500	7,365
*Satemo, G.	"	...	700	2,500
*Standard, G.	Cal.	...	105,320	188,279
Star, S.	Nev.	...	12,299	27,095
*Stormont, S.	Utah	...	15,809	34,834
Syndicate, G.	Cal.	...	...	9,217
Tintic M. & M. Co.	Utah	...	...	7,632
*Tip Top, S.	Ariz.	...	...	7,976
*Tombstone, G. S.	"	...	51,000	123,011
Yellow Jacket, S.	Nev.	...	14,704	28,956
Total amount of shipments to date				$3,070,712

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Thursday Evening, March 22.

Copper.—The principal feature during the week has been the rumor that upward of 7,000,000 pounds of Lake copper have been sold for export at a price reported to be 16 cents. We discuss the situation editorially, and need only add now that, previous to the transactions named, there have been sales of small lots of Lake at 17⅜@17½c., while transactions in other kinds of copper have been made on the basis of 15¼@15½c. How far the export sales will check the demoralization in other brands remains to be seen. It will certainly aid them materially. The latest English cables are £72@£72 5s. for Best Selected, and £65 10s.@£65 15s. for Chili Bars.

Tin.—The market has been more quiet, sales aggregating from 300 to 400 tons, closing at 22½c. spot for large lines of Straits, and 22¼@22⅝c. for jobbing lots. The shipments from the Straits for the first two weeks of the month were only 50 tons. England cables £97 5s. £97 10s.

Lead.—The only wholesale transaction of which we have been able to learn was the sale of 100 tons of Refined lead at 4·70c. Business is extremely dull and lifeless. The Richmond Company is accumulating a stock here that is not, probably, very far short of 2000 tons; but as yet its representatives have shown no disposition to place any of it on the market. In the West, the representative of the Horn-Silver and Omaha works must also be accumulating some lead, so that there seems little prospect for any upward movement in this metal, while some of the heaviest consumers are well supplied by recent purchases. England is unchanged at £18 10@£18 15s. for English Common.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

The market remains about the same, if any thing a shade weaker. Sales during the week were 290 tons of Refined at 4·25c. and 100 tons of Hard at 4·22½c.

Spelter.—There is a decidedly better feeling, and prices have been advanced, chiefly, it would appear, in consequence of a better demand in the West. Much of the business is done directly, and the quantities reaching the open market are therefore not large, since the import movement has entirely ceased. We quote 4·75@4·85c. for ordinary to good domestic brands. England cables £15 10s.@£15 15s.

Antimony.—Business has been quite active, about 150 casks changing hands. We quote 11c. for Cookson's and 10c. for Hallett's, the bulk of the stock being in dealers' hands.

Quicksilver.—The market during the week has been shaky and 36½@37c.—*San Francisco Commercial Herald.*

IRON MARKET REVIEW.

NEW YORK, Thursday Evening, March 22.

The British Board of Trade returns for the two first months of the year show the following movement to this country of iron and steel:

	To U. S. 1883.	To U. S. 1882.	All countries. 1883.	All countries. 1882.
Pig-iron	40,133	58,574	165,078	195,310
Bar, angle, bolt, and rod	2,513	5,900	43,466	52,511
Railroad, of all sorts	11,623	51,032	156,515	151,621
Hoops, sheets, and plates	3,961	5,528	52,895	48,702
Tin plates	31,031	33,273	39,483	49,430
Old	7,535	22,372	11,485	28,639
Steel, unwrought	6,706	33,106	11,874	37,362

American Pig.—The lack of vim which we noted in our last has deepened into apathy, and beyond contracts for a few thousand tons, nothing has been done. Buyers show no desire whatever to take hold, and while the makers of well-known brands appear little affected, and firmly adhere to their figures, there is more irregularity in outside brands, and the market is weaker. We quote $22.50@$25 for ordinary to choice No. 1 Foundry; $21.50@$22.50 for No. 2; and $19.50@$20.50 for Gray Forge, of which sales aggregating about 1000 tons have taken place at low figures. Bessemer pig is quiet and dull, with quotations at $20@$21 for American at furnace, and $21.50@$22 nominally at tide-water for foreign. Spiegel is unchanged.

Scotch Pig.—We have nothing new to report in the way of business in Scotch pig. Arrivals foot up to 2500 tons, mostly sold previous to arrival. Sales have been very small. Freights are unchanged. We quote: Coltness and Langloan, $24.25@$24.50; Summerlee, $23.50@$24; and Eglinton, $21@$21.50. At the Wall Street Exchange, the following cable quotations were received to-day: Carnbroe, 55s. 3d.; Gartsherrie, 62s.; Summerlee, 62s. 3d.; Coltness, 64s. 6d.; Langloan, 64s. 9d.; Glengarnock, 55s.; and Eglinton, 49s. 6d. Warrants were 47s. 6d.

Rails.—Beyond a few sales of small lots, there is nothing to report. For such small quantities, $39 at mill is the ruling price, but it is probable that for large contracts, later delivery, less would be accepted; in fact, it is stated that recent large transactions have been on the basis of $38. Western mills are trying to get $42, but it is believed will take considerably less.

Old Rails.—Business has been quiet, with values unchanged, at $24@$24.50 for Ts.

Scrap.—Small sales have taken place at the range of $24@$24.50 ex ship.

Philadelphia. March 23.

Buyers are still holding off and restricting their purchases to small lots for current requirements. Quotations show no improvement as yet, and manufacturers and makers of pig-iron are generally disposed to accept all offers made, provided they are within safe reach of the selling prices.

Pig-Iron.—Transactions in pig since Monday have been mainly in forge iron and those of standard brands. A few lots of inferior have been sold as low as $18 at furnace and some at $18.50, but $19 is claimed as the average selling price for good brands. Special brands are selling at $19.50@$20, and one or two as high as $20.50; no special brands being offered. Manufacturers are preparing to purchase more freely than they have done heretofore, as their stocks are low, and prices are not likely to decline any

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. March 17. H.	L.	March 19. H.	L.	March 20. H.	L.	March 21. H.	L.	March 22. H.	L.	March 23 H.	L.	SALES.
Alice, Mon.					3.00	2.70	2.90		2.95	2.90			1,300
Amie Con., Co.			.24		.25	.23	.24		.26	.24			14,400
Argenta, Ne.													
Bar. & Walker, Ut.	11.50	10.00	11.50	11.00			10.50		10.88				1,065
Bassick, Co.							.53	.52	.55				1,000
Belle Isle, Ne.							.90		.85				1,260
Bodie Cons., Ca.	.90		.85		.80								
Breece, Co.													2,800
Bulwer, Ca.	.95		.95		.90		.92	.90	.90	.85			2,780
California, Ne.					.06	.05	.05		.05	.04			
Cal. & Hecla, Mich.													
Caribou Con., Co.													400
Chrysolite, Co.	1.35		1.35	1.30	1.35	1.30	1.35		1.35	1.30			1,320
Climax, Co.					.19								100
Cons. Va., Ne.	.50		.48		.50	.49	.50		.48	.45			3,775
Deadwood-Terra, Dk.													
Dunkin, Co.									.80	.28			200
Eureka Cons., Ne.			7.25	6.75	6.85	6.50	5.50		5.75	5.50			1,040
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.			.07				.07		.08	.07			3,000
Gould & Curry, Ne.													
Grand Prize, Ne.													100
Great Eastern, Dk.	.45												700
Green Mountain, Ca.			.03						.79	.78			500
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.					.03								100
Homestake, Dk.					15.75				16 00				60
Horn-Silver, Ut.			7.88				8.00		8.00				275
Hukill, Co.	.15		.15		.16								1,200
Independence, Ne.					.40				.43	.41			700
Iron Silver, Co.	3.00		2.75				2.80						800
La Plata, Co.													
Leadville C., Co.	.71		.72		.73	.72	.70		.72				2,100
Little Chief, Co.	.38		.39	.38			.38		.38				1,800
Little Pittsburg, Co.	.70	.65	.71				.70						1,650
Martin White, Ne.									.45				200
Moose, Co.													
Navajo, Ne.					3.40		3.50		3 50				625
Northern Belle, Ne.	9.63		9.63		9.63	9.50	9.75		9.75	9.63			550
North Belle Isle, Ne.													
Ontario, Ut.	24.50	24.00			23.75		24.00		24.00				155
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.									44.00				100
Quicksilver Pref., Ca.													100
" Com., Ca.					.05		3.38		.05				3,000
Rising Sun, Ca.	.05				.07	.03	.08	.05	.75	.09			43,800
Robinson Cons., Co.	.78	.72	.70	.62									
Savage, Ne.													15,100
Sierra Grande, N. M.	2.75	2.55	2.75	2.45	2.65	2.50	2.75	2.45	2.50	2.40			800
Sierra Nevada, Ne.	3.00												55
Silver King, Ar.			10.88		10.88								
Spring Valley, Ca.													350
Standard, Ca.					6.88		6.63	6.50	6.50				
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													600
Yellow Jacket					2.25								

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. March 17. H.	L.	March 19. H.	L.	March 20. H.	L.	March 21. H.	L.	March 22. H.	L.	March 23. H.	L.	SALES.
Advance													
Albion, s. L.													4,300
Alta-Montana, G.							.10	.08					100
Am. Flag, s.	.08												
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													100
Best & B'lcher, G. s.							4.13						
Big Pittsburg, s. L.	.17						.18		.12	.11	.14		1,000
Bradshaw, s.											.30		500
Buckeye													
" pref.													
Bull-Domingo, s. L.											.07		400
Bye and Bye			.02		.02		.02		.02		.02		800
Calaveras, G.													
C'lav'r's W. & M. Co.													
Cal., B. H., G.					.80								200
Carbonate Hill, s. L.					1.30								200
Catskill													
Central Ariz'na, s.			.37	.35	.36						.36	.35	900
Chapparal													
Cherokee, G.	.03		.05	.04	.05		.04						3,300
Cons. Imp'r'l, G. s.							.08						500
Con. Pacific, G.													
Crowell, G.			.06		.07						.05		5,800
Dahlonega, G.													
Decatur	.07	.06	.08		.08	.07	.08	.07	.07				28,900
Durango, G.	.09		.08		.08								1,200
Eastern Oregon			.75										200
Elko Cons.	.16	.14	.15	.13	.10		.12		.13	.12			7,100
Enterprise	.18	.16	.19	.16	.20	.19	.19	.18	.20	.19			28,900
Fannie Barret										2.25	2.20		400
Gold Placer, G.													
Goodshaw, G.							.05	.04	.05				1,500
Granville, G.													
Harlem M. & M. Co.	1.40	1.35	1.40	1.35	1.40	1.35	1.40	1.35	1.40	1.55			8,500
Hortense, s.													
Lacrosse, G.	.18	.15	.16	.15	.16		.14		.14				14,600
Mariposa Pref., G.													
" Com., G.													1,160
Mexican, G. s.					4.13	4.00	3.80						600
Miner Boy									.02				
Mono													
North Standard, G.													
N. Horn-Silv'r, s. L.													
Ori'nt'l & Miller, s.	.14		.14	.13	.14	.13	.16	.15	.17	.15			16,200
Quartz Creek													
Rappahannock, G.					.09		.09		.09				3,500
Red Elephant, s.	.06				.06								1,100
Ruby, of Arizona													
Silver Cliff, s.													
Sonora Con.	.45	.44	.43	.39	.42	.34	.41	.39	.41	.36			41,900
South Bodie, G.													
South Bulwer, G.													
South Hite			.12		.13	.09	.14						9,700
South Pacific	.08	.07	.08		.08	.07	.08	.07	.08				10,700
State Line													
" Nos. 1 & 4, s.	.04		.04		.04								700
" Nos. 2 & 3, s.	.06		.06		.07				.06				2,000
Sutro Tunnel			.21		.21	.20	.21		.20				1,500
Taylor-Plumas	.18		.17		.18		.18	.17	.18				15,300
Unadilla, s.													
Union Cons., G. s.	5.50	5.13			5.25	5 13			4.75	4.70			750
Vandewater							20						100
Washington							.07		.08				600

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 108,470. Non-dividend shares sold, 215,490.

BOSTON MINING STOCKS.

	March 16. H.	L.	March 17. H.	L.	March 19. H.	L.	March 20. H.	L.	March 21. H.	L.	March 22. H.	L.	Sales.
Allouez	2.00				13.00		2 13						150
Atlantic													15
Aztec													
Best & Bel.					.90								100
Bodie Con.			2.50				2.38		2.50		2.50		925
Bonanza D.													
Bruns. Ant.													100
Bulwer	.92												
California							240		240		240		97
Cal. & Hec.	240												
Carbon. Hill			.60	52½	.50	.45	.47½	.45	.47½	.45	.46	.45	14,300
Catalpa	.60												200
Central Ariz	.35												
Cherryfield													
Chrysolite													
Con. Virginia													
Copp'r Falls													
Crescent	.38		27½		.25	.23	.22½	.22			.22½	.20	3,500
Cumberl'd	.60		.60		.60								1,900
Decatur					.08								500
Deer Isle					.08								500
Denver City													
Douglas					.80								200
Duncan													
Dunkin													
Empire	.20										.19		700
Eureka Con.							7.00						20
Franklin	11.50		11.50	11.00			11.25	11.13	11.38		12.13	12.00	290
Gila County													200
Hancock G.							9.00				9.00		
Harshaw													
Huron													
Indian G'n.					1.38								100
Little Pitts.													
Mammoth													
Mass. & N.M.	.10		.10		.10		.10	.09			.10	.09	29,400
Milton													
Napa													
National	1.00								1.00		1.00		275
North. Belle													
Osceola			29.50		29.50				29.50		29.50		10¼
Penn-Breck.													
Pewabic	6.50		6.50								6.00		590
Pine Tree													
Plymouth	.21						.20				.20		40
Quincy	48.00				48.50		49.50						
Ridge													100
Robinson	.84												900
San Pedro	.62½	.57½	.55				.55						30
S'ra Nevada	2.60												200
S'ra Grande			2.75				2.50						25
Silver Islet	3.00				3.00		3.00						2,000
Silver King	10.88												1,700
Simpson Gd			.05										
So. Pacific					.07		.07				.07		
Standard													
State Line Nos. 2 & 3													
Sullivan	1.00				.93¾								200
Sutro Tun.	.20		.21				.22				.22		1,100
Sycamore													
Twin Lead.	.05		.05										2,000
Vizina													

PHILADELPHIA MINING STOCKS.

	March 16. H.	L.	March 17. H.	L.	March 19. H.	L.	March 20. H.	L.	March 21. H.	L.	March 22. H.	L	Sales.
American													
Argent	.19	.18	.19	.17	.18		.18		.17		.16		30,800
Arizona So.													
Aztec							.04				.08		6,700
Battle Mt.	.04		.04										
Black Sul.													
Bodie	.03	.02	.03		.04		.03						23,800
Buena													
California													
Cincinnati	.09								.10	.09	.10		1,900
Comprom'e	.35		.32½		.30		.30		.30		.32½		14,600
Contention													
Dauntless													
Del Monte			.13		.03		.03						11,000
Denver City	.12						.11		.11		.12		6,900
Fairview							.01						5,000
Eureka													
Girard	.14		.15	.14	.15		.15		.13	.12	.13	.10	31,700
Golconda													
Golden Age													
Governor	.10				.10		.09		.09	.08			17,700
Grand Uni'n	.18		.18		.18						.16		2,100
Gunnison													
Hancock													
Iowa-Gulch	.09	.08	.08	.07	.08		.08		.08	.07	.07		25,600
King Bul'on													
Ledger Con.													
Little Dia'd.											.05		4,000
Little Maud													
L'g & D'y Hl													
McCullough													
Magnolia			.01		.01								2,000
Montana													
Mt. Lincoln													
Mt. Sheridan	.04		.04		.05		.05		.05				16,500
National													
Orion													
Orion Pref.											.10		1,000
Palmetto E.													
Pembina	.20				.20		.19		.19		.19		6,700
Penn-Breck.	.13		.14	.13	.14	.13	.14	.13	.13	.12	.12	.11	48,200
Permanent									.01				3,000
Pizarro			.01										2,000
Pizarro Ex.													
Potosi													
Rara Avis					.50						.40		1,000
Rara Avis E.	.08		.08		.09		.09	.08	.09		.09		25,400
Record													
Rice Pion'r.													
San Pedro													
Sierra G'nde	2.70		2.70	2.47½	2 70	2.50	2.60		2.62½	2.50	2.55	2.45	12,720
Silver Cord			1.35								1 45		1,100
Silv'r Plume													
Silver Rock													
Sovereign													
Standard													
Sultana	.04	.03	.04	.03	.04		.04		.04		.04		20,900
Sutro Tun'l.													
Tombstone	.85		.85		.85		.85		.85				6,800
Tranquilli'y													
Victor													
Yale Mt.													

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further. Wants will not be anticipated very far ahead, as the volume of demand is doubtful. Foundry is moving in small lots at $24@$25, with one or two special brands about this figure. No. 2 iron is to be had at $22.50@$23. White and mottled lots are heard of occasionally at exceptionally low figures. Buyers are more disposed to come into the market just now than they have been for several weeks, but there is still an element of doubt manifesting itself as to the future course of the market.

Muck Bars.—A few small transactions in Muck Bars were reported at $36@$36.50, though sales have been made below these figures. Charcoal Blooms are moving along in a slow way at $64; Anthracite, $55 Occasional concessions are made from these figures.

Merchant Bar.—Finished iron is in a very unsettled condition. Transactions are restricted to small lots. Buyers look for a further weakness, but manufacturers claim there is nothing in iron at present figures. Western competition has manifested itself more freely within a few days, and lots of refined are offered in this market at 2·10@2·20c. Buyers are disposed to defer large engagements, and take advantage of such offers. Card rates, 2·30c. Nothing outside of small lots from store command this figure. Average prices are 2·20@2·25c. Large lots, 2·15@2·20c. Common iron is selling from 2·15c. down to 2c. Pittsburg iron is offered there at 1·90c. plus freight. This new competition is creating a good deal of unrest among buyers, who are naturally restricting demand until bottom is reached. Skelp iron is fairly active at 2·15@2·30c. A few transactions in wrought pipes and tubes have been closed at 67½@70c. off pipes and 55c. off tubes.

Sheet-Iron is moving in small lots at 4@4½c., with good concessions for large orders, which are now coming along.

Nails are quoted bottom at $3.15 for car-load lots, to $3.20@$3.30 for small lots, though offers at $3.10 would be accepted, and buyers were not willing to take hold even at this figure, in view of the possible excess of supply due to full time in the West. Pittsburg nails have been offered in New York at $3 at mill.

Structural Iron.—A leading firm here has secured a contract for the construction of a two-mile bridge near Harrisburg. The contract is a large one, and was taken at satisfactory figures. Quotations in small lots are given at 2½c. for Angles; 3¼c. for Tees; 3½c. for Beams and Channels. The outlook is favorable for an active demand, but buyers are very slow to place orders unless concessions are extended.

Plate and Tank.—The volume of business since Monday in Plate and Tank has not been large. Common plates are 2½c.; Shell is quoted at 3½c., and Flange at 4¼c., but large orders can be placed at shaded figures.

Steel Rails.—There is much difference of opinion as to inside steel rail quotations. One establishment here quotes $41, but would take very nearly $3 less. Average quotations for small lots are $39@$40. Negotiations are in hand for large lots, and rumor states that probable figures will be near $38.

Old Material.—English Tees are quoted at $24.50. Transactions small. Double-Heads are offered for shipment at $27, tide-water delivered.

Scrap.—A few sales of Scrap have been made at $27.50 for selected No. 1, ex yard. Buyers are purchasing for immediate requirements only. No. 2 is selling all the way from $25@$26.50, according to quality and location.

Cleveland. March 21.

Our pig-iron market has more life than at last report, but values are unchanged beyond the advance of 50c. to $1 made by Southern furnaces. Compared with January 1st, 1883, furnace yards show considerably smaller stocks, especially of good No. 1 Foundry. Consumers are supplied for from three to six weeks, but are inclined to purchase more liberally than of late.

The prices for Lake Superior ores for the coming season are being fixed on the basis of $8.50 on docks here for Republic. In this branch of the trade, there is a marked inquiry, but few sales have thus far been consummated. We quote:

No. 1 Bessemer	$23.50@$24.00
" Foundry, all ore	22.50@ 23.50
" Foundry, cinder mixture	22.00@ 23.00
" Soft Foundry	21.50@ 23.00
" Open silvery	21.50@ 22.00
Mill Irons	19.50@ 22.00
Four months, f. o. b. cars furnaces:	
Nos. 1 and 2 Charcoal	26 50@ 27.50
Nos. 3, 4, 5, and 6 Charcoal	27.00@ 28.00
Hanging Rock Charcoal	23.00@ 26.50
Strictly Cold-Blast Charcoal	28.50@ 31.00
Four months, f. o. b. cars Cleveland:	
Bessemer ores	8.50@ 10.00
Hematite "	6.00@ 8.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 23.

Anthracite.

On Saturday, the Pennsylvania Coal Company issued the following circular for Pittston coal at Newburg:

Lump	$3.95
Steamer	3.95
Grate	3.90
Egg	3.95
Stove	4.05
Chestnut	4 15
Pea	2.85

And this was followed promptly by the other companies, who agreed upon the following opening prices:

Broken, f. o. b	$3.90
Egg, "	4.00
Stove, "	4.20
Chestnut, "	4.30

These figures are a little higher than the opening prices of last year, and are slightly above the equivalent of the Pennsylvania Coal Company's list, taking into account, on the one hand, 20 cents off to contractors, and on the other hand, a difference in price of 15 cents here and in Newburg.

It can not be said that the announcement of these figures has as yet produced any effect; in fact, we hear that there have been sales during the week at low figures. Buyers have not shown any particular eagerness to take hold at the new prices. How long they will be able to hold off remains to be seen, but their position will be strengthened unless the policy of restricting is continued for some time to come. It has not yet been definitely settled whether there will be full or half-time next week or the week following.

Mr. John H. Jones, accountant, has published the following statement of the anthracite coal tonnage for the month of February, compared with the same period last year:

	February 1883.	For year 1883.	For year 1882.	Differ'ce.
Phila. & Reading RR.	475,143	940,653	772,654	I. 167,999
Lehigh Valley RR.	*401,388	832,965	696,968	I. 135,996
Central RR. of N. J.	280,329	584,812	493,517	I. 91,295
Del., Lack. & W. RR.	308,626	646,887	552,456	I. 94,431
Del. & Hud. Canal Co.	†194,861	442,586	409,740	I. 32,846
Pennsylvania RR.	165,160	327,318	302,023	I. 25,295
Penna. Coal Co.	90,551	193,304	163,025	I. 30,279
N. Y., L. E. & W. RR	21,636	45,209	48,769	D. 3,559
Total.	1,937,996	4,013,738	3,439,154	I. 574,584

* This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 5402 tons.

† In addition there were 39,279 tons transported from mines by Delaware & Hudson Canal Company during February, which are included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, February 28th, 1883, was 575,695 tons; on January 31st, 1883, 616,759 tons; decrease, 41,064 tons.

Bituminous.

The trade is exceedingly dull, more lifeless, in fact, than it has been for many years at this season. Though prices are low, consumers insist upon concessions even for the small quantities they buy under pressure of actual needs. Freights have declined sharply during the past ten days, and have reached a figure that must leave but little for the boatmen.

The only transaction of any importance that we hear of in the way of contracts is the closing of a 10,000 ton contract with the Fitchburg Railroad, secured by a company mining George's Creek Cumberland, at a low figure. We quote nominally for Cumberland $4.45@$4.70, according to quality, and Clearfield $4.40@$4.65.

SUPPLIES.

Phosphor-Bronze Wire.

Stubs gauge.	Diameter, in.	Weight per mile, lbs.	Breaking strain, lbs.	Price per pound, cents.
16	·065	About 66	About 270	40
17	·058	" 53	" 220	41
18	·049	" 40	" 165	42

Discounts: On orders of 100 pounds and less than 500 pounds, 5 per cent. On orders of 500 pounds and over, 10 per cent.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended March 17th, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	54,456	610,255	47,158	590,244
D. L. & W. RR. Co.	70,327	796,587	61,065	757,318
Penna. Coal Co.	14,225	202,736	12,071	168,707
L. V. RR. Co.	23,531	190,062	28,277	199,896
P. & N. Y. RR. Co.	3,682	36,413	2,534	34,257
C. RR. of N. J.	37,923	404,255	31,637	402,516
North & West Br. RR.	15,137	108,997	.....	.....
	219,281	2,349,305	182,742	2,158,928
Lehigh Region.				
L. V. RR. Co.	78,339	813,316	69,401	761,072
C. RR. of N. J.	34,377	363,098	27,443	332,378
S. H. & W. B. RR.	779	3,643	.....	11,273
	113,495	1,180,057	96,844	1,104,723
Schuylkill Region.				
P. & R. RR. Co.	103,283	1,130,287	91,562	1,023,903
Shamokin & Lykens Val.	25,205	243,723	8,120	194,604
	128,488	1,374,010	99,682	1,218,507
Sullivan Region.				
St Line&Sul.RR.Co.	1,034	11,861	989	9,879
Total	462,298	4,915,233	379,257	4,492,037
Increase		423,196		
Decrease				

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Horsford's Acid Phosphate

In Sick Headache.

DR. N. S. READ, Chicago, says: "I think it is a remedy of the highest value in many forms of mental and nervous exhaustion, attended by sick headache, dyspepsia, and diminished vitality."

ASSESSMENTS.

SAN FRANCISCO, March 5, 1883.

THE BODIE CONSOLIDATED MINING COMPANY has levied assessment No. 2 of FIFTY CENTS PER SHARE, delinquent April 16th. Sale day, May 16th. GEORGE W. SESSIONS, Secretary *pro tem.*

TIP TOP SILVER MINING COMPANY.

Location of principal place of business, San Francisco, California.

Location of works, Yavapai County, Arizona Territory.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 8th day of March, 1883, an assessment (No. 5) of TWENTY-FIVE (25) CENTS per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, Room 44, Nevada Block, No. 309 Montgomery street, San Francisco, California, on all certificates of stock issued at San Francisco, and at the Farmers' Loan and Trust Company, No. 20 Exchange Place, New York City, on all certificates issued at New York.

Any stock upon which this assessment shall remain unpaid on MONDAY, the SIXTEENTH (16th) day of APRIL, 1883, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the FOURTEENTH (14th) day of MAY, 1883, to pay the delinquent assessment, together with cost of advertising and expenses of sale.

By order of the Board of Directors.

HENRY DEAS, Secretary.

Office, Room 44, Nevada Block, No. 309 Montgomery street, San Francisco, California.

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(Established 1848.

Balances and Weights, Furnaces, Scorifiers, Cupels, Crucibles, Tongs, etc.

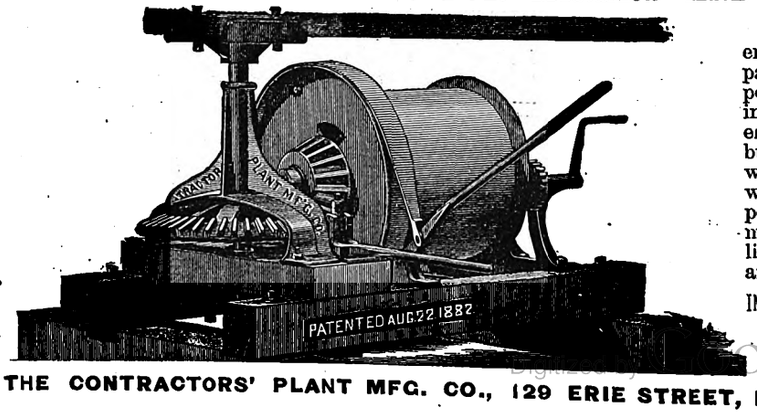
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6 Barclay and 12 Vesey Sts., New York.

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This is a horse-power designed principally for mining purposes or raising building material in the erection of high buildings. A horse will raise a bucket weighing 600 to 700 pounds 75 feet per minute. Is small, light, easily handled and durable.

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THE CONTRACTORS' PLANT MFG. CO., 129 ERIE STREET, BUFFALO, N. Y

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Fig. 1

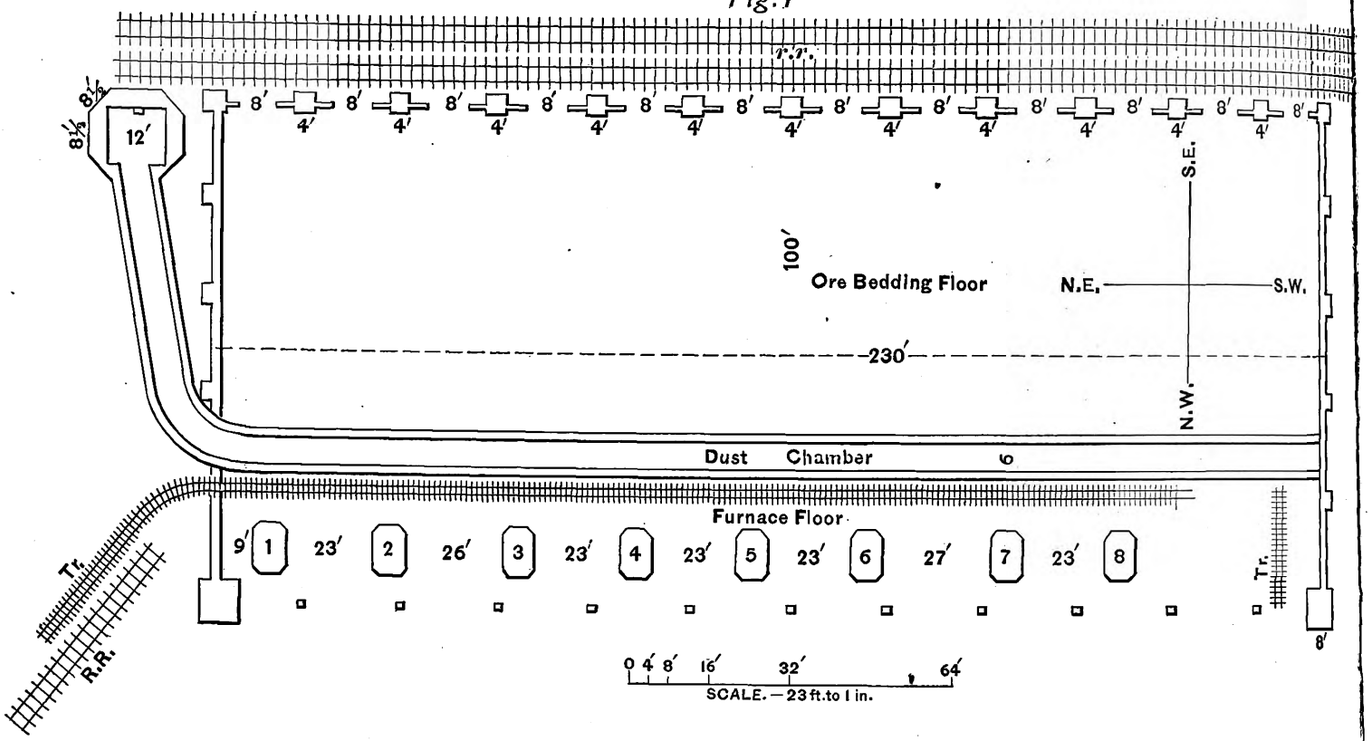
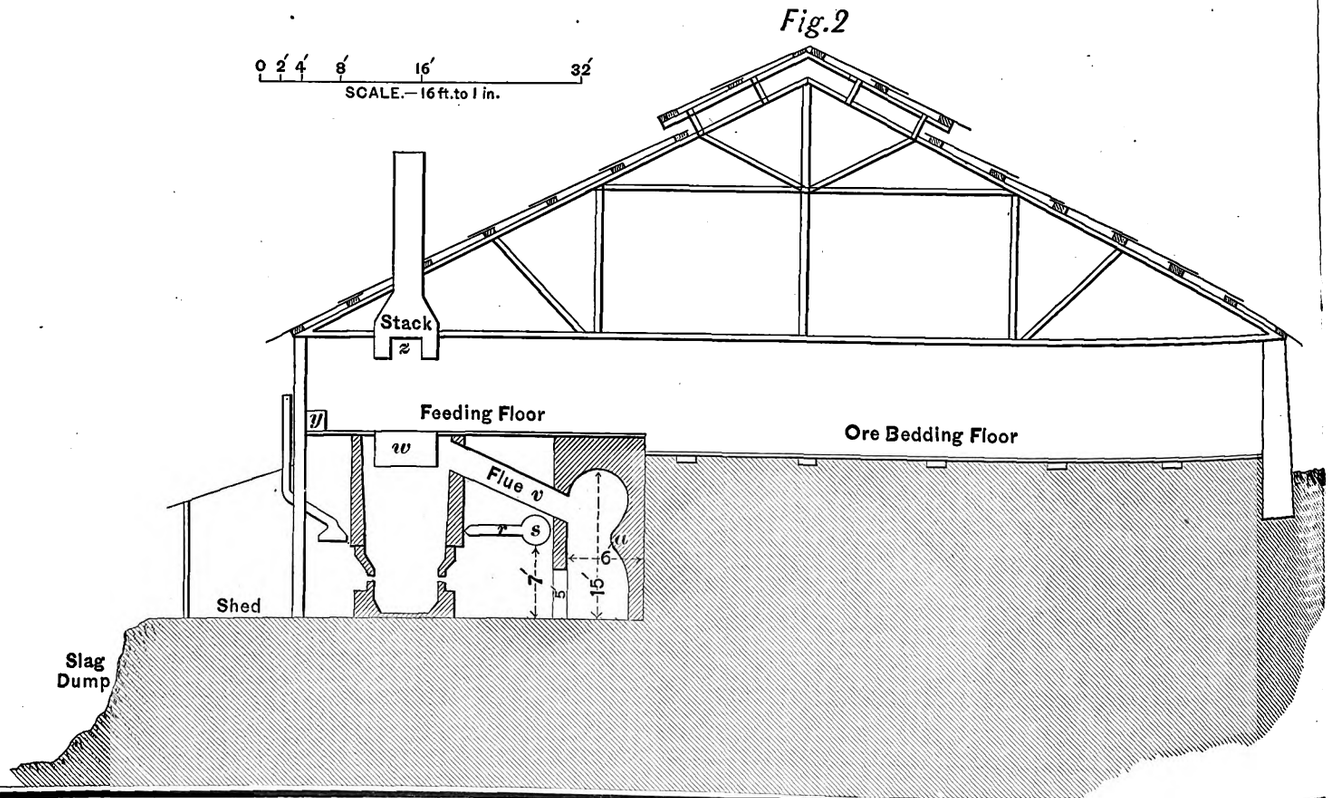


Fig. 2



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Fig. 3

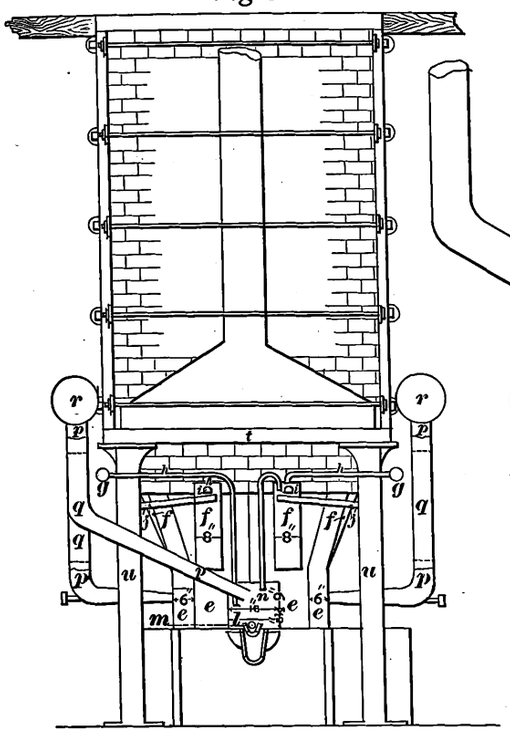
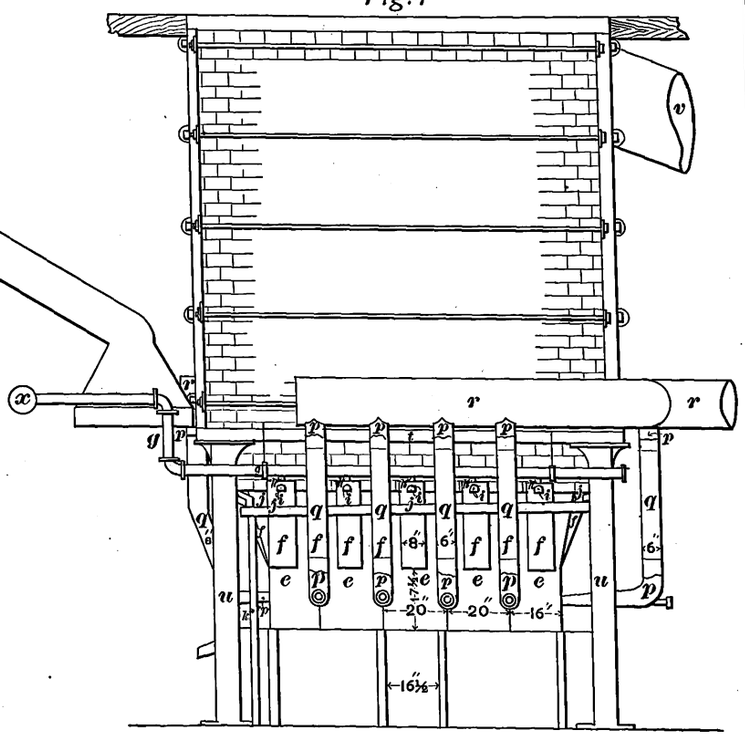


Fig. 4



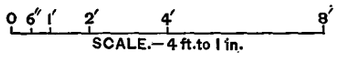


Fig. 5

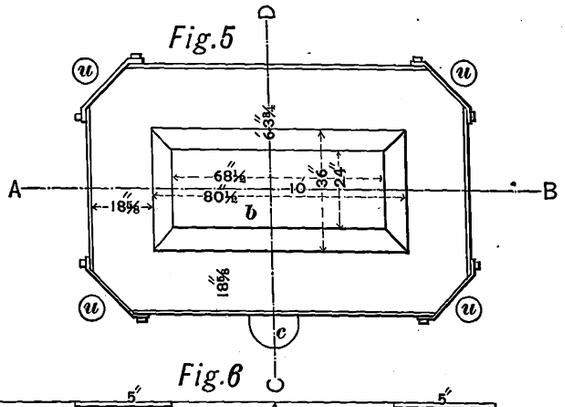


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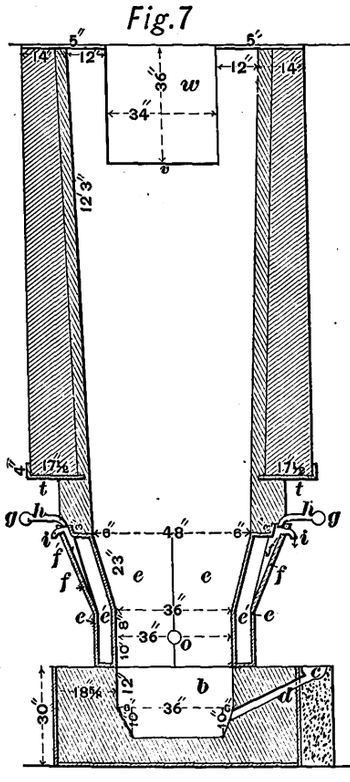
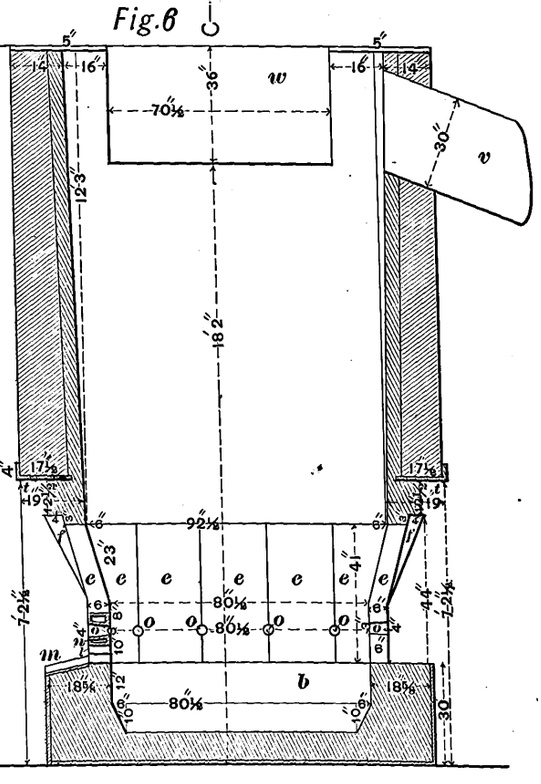


Fig. 6



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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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WE understand that there is a movement on foot to bring into the markets of the world brimstone from the west coast of South America.

THE Indians are again making their spring raids, and are seriously threatening the famous Clifton copper district. A series of outrages has already been committed. In spite of the warnings that annually cost so dearly to private interests, the government persists in maintaining only a small force for their protection.

THE details of the plan which we announced in our last issue as completed last Friday, for the consolidation of the Iron and Metal Exchange and the New York Iron and Metal Exchange, have been made public. The members of both Exchanges are given the option of joining the new organization, to be called the New York Metal Exchange, within thirty days after notice has been given of the new organization, upon payment of an initiation fee of one hundred dollars, the membership to be limited to four hundred.

THE Commissioners of the Chicago Exposition of Railroad Appliances have had the good idea of appointing a committee, of which Mr. WILLIAM SOOY SMITH is chairman, to make tests of the strength and quality of substances used in general construction. A circular giving details has been issued by Mr. E. H. TALBOTT, the Secretary of the Exposition, and we trust that the request for specimens will be widely complied with by manufacturers of structural iron, steel, and metals.

THE Compendium of the Tenth Census, recently issued, contains some figures which will serve to give an idea of the magnitude of the quarrying interests of the country, which in 1880 gave employment to 39,723 men, 8059 horses, and 851 mules; had 339 machines for quarrying, 2290 machines for hoisting, 1308 machines for dressing, and used $192,175 worth of explosives. The capital invested is given at $25,414,497, and the value of the product in the census year at $18,356,055, there being 1525 quarries in all. Marble and limestone lead the list with 65,523,965 cubic feet, followed by the sandstone quarries with 24,776,930 cubic feet, crystalline siliceous rocks with 5,188,998 cubic feet, and slate with 457,267 squares, or 4,572,670 cubic feet.

CLOSELY following upon the statistics for 1880, which we printed in a recent issue, comes the official statement of the production of Spain in 1881. The make of lead was 90,672 tons, of which 7690 tons are reported as "argentiferous lead," whatever that may mean. It is well known that desilverizing is done much more extensively in Spain than formerly, and yet the export statistics show that as yet the Spanish works have not so entirely crowded out the English works as these figures would seem to indicate. The copper production seems to have remained stationary, being reported at 23,478 tons, the amount of pyrites raised being 1,455,892 tons. The manufacture of spelter has increased from 4221 tons in 1880 to 7032 tons in 1881, while the yield of quicksilver was 1812 tons, against 1387 tons.

ALABAMA COAL AND IRON LANDS.

During the last days of the session of Congress, a bill passed the Senate, after receiving the sanction of the House of Representatives, which to say the very least makes extensive frauds possible. Notwithstanding the fact that the time of the Senate was restricted and important measures were pending before it, the bill in question did not escape without searching scrutiny. The points brought up against it were sufficiently specific to demand more mature consideration and more hesitation on the part of those who voted for it.

Previous to 1873, public land was sold in Alabama to small settlers. In that year, a law was passed providing that "coal lands" of the United States should not be sold at less than $20 an acre if within 15 miles of any completed railroad, and for not less than $15 an acre if outside of the 15-mile limit. By later laws, coal lands in the States of Kansas, Missouri, Nebraska, and Michigan were made available for sale as agricultural lands, and the Hon. JOHN T. MORGAN, of Alabama, claimed for Alabama a similar right. In the House of Representatives, the bill was quietly passed. As framed originally by the friends of the measure, it read, like the similar ones relating to Kansas and Missouri, that "coal lands of the United States in Alabama shall hereafter be subject to disposal as agricultural lands, any law to the contrary notwithstanding." For this bill another was substituted, drawn up by the Commissioner of the General Land-Office, reading: "Within the State of Alabama, all public lands, whether mineral or otherwise, shall be subject to disposal only as agricultural lands; provided, however, that all lands which have heretofore been reported to the General Land-Office as containing coal or iron shall first be offered at public sale ; and provided further, that any *bona-fide* entry under the provisions of the homestead law of lands within said State heretofore made may be patented without reference to an act approved May 10th, 1872, entitled 'An act to promote the development of the mineral resources of the United States,' in cases where the persons making application for such patents have in all other respects complied with the homestead law relating thereto."

The coal lands of Alabama have engaged the attention of the government officials for a number of years. On September 11th, 1878, Secretary SCHURZ detailed Mr. F. WINTER, a geologist, as special agent to investigate the coal and iron lands of Alabama ; and in transmitting the report, on August 2d, 1879, Secretary SCHURZ recommended that so far as lands shown to be mineral were concerned, they should be withheld from sale until further legislation. The report made by WINTER appears to have been hasty and incomplete. Thus, for instance, he does not include in the mineral lands territory from which the Pratt mines, now the largest in the State, are taking 1000 tons of coal per day. He estimated the government lands underlain by coal in the Coosa, Cahaba, and Warrior fields at 1,573,280 acres, of which no more than one third he reports to be valuable for mining purposes. The area underlain by iron ore he places at 224,000 acres.

The General Land-Office, in order to prevent the retarding of the settlement of the lands belonging to the government, and set aside as "coal lands," permitted the entry under the homestead laws, when the claimants testified under oath that the lands were non-mineral in character.

This, the friends of the new bill claimed, gave rise to much abuse, and their statements are corroborated in a startling way by some of its most violent opponents. Mr. J. H. PERDUE, a special agent of the General

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Land-Office, in May, 1882, wrote to Secretary KIRKWOOD, in reporting on his investigations in Saint Clair, Shelby, and Jefferson counties, that not one acre out of a hundred was fit for agricultural purposes, and that yet there is little land that has not some kind of claim upon it, either in the form of a homestead entry or as a declaratory statement; and he estimated that the entries wrongfully made in Jefferson County alone aggregate 80,000 acres. There can be no doubt that the most extensive frauds were committed, a government official securing twenty indictments. The *modus operandi* appears to have been to have entries made by employés or ignorant men; to have them swear to the non-mineral character, and afterward cause the entries to be transferred to the "speculators." It is stated that one person bought in the North a package of soldiers' and sailors' homestead certificates, and by means of them secured in one day a slice of land sixteen miles long in the center of a coal-field. It is alleged that his bookkeeper made affidavits to the effect that the land was non-mineral.

Senator MORGAN, in support of the bill which he succeeded in passing, argued that the adoption of the measure would be the best means of getting over the trouble, because it would be impossible to prevent speculators from getting their lands fraudulently. He advanced the further argument that development was checked by the land granted to the Memphis & Charleston, Mobile & Ohio, Alabama & Great Southern, and Louisville & Nashville railroads, which got 15-mile alternate sections of lands along the north, west, south, and east borders, respectively, of the Alabama coal-field. These roads declined to build branches, in order to check competition of mines on other lands.

The bill was supported by the Senate and House of Representatives of Alabama, which passed a joint resolution in favor of it, dated December 12th, 1882. It received the indorsement, too, of Secretary H. M. TELLER, in a letter dated July 10th, 1882. It was, however, lukewarmly received previously by Secretary KIRKWOOD, at whose request the Commissioner of the General Land-Office, N. C. MCFARLAND, made a report in which he says:

"The policy of so disposing of the public lands that large areas will be owned by single individuals or corporations, may well be doubted, or at least merits a careful consideration. It is also to be borne in mind that a too restrictive policy is a substantial inducement to fraud, and at the best may postpone but briefly the acquisition of large titles by individuals who command the necessary capital and enterprise. This result would be more likely to occur in a State like Alabama, where there is doubtless so much land which contains coal and iron, but the amount and value of the deposits in which are so uncertain. The policy of the proposed law is one which it is the peculiar province of Congress to determine, and concerning which I prefer to make no recommendation. The proviso for public sale of the lands supposed to be valuable for their mineral deposits, I would think wise, because it will enable the government to realize the largest possible price for the lands."

The policy of converting mineral lands into agricultural lands by act of Congress was sharply attacked, and it was pointed out that the bill may be construed that those lands which have not been hitherto reported to the government as "coal lands," may be turned in, without any sale as mineral lands, simply as agricultural land, under the homestead laws, at $1.25 per acre. There is evidence that some if not considerable valuable property, may thus be secured, or has been so taken up already. A sound point raised against the bill is, that there are no provisions in it as to the size of the parcels in which these coal and iron lands may be disposed of by public sale. This is apparently left to the discretion of the Secretary of the Interior and the officials of the General Land-Office, who may decide that the best interests of the government demand the sale of large tracts only, thus making it possible only to combinations of wealthy capitalists to become bidders. It was furthermore pointed out that the proviso that "*bona-fide* entries already made under the homestead laws may receive patents" will practically legalize many if not the great majority of the fraudulent acquisitions of coal lands made in Alabama.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Electro-Amalgamation of Gold Ores

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of March 24th, you publish an article taken from *Engineering* on the Electro-Amalgamation of Gold Ores, which seems likely once more to bring before the public the question of the treatment of "rusty" gold and the use of the electric current to assist its amalgamation. Most of the old investors in Colorado gold mines, which unfortunate country is supposed to be peculiarly infested with this "rusty" gold (and, in my experience, still more cursed with inventions to treat it), have learned by sad experience to have nothing to do with inventions for the treatment of refractory sulphurets, preferring to leave the matter to competent metallurgists; but many who have not had this dearly-earned experience may be attracted by this invention, and it is to them that I address a few lines of warning.

In the first place, not one mine in a thousand carries "rusty" gold, and the few mines that do contain a portion of their auriferous contents in this unamalgamable condition can usually get their ore satisfactorily treated by the addition of a few of the well-known chemicals, and by carefully saving the blanket tailings. The truth is, that that portion of the gold which will not amalgamate is either chemically combined with the sulphurets, or so thoroughly and thickly coated with the same, that its envelope would resist the strongest electric current ever generated in the mind of the most sanguine patent process man.

In the second place, almost all ores that carry their gold in a condition difficult to amalgamate contain enough silver and copper or silver and lead to necessitate smelting, either before or after concentration.

In the third place, instead of costing $15 per ton to smelt such ore, the real truth of the matter, in nine cases out of ten, is, that after a simple concentration, preceded or not, as the case may require, by battery amalgamation, the smelters will pay such a price for such concentrations, as a flux for other ores, as would make it more profitable to beneficiate them in this manner than to amalgamate them under the most favorable conditions.

Fourthly and lastly, and speaking only from experience, which, however, has been pretty extensive in this direction, every attempt to improve on the present system of amalgamation of gold ores, as practiced according to their respective methods in Colorado and California, has been a total failure wherever electricity has been tried; and though this by no means precludes the possibility of success in the future, it should at least serve as a warning to those who, with little or no experience of the peculiar ores that they may be called upon to handle, fancy that they can do better work than the men who have spent the greater part of their lifetime in the practical amalgamation of ores, besides keeping thoroughly posted in all improvements that have been made public, and making a point of carefully testing every thing that might seem any advance on the method they were employing.

NEW YORK, March 24, 1883. EDWARD D. PETERS, JR.,
Ass't-Manager Orford Nickel and Copper Co.,
Late Terr. Assayer of Colorado.

OFFICIAL STATEMENTS AND REPORTS.

THE PEABODY COPPER MINES, RUSSELLVILLE, ARIZONA.

We have received a copy of a report by Mr. George J. Johnson, of Boston, a mining engineer prominently connected with the copper mining interests of Arizona, on the Peabody mines, formerly the property of the Russell Gold and Silver Mining Company, but recently acquired by Messrs. Underwood & Clark, of Kansas City, Mo. The mines are located in the Cochise Mining District, seven miles north of Dragoon, Summit Station, Arizona, and include the Peabody, Copper King, Highland Mary, and Donna Anna claims, to which have been added, by purchase, the Dreadnaught, and a two-thirds interest in the Columbia, Saratoga, and Vesuvius. In the absence of the plans to which Mr. Johnson repeatedly refers in his two reports, which are dated respectively the 22d of January and the 10th of March, we can not follow his description of the mines themselves; but he gives a series of interesting data which deserve to go on record. Geologically, the mines are found in stratified dolomite. They follow the dip and strike of the country-rock, which is crossed at right angles by occasional ledges of barren quartz. The principal mine is the Peabody, in which the vein opened out by the workings, 106 feet deep, has a dip of 48 degrees. A large, irregular chimney of ore has been stoped out, forming a chamber about 30 by 30 by 45 feet; but although explored to a width of sixty feet, neither wall rock has as yet been determined, the ore-body at this point apparently extending through the limestone lying between two parallel veins. The ores consist mainly of copper glance and bornite, red and black oxide and carbonates occurring in smaller quantities. The ore of the Copper King, on a well-defined vein, contains considerable amounts of iron oxides, which make it valuable as a flux with the Peabody ore. Little work has been done on the Dreadnaught, Columbia, Saratoga, and Vesuvius, which Mr. Johnson pronounces promising claims.

The Russell Company, whose want of success was due solely to lack of working capital to properly develop its property and a total want of experience in mining matters, had a thirty-ton furnace, furnished by the Pacific Iron-Works, which was situated three miles north of the Peabody mine, on a line between the mine and Summit Station.

In his first report, Mr. Johnson calculates the net value of copper per pound at the smelter as 13 cents, assuming the average price of Arizona copper for the year as 16¼ cents refined and delivered in New York, deducting $30 per ton freight and 2 cents per pound for refining and selling. With this as a basis, which probably is now subject to some modification, unless the copper ranks high in grade, Mr. Johnson, in his first report, says, in regard to the smelting of the ores:

"The ore is easily worked, requiring as flux about 20 per cent limestone, and it has averaged from 17 to 18 per cent of copper. The slag contains less than one per cent. The operations of the Russell Company commenced April, 1881, and have been continued in a very irregular manner up to the present time. The furnace was first blown in about the middle of June last; but its operation, on account of lack of water, was very irregular up to October 1st, when a continuous run of thirty-eight days was made. The furnace was in operation in all about ninety-five days, and smelted on an average from 22 to 23 tons of ore daily, producing 122 tons matte of about 65 per cent copper, and 281 tons black copper of from 92 to 95 per cent copper. There have also been shipped during the past year eight cars selected ore, ranging from 27 to 52 per cent; average, about 35 per cent copper. Trinidad coke is used at the furnace successfully, and costs delivered $18 per 2000 pounds, each ton of coke smelting from five to six tons of ore. Ore of 15 per cent copper would net as follows: 300 pounds less 5 per cent loss = 285 pounds; at 13 cents per pound = $37.05, less cost of mining, $7, and cost of smelting, $8; leaving a net profit per ton of ore of 15 per cent of $22. Ore of 17 per cent would net as follows: 340 pounds less 5 per cent loss = 323 pounds of copper; at 13 cents per pound = $42, less cost of mining and smelting, $15; leaving a net profit per ton of 17 per cent ore of $27."

In his later report, Mr. Johnson says on the same subject: "The present cost of cord-wood of fair quality is five dollars per cord, delivered. As, however, this is not a heavily-wooded country, any considerable consumption, such as would be necessary for the treatment of from 900 to 1500 tons of ore per month in reverberatory furnaces, would soon raise

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the price to from ten to fifteen dollars per cord, thereby making raw fuel an expensive article. Reverberatory furnaces have, moreover, the further disadvantages of requiring of the common furnace-man a far higher degree of skill than the blast-furnace, and of producing slags of a higher percentage of copper. Regarding the ores of the Peabody mine, which, containing the largest proportion of copper glance, are best adapted to the reverberatory furnace, I consider that the first operation may be conducted to better advantage in the blast-furnace, for the following reasons: As requiring a less degree of skill of the common furnace-man. As furnishing a slag so poor that it may be rejected without any considerable loss. As the Peabody ore consists mainly but not entirely of copper glance, and as a part of the sulphur is eliminated in the blast-furnace, the result of the first smelting operation per ton of 2000 pounds charge would be approximately as follows: Assuming the charge to contain 15 per cent copper, 80 per cent of charge, 1600 pounds, would form a slag containing not over ·75 per cent copper to be rejected as worthless. Fifty per cent of the copper, or 7½ per cent of the charge, 150 pounds, would be in the form of black copper, the most advantageous form for shipment. The remainder of the copper, 150 pounds, together with sulphur and iron, amounting in all to 250 pounds, or 12½ per cent of the charge, would form a matte of say from 50 to 60 per cent. This matte would be subject to further treatment, together with selected high-grade glance, either by roasting in heaps or stalls and returning to the blast-furnace, or probably to greater advantage in a small reverberatory, whereby the same could be brought to the grade of blister-copper. By mixing with Peabody ore the ore of the Copper King, which contains less sulphur, more carbonates, and more iron, the product would be a larger percentage of black copper and less matte, which would also be of a higher grade, thereby increasing the relative advantages of the blast as compared with the reverberatory furnace process. The cost of smelting Peabody ore in a thirty-ton blast-furnace would be as follows. The charge consists of 25 tons Peabody ore of from 15 to 17 per cent copper and 5 tons limestone as flux:

Metallurgist in charge, $300 per month—per day	$10.00	2 roustabouts, 12-hour shifts, at $3.	$6.00
Day foreman	5.00	2 engineers, 12-hour shifts, at $5..	10.00
Night foreman	5.00		
3 tappers, 8-hour shifts, at $4	12.00	Total cost of labor for 25 tons ore, 30 tons charge	$84.00
3 chargers, 8-hour shifts, at $4.	12.00	5 tons limestone as flux, at $3 per ton.	15.00
2 slag-wheelers, 12-hour shifts, at $3.50	7.00	5 tons coke at $18 per ton, delivered	90.00
2 bullion-wheelers, 12-hour shifts, at $3.50	7.00		
1 crusher-feeder, 1 shift	3.50	Total cost for 25 tons Peabody ore	$189.00
2 charge-wheelers, 12-hour shifts, at $3.25	6.50	Cost per ton Peabody ore	7.56

"By using Copper King ore together with Peabody ore, we should probably be able to smelt with little or perhaps no limestone as flux, consequently decreasing our expenses in this direction as well as smelting each ton of ore with a smaller percentage of coke. When running two furnaces, our labor account per ton will be somewhat decreased. On the other hand, the above estimates do not allow for increased expenditures per ton of ore caused by accidental interruptions of the operation of the furnace or for necessary repairs; nor does it provide for further treatment of the matte. Having carefully weighed all these considerations, I consider the fair average cost of smelting per ton of 2000 pounds ore to be $8.

"The ore of the Peabody mine contains one ounce of silver to every twenty pounds of copper on an average. On account of the expense attending the separation of copper from silver, there is little probability of being able to find a market in which the silver would be of any value when associated with copper in the above proportions. Occasional assays of specimens have been found to carry considerable amounts of gold. Possibly we may be able to sort out small amounts of ore of such a character that the relative proportions of gold and silver to the copper may be such as to give a commercial value to the precious metals."

Mr. Johnson has paid particular attention to the water supply. He has arranged for pumping a supply of 3000 gallons per hour to a reservoir of 20,000 gallons capacity, situated 130 feet above the surface of the wells, and 50 feet above any point on the pipe-line which connects the five wells available with the reservoir, a distance of 5500 feet.

The pump is a Knowles, with three-inch suction and two and a half inch discharge. From the reservoir to the furnaces, 400 feet west of the main Peabody incline, a distance of about two miles, the water will flow through a two-inch pipe. The whole pipe-line will be sunk from six to twelve inches under the surface of the ground. The cost of pumping will not exceed $8 per day, which will be more than repaid by the prices paid for water by the inhabitants of the new town-site. Mr. Johnson estimates that the total supply of water needed per day, even when running two furnaces constantly, would not be over 15,000 gallons, allowing 5000 gallons per furnace. The old furnace is in process of removal, and a second one has been ordered from Messrs. Fraser & Chalmers. The furnace building is to be of sufficient size for two furnaces. An ore-house of a capacity of 500 tons, with sorting-floors of a capacity of 90 tons, is to be erected twenty feet from the hoisting-works. A new gallows-frame for the hoisting-works, which will be twelve feet higher than the present one, is now constructing. The ore as raised from the mine will be dumped on the sorting-floor, thence the waste will fall through a chute upon the waste-dump. The ore will fall into the ore-bins below, whence it will be discharged through a chute into cars of one ton capacity each. The cars will run on a double-track tramway 400 feet in length, 60 feet elevation, and dump immediately in front of the crushers. The motive power for the tramway will be furnished by an engine of from five to six horse-power, steam for which will be furnished from the boiler used to run the engines of either furnace; thence by means of a false chute the crushed ore will fall into either of the two ore-bins provided for the two furnaces, as desired. The total expense of hauling ore from the mouth of the incline to the feed-door of the furnaces, including crushing, is estimated not to exceed ten cents per ton. The arrangements for handling coke, ores from other mines, and limestone when needed as flux, are correspondingly economical.

As for the mining developments, they are confined at present on shaft No. 1 of the Peabody to sinking the main incline; also a chute from the north drift, marked *D*, to meet the main incline. The main incline is now in the foot-wall, which is a very hard limestone, in consequence of which progress is slow. As soon as a sufficient depth has been attained to allow the replacing of the first station, developments in different parts of the main workings will be pushed energetically. Prospecting-work along the upper vein at shaft No. 5 is prosecuted for the purpose of determining the most available point for sinking a permanent incline-shaft. The incline at shaft No. 4 is now down 25 feet 6 inches, a contract having been let to sink the same 50 feet deeper, following the vein.

The main incline on the Copper King will be sunk from its present depth of 35 feet to the depth of 85 feet, following the vein.

In concluding his report, Mr. Johnson says: "I regard the whole property as being of great and permanent value, and one which may be profitably worked for many years. I estimate the monthly production of ore at 1200 tons, of an average of 15 per cent copper, and the net profit for the year commencing May 1st, when our furnace will be blown in, at from $250,000 to $300,000."

ATLANTIC MINING COMPANY, LAKE SUPERIOR, MICH.

The report of the directors of this Lake Superior copper mining company for the year 1882 has just been issued. From 189,800 tons of rock stamped in the mill, yielding 13·866 pounds of copper per ton or 0·693 per cent, there were produced 3,768,540 pounds of mineral, or 2,631,708 pounds of refined copper. The gross value of the product per ton of rock treated was $2.40·4, and it cost $1·1885 to mine, break, and select the rock, including all surface expenses and construction account. The cost of transporting by the company's railroad to the mill was 4·90 cents per ton, and the cost of washing and separating was 37·7 cents, to which added the cost of freight, smelting, and marketing product, including New York office expenses, of 30 cents per ton, carries the total expenditure per ton of rock treated to $1·9082, leaving a net profit of 49·58 cents per ton of rock, and 51·61 cents, including the interest earned.

The total number of cubic fathoms broken in openings and stopes was 10,170, costing in all $157,787.66, including 29·5 feet of sinking at $15.57 per foot, 2801·5 feet of drifting at an average of $10.05, and 9773 fathoms of stoping at $10.65. The timbering, tramming, and labor cost $43,238.63, and timber materials and supplies $6776.94, making the total underground expenses $182,764.58, from which is deducted profit on supplies, $24,926.92. The total surface expenses aggregated $66,859.03, the heaviest items being superintendence and labor, $36,778.88; fuel, $18,146.19; and supplies and materials, $7541.04. The net railroad expenses were $9307.31, of which $6435.67 were expended for labor, and $2650 for fuel. The stamp, with expenses, aggregated $70,355; labor costing $26,060.39, fuel $33,276.78, and supplies $10,375.03. The construction was small, and included one Rand drill and an Evans slime-table, costing $250. The total expenditure at the mine was $305,246, and smelting, freight, and all other expenses were $56,933.49, a total of $362,179.49. Among the expenses were $12,909.10 for freight, $34,093.15 for smelting, and $2307.89 for brokerage. The company sold 1,734,356 pounds of ingot copper, at an average price of 17·84 cents, valued at $309,469.92. There were on hand on the 31st of December, 900,319 pounds of ingot copper, which, at a valuation of 17 cents, would fetch $153,054.23. Besides this, the company had at the smelting-works 288,379 pounds of copper, valued at 14 cents, or $6242.30 less than at the same time a year ago, making the total receipts and value of stock of copper $456,281.85,; o which is added balance of interest account of $3855.67, showing a profit in 1882 of $97,958.03, and carrying the net surplus to $338,649.67, from which a dividend of $80,000, $2 per share, was distributed in February, thus making the total dividends to date $220,000, against assessments levied aggregating $280,000. The assets, consisting of cash, $47,109.75; loans, $30,000; supplies at mine, $104,886.91; and copper; foot up to $375,423.95; the liabilities being $36,774.28, leaving a balance of $338,649.67, less the $80,000 dividend.

PHILADELPHIA & READING RAILROAD AND COAL AND IRON COMPANIES.

The report of the Philadelphia & Reading Railroad and Philadelphia & Reading Coal and Iron companies, which has just come to hand, says *Coal*, contains a series of very interesting reports by the chiefs of the different departments. The railroad company carried 8,429,826 tons (of 2240 pounds) of coal during the fiscal year ended November 30th, 1882, against 8,072,142 tons in 1881, 7,179,399 tons in 1880, and 8,147,580 tons in 1879, the total tonnage, including weight of passengers and company's materials, having been 18,054,351 in 1882. The number of tons of coal hauled one mile was 679,041,172 ton-miles, and the receipts from the transportation of coal were $9,754,312.11. Of this, 628,975,470 ton-miles were paying freight, thus making the receipts per ton per mile 1·55 cents. Of fuel for company's use, there were 566,779 tons. During the same period, the company carried 7,490,883 tons of general merchandise, the ton mileage being 350,476,278, for which $6,308,066.39 were obtained, an average of 1·79 cents per ton per mile. Here also, however, the tonnage was not all paying freight, as many as 1,085,673 tons of the merchandise being for company's use. The paying mileage was 327,347,373 ton-miles, making the average rate $1.93.

Mr. J. E. Wootten reports the saving due to the use of coarse coal in locomotives to have been $236,000 during 1882, it having been $107,000 in 1881, and $30,000 in 1880, when the Wootten fire-box was first introduced. The quantity of such fuel used was 14,283 tons in 1880, 51,078 tons in 1881, and 112,823 tons in 1882; and during the month of November last, the full supply needed for all the locomotives capable of using it, 115 in all, or 16,698 tons, was for the first time procurable. In that month, the saving effected was $35,065, representing an annual saving of $420,780. For passenger locomotives, Mr. Wootten states that it is desirable to make further improvements in the apparatus for separating the slate; and when this is completed and all the freight engines now at work are reconstructed, he believes that the saving in fuel expense will foot up to $675,000 per annum. He refers also to one important point, namely, the fact that the comparatively low furnace temperature required for steam generation, when burning this kind of coal, appears to lengthen the time of service of the steel fire-sheets. He gives figures showing the mileage per number of engines fitted with the Wootten fire-box, which prove that they are doing better than the average of 120,000 miles usually attained with ordinary anthracite sizes.

The steam colliers did not do as well financially as they have done in some years; they realized a profit of $271,547.82 on the carriage of 574,931 tons of coal at the low average rate of $1.12.

The report of Mr. S. B. Whiting, Chief-Engineer, contains some inter-

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esting figures. The company mined 3,363,882 tons of coal from lands owned and controlled by it, and took 747,948 tons from other lands. Tenants mined from lands owned by the company 1,156,193 tons, and from lands controlled by the company 356,766 tons. Mr. Whiting states that the collieries operated by the company are prepared to ship 5,000,000 tons; and as he computes that, if mining had not been suspended by agreement forty-eight days, the output would have been 4,900,000, it appears that the company when mining drove its plant very nearly to its full capacity. Mr. Whiting gives his usual statement showing the tonnage, expenses, and average cost per ton, at the collieries worked by the company. We copy last year's figures below, because they strikingly show how close a relation increased product and the cost per ton bear to one another:

Months.	For year ended November 30th, 1882. Tonnage.	Expenses.	Cost per ton.
December, 1881	383,939 08	$597,409.08	$1.55·6
January, 1882	240,432 15	393,671.36	1 63·7
February	202,611 02	337,334.26	1.66·5
March	270,238 04	437,785.56	1.62·0
April	298,187 05	474,117.33	1.59·0
May	285,950 11	457,521.60	1.60·0
June	339.179 01	488,417.76	1.44·0
July	396,101 05	560,482.91	1.41·5
August	416,405 18	571,661.29	1.37·3
September	377,175 18	539,361.68	1.43·0
October	441,813 16	593,798.01	1.34·4
November	459,795 02	606,929.40	1.32·0
Total	4,111,830 05	$6,058,490.24	$1.47·3

Of course, there is no mathematical rule; but it will be seen how, with a declining tonnage in December, 1881, January, 1882, and February, the cost per ton goes creeping up; how it promptly drops off in June with a larger product; reacts slightly in September; and reaches its minimum in November, which was the greatest month on record thus far for the company's collieries.

The averages for the preceding years were as follows:

	Tonnage.	Cost.
1878	2,727,608	$1.23·7
1879	4,269,929	1.14·3
1880	3,460,464	1.43·6
1881	3,937,607	1.49·7
1882	4,111,830	1.49·3

In conclusion, we give below Mr. Whiting's accident statistics:

Year.	Total tonnage.	Total serious accidents. Non-fatal.	Number of tons mined per serious accident.	Total fatal accidents.	Number of tons mined per fatal accident.
1873	1,348,838	132	10,294	44	30,655
1874	1,374,791	96	14,320	36	38,188
1875	1,510,572	80	18,882	30	50,352
1876 (11 mos.)	1,853,364	75	24,711	30	61,778
1877	3,794,529	185	20,511	45	84,323
1878	2,727,608	217	12,570	44	61,991
1879	4,269,929	238	17.941	52	82,114
1880	3,460,464	198	17,477	43	80,476
1881	3,937,608	236	16,685	33	119,321
1882	4,111,830	191	21,528	43	95,624

Year.	Number of employés.	Total serious accidents. Non-fatal.	Per cent serious accidents.	Total fatal accidents.	Per cent fatal accidents.
1873	5,000	132	2·64	44	0·88
1874	8,000	96	1·20	36	0·45
1875	9,000	80	0·89	30	0·33
1876	9,110	75	0·82	30	0·33
1877	11,428	185	1·61	45	0·39
1878	10,630	217	2·04	44	0·41
1879	12,661	238	1·88	52	0·41
1880	13,093	198	1·51	43	0·33
1881	13,509	236	1·75	33	0·24
1882	13,705	191	1·39	43	0·31

THE CELY IRON REFINING PROCESS.

At one of the meetings of the Société de l'Industrie Minérale, at St. Etienne, France, M. Thiollier gave the results of a series of preliminary experiments made to test the process proposed by M. Laurent Cely, to refine iron, steel, and pig by the action of moist hydrogen. It is well known to chemists that, when a current of moist hydrogen is allowed to pass through a porcelain tube containing impure iron, heated to a temperature ranging between dark and cherry-red, the impurities of the iron are carried off. M. Thiollier, in order to test the reactions on a larger scale, has built a small experimental plant near Paris, in which he has four muffle-furnaces, of different shapes, capable of together treating one ton of metal. The cast-iron muffles are covered internally and externally with an enamel having alkaline silicates as a base, in order to protect them against oxidation externally, and the action of the hydrogen internally. The muffles or retorts are charges, and the joints, which are outside of the furnace protected from the heat, are luted. The hydrogen is introduced through small pipes, the quantity required being small only; and special precautions are taken to prevent explosions, a current of carbonic acid gas being put through the muffle after the hydrogen has acted upon the iron. While the hydrogen is passed through, the muffle is heated. M. Thiollier has evidence of the efficacy of the process, but has not yet completed his series of analyses. He states that malleable iron, after a few hours' treatment, has all the properties of steel, and is capable of being forged, welded, and hardened. Steel irregularly cemented is transformed into a uniform metal, and wrought-iron is similarly, though slowly, improved. He has tested the process, so far as wrought-iron is concerned, on poor wire particularly. M. Thiollier estimates the cost at two francs per one hundred kilograms.

SETTLING-TANKS IN SILVER MILLS.*

By Albert Williams, Jr., Washington, D. C.

A large proportion of the work performed in wet-crushing silver mills is devoted to the handling and re-handling of pulp between the battery and the pans. There seems to be no generally applicable substitute for the settling-tanks; and in the present system of constructing mills, the tanks involve an amount of labor which may be regarded as disproportionate and unnecessary, in view of the automatic improvements which have been introduced in other directions. This difficulty has been met, however, by Boss's continuous process, in which the pulp flows directly from the mortars to the first of a series of constantly working overflow-pans. This method has been adopted at the Noonday mill, Bodie, California; the Harshaw, Arizona; the Sierra Grande, New Mexico; and the Prietas, Sonora, Mexico. The continuous process, while giving excellent results with special ores, and under peculiar local conditions (such as a deficiency in water supply), is not, I believe, claimed to be available for all raw-amalgamating mills, notwithstanding its well-merited popularity for certain work. Some trouble has been experienced from the tendency to concentration in the pans; though this can be avoided by skillful manipulation. It has also the disadvantage inherent in combinations of distinct operations: it requires a very nice adjustment of the water supply to obtain full battery efficiency without running the pans too thin; although the latter defect is partially compensated for by the gradual thickening of the pulp as it proceeds through the series of pans. The objection is similar to that which holds in a parallel duplex process, that of combining roasting and smelting in a single furnace, where each operation is injuriously affected by the necessity of fitting it in with another and entirely different one.

In the prevailing type of wet-crushing silver mills, the battery sands, after settling, are manipulated in one of the three following ways: They are either shoveled into wheelbarrows or cars, and thus conveyed to the pans; or they are dumped in heaps upon the platform immediately back of the pans, from which they are again spaded into the pans; or, if taken from the row of tanks nearest the pans, they are sometimes thrown directly from the tanks into the latter by a single handling. Each of these methods may be applicable in a single mill, according to the arrangement of the tanks relatively to the pans. All involve hard work and the employment of many men. Thus, of the force employed in the six Comstock mills (the Brunswick, California, Mariposa, Morgan, Scorpion, and Trench), which numbered in 1880 215 men, no less than 49 were tank-men; and of the crews of two mills in Owyhee County, Idaho (the Ellmore and Jones & Adams), 6 were tank-men, out of a total of 19. The wages were $4 per shift of ten and twelve hours. These eight examples show that 24 per cent of the labor in the mills named consisted in handling the tank-pulp. The instances cited include all the data I have at command, and probably show a fair average of the practice in mills of the same type. Remembering the notable saving which has been effected in other details of modern amalgamating mills, it appears that here is a possible opening for improvement.

The object of this paper is to throw out a hint which may invite discussion, and may suggest to the builders of the mills of the future a remedy for the existing clumsy, slow, and expensive mode of handling tank-pulp. Instead of the laborious shoveling of the heavy, tenacious pulp to higher levels from the tanks, why not utilize the always obliging force of gravitation? This is already done in passing the ore from the bins successively through grizzlies, rock-breakers, and ore-feeders to the stamps, and in settling the pulp; and after leaving the pans, the pulp flows downward to the settlers, and thence to the agitators and sluices. In all these stages, the movement is steadily downward, and is effected by gravity: it is only when the settling-tanks are reached that an interruption occurs. Suppose now that, instead of the ordinary tanks, we introduce a series of hopper-shaped boxes provided with gates at the bottom, placing the pans from 6 to 10 feet below the usual level, and discharging the settling-boxes into movable troughs leading to the charging-holes of the pans. The position of these self-dumping tanks would be the same as that of the ordinary ones; the grade of sluices from the battery to the tanks would not be changed; and the arrangement of overflow-gates would be identical. The tank capacity could also be kept the same, while diminishing the area; for the capacity of the common tanks is determined by the limit of depth from which a man can conveniently shovel; this depth ranging in present mills from 24 to 40 inches, and seldom exceeding 30 inches. The proposed system would allow the compartments to be smaller in area because of their correspondingly greater depth. The gates at the bottom of the tanks could be actuated by levers extending above the pan-floor. Perhaps the best arrangement would be to employ hinged bottoms surfaced with burlap, sheet-rubber, or other packing. Any slight leakage would not be objectionable; for the water would be strained as it escaped, and all drippings would collect in a large fixed trough underneath the tanks, from which the water could be conducted to the slime-ponds, or used in diluting the pan and settler charges. The details of construction can be elaborated by any mill designer.

The plan of using gravity-discharging tanks is open to certain objections. It demands steeper grades inside the mill, to allow room for a half-floor beneath the tanks and give sufficient fall for the sluices from tanks to pans. The work of excavation for foundations would be increased, and the mortar-beds would need somewhat heavier backing. On the other hand, the area accupied by the building could be slightly reduced. The expense would depend on the natural grade of the site. For a twenty-stamp mill, the addition to the first cost (given a favorable site) should not exceed $1000—an amount which could be saved in wages of tank-men in a three months' run.

THE Italian government has limited the export of iron ore from the island of Elba to 250,000 tons annually. The output in 1880 was 287,680 tons, from six mines, employing together 1200 men at two francs per day, being 69,425 tons more than in 1879. The ore is exported by contract with the government by the Elba General Miners' Bank of Leghorn, Italy.

* Read at the Boston Meeting of the American Institute of Mining Engineers.

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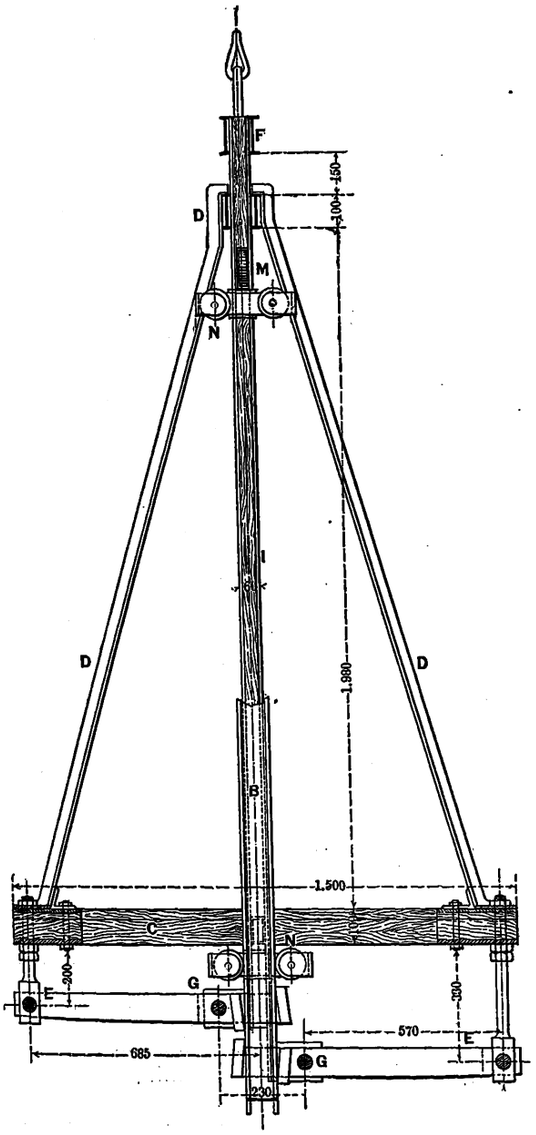


Fig. 1.

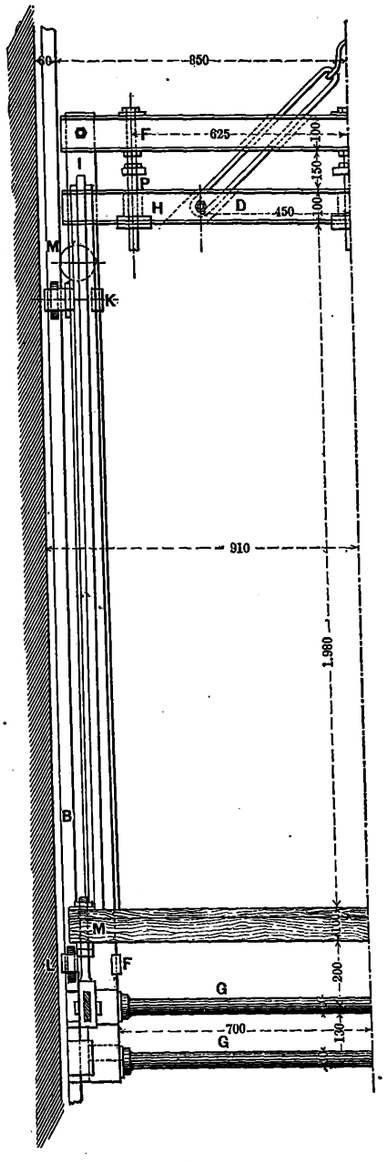


Fig. 2.

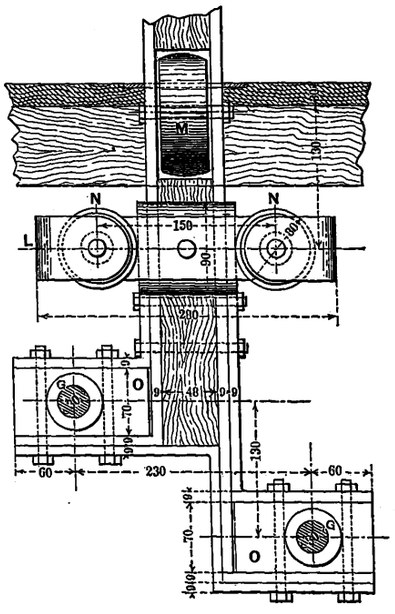


Fig. 3.

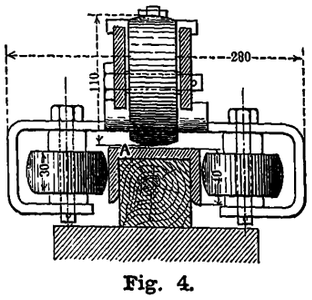


Fig. 4.

THE LIEVENS SAFETY-CATCH.

THE LIEVENS SAFETY-CATCH.

At the recent annual Agricultural Exhibition in Paris, MM. Lievens and Crespin showed a safety-catch for elevators and cages which possesses some features distinguishing it from devices of a similar kind used in this country. The *Revue Industrielle*, from which we have borrowed the accompanying engravings, speaks of it as having attracted a considerable share of attention. The cage consists of two parts, having an independent motion vertically, but connected with one another through the levers *E*, *G*, Figs. 1 and 2, which constitute the brake. The one part is formed of the platform *C*, Fig. 1, suspended by the frame *D* from the hoisting-chain or rope, and bearing the bolts *E*, Fig. 1, to which one end of the brake-levers *G* is attached. The other movable part of the cage consists of the beam *F*, Fig. 2, which carries the guide-rollers, and to which is attached the other end of the levers *G*. The hoisting-rope is fastened to the chain which is attached at *H*, Fig. 2, and does not touch *F*. At *K* and at *L*, Fig. 2, the frame *F* carries rollers which grasp the two sides of the guides, while a third roller, seen in plan in Fig. 4 and in elevation Fig. 3, slides along the other surface, thus securing easy running. As is shown in Fig. 3, the lower part of the frame has the bearings *O* for the brake-levers *G*.

The principle of the working of the safety-catch is the relative movement of the two parts of the cage. This movement is limited by the springs *P*, Fig. 2, which connect the two frame-beams *F* and *D*. When these beams are near one another, the brake-levers do not touch the guide *U*; but as soon as the distance becomes greater, the platform *C*, and with it *E*, drop down, and the brake-levers at once take hold. When the cage is suspended by the rope, the platform *C* and its frame support the guide-roller frame *F*, with the aid of the springs *P*, and the frame *F* by its weight occupies a position close to *D*, thus keeping the brake disengaged. As soon, however, as the rope breaks, the platform drops faster than the brake and guide-roller frame, and the brake-levers act promptly, the weight of the cage and load tending to give them a better grip.

LAKE SUPERIOR COPPER INTERESTS.

Special Correspondence of the Engineering and Mining Journal.

Sympathizing a trifle, perhaps, with the depression in the demand for the raw and manufactured products of iron, and to a certain degree itself dependent upon this demand for a market, copper enters the new year with less inspiration than at any time since 1879. Bids for ingot have scarcely risen above 18¼ cents, and although the price asked during the last week in January was 18½ cents, it is not probable that the average sales thus far will reach any thing beyond 18 cents, if, indeed, they touch that figure. Prices as a rule fall off when navigation opens and overland transportation is discontinued, so that we may look for lower prices by June, unless the electric light companies, underground telegraphy, a revival of locomotive building, and other multiplication of uses for the mineral come to our rescue. During the month of January last year, the prices paid for ingot reached 20½ cents, and for the first three months would not average below 19⅛ cents. This difference, insignificant in small transactions, is an immense bolster to the successful operation of a mine, when the aggregate annual production reaches pounds in the millions. A difference of two cents a pound would have made a difference of $80,000 to the suffering Pewabic in her cupriferous resources for 1882, over $60,000 to the Allouez, over $80,000 to the Osceola, much over $100,000 to the Quincy, and considerably over $600,000 to the Calumet & Hecla, that eighth wonder of the world. This is of no practical consequence to the Calumet & Hecla, which would only have to sweat a little to make up its return of $2,000,000 per annum to stockholders, even if the price of copper should fall to 15 cents; but it must be remembered that this mine is entirely exceptional, requiring no parsimonious economy—nor practicing it either, for that matter, it is to the great credit of its management to say—and presenting in its underground workings no problems except deep and rapid hoisting and the timbering of the chambers stoped out by its thousand employés. With the Atlantic, for instance, however compared with which the Calumet & Hecla yields over seven times as much

copper per cubic fathom of rock, a fall to 15 cents average would mean a suspension of dividends, if not of operations; and as for the Keweenaw mines, it would mean either a new harvest of assessments, or, what is worse, a new era of tributers, or, what might be worse, but would probably be better, a stoppage of machinery until a revival of prices. The market is now overstocked, although not glutted, with ingot; but prices have been maintained thus far by combination, as that production is more or less self-supporting; nor do dealers generally desire any reduction in prices, unless it be the brass founders, who are hankering for markets "beyond seas." The apathy of the market is due, therefore, not to ruling quotations, but to a stagnation in the demand for cupriferous wares. Certainly prices for lake ingot ought to fall no lower than advices from brokers put them at this week; for the margin by means of which the industry is carried on is already so meager that our American mines can hardly stand on their feet, even with the protection afforded them by our Washington Solons. And unless the price does take a rise from present rulings, the danger of this region suffering from competition with Western ores will soon be eliminated, since a fall of lake to 15 or 14 cents would mean only a shilling for Western brands; and as it now is, with the exception of one mine, the Copper Queen, these properties are said to be already in the early stages of dissolution.

However this may be, there is probably no industry in our country where operations are conducted on a closer shaving of profit, where greater executive ability and foresight are demanded, where the greatest possible results must be obtained from the smallest possible outlay, than in the mining of copper. Of course, this will not apply to the Calumet & Hecla, which yields about six per cent mineral per ton, and is rich beyond even fabulous competition; but, as already remarked, this wonder of the world is unique, entirely exceptional, and ought not to be at all considered in determining protective rates for copper production. There are at least twenty other mines among us—average mines, with approximately equal prospects—but the repository of an enormous outlay of capital already expended, the existence and operation of which are at least deserving of consideration. Of the better class of these, the Atlantic yields only a trifle over seventy one hundredths of one per cent of mineral per cubic fathom of ground sent through the stamps; and this amount again is reduced by a large per cent when the mineral is sent through the smelting-works to produce ingot. The Allouez makes a showing of less than one per cent, the Copper Falls about ·83 of one per cent, and even the magnificent Osceola only a trifle over 1·29 per cent. In some of the mines, vast quantities of rock must be sorted and thrown away on the burrows which wind off from the shaft-houses, before any boulders can be discovered which are at all worthy of being thrown into the crushers and ultimately treated in the stamps and wash-houses. Iron and copper mining have little in common. Iron mines require no such plants as are from the very start essential to the production of copper. A good derrick, "mast and boom," in mining parlance, or donkey engine, with a few thousands of ready money, can make a fair start at mining iron; and as a rule, a Webster, Camp & Lane hoisting-drum of moderate size is adequate to all the hoisting exigencies of the case. With copper, however, and especially since prices no longer yield bonanza profits, the most expensive and enormous machinery must be put in from the start in order to make the property at all self-supporting, to say nothing of being profitable. Air-compressors, machine drills, high explosives, massive drums for deep and rapid hoisting, stamps which strike the rock with the force of a hundred tons, well-elaborated facilities for the scientific treatment of the rock in mills and tail-houses, are one and all the imperative accompaniments of beginning operations. A lack of any one of them will cripple the mine; a want of two or three will make the mine a constantly increasing burden to its owners. For example, the Conglomerate, which is rebuilding on the site of the old Delaware, finds it necessary to expend in the neighborhood of a million—of which nearly three quarters is already invested—before it will be ready to return a "copper" to its proprietors. I ought to say, by way of parenthesis, that the whole mining plant, when I visited it some time since, presented one of the finest appearances of any mine in the whole lake country. A railroad to Lac la Belle, and a mill of Ball stamps are just now in process of construction. If the finest of shaft-houses, trestle-works, skip-roads, and handsome locations can make the enterprise successful, certainly the Conglomerate is destined to a proud place among our Michigan mines. What is the result of the Philadelphia meeting of the stockholders of this property—this week, I think—I have not yet learned. The future of the Conglomerate is enigmatical: the lode is very wide, and much poor ground must be broken to get what little copper the lode contains. Certainly, a liberal outlay of money must precede any realization at all from the money already invested; but as the lode is moderately charged with copper, perhaps 1½ per cent, it is highly possible that the property will one day make remunerative returns for moneys already and hereafter to be invested.

In fact, it is a lack of proper equipment that makes the mines in the neighborhood of Houghton—all of which, if I am not misinformed, yield a better showing of ingot than the Atlantic—such expensive elephants on the hands of their stockholders. The Allouez, lacking only facilities for transportation and treatment, is positive proof. A liberal donation from the stockholders of this property, which would purchase a new locomotive, fix up the stamps, put on a fleet of new cars, and open up the mine with proper reserves, would be far better than dribbling along with fifty cents this year to meet deficiencies, and fifty cents next year to meet the same inevitable deficiencies, which do and must occur with present methods of working such a lode. The Allouez is now in good paying ground, although the drifts north of No. 3 shaft do not meet expectations at the seventh level, nor does the bottom of the shaft expose as much copper as the trend of the mineral led its operatives to expect; but what with stoppage from storms, repairs of what once was a locomotive, and other stumbling-blocks to which I will not now refer, there are halts in operations at the mill, and this means a painful halt in the already painful march to self-support and remuneration. The tributers left the Allouez with little workable ground opened up, and the mine has since been slowly recovering from the attack always so paralyzing from this source. The mining captain is pushing the work of opening up the mine's resources, although the peculiar geological construction of the lode, together with the company's available resources, makes the opening of "reserves" at present, at least, very up-hill work. If a few disturbing factors could be eliminated, the Allouez would undoubtedly take its place among the remunerative properties of this region; but as matters now stand, that day is yet to dawn.

And what is true of the Allouez is true, with some shades of difference, of the Phœnix, Copper Falls, Conglomerate, and the Houghton mines, especially if prices for ingot reach a lower average—as is quite likely—than last year. It was hard work for these properties then, with copper at 18½ cents; and should the change in the tariff and the increased importation of Spanish and Canadian pyrites and Chilian bars glut the market and sicken the price to an average in the neighborhood of 16 cents or less, there can be little doubt but that the best place for copper stocks will be in somebody else's pocket. It is not the Calumet & Hecla that needs protection: this mine could compete with the Spanish and Chilian mines on the open sea of free trade. But this corporation represents less than one tenth of the number of shares in lake copper mines, many of which have been far more expensive than the original cost of Calumet stock, and have not been at all remunerative. It will not do to say that this is one of the accidents of trade, one of the incidents of speculative enterprise; if we are to encourage the investment of capital in the development of our mineral resources, the protection ought to be on a basis that would allow the average mine to yield a moderate return, both in wages to employés and profit to employer. The Calumet & Hecla, which is exceptional, needs no protection; but the other twenty mines, which are the great rule, do, or they must cease to exist. Inadequate protection is mockery and deceit; for with no pretension to protection, capital would not be beguiled into insane investments, which is the one result of a pretended policy of protection. Of the real merits of this pudding, however, more can be said after we have chewed on it for a few months.

The report of the Pewabic has just reached me, and shows for the past year cash receipts, including amount carried over from 1881 and the assessment of $2 per share, and which realized the company $57,500, of $678,928.14. Of this, all has been paid out for loans and contingencies, so that only a trifle over $16,000 remained in the treasury as the resources for starting the heavy expenditures of the current year. I notice a falling off of 0·40 of one per cent in the metalliferous production of the ground passed through the stamps, which is a serious matter. The agent, Mr. Johnson Vivian, every way a capable and honorable miner, has done all that human skill could do with his resources and the disheartening outlook under surface; nor is he now able to see how, in the present yield of the stopings, even the present meager product can be maintained. And yet it is possible that the Pewabic will one day be a veritable bonanza to its owners, although that day is far distant.

SPECULAR.

WAGES IN SHEFFIELD.

Mr. Robert P. Porter, as special correspondent of the *Tribune*, gives the following figures as the average present weekly earnings of the thrifty workman of the Sheffield District who works full time:

Rolling-Mills.			
Puddlers*	$7.50	Bogie-men	$5.35
Puddlers underhand	5.50	Hammerdrins	7.50
Shinglers or hammer-men*	12.00	Pattern-makers	7.00
Shinglers' Assistant	8.00	Molders	7.50
Ball furnace-men*	12.00	Fitters	7.00
Ball furnace-men underhand	6.00	Laborers	5.00
Charcoal lumpers*	12.50	Iron nailers	4.00
Rollers*	12.75	Spring-fitters	9.00
Rollers' assistant	7.00	Assistant	5.00
Metal refiners	11.00	Tire-rollers	9.00
Plate-rollers*	14.50	Machinist (best)	8.50
Firemen	7.50	Machinist (ordinary)	7.50
Furnace-men*	12.50	Machinist (inferior)	6.00
Forge-men*	12.50	Rivet boys	1.20
Lever-men	7.50	Engineers	7.00
Electro-Plate Trade.			
Stampers	$8.00	Buffers (women)	$4.00
Piece-workers	8.00	Chasers	9.00
Braziers	8.50	Engravers (women)	9.00
Buffers	7.50	Burnishers	2.50
Britannia Metal.			
Spinners	$12.00	Makers-up	$8.00
Stampers	7.50	Burnishers (when plated)	2.50
Casters	7.50	Rubbers (girls)	2.50
Steel Manufacture.			
Melters	$15.00	Coker	$6.00
Turners	9.00	Pot-makers	9.00
Fitter-out	9.00	Collar lad	3.75
Files.			
Forgers	$10.00	Grinders	$10.00
Strikers	8.00	Cutters	9.00
Hardeners	7.50		
Saws.			
Long and circular saw-smith	$11.00	Grinders	$11.00
Short " "	8.25	Handle workers	9.00
Edge Tools.			
Forgers	$12.00	Grinders	$12.50
Strikers	9.50	Hardener	6.50
Sheep-Shears.			
Forger	$10.00	Assistant	$5.00
Striker	7.50	Hardener	6.50
Grinder	11.00	Bender	8.00
Hafters.			
Iron	$7.50	Others	$5.50
Bone	7.00		
Pocket Cutlery.			
Forgers	$7.00	Hafters	$6.50
Grinders	8.00		
Table Cutlery.			
Forgers	$7.50	Grinders	$8.00
Strikers	7.00		
Table Forks.			
Forgers	$6.50	Filers (women)	$2.50
Grinders	6.00		
Scissors.			
Forgers	$12.00	Holers and handmen	$6.75
Grinders	12.00	Burnishers (women)	3.00
Filers	7.50	Dressers (women)	4.00
Putters together	7.00		
Razors.			
Forgers	$12.00	Hafters	$9.00
Strikers	10.00	Putting-up women	2.50
Grinders*	12.50		

* Piece-work.

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PROGRESS IN SCIENCE AND THE ARTS.

Utilization of Pyrites Refuse for Steel-Making.—Experiments are now making at the Terrenoire works for utilizing the residue of iron pyrites. Briquettes are made with the pyrites conglomerated with hydraulic lime; and, by simple exposure to the atmosphere, an ore is obtained which is said to yield pig excellent for steel-making purposes. The sulphur is believed to be completely counteracted by the lime, and there is no phosphorus. The company has large banks of pyrites refuse that it has hitherto been unable to utilize.

Panclastite.—The nihilists are reported to be considerably interested in a new explosive that is making quite a stir in Europe. It is the invention of Eugene Turpin, and glories in the name of "panclastite" or "brise-tout." It is said to be composed of two liquids, each non-explosive when alone, but when mixed together, just as wine and water are mixed, a fulminating compound is produced which can be exploded either by ignition or percussion. Experiments made at Cherbourg by the iron plate and the lead cylinder tests showed it to be much more powerful than dynamite, while by trial it was shown to be much less sensitive to a blow.

An Ancient Peruvian Bronze Chisel.—At the meeting of the French Academy of Science on February 6th, M. Boussingault submitted to the members a bronze chisel harder than copper and not so hard as iron, composed of 95 copper, 4·5 tin, and traces of lead and silver. It is a specimen of the metallurgy of the Incas before their conquest by Spain, and has served to work the stone of Peru. It was found on the high-road between Quito and Cuzco. As to the supposed hardening that was given to bronze, M. Boussingault declared that he knew nothing of it, and had never been able to produce it.

The Gjers Soaking-Pit.—The soaking-pit processs of Mr. John Gjers continues to give excellent results. In one week, at the West Cumberland Iron and Steel-Works, Workington, where it is in full swing, they put 2572 ingots, weighing 2391 tons, through fourteen soaking-pits, and made 2176 tons of rails and 77 tons of blooms. The rail-mill worked eleven shifts. The ingots put through the soaking-pits were cogged direct from them to 8-inch blooms; they were then reheated and rolled into rails. Three second heating furnaces were used, and the mill work was done with one cogging and one finishing engine.

Underground Wires in England.—Mr. W. H. Preece, F.R.S., in a recent paper says, speaking of the post-office system: "Wires are almost invariably carried underground through towns. Copper wire insulated with gutta-percha, incased in iron pipes, is the material used. There are 12,000 miles of underground wire in the United Kingdom. There is a great outcry for more underground work in England, owing to the destruction to open lines by gales and snow-storms; but underground telegraphs, wire for wire, cost at present about four times as much as overground lines, and their capacity for the conveyance of messages is only one fourth; so that overground are, commercially, sixteen times better than underground wires. To lay the whole of the post-office system underground would mean an expenditure of about £20,000,000. Hence there is no desire to put wires underground except in towns. Besides, snow-storms are few and far between; and their effects are much exaggerated.

An Automatic Clock.—There is an automatic clock at the London Stock Exchange, which has now performed very well for six months, invented by M. Dardeme. The winding apparatus consists of a small windmill, fixed in a chimney, or any other place where a tolerably constant current of air can be relied upon. By means of a reversed train of multiplying wheels, this windmill is continually driving a Huyghens endless chain *remontoire*, a device well known to clock-makers. A pawl acting on a wheel prevents the motor from turning the wrong way, and, by a simple arrangement, whenever the weight is wound up right to the top, the motion is checked by a friction-brake automatically applied to the anemometer by the raised weight lifting a lever. When the weight is thus raised to the top, the clock has a sufficient store of energy to go for eight days or more, so that it will be seen that it is by no means dependent on a regular current of air. The Belgian government has for the past two years adopted this system of clocks on the state railroads, and we are informed that they are now testing by certain English railroad companies with a view to their adoption.

Long-Distance Telephoning.—Our bright contemporary, the *Electrical Review*, referring to the experiments with the Hopkins transmitter and the Dorrance and Baxter telephones, says: As a matter of fact, when the conditions are taken into consideration, there is very little of the extraordinary in these experiments. It must not be forgotten that the line wire employed was such a one as has never, until now, been constructed; a wire that on its last resistance measurements measured but 1½ ohm per mile, and that for its size and conductivity has a very low electrostatic capacity. By the use of such a wire, we have no hesitation in saying that conversation could be readily carried on between the two terminal points, using an ordinary Bell magneto-telephone as a transmitting instrument. Neither must it be forgotten that no switch-board intervened between the talking parties at both ends of the line, and that, above all, no short subscribers' lines were hitched on at both ends, with a central office operator stationed at the junction point, and a well-meaning but plot-marring subscriber at the end of each short line. Experimentally, we can do almost any thing; but doing it experimentally and commercially are very different things. We are reminded of the old saying of Professor Morse, who, before he would consent to go into any thing new, would satisfy himself not only that it was practicable, but also that it was practical. The uniform success of all telephones which have been operated over this Cleveland line point, we imagine, to a sound moral, namely, that to communicate by telephone successfully over very long distances, the class of construction employed and the character of the conductor are elements fully as important as the instruments whereby the message is transmitted or reproduced.

THE COPPER PRODUCT OF CHILI AND BOLIVIA.—According to advices from Valparaiso, the comparative exports of fine copper from Chili and Bolivia to all parts of the world during the following years were, in tons:

1882.	1881.	1880.	1879.	1878.	1877.
43,128	38,160	43,135	49,560	46,931	45,561

The relative proportions of the different descriptions of copper being:

	1882.	1881.	1880.	1879.	1878.	1877.
Bar copper.....	84·611	82·276	80·76	80·10	82·65	75·325
Copper regulus...	13·768	15·820	16·29	17·20	15·47	18·682
Copper ore.....	1·621	1·904	2·95	2·70	1·88	5·993
Total...	100·00	100·00	100·00	100·00	100·00	100·00

STEEL CASTINGS.—The process of manufacturing steel castings, says Sergius Kern, in the *Chemical News*, is very carefully kept secret at all works engaged in such a business. We have had several interesting papers by M. Pourcel, of Terrenoire, France, but he gives nearly nothing about the *modus operandi*. We understand well that a man is not expected to say every thing about his method, if it brings him dollars and cents. In Russia very few steel castings were made at some works, and these may be called only experimental. Information was lately received of a process of molding for steel casting, the invention of Mr. George Cowing (*Journal of the Iron and Steel Institute*, No. 2, 1882, p. 731). Quartz from Finland (a very pure specimen) was calcined, ground to a rather fine powder, and mixed with from 2 to 3 per cent of glue-water and flour. This was used for molding. As a facing, fine quartz powder, with a small quantity of graphite well mixed with water, was used. The steel was prepared as follows: 80 pounds of good iron, containing about 0·10 per cent of carbon (it is proposed to use soft basic steel), were melted in a crucible; and next were added 2 pounds of silicon pig-iron, containing 6·5 per cent of silicon, and 0·5 pound of ferro-manganese, containing 75 per cent of manganese. The metal was kept in the furnace, with the alloy, for about fifteen minutes, and it was next poured into the molds. The castings had a very clean surface, and were good. Mr. Kern holds that the clean surface depends much upon the molding material. There is certainly a reaction between the silica and the gases. Secondly, as the quartz *expands* by heat, it gives a free passage to gases, and at the same time compresses the casting.

A PROSPEROUS AUSTRALIAN TIN MINE.—The directors and officers of the famous Mount Bischoff Tin Mining Company have just made their report for the six months ended December 31st, 1882. The accounts submitted at the previous general meeting showed a balance to the credit of the profit and loss account of £45,939 7s. 8d., and a further sum of £60,384 7s., being the earnings of the last six months, has since been transferred to the credit of the account, making a total credit of £106,323 14s. 8d. Of this sum, £54,000 have been distributed in dividends, and £2025 have been paid for dividend tax. In accordance with previous practice, the directors have caused to be written off the undermentioned accounts various amounts at the rate of 20 per cent for depreciation in value: Plant account, £6497 1s. 1d.; furnace plant account, £298 11s. 10d.; office furniture, £46 9s. 11d.; and horses, £36 0s. 4d. After providing for these deductions, there still remain to the credit of the profit and loss account a balance of £43,370 11s. 6d. The mine manager reports that the full number of stamp-heads was kept at work during the first four months; but after that, as the weather kept dry, he had to economize and use only sufficient to work fifteen head. The number of tons treated during the half-year was: By the 40-head battery, 14,401¼ tons; and by the 15-head battery, 7204¼ tons, together with 3118 tons of sand sent down from the sluices, making a total of 24,724 tons. The quantity of ore obtained during the last six months was 1420 tons; and since the formation of the company, 15,604 tons. Mr. W. L. Jenkin, the smelting manager, reported that the quantity of ore smelted was 1655 tons, yielding 1158 tons 17 cwts. 1 qr. 22 lbs. of refined tin. Of this, 1393 tons 8 cwts. 0 qrs. 10 lbs. of ore, yielding 975 tons tin, were smelted on account of the Mount Bischoff Company, and the remainder, 262 tons ore, producing 183 tons 17 cwts. tin, on account of the public. The average assays, as compared with those of the previous half-year, are, he continues, higher, the No. 1 ore yielding a fraction over 1 per cent more, while the No. 2 ore is about nine tenths of a unit less. The average assay of the refined metal is also a little higher, while that of the slag is a fraction lower. The smelting cost may have somewhat increased, in consequence of the excessive quantity of iron the Bischoff ore contains in its matrix, much of which is reduced with the tin, and necessitates long and careful refining to bring the metal up to the very high quality as shipped.

THE PROFITS OF THE TELEPHONE.—At the annual meeting of the Bell Telephone Company, held at Boston on the 27th, the reports made showed the rapidity of the development of the business the past year. The total earnings for the year amounted to $1,576,031.57, against $1,001,924.91 the previous year. The expenses were $603,987.29, against $439,862.76 the year preceding; net earnings for the year, $972,044.28; balance of income from previous year, $126,034.58; total, $1,098,078.86. The total of the previous year was $606,555.01. Dividends paid, $595,000; carried to surplus account, $334,997.32; balance of income account, $168,081.54; total, $1,098,078.86. The increase of interchanges of telegraphic union doubled last year. The sales of instruments for export decreased and are likely still further to decrease, as foreign countries are making good instruments of their own. The royalties from manufacturers now go to the manufacturing branch. Local companies in New York, Chicago, San Francisco, and Boston are all paying dividends. All of the Dominion of Canada, exclusive of Newfoundland, is supplied by the American Bell Company, and dividends are to be expected from Canada. The legal expenses of the company have been heavy during the year. The report of the treasurer congratulates the company on the fact that the courts have decided that the Dolbear condenser telephone receiver, so-called, infringes on the Bell patent, and an injunction has been issued; also upon the opinion of Justice Gray that the Bell patent has all the breadth that has been claimed for it, and covers microphones and instruments that employ electrical undulations. The People's Telephone Company, using a carbon transmitter, has set up lines in New Jersey, and the report says that an action on the case called forth the most careful examination that has

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ever been given to the principles of the various instruments, and gives additional proof that the microphone and other things claimed under the Bell patent are authorized. The case has since been decided in favor of the Bell Company. The underground wires in Boston have been found to transmit distinctly only for short distances, and it will be necessary to devise further improvement before they can be made available to any extent. It was voted that the capital stock of the company be increased from $7,800,000 to $9,800,000, and that new shares be allowed on the basis of one new share to each holder of the old ones.

IRON AND COAL IN ALABAMA.—The Birmingham (Alabama) *Iron Age* says: The projected coal road, from Birmingham to Mobile, when completed, will be of immense value, not only to Mobile, Selma, and Birmingham, but to the entire State of Alabama. From Mobile to Selma, it opens up, in part, a rich agricultural country well suited to stock-raising and farming, a fine belt of pine timber, equal to any in the State, passing near the salt springs and wells in Clark County. Fifty-seven miles will connect the Grand Trunk Railroad and the Selma & New Orleans Railroad, so-called, giving a continuous line of rail from Mobile to Selma and to Briarfield, on the line between Bibb and Shelby counties. We are informed that a very strong railroad company has been organized, and it has a corps of engineers in the field running lines and locating the route through the lower pocket of the iron and coal-fields between Briarfield and Birmingham. It is thought the road will pass through the center of the coal measures spreading for miles on both sides of the Cahaba River, tapping the East Tennessee, Virginia & Georgia Railroad at or near Briarfield iron-works, north of Selma. There are only fifty-seven miles of the new road to build to connect Mobile, Selma, and the Briarfield iron-works by rail. From Briarfield, the company will branch off in the direction of Birmingham, and it will only have to build the road twelve miles to reach the mouth of Dailey's Creek, the center of the finest coal measures in the State. In constructing this portion of the road, it will pass near the iron-works of Clark Underwood & Candle, now in process of construction—heretofore called the Bright Hope Iron Company—on the falls of the Little Cahaba River. The Bright Hope iron ore-beds and the Briarfield ore-beds cover the lower pockets of iron beds in the State of Alabama. All of these beds are the finest brown hematite ores, surpassed by none in the State, and are in great abundance. There are only sixty-nine or seventy miles of new road to build to connect Mobile by rail with the mouth of Dailey's Creek, at the head of the Lillie Shoals, on the big Cahaba River, in the center of the lower pocket of the finest coal in Alabama, and in great quantities, which for ages can not be exhausted. The coal measures cover several miles on both sides of the river; the coal is hard, and susceptible of bearing transportation any distance, is superior to any in Georgia, Tennessee, or Alabama for grate fuel, and equal to any for gas, coke, or steam. These coal measures are the nearest coal to Mobile and the Gulf of Mexico. What will be the future of Mobile when this coal road is finished? It will make it the emporium of coal in the Gulf of Mexico, to furnish the shipping of all the West India islands, the sea-coast of Mexico, and South America. It will make Mobile a large sea-coast manufacturing city.

FURNACE, MILL, AND FACTORY.

The Cope & Maxwell Company, of Hamilton, Ohio, has sold out, and has been succeeded by the Gordon & Maxwell Steam Pump Company.

Amherst furnace, in Amherst County, Va., has gone out of blast for repairs after a long run.

Callia furnace, in Botetourt County, Va., has been repaired and improved and will very soon go into blast.

John Leighton, President of the Chattanooga Steel-Works, has gone to Philadelphia, to make extensive purchases of machinery for these new works.

The Lake Shore Tube-Works is the name of a new manufacturing establishment about to be erected in Pittsburg. The object of the company is the manufacture and sale of wrought-iron tubes and pipes. The new concern will be a rival of the National Tube-Works, at McKeesport.

The Belmont blast-furnace, at Wheeling, finished the working up of the stock of material on hand last week, and was shut down. The furnace will not be relighted until the latter part of May, as there is now metal enough on hand to supply the works until about the first of June.

The Lane & Bodley Company, of Cincinnati, well-known and extensive manufacturers of machinery, has recently acquired additional factory accommodations, and will soon be able to add 100 men to its working force. It has filled orders during the winter for several stamp-mills, ranging from 10 to 30 stamps, for different sections, and now has nearly ready for shipment a forty-stamp mill outfit to go to Georgia, and another ten-stamp mill which will go to Colorado. With its increased facilities, it hopes to meet the demands of this growing branch of its extensive business.

The Swift Iron and Steel-Works and the Riverside rolling-mill are running double turn in all departments, with prospects brightening.

The Jarvis Furnace Company, Boston, Mass., has been setting a number of its furnaces under steam-boilers, in the West Indies, to burn wet bagasse, or sugar-cane trash, without drying. The system has proved successful, and the company has received this week orders for a large amount of work, to begin when the present crop is completed.

Major A. B. de Saulles has resigned his position as superintendent of the Dunbar Furnace Company, and on April 1st will move his family to Sunny Brae, near Oliphant. Mr. de Saulles will, after April 1st, be general superintendent of the works of the Fayette Coke and Furnace Company, at Oliphant station, in which he is largely interested. He still retains his interest in the Dunbar Company, and is a director in it. Harry W. Hazard will take his place at Dunbar as general superintendent.

R. D. Wood & Co. have closed an order for 37,000 feet of street mains from the Gate City Gas-Light Company, of Atlanta, Ga.

A. L. Archambault, steam-engine works, Philadelphia, recently placed two of his vertical engines in the Rome Merchant Iron-Mill, Rome, N. Y., one 20×22 and the other 22×24.

A new iron steamship, built by the Jackson & Sharp Company, Wilmington, for Rodriguez & Brother, Sagua la Grande, Cuba, was launched on Thursday. She is 100 feet long, twenty-three feet beam, and eight feet hold. After receiving her machinery at Neafie & Levy's, the vessel will be used for passenger and freight traffic in Cuban ports. The company will soon begin work on the new steamer for the Electric line. She will be 155 feet keel, 166 feet over all, 33 feet 7 inches beam, and 8 feet hold.

Several hundred men resumed work at the rolling-mill of the New Jersey Steel and Iron Company, at Trenton, N. J., on the 26th. The whole number of those who have consented to go to work at the reduced wages is 700; but owing to the scarcity of helpers, they did not all resume. Six furnaces were started

The conference between the management of the Joliet Steel-Mill and the Amalgamated Association of Iron and Steel-Workers was held on the 22d, and resulted in the men accepting the proposition made by the mills, which is understood to be a reduction from last year's scale of 33⅓ per cent. The furnaces have been blown in, and the mill started with a force of 2000 men, nearly all of whom will be from among the old employés.

The stockholders of the Union Iron and Steel Company, of Chicago, have agreed to the proposition to increase the capital stock to $3,000,000, of which $1,400,000 shall be preferred. This will enable the management to resume operations.

Capitalists from New York have been at Bloomington, Ill., several days, and have selected a site for the erection of extensive iron-works.

J. L. Edwards & Co., proprietors of the rolling-mill at Canal Dover, O. have made an assignment to Charles Harger. Their liabilities are $50,000, and their assets $30,000.

The puddling-mill at Bay View, Wisconsin, which was run for three weeks, is now closed for two or three weeks until the accumulated stock of puddled iron is reduced. It is said that if the mill is kept running on half-time, it is as much as can be expected for some time to come, and there are more furnaces running in the mill than the demand for iron warrants.

An important meeting of the Western Nail Association was held at Pittsburg on the 28th. All the mills in the district were represented. After some discussion, it was decided not to suspend operations on the 7th of April, as was ordered at the last meeting, but to work two weeks longer. At the expiration of that time, a meeting will be held, at which it will be decided to continue in operation for an indefinite period. The manufacturers say that it is not their intention to increase the price of nails, but that the present rate, $3.40 per keg, must be maintained.

J. W. Mumper & Co., iron furnace and general traders, of Barre Forge, Pa., have called a meeting of their creditors to ask an extension. The liabilities are about $40,000.

The Steel Ore Company, of Pottstown, Pa., has changed the name of the furnace at Bechtelsville, which it has recently leased, to Norway Furnace.

The Roanoke, Va., *Times* states that recent developments in Roanoke County show very large and extensive deposits of a very excellent iron ore conveniently located. It rather closely estimates that pig metal can be made at the following cost:

1¼ tons of coke	$3.13
2 tons of iron ore at $1.75	3.50
1 ton of limestone	60
Labor per ton of metal	75
Interest on investment	50
Incidentals	50
Total per ton	$8.98

The ores analyze from 55 to 57½ per cent of iron, 0·40 to 0·68 phosphorus, and 3·77 to 4·21 silica.

Gunnison, Colo., has been selected as the site for the erection of iron and steel-works. The company has been organized in St. Louis some weeks, and has a capital of $5,000,000. The promoters of the scheme are B. W. Lewis and J. H. Harrison, of St. Louis, and J. M. Schoonmaker, of Pittsburg, together with the leading officers of the Union Pacific Railroad, and other wealthy capitalists of New York, Boston, Pittsburg, Philadelphia and St. Louis.

The Scranton Steel Company, of Scranton, Pa., started its new mills on the 29th. Employment will be furnished to over 1000 men. Large contracts have been booked.

The Clayton Steam Pump and Air-Compressor Works announce that they will remove May 1st, to their new works, 45 and 47 York street, Brooklyn, N. Y., near the approach of the New York and Brooklyn Bridge, where they will have enlarged accommodation and improved machinery.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

The suit of the Knoxville against the Christmas Company has been finally decided in favor of the Knoxville.

EMERALD.—The shaft has attained a depth of 170 feet, and good ore is extracted.

GRAND CENTRAL.—The last shipment of machinery for the large pumps has arrived.

RANDOLPH.—This mine has been leased.

TOMBSTONE.—It is reported officially that the ten stamps of the Corbin mill have been running mainly on ore from the West Side mine. This mine has developed so rapidly within the past two months that it is expected that the out put in April will run the whole twenty stamps of the Corbin mill. Superintendent Church reports that one third of the Gird mill tailings-heap has been concentrated, and one half of these concentrates smelted with flux from the Lucky Cuss mine, yielding $56,000, and thus proving the Gird tailings alone good for $300,000, counting in the flux necessary to smelt them. The Corbin mill tailings-beds are larger than the Gird by at least 25 per cent. None of these has yet been concentrated.

PIMA COUNTY.

PIONEER.—The smelter has been put in practical operation with satisfactory results. Half a ton of galena ore has been run through, which yielded a bar of metal worth $150, or 93 per cent of the assay value. The Tucson *Citizen* says that the smelter is built of adobe, lined with fire-brick. It is about four feet square outside, and about twelve feet high to the top of the chimney. The blast is furnished from a huge forge-bellows propelled by hand. The smelter is an improved pattern of the Mexican smelter, with a capacity of one ton per day of ten hours. The cost was perhaps $250, which includes every expense up to the moment of starting it in operation.

PINAL COUNTY.

QUEEN CREEK.—The smelter has been purchased by J. D. Reynolds, and will be put in working order at once.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended March 17th shows: Ore crushed, 141·48 tons; average assay value of pulp, $53.66 per ton; of tailings, $6.14. East cross-cut, 1000 level, in 328 feet. The pumps are

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running at about eight strokes per minute. The north drift, 800 level, is 289 feet long. In this drift, a fan is running by compressed air. South drift, 770 level, of shaft is 65 feet long. North drift, 672 level, is 28 feet long.

BODIE TUNNEL.—The ore-veins continue to look well. About 40 tons of ore a day are crushed, yielding the usual amount of bullion.

STANDARD CONSOLIDATED.—The report for the week ended March 17th shows: Ore extracted and shipped to mills, 1331 tons. West cross cut, 1000 level, in 1270 feet. South drift from east cross-cut, 700 level, in 562 feet, where the vein is about three feet wide. West cross-cut from north drift is 104 feet long, and the ground is hard to blast. North drift No. 1, 500 level, is in 565 feet, and shows the vein about five feet wide. North drift from south uprise No. 1 is 99 feet long, and the vein is 6 feet wide. South drift No. 2, 385 level, is in 364 feet, and shows the vein 6 feet wide. The slopes are looking well.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GREEN MOUNTAIN.—The mills have started up again. The tunnel continues to go ahead rapidly.

TAYLOR-PLUMAS.—The mill, which started up again recently, is now supplied with ore from the winze. The manager desires to get a good milling test of the value of the ore from this part of the mine.

SAN BERNARDINO COUNTY—CALICO DISTRICT.

A correspondent of the Eureka *Sentinel* states that there are two distinct walls and well-defined ledges in the King, Moscow, and Sioux mines. The ledge in the King is about 14 feet wide, with porphyry on both sides. The greatest depth yet reached is in the King mine—150 feet. The ore is silver-bearing and soft, some free and some base. Some specimens show copper-stained quartz, carrying horn-silver, almost pure. The different mines are now developing, several mills are running, and a new ten-stamp mill is building. The trouble so far is to get water, though the wells dug on the flat seem to yield a fair supply.

CANADA.

MICHIPICOTEN.—The Michipicoten Native Copper Company held an extraordinary meeting in London recently. The company has expended £38,000 on development, buildings, and machinery, and is now unable to go on, on account of lack of funds. The company will be wound up and a new company is to be formed.

NOVA SCOTIA.

COXHEATH.—This property, which is owned and worked by a Boston company, is situated on the north side of Coxheath Mountain, near French Vale, and has an extent of 640 acres. It is developed by two shafts about 100 0 feet apart. No. 2 shaft is the main center of operations. The shaft was sunk alongside the lode at a distance of a few feet; 120 feet from the surface, the first cross-cut was started. Three feet from the shaft, the copper was struck. The cross-cut was continued in the hope of piercing a parallel lode, and is now in about 80 feet, while the copper was drifted on and a small quantity stoped out. The ore having been struck in a somewhat disadvantageous position, the shaft was opened 20 feet lower, from which point drifts have been pushed east and west nearly 80 feet in each direction on the lode, showing perfectly regular walls and ore beyond a doubt in paying quantity. The face of the eastern drift shows a piece of undisturbed ore nearly 18 inches wide, with scarcely a particle of rock visible in it. In the east drift, a winze has sunk over 30 feet deep all the way in ore; and on the west side, in addition to the drifting, the rock has been stripped off the copper more than 20 feet high, leaving a wall of ore all ready to be blasted down. Regular shipments of ore have commenced, and it is expected that from 15 to 20 tons will be raised daily. Assays made show that the ore also carries silver.

COLORADO.

CHAFFEE COUNTY.

MERRIMAC.—A strike has been made in this lode, adjoining the Black Tiger mine, of twelve inches galena and carbonates running 63 per cent lead and 36 ounces silver per ton. The Merrimac is owned by a Rushville, Ind., company, which is working a number of claims in the immediate vicinity of Buena Vista.

GREELEY.—At a distance of 223 feet in the tunnel on the Valley View No. 2, worked to open the Brighton lode, owned by this company, the miners struck a body of free-milling ore identical with the Columbus vein.

CLEAR CREEK.

MOLINE TUNNEL.—This company is still at work on the New Boston lode, running east, and has reached a distance of forty-five feet. The ore at this point holds out in quantity, and is of a better grade. Superintendent Hartzell states that they will begin to drift west next week, and start in to put up the cable tram, which is to be 2200 feet long, this being the distance from the mouth of the tunnel to the mill.

DOLORES COUNTY.

GARFIELD.—A large body of iron and lead carbonates has been struck in the mine.

FREMONT COUNTY.

ROYAL GORGE.—Work has progressed rapidly at the smelters, and the final details are now receiving attention. Power has been applied to the machinery, and it works smoothly throughout. The crushers have been started, and one of the stacks will be blown in shortly. The masonry of the second stack is completed, and the water-jacket will be in place and ready to be charged soon.

GUNNISON COUNTY.

The Elk Mountain *Pilot* says that great preparation is going on in camp for the extensive working of mines this summer. Companies are making arrangements and planning to work their properties to the best advantage, and we are looking forward to a very active season. There will be machinery put on several mines, and more systematic work is looked for.

LAKE COUNTY.

Late Leadville exchanges contain the following:

CATALPA.—All the workings of the Catalpa, from the upper shaft down, are now leased. Manager Hill is running a new drift from the bottom of the incline, a distance of about 600 feet above the upper shaft, with the expectation of cutting the ore-body developed in the Big Chief, near the Catalpa line. From the location of the body, it seems likely that it will be caught by the drift in about 100 feet.

IRON HILL.—A body of sand ore was struck in the Silver Wave shaft at a depth of 350 feet.

LITTLE PITTSBURG.—The official report shows that the ore-shipments for the week ended March 15th were 286 tons, making 564 tons for the month and 1754 tons since January 1st. A large force of men has been put to work in shafts Nos. 9 and 10 in the northern part of the property, with a view of developing that hitherto unexplored portion of the mine. The ore-body recently struck in the O. K., an adjoining mine, is looking so well that a drift from No. 10 is to be run in that direction. Two drifts are now running from No. 9 toward the Amie property.

LONG & DERBY.—A portion of the workings has been leased.

MORNING STAR.—At the mine, good progress is made at the McHarg shaft. The Waterloo incline is down about 300 feet and has something over 125 feet to go before it will reach the point where connection will be made with the McHarg shaft. It carries ore in the breast, and drifts have been run north and south in the ore. The mine keeps up its regular shipments, and the ore is of very good grade.

SILVER CORD.—According to the Ten Mile *News*, interest ceases on the Silver Cord bonds on April 1st. It is not known how many of them have been redeemed, but it is presumed that the bulk has been paid off in full. The original issue was $173,500, and they were payable in April, 1884. The company had, however, reserved the right to pay them off this year, and having the money on hand, the directors have availed themselves of the privilege.

PUEBLO COUNTY.

COLORADO SMELTING COMPANY.—Ground has been broken at Pueblo for this company's new building.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—Reports announce that this mine has been leased to Mr. Greer, of Kokomo, of the Greer smelter, now the Greer concentrating-works.

WINTERGREEN.—This mine, said to be a promising property, situated on Jack Mountain, has been sold to Denver parties for $4750.

DAKOTA.

FATHER DE SMET.—The superintendent writes, under date of March 8th, as follows: Herewith express company's receipt for bar No. 154, 1038·25 ounces of gold, the result of run of mill for the last half of February. The mill is running well—no stoppage for any thing. At the mine, every thing is progressing as usual. We are driving four drifts, and hope to be rewarded by striking a fine body of ore in each of them. Our last month's run indicates the necessity of such a movement on our part. Report of the mine from March 8th to March 15th shows ore extracted from first, second, and third levels, 2150 tons. Ore milled, 2100 tons. North end tunnel advanced 2 feet; in 833 feet. Third level header advanced 6½ feet; in 160 feet. Golden Gate header running north advanced 13 feet. Have started a cross-cut on second level running west from Cook's chamber. Cross-cut in 11 feet.

The report of the superintendent from March 15th to March 22d shows ore extracted from first, second, and third levels, 1900 tons. Ore milled, 1900 tons. North end tunnel advanced 6 feet. Tunnel in 839 feet. Third level header advanced 5 feet. Header in 165 feet. Golden Gate header running north advanced 9 feet. West cross-cut from Cook's chamber advanced 6 feet. Total length, 17 feet.

Reports from Deadwood are as follows:

GUSTIN.—The report is again current that the owner of this mine will erect a 100-stamp mill this season. The works would have been established last year but for litigation which has happily terminated. The Gustin, although a cement mine, is considered among the best properties in the hills, having paid handsomely for the past three years, notwithstanding that its two mills are mere "rattle-boxes."

ORO FINO.—The superintendent has returned from the East. The mill is still idle, and will remain so until hoisting-works are erected and the mine opened at greater depth, all ore having been exhausted from the old workings.

SITTING BULL.—The mill is in operation, and prospects are very favorable for a longer and more remunerative run than ever before.

GEORGIA.

AURARIA.—No work is doing at this mine at present.

CHESTATEE.—Great improvements are making at the mine. The mill is running regularly.

CHICAGO & GEORGIA.—Preparations are making to move the mill down the creek, so as to get lower on the lead.

COLUMBIA.—The flume line to the mine recently purchased is under rapid headway. The company is putting the lumber for building on the ground, and finishing the grading. The tunnel on which digging is going on from both ends will be soon completed. In a week or two, the pump and boiler for throwing water on the mine will be here. A reservoir on the west side of No. 988 will soon be built, to receive the water.

HIGHTOWER.—The extraction and crushing of ore will be commenced in April.

WELLS.—The cut is opening and the mill will be started up shortly. There is good ore in sight.

MAINE.

SULLIVAN.—The secretary reports that the mill has not been running this year

MEXICO.

We have received the following from Parral, dated March 19th:

Having lately returned from Durango, where I have had ample opportunity to examine various mining properties, I propose to send you descriptions of several, so that your readers may have some notion of the opportunities in Mexico awaiting skill and capital.

CANDELARIA.—The Candelaria mine and mill are situated at Vaca Ortiz or Metales, a point on the western slope of the Sierra Madre Mountains, in the State of Durango, about 200 miles southwest by south of Parral. It contains about one thousand people, of whom nearly all the working force is employed in or about the mine or mill. The mine is on the east side of the Metales River, and the mill immediately opposite on the west side. It occurs in a mountain of the form of a sugar-loaf, which gives it facilities for economical working by means of tunnels. Of these there are three—two driven on the vein, and the third or lower a cross-cut, with some 150 feet to be driven (estimated to cost $3000) to cut the vein. The bight of this mountain is some 3600 feet above the river level. The lower tunnel now driving will cut the vein some 1500 feet below the outcrop, while, 500 feet still lower, there is another good tunnel-site; and a tunnel can be driven from the river level or 3600 feet below the outcrop. There are two principal veins, running from north to south, dipping slightly west; and these are intersected by various veins running from east to west, which, at the points of junction, form bonanzas. The workings are nearly 1200 feet deep, and at the bottom are in ore from 13 to 15 feet wide, running over 80 per cent of copper, 150 ounces of silver, and $20 gold per ton. The upper workings are in ore of lower average value—over 20 per cent of copper and 100 ounces of silver per ton. All through the mine are large bodies of rich ores running from $500 to $1500 of silver per ton, while the average vein-matter is as just stated. Last week, there arrived in Parral from this mine concentrates and ores which sold on the following assays: Concentrates, $12,331 silver per ton; copper ore, $1409 per ton. No allowance was made for the gold or copper.

On the completion to the vein of the lower tunnel, a block of vein-matter, practically virgin, will be laid open 800 × 1500 × 13 feet. When this tunnel is completed, the ores can be mined and put in mill for less than $5 per ton, while the cost of smelting them into matte will not exceed from $10 to $12 a ton, in suitable water-jacket furnaces working 40 tons each daily, making a total cost of from $15 to $17 a ton. The present cost of ores from the upper works is $25 per ton.

The mine is sufficiently open to permit a daily extraction of 100 tons of ore, as soon as the tunnel is completed and the water-jacket smelters are ready to take

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care of that quantity. The present owner has spent during the last six months $42,000 in opening and clearing the mine, running the lower tunnel, and enlarging and improving the mill. This is driven by water-power, of which there is enough not only to drive a large mill, but to drive air-drills in the mine whenever compressors are supplied. The power is made available by one overshot water-wheel 34 feet in diameter; and another overshot, 36 feet diameter 6 feet breast, has been commenced. A water-jacket smelter is now in course of construction. Hitherto the method of treating the ores has been grinding, concentration, and lixiviation; but it is believed that smelting into matte and the shipment of it to Europe will be better and more economical, and will permit a larger daily output. The former owners shipped large lots of ores to Europe.

No one can tell what is in the ground unseen; but with a mine proved 1200 feet deep, and with its unequaled approaches, it is evident this will shortly be one of the famous mines of the world. GEORGE WILSON.

MARCH 19, 1883.

Marble of every color and of great extent has been discovered near Chihuahua City, and measures are taking by Americans to open the same.

MIQUETA GOLD AND COPPER MINING COMPANY.—A correspondent of the Mexican *Financier* writes as follows: The first work on the property now owned by this company was done in the winter of 1881-82. In April, 1882, the property, with all its annexes, passed into the hands of the corporation known as the Miqueta Mining Company, which was organized by and chiefly consists of Mexican gentlemen. This company owns now about one square league of mining territory and timber lands in the barrancas or cañons of Miqueta and Chonguis, in the canton of Jalacingo. The climate is as near perfection as can be had. The company is mining on four distinct lodes, the Miqueta, which is the principal one, the Prida, the Garfield, and the New Discovery. The Miqueta vein has a strike of about fifteen degrees east of north, and a dip to the east averaging eighty-five degrees. The outcrop can be traced from the bed of the river, up the side of the cañon until the crest of a dividing ridge hides it from view. A distance of 3000 feet has been well prospected and good assays of gold have been made from specimens taken along that entire distance. The country-rock through which the fissure passes is metamorphic slate (probably Azoic) at the bottom of the cañon. As you rise, these slates are covered by a stratum of gneissic rock, which in turn, and farther up the mountain, is replaced by broad outcroppings of porphyry. In this porphyry, 1000 feet above the river-bed, the developments have been made by this company. Just above the mine, and overlying the porphyry, the fissure enters a soft magnesian limestone formation, about 1000 feet thick, which forms the capping stratum of the ridge. This is metamorphosed near the top to a much harder grade of limestone and to white and blue marble. The average width of the fissure is three feet, though it sometimes shows twice that width. The vein-matter lies in laminations, the first of which, next to the east wall, is a soft auriferous sand about six inches wide, very red in appearance, sometimes highly argillaceous, and at other times composed of small quartz pebbles and sand. Assays showing 39 ounces in native gold have frequently been made from specimens taken from this part of the vein. Next to this on the west lie from four to eight inches of auriferous pyrites of copper (chalco-pyrite and bornite), which assay from 12 to 20 per cent in copper and from half an ounce to two ounces in gold. The rest of the vein next to the west wall is filled with soft talcose slate, which sometimes carries a small amount of gold, but generally too little to pay for milling. It forms the gang or wash-rock of the vein. The Miqueta vein is developed for a distance of 800 feet on the surface by a number of shafts and drifts, and to a depth of 200 feet into the mountain, and has been very constant in its supply of ores since the date of its opening. The mine is well equipped, and has a working force of from 80 to 100 men constantly employed. The other three veins worked by the company differ very little from the Miqueta in structure, except that none of them carries copper ore. The new discovery tunnel is driven 60 feet on the vein, showing a pay-streak from 10 to 16 inches wide, which gives constant assays of from two to four ounces. The Prida and Garfield lodes carry gold and iron in paying quantities, and have tunnels driven on each of them to a depth of 140 feet, both on good ores. The company has been the first, at least in this part of the country, to introduce a complete system of American mining. It has a first-class ten-stamp American mill brought from the United States. This company has now in construction a self-acting wire-rope tramway, to carry the ores from the mine lying a thousand feet up the mountain down to the mill. It will be 2138 feet long, from top to foot, and the loaded car in descending will raise the empty car to the mine.

MONTANA.

ALICE.—It is stated that the old twenty-stamp mill, which has been running on base ore, will shortly be fired up on free-milling rock from the new strike on the foot-wall of the vein on the 100-foot level. The new strike has been exposed for a total length of 150 feet, for which entire distance the average width of the ore-body is about four feet. It pulps $50 in the mill.

ANACONDA.—This copper mine is also a producer of silver ore, and has for the past eight months regularly supplied the fifteen-stamp Dexter mill with free-milling ore. This supply is taken principally from the 100 and 200-foot levels, below which the ore carries an increasing percentage of copper until, on the 4th, 5th, and 6th levels, the ore is almost exclusively copper-bearing for the full width of the ledge. The amount of ore worked daily is about 27 tons, which is crushed wet. The assay-value of the ore, which is free, averages about $30, though above the copper levels there are thousands of tons of high-grade silver-copper ore which is rich enough to ship, but which can not be worked by the free-milling process.

MOULTON.—The new ore-body was discovered on the south vein, at a point about midway between the end-lines of the claim and 580 feet west of the main shaft. The shaft is 20 feet deep, and the vein is from four to six feet wide, most of it pay-ore. Ten tons of ore, which mills about $100 a ton, are extracted daily. The strike is increasing in width, and the bottom of the shaft is all in ore. In the main workings, operations are progressing as usual, and the production of 40 tons of ore a day is regularly maintained. On the 200 and 300-foot levels, the stopes are looking well, and on the latter it is believed the same chute of ore is worked as the one recently struck on the surface in the south vein. In this event, a fine body of ore will soon be available for stoping from the 300-foot level to the surface.

PARROT.—The output of this mine is at present 125 tons per day. At the smelter, five reverberatory furnaces are constantly in operation in preparing the ore for reduction into matte. The concentrator, which has a capacity of 50 tons, is continuously employed, and it is safe to say that the works reduce an average of fully 100 tons of ore a day, in addition to which regular shipments of crude ore are made. From four to six car-loads of ore and matte is the amount daily shipped East by the company, and the fact that the producers of the copper are also the consumers of it gives them a great advantage over other producers. A report is in circulation that, on the return of Mr. Farrell, extensive copper refining-works will be erected, which would prove of immense benefit to the copper interests of this district.

SILVER BOW.—Operations at the different mines continue. The mill is making a successful and continuous run on good ore, of which it reduces 30 tons every twenty-four hours. The percentage of chlorination and amalgamation is said to be uniformly high.

NEVADA.

ALBION.—At a meeting of the directors and creditors, an arrangement was made whereby Messrs. Robinson, Gurnee, Bell, Pichoir, and Smith resigned, and the following gentlemen were elected to fill the vacancies: Charles H. Fish, Henry T. Scott, F. A. Wagner, A. J. Ralston, and Samuel Hart, who, with Mr. S. Heydenfeldt and Julius Jacobs, form the new Board of Directors. Mr. Charles H. Fish was elected President, and Mr. A. W. Havens Secretary, to take effect April 1st.

CHOLLAR.—At the annual meeting the following board of directors was elected: A. K. P. Harmon (President), C. L. Weller (Vice-President), J. D. Fry, William Norris, and J. H. Dobinson. W. E. Dean was re-elected Secretary, and I. L. Requa Superintendent. The superintendent's report shows that the work done on the 2400 level proves that precious metal does not exist there. On the 2600 level, at a point 410 feet west from the shaft, the lode was intersected. The ledge at this point is nearly 100 feet in width, well defined, with a two-foot clay wall on east and a clay duke on west. The largest sum obtained from assays was $1.90. A drift started north 100 feet in the vein produced no assays of value. At a point 362 feet west from the shaft, a tunnel was run, which was carried to the north line of the Potosi. No cross-cutting or prospecting has been done from this drift, but will be when the Potosi Company completes its drift to its south line. Wherever the main adit comes in contact with the vein, clay and quartz not unpromising in appearance were abundant.

HALE & NORCROSS.—The first official letter of Superintendent Keating states that he has examined the mine and its properties and found them in a satisfactory condition. In that part of the mine on the 2600 level of the joint Savage and Norcross drift, samples have been taken from the quartz stringers previously passed through the north lateral joint Savage drift, and the result shows sample No. 1 to contain gold, $10.55; silver, $58.44. No. 2, gold, $18.08; silver, $72.59. No. 3, gold, $9.04; silver, $30.16. No. 4, gold, $3; silver, $14.14. No. 5, gold, $2.25; silver, $7.54. No. 6, gold, $1.50; silver, $6.59. No. 7, gold, $7.54; silver, $35.82. No. 8, gold, $3; silver, $11.31.

NEW MEXICO.

HACKBERRY.—The superintendent states that he has ten cars of material coming from the East, and that as soon as they arrive, the mining and milling company will begin work.

HARD SCRABBLE.—The developments consist of a tunnel 195 feet in length, cutting the vein diagonally at about seventy feet from its mouth. After passing through the vein a short distance, the tunnel makes a turn, and is now continued to enter the vein again from the east side. At the point where the tunnel cross-cuts the vein, it shows a width of sixty-two feet. The first level, twenty feet above the tunnel, also cross-cuts the vein from wall to wall, showing a width of about sixty feet. Forty feet higher is another level, 160 feet in length, and from which the ore is stoped to the limestone cap-rock previously referred to, and which is just above this level. The last-mentioned level is connected with the surface by an air-shaft. These developments open an ore-chimney about sixty feet in breadth and nearly 100 feet long, inclining 80 degrees to the northeast. The ore taken from this portion of the mine is a quartz and siliceous sand carrying on an average about six per cent lead and twenty-five ounces in silver to the ton, with very little iron. In addition to the above developments, are a number of open cuts and shallow shafts, sunk on both sides of the limestone cap, and next to the wall-rock. All of these openings show good ore. About 300 tons of ore have been shipped this year, averaging twenty-five ounces of silver to the ton. The bulk of the ore was sent to the Magdalena smelter.

MAGDALENA.—The smelting-works were recently blown in again. The works consist of a single water-jacket blast-furnace, of medium size, good engine, boilers, blower, pumps, and ore-crusher. The ore reduced at the smelter is principally from the Juanita, Hardscrabble, and Graphic mines. The manager is endeavoring to make other contracts, and, if successful, will add another furnace to the plant, and make preparations to do a large smelting business. In addition to the smelting-works, the company owns about fifteen mines and prospects, mostly prospect properties, however. The most valuable property is the Iron Mask lode, located near the smelter. It had been worked regularly until a few days ago, when the water drove the miners from the workings. The ore from the Iron Mask is principally copper and silver, very rich, but also pockety. Arrangements have been made, and within a short time pumping and hoisting machinery will be placed on the shaft, and work resumed.

PENNSYLVANIA.

The engine-house of the Monocacy Iron Company at the ore mines in West Pikeland, Chester County, which was burned a few days ago, has been rebuilt, and operations are about to be resumed.

A rich deposit of hematite ore has been discovered on the farm of John Hill, two and a half miles from Reading, and arrangements have been made to work the mine on an extensive scale. The ore lies close to the surface, and the deposit has been penetrated to the depth of thirty-three feet.

UTAH.

According to the Salt Lake *Tribune*, the Mountain Chief property, located near the Ontario at Park City, is involved in a contest in the courts for the purpose of determining title. The claim lies just north of the Ontario ledge, and so close to the new hoisting-works of that company that the carpenter-shop is said to have been erected on it, and the dump there also covers a portion of the ground. It is stated that notice has been given to the Ontario people that they must not occupy or injure the property by depositing *débris* on it, and that they must cease to trespass on the property.

A correspondent of the Salt Lake *Tribune*, in speaking of the condition of the mining districts in Beaver County, says of the Star District that a good body of ore has been struck in the Kanarrah mine, in South Camp, at a depth of 250 feet. The ore-body is large and continuous.

Work continues on the Mammoth and St. Mary mines with good results; in fact, all the mining claims that have been worked upon the past winter are looking better than ever before, and greater depth is attained, which proves that the ore-bodies lie deep. Some of the claims have reached a depth of 300 feet, with ore in the bottom. This district is not troubled with water, as the mines so far are dry, and are likely to remain so for 1000 feet at least.

At North Camp, work has been started upon the Osceola, and some good ore has been taken out. Also on the Dykes and Morehouse mines.

The Lake Superior mine is now worked, and a large body of copper ore, containing gold and silver, is opening up.

In the Bradshaw District, the Cave mine has stopped the shipment of ores to Frisco. Rumor has it the company contemplates the reduction of its own ore at Milford, which is sixteen miles nearer the mine, at an early date.

The Horn-Silver works should have been built at Milford or some point in the valley, as the situation and facilities are here for them. Work in the Horn-Silver has been resumed. The cave was expected and prepared for some time ago, but they did not expect it to go so deep as it is now. It will be all the safer to work in the future. By the cave they have saved great expense in timbering, and it was most all ore that came down.

The O. K. copper mine, in Beaver Lake District, is looking well, and a whim is constructing.

Lincoln District is looking up again. The Frisco Mining and Smelting Company has become interested in it of late.

Work still progresses on the Lone Brother and other claims, with favorable results.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, March 30.

There is no change of interest to note in the mining market this week compared with last. Business has been quiet, and the dealings were confined generally to the low-priced fancies. The tone of the market throughout has been one of depression, and closed to-night dull and weak. Below will be found a complete summary. The total number of mining shares sold at all the Exchanges aggregates 346,695, as against 323,960 last week.

The Comstock shares have been generally quiet and weak. California sold, assessment paid, at 25c., and assessment unpaid at 5@3c. Consolidated Virginia was quiet and irregular, selling from 47@50@46@48c. Sierra Nevada records one small transaction at $2.15. Union Consolidated was quiet and weak, declining from $4.75@$3.50. Ophir records a small business at steady prices: it sold from $2.88 @$3. Yellow Jacket was quiet and a little weak, selling from $3.@$2.50@$2.63. Best & Belcher sold at $3.75 with one transaction. Sutro Tunnel was quiet and steady, the sales aggregating 8600 shares at 20 @19c.

The Leadville stocks were quiet and steady. Amie Consolidated records a large business at steady prices, selling at 24@25c. Chrysolite has been weak, under a small business, selling from $1.30@$1.20. Dunkin was quiet and weak at 30@20c. Hibernia sold at 4c., the transactions being small. Iron Silver was quiet and steady, selling from $2.80@$2.90. Leadville was also quiet and steady, selling from 73@70c. Little Chief sold from 41@40c., with transactions of 5100 shares. Little Pittsburg was dealt in to the extent of 600 shares, at 66@62c. Big Pittsburg was quiet and a little weak; it sold from 17@13c. Climax records a small business at steady prices, selling from 8@10@9c.

The Bodie stocks were quiet and record steady prices. Bodie sold from 90@85c. with a business of 770 shares. Standard had a small business at steady prices; it sold from $6.25@$6.50. Bulwer was quiet and irregular, selling from 85@90@85c. Goodshaw sold at 5c., with a small business.

The Tuscarora stocks record but a moderate business, and have been weak. Grand Prize was irregular at 55@60@57c., the transactions amounting to 500 shares. Argenta sold at 55c. Belle Isle had a small business at very irregular prices; it sold from 62@90c., then declined to 50c. Navajo was quiet and weak, selling from $4.15@$2.75. North Belle Isle was weak at 55@50c., with a business of 1100 shares. Independence had a moderate business, but was weak; it sold from 80@70c. Elko Consolidated was active and very irregular, selling from 12@18@13c.

In the miscellaneous list, Alice was quiet and a little weak, selling from $2.95@$2.85. Eureka Consolidated records a small business at declining prices; it sold from $6.25@$5.50. The Green Mountain stocks were quiet and steady. Gold Stripe sold from 8@7c. Green Mountain sold from 75@78c. Rising Sun sold at 5c., and Cherokee at 3@4c. Homestake has been moderately dealt in, but at irregular prices; it sold from $15½@$15¾ @$15¼@$15½. Horn-Silver was quiet and steady, selling from $7.75@$7.88. Robinson Consolidated has been very active and very irregular; it sold from 72@79@70c., closing to-day at 75c. Sierra Grande sold ex dividend this week, but has been about steady; the sales aggregate 31,000 shares, selling at $2.10@$1.75@$1.85.

Alta-Montana has been quiet and steady at 8@9c. Central Arizona records a small business at irregular prices, selling from 25@34@38c. Decatur has been quite active and steady, selling at 7@6c. Eastern Oregon was strong under a small business, and sold from 60@70c. Harlem M. and M. was fairly dealt in, and was very irregular, selling from $1.40 up to $1.55, and then declining to $1.40, closing at $1.50, buyer thirty days. Lacrosse had a fair business at about steady prices, selling from 17@14c. Oriental & Miller was active and steady, selling from 18@16c. Rappahannock sold at 9c., with a small business. Sonora Consolidated was very active and very irregular; it sold from 40@55@47@49c., with a business of 37,600 shares. South Pacific was active and steady, selling at 8@7c. The State Line stocks were quiet and steady; Nos. 1 & 4 sold from 2@3c., and Nos. 2 & 3 at 6c. Taylor-Plumas was active and steady at 17@18c.

A majority of the directors of the Climax Mining Company applied to Judge Donohue on Thursday for an order to dissolve the company. The company was organized in 1879, with a capital of $2,000,000. Its mines are situated at Leadville, Colo. The reason given for the application is, that the mines are exhausted, and that the company is in debt to the extent of $16,198.44. Its assets are five and a half acres of land at Leadville and the machinery for working the mines. Judge Donohue granted an order requiring all persons interested in the company to show cause on August 17th next why the petition should not be granted and the company dissolved.

The Tombstone Mill and Mining Company has paid another installment this month of $25,000 on its old debt, being profit derived from the Corbin mill.

The conference committee of the New York Mining Stock Exchange and the National Petroleum Exchange has arrived at a basis of consolidation, and the Governing Committee of the former body has requested a written opinion from members in regard to it, by April 3d. The conditions, as agreed upon, for the proposed union, are as follows: Members of the Petroleum Exchange to become members of the Mining Exchange on paying $100 each and also a sum equal to the net reserve of the Gratuity Fund of the Mining Board on the basis of present membership. This would be about $23 apiece. The Governing Committee of the Mining Exchange is to be increased from twenty-seven to twenty-nine members, the additional places to be filled from the incoming members of the Petroleum Exchange. It is also provided that the surplus now in the treasury of the Mining Exchange in excess of $100 apiece (about $40) is to be credited to the present members and applied in payment of future dues or other indebtedness by them to the Exchange.

The threatened suit, noted in our last issue, by some the members of the American Mining Stock Exchange against the Mutual Trust Company, was begun on Monday last by William T. Brown. In Mr. Brown's complaint, he demands that the defendant Trust Company shall account to him for all moneys paid to the Trust Company for memberships in the Exchange; and that if it shall appear that they have been squandered, he may be given leave to bring in the officers of the company as co-defendants; that the defendant company be removed as trustee and enjoined from expending any of the funds remaining in its hands, except under the orders of the court; and that a receiver of the trust funds may be appointed. The summons and complaint were served upon the officers of the Trust Company, and they have twenty days in which to file an answer.

MEETINGS.

Copper Queen Mining Company, Nos. 37 and 39 Wall street, New York City. Annual meeting of stockholders and election of trustees April 9th, between twelve and one o'clock P.M.

Minas Nuevas Mining Company, Nos. 46 and 48 Exchange Place, New York City. Annual meeting of stockholders and election of trustees April 3d, at eleven o'clock A.M.

DIVIDENDS.

The Bulwer Consolidated Mining Company, of California, has declared dividend No. 17, of five cents per share, payable April 12th, at the Farmers' Loan and Trust Company.

The Copper Queen Mining Company, of Arizona, has declared a quarterly dividend of fifty cents per share, payable April 16th. Transfer-books close April 13th, and reopen April 17th.

The Gem Mining Company, of Colorado, has declared a dividend of two per cent on the capital stock, payable April 2d, to shareholders of record March 29th.

The Glen Mining Company, of Colorado, has declared a dividend of one per cent on the capital stock, payable April 2d, to shareholders of record March 20th.

The Granite Silver Mining Company, of Colorado, has declared a dividend of one per cent on its capital stock, payable April 2d, to shareholders of record March 29th.

The Hope Mining Company, of Montana, has declared a quarterly dividend of $1.50 per share, payable to stockholders of record March 26th, at the office of the company, 417 Olive street. St. Louis, Mo.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF MARCH, AND FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of March.	Since January 1, 1883.
Atlantic, C	Mich.		$80,000
Boston & Montana, G	Mont		10,000
Bulwer Consolidated, G.	Cal	$5,000	15,000
Calumet & Hecla, C.	Mich		500,000
Carbonate Hill, S.	Colo.	10,000	20,000
Castle Creek, G.	Idaho	3,000	9,000
Central, C.	Mich.		60,000
Christy, S. L.	Utah		6,000
Contention, S.	Ariz.	62,500	187,500
Con. Gold M. Co. of Ga.	Ga.	4,000	12,000
Copper Queen, C.	Ariz.		125,000
Cosmopolitan	Utah.		50,000
Deadwood-Terra, G.	Dak		20,000
Father de Smet, G.	"		40,000
Gem, S.	Colo.	2,500	5,000
Glen, S.	"	1,000	2,000
Granite, S.	"	1,250	2,500
Hecla, S.	Mont		15,000
Holyoke, G.	Idaho	4,000	12,000
Homestake, G	Dak	50,000	150,000
Hope, S. C. L.	Mont	12,000	12,000
Horn-Silver, S. L.	Utah.		300,000
Idaho, G.	Cal.		15,000
Indian Spring Drift.	"		1,000
Iron-Silver, S. L.	Colo.	100,000	100,000
Jocuistita, S.	Mexico		50,000
Kentuck, S.	Nev.	3,000	9,000
Leadville Consolidated, S.	Colo		20,000
Navajo, G. S.	Nev.	25,000	75,000
Northern Belle, S.	"	25,000	75,000
Ontario, S. L.	Utah		75,000
Osceola Consolidated, C.	Mich		50,000
Oxford, G	N. S.	5,000	5,000
Prussian, S. L.	Colo		15,000
Quincy, C.	Mich		240,000
Richmond, S. L.	Nev.		135,000
San Francisco, C.	Cal		2,500
Shoshone, G.	Idaho.	1,500	4,500
Sierra Grande, S.	New Mex.	100,000	300,000
Silver King, S.	Ariz	25,000	75,000
Smuggler, S.	Colo	6,000	9,000
Standard Cons., G.	Cal	25,000	75,000
		$470,750	$2,964,000

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, No. 55 Broadway, report as follows for the week ended Friday, March 30th, half-past one P.M.:

On Thursday night, the 22d, the Anchor wells Nos. 14 and 16 came in, and on Friday (which was a holiday) the Murphy well, near Balltown, was reported flowing. The result of these facts transpiring during the adjournment from Thursday till Saturday morning was, that at the opening Saturday oil sold at $1, as against the closing of $1.03 Thursday night. By Monday noon, the decline reached 92⅝c. as the lowest quotation, from which it recovered before night to 95⅛c.

There was no special feature to the market tween Monday evening and noon of Thursday waiting condition prevailed during this interval, but at two o'clock Thursday P.M., there was a sharp upward turn from 95½c.@$1.00¼, with a decline 98⅛c. at the close. This was due to a rumor that the Murphy well was a "duster," that is, was dry. This not proving to be true, the market this (Friday) morning opened off 2 cents from last night's closing at 96c., sold down to 94⅛c., recovering to 97¾c., at this writing, two P.M., being 96c.

The "short" interest in Oil City and Bradford is so heavy that carrying charges hardly equal the actual storage, and it is probable that the importance of the new wells has been fully discounted, and that, as soon as the actual status of the Murphy well is ascertained, oil will sell over the dollar mark.

The significance given to the Murphy well is due to the fact that it is outside the present known limits of the Cooper pool, and the "bears" assert that it opens up a new field, though the "bulls" assert that it is too small a field to affect production.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
March 24	$1.00⅛	$1.00⅛	$0.97½	$0.97⅝	619,000
26	.98⅜	.98⅜	.93⅝	.95¼	1,044,000
27	.94⅛	.95⅛	.93⅝	.95	735,000
28	.95¼	.97⅝	.94⅝	.95⅛	836,000
29	.94⅝	.99	.94¼	.98¾	566,000
30	.95	.97⅝	.94⅛	.94⅛	802,000
Total sales.					4,602,000

REVIEW OF THE SAN FRANCISCO MARKET.

Business has been rather quiet in the San Francisco market. The Comstock shares have been weak, and show a decline in all the more prominent ones. The

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Sierra Nevada Company has levied an assessment of one dollar per share. The Tuscarora stocks remain quiet and firm. There are good reports from the mines.

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Mar. 23.	Mar. 24.	Mar. 26.	Mar. 27.	Mar. 28.	Mar. 29.
Albion	....	....	1¼	....	....	1¼
Alpha	....	....	....	....	....	....
Alta	....	7-16	13-32	13-32	13-32	13-32
Bechtel	....	....	....	....	....	....
Belcher	....	21-32	11-16	21-32	21-32	21-32
Belle Isle	....	11-16	13-16	21 32	21-32	9-16
Best & Belcher	....	....	3⅝	3⅝	3⅝	3¾
Bodie	....	29-32	1¼	27-32	15-16	27-32
Bullion	....	....	....	....	....	....
California	....	3-32	1-16	1-16	1-16	1-16
Challar	....	....	....	....	....	....
Con. Virginia	....	½	7-16	½	7-16	7-16
Crown Point	....	29-32	29-32	29-32	29-32	27-32
Elko Cons	....	....	....	....	....	....
Eureka Con	....	5⅞	5⅞	....	5½	....
Exchequer	....	5-16	5-16	¼	¼	....
Gould & Curry	....	2⅛	2⅛	2⅜	2¼	2⅜
Grand Prize	....	9-16	9-16	9-16	½	½
Hale & Norcross	....	2¾	2⅛	2⅛	2⅛	2⅜
Independence	....	13-32	7-16	13-32	13-32	11-32
Martin White	....	11-32	13-32	11-3	11-32	11-32
Mexican	....	3⅛	3¼	3¼	3	3
Mono	....	3-32	3-32	..	....	....
Mount Diable	....	....	3¼	....	....	....
Navajo	....	3¾	4	3¾	3¾	3¾
Northern Belle	....	9⅜	9½	9⅛	9⅝	9½
North Belle Isle	....	7-16	½	13-32	....	13-32
Ophir	....	2⅛	2¾	2⅞	2⅛	2⅛
Overman	....	....	....	....	....	....
Potosi	....	27-32	15-16	1	29-32	1
Savage	....	....	....	....	....	....
Scorpion	....	....	....	....	....	....
Sierra Nev	....	2¾	2⅛	2⅝	2⅝	2⅝
Silver King	....	10⅝	....	10¾	....	....
Tip Top	....	....	....	....	....	....
Union Con	....	4¾	4⅝	4	3¾	3¾
Wales Con	....	3-16	3-16	....	¼	¼
Yellow Jacket	....	2¾	2⅛	2¼	2¼	2⅛

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, March 29.

There is absolutely no feature to the market for mining stocks to be reported this week. The transactions recorded are very light, and although prices are tolerably well sustained, the lack of orders and the entire absence of any speculative element serve to render the market dull and featureless. Calumet & Hecla is firm, and actually shows an advance of $2 per share over last week, although less than ten shares sold at $242, which was the bidding price to-day at the close. Holders of this stock are well contented with the return for their investment, and seem to be indisposed to part with their shares at this price, notwithstanding the outlook for the coming year is not so favorable as could be desired. Franklin, steady at $12 on small sales. Quincy, in fair demand at $49@$49½, with but little stock offering. Osceola declined from $29½@$29, and was offered at that price at the close. Atlantic declined from $13 (March 10th) to $10, but subsequently rallied and sold at $11, which is now bid. National sold at $1⅛. Allouez sold at $2@$1¾.

In silver stocks, Bonanza Development declined from $2½@$2; over 2000 shares sold at the latter price to-day, which was also the closing bid. Catalpa was steady at 45@47½c.; Crescent, at 22½c. San Pedro declined from 55@45c., with later sales at 50c., closing 50c. bid. Harshaw sold at 75c.

At the Boston Mining Exchange, business continues to rule dull, without any feature of interest. Massachusetts & New Mexico shows a further decline from 10@8c. Empire declined to 18c., and the tendency of the stocks dealt in at this Board is to lower prices.

3 P.M.—There was no change to note in the market this afternoon. Bonanza sold at $2; Catalpa, 45c.; San Pedro, at 55c. Closing prices: Allouez, $2¼ asked. Atlantic, $10½ bid. Antimony, $14 bid, $15 asked. Calumet & Hecla, $242 bid. Huron, 50c. bid, $1 asked. Franklin, $11 bid, $11½ asked. National, $1 bid, $1⅛ asked. Osceola, $29 bid, $29½ asked. Pewabic, $4 bid, $5¾ asked. Quincy, $49¾ bid, $50 asked. Sullivan, 50c. bid, $1 asked. Since the Board, sales of Osceola reported at $29.

BULLION MARKET.

NEW YORK, Friday Evening, March 30.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended March 30th, as compiled from various sources, amounted to $146,644.34, as against $184,834.47 reported for the previous week. The receipts from January 1st, 1883, to date are $3,582,208.08.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended March 24th	$378,570
Corresponding week last year	254,320
Since January 1st, 1883	3,604,915
Corresponding period last year	12,751,303

Imports.

Week ended March 24th	$2,570,753
Corresponding week last year	111,511
Since January 1st, 1883	4,152,669
Corresponding period last year	941,579

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent, and the outside rate for bankers' bills is the same. During the week, the bank lost £302,000 bullion, and the proportion of its reserve to its liabilities was reduced from 40 11/16 to 38¼ per cent, against 42¾ per cent at the same date last year. The weekly statement of the Bank of France shows a gain of 1,650,000 francs in gold and a loss of 9,525,000 francs in silver.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
March 24	50¾	109¾	March 28	50⅞	110⅛
26	50¾	109¾	29	*	110¼
27	50¾	109⅞	30	†	110⅜

* 50⅞@51. † 51@51 1-16.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.		Month of February.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	.....	$82,875	$147,807
*Alta-Montana, G. L. S.	"	.....	.....	$10,625
*Belmont	"	.....	7,432	7,432
Bodie, G. S.	Cal	.....	.....	44,798
Bodie Tunnel, G.	"	.....	10,471	22,102
*Bonanza King, G.	"	.....	51,355	113,132
*Boston & Montana, G.	Mont	.....	16,883	34,936
*Central Arizona, S.	Ariz	.....	.....	15,627
*Christy, S.	Utah	.....	22,577	45,838
*Chrysolite, S. L.	Colo	.....	130,945	57,435
Contention, S.	Ariz	.....	.....	88,694
Crescent, G.	Cal	.....	.....	13,000
*Custer, G. S.	Idaho	.....	.....	43,572
*Deadwood-Terra, G.	Dak	.....	38,860	84,556
*Derbec Bl. Grav., G. S.	Cal	.....	.....	8,337
*Father de Smet, G.	Dak	.....	27,112	69,189
*FriscoM. & S. Co. G. S. L.	Utah	.....	21,252	43,923
*Homestake, G.	Dak	.....	103,670	211,348
*Hope, S.	Mont	.....	.....	20,574
Horn-Silver, S. L.	Utah	.....	276,000	479,000
*Independence, G. S.	Nev	.....	8,152	10,173
*Kentuck, G. S.	Mont	.....	2,102	4,262
Lexington, S.	Colo	.....	103,315	192,365
*Little Pittsburg, S. L.	Cal	.....	6,768	11,875
*Marguerite, G.	Nev	.....	15,600	25,900
*Martin White, G. S.	Mont	.....	56,675	86,287
Moulton, G. S.	Nev	.....	.....	41,005
*Navajo, G. S.	"	.....	64,343	193,387
*Northern Belle, S.	"	.....	155,916	221,090
*Ontario, S. L.	Utah	.....	181,846	364,067
*Oxford, G.	N. S.	.....	4,500	7,365
*Pinal Cons., S. L.	Ariz	.....	34,283	§49,810
*Satemo, G.	N. S.	.....	700	2,500
*Standard, G.	Cal	.....	105,320	188,279
Star, S.	Nev	.....	12,299	27,095
*Stormont, S.	Utah	.....	15,809	34,834
Syndicate, G.	Cal	.....	.....	9,217
Tintic M. & M. Co.	Utah	.....	.....	7,632
*Tip Top, S.	Ariz	.....	15,007	22,983
*Tombstone, G. S.	"	.....	51,000	123,011
Yellow Jacket, S.	Nev	.....	14,704	28,956
Total amount of shipments to date				$3,214,017

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, March 30.

Copper.—The market has been weak, Lake copper having sold as low as 17⅛c., and being now offered at 17@17⅛c., with little disposition manifested to buy. The feature of interest during the week has been the declining on the part of the lake companies of an additional block of 3000 tons of copper for export at a price rumored to be 15⅝c. The reason for this refusal is stated to be that the lake companies do not see their way clear to supplying the home demand. It is believed that negotiations are now pending with manufacturers for contracts for delivery.

Manufacturers do not speak in a sanguine tone of the future, and, making due allowance for the natural bear feeling on their part, it does seem that business is not very brisk with them. The constant decline in raw material may, however, have had the effect of inducing buyers of manufactured goods to hold off. The lesser producers must feel the competition of other brands, some of which are pushed with exceptional facilities and by strong parties. We understand that at a recent meeting of brass manufacturers a considerable quantity of "Anchor" and "Star" brands of copper were taken; in fact, it appears that the Waterbury manufacturers are pretty well supplied for many purposes. Nominally these brands are held at 16¾@16½c. respectively; but there are reasons to believe that these prices are shaded one quarter of one cent per pound for any thing but jobbing lots. Baltimore is quoted 15¼c., and other brands 15⅛c. It must not be forgotten that these figures are very near the parity of Best Selected in England, with which they favorably compare. There is, therefore, only a small margin for a further decline, provided the English market s held. London cables £65 10s.@£65 15s. for Chili Bars, and £72 5s.@£72 10s. for Best Selected.

Lead.—By a sudden bear movement on the part of one of the principal holders of lead, sales aggregating probably from 900 to 1000 tons of lead, in large and small lots, have changed hands at 4·50c., and a sale is reported from Boston of lead by a Chicago firm at 4·50c. delivered, equal to 4·45c. bid. There are rumors that negotiations are going on for the sale of the large block of Richmond lead here and to arrive. As yet, nothing has been settled, however. Refined is entirely nominal at 4·55@4·60c.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market has declined slowly since our last report. Sales yesterday were 400 tons of Refined at 4·12½c., and to-day 80 tons of Chemical Lead at the same price.

Tin.—Our market has been quiet, though a better feeling prevails. The Banca sale went off at a parity of £96 10s., which is also the latest London cable. At the close, the market is 21⅝c., spot Straits; 22c. Australian; 21½c. Billiton; and 22c. Banca.

Spelter.—The market is quiet, with Domestic at 4·75@4·85c. England cables £15 15s.@£16.

Antimony.—We hear of no business, and repeat our quotations, 11c. for Cookson's and 10c. for Hallett's, in jobbing lots.

IRON MARKET REVIEW.

NEW YORK, Thursday Evening, March 30.

American Pig.—What little business in the way of contracting for the season's delivery did exist has now entirely ceased, to judge from the apathy of buyers. The Thomas, Allentown, and Crane companies are still maintaining the prices fixed, but are not doing any thing, while other less known brands must force sales by concessions of from 50 cents to $1 per ton. We quote $22.50@$24.50 for ordinary to choice Foundry No. 1; $21.50@$22.50 for No. 2; and $19@$20.50 for Gray Forge. In Bessemer Pig, we note the sale of a few thousand tons at Lebanon for $18, $19, and $20, for Nos. 3, 2, and 1, respectively, the bulk being Nos. 2 and 3. Spiegel is quiet at $26 for 10 to 12 per cent, and $32 for 20 per cent.

Scotch Pig.—Very little has been done, but as yet the absence of transactions has not materially weakened prices, which will not take place until the arrivals begin to go into store. Freights are still 5 shillings from Glasgow to New York. We quote Coltness and Langloan, $24.25@$24.50; Summerlee, $24@24.50; and Eglinton, $21@$21.50. At the Wall Street Exchange, the following cable quotations were received to-day, showing a slight decline in some bonds: Carnbroe, 55s. 3d.; Gartsherrie, 61s. 9d.; Summerlee, 61s. 6d.; Coltness, 64s.; Langloan, 64s. 6d.; Glengarnock, 55s.; and Eglinton, 49s. 3d.; Warrants are 47s.

Rails.—We hear of no business of magnitude, although the inquiry for small lots for spring and

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	March 24.		March 26.		March 27.		March 28.		March 29.		March 30.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.95						2.95	2.90	2.90		2.85		1,000
Amie Con., Co.	.25	.24	.25	.24	.25	.24	.25	.24	.25	.24	.25	.24	13,800
Argenta, Ne.							.55						100
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.	.62		.70		.90	.85	.75	.70	.68		.50		1,360
Bodie Cons., Ca.							.90		.90	.95	.85		770
Breece, Co.													
Bulwer, Ca.	.90	.85	.90		.90	.88	.88				.85		1,900
California, Ne.	.25		.25		.25		.05	.03	.03				3,000
Cal. & Hecla, Mich.													
Caribou Con., Co.													
Chrysolite, Co.	1.30				1.25		1.30		1.25		1.30	1.20	600
Climax, Co.			.09		.09		.08		.10		.10	.09	5,900
Cons. Va., Ne.	.48	.47	.50	.49	.47				.48	.46	.49	.48	2,900
Deadwood-Terra, Dk.													
Dunkin, Co.	.30								.22	.20			400
Eureka Cons., Ne.	6.25				6.00		5.75	5.50	5.75	5.50			525
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.	.08	.07	.07				.07		.07		.07		4,500
Gould & Curry, Ne.													
Grand Prize, Ne.	.55						.60		.60		.57		500
Great Eastern, Dk.													
Green Mountain, Ca.	.77						.75		.78	.77			500
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.	.04								.04				1,100
Homestake, Dk.	15.63	15.50	15.50		15.63	15.50	15.75	15.50	15.50	15.25	15.50	15.25	1,260
Horn-Silver, Ut.	7.88	7.75	7.75								7.88		335
Hukill, Co.									.15		.15		200
Independence, Ne.	.42		.78	.75	.80		.79	.75	.70				2,600
Iron Silver, Co.	2.80		2.80		2.90	2.85	2.85		2.90	2.85	2.90		4,700
La Plata, Co.													
Leadville C., Co.	.72						.73		.71	.70	.70		2,400
Little Chief, Co.	.41	.40	.41	.40	.40		.40		.40		.41	.40	5,100
Little Pittsburg, Co.					.65		.66	.62					600
Martin White, Ne.					.40								100
Moose, Co.													
Navajo, Ne.	4.00	3.65	4.00	3.90	4.15		4.00		3 60		2.75		1,870
Northern Belle, Ne.	9.75	9.50	9.88		9.75		9.75		9.88		9.50		515
North Belle Isle, Ne.	.55				.50								1,100
Ontario, Ut.	28.00		28.50								24.00		20
Ophir, Ne.	3.00	2.88	3.00										850
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.			43.00	42.00									200
" Com., Ca.											8.25		200
Rising Sun, Ca.							.05		.05		.05		3,000
Robinson Cons., Co.	.77	.72	.79	.75	.78	.74	.74	.71	.74	.70	.77	.72	44,650
Savage, Ne.													
Sierra Grande, N. M.	2.50		2.10		2.00	1.75	1.65	1.75	1.80	1.75	1.85	1.80	31,000
Sierra Nevada, Ne.									2.15				40
Silver King, Ar.			11.00						10.75				120
Spring Valley, Ca.													
Standard, Ca.	6.25				6.50								230
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket	2.75		3.00	2.75	2.75				2.63	2.50	2.75	2.63	2,250

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	March 24.		March 26.		March 27.		March 28.		March 29.		March 30.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance													
Albion, s. L.													
Alta-Montana, G.			.09		.09		.09	.08	.09	.08			3,000
Am. Flag, s.	.05	.04											1,700
Barcelona, G.			.19										500
Bear Creek													
Bechtel Con., G.													
Best & Bicher, G. S.	3.75												50
Big Pittsburg, S. L.	.15	.14	.17	.13			.13						6,000
Bradshaw, S.												.31 .30	200
Buckeye	.02												100
" pref.	.05												500
Bull-Domingo, S.L.	.08	.07											400
Bye and Bye												.02	100
Calaveras, G													
Clav'r's W. & M. Co.													
Cal., S. H., G.	.80					.75							300
Carbonate Hill, S L.												1.15	1,000
Catskill													
Central Ariz'na, S.			.38	.25			.34				.33	.32 .33	1,100
Chapparal													
Cherokee, G.	.04	.03	.04		.04		.03		.03		.04		5,800
Cons. Imp'r'l, G. S.													
Con. Pacific, G.													
Crowell, G.												.04	1,000
Dahlonega, G.													
Decatur	.07		.07	.06	.06		.07	.06	.07	.06	.06		21,900
Durango, G.									.07			.07 .05	3,900
Eastern Oregon			.60		.65		.60		.70				900
Elko Cons.	.17	.12	.14		.15		.18	.15	.17			.18 .11	17,400
Enterprise	.21	.20	.22	.21	.22	.21	.22		.23	.22	.25	.24	12,400
Fannie Barret			2.20				2.25		2.25				500
Gold Placer, G.													
Goodshaw, G.	.05												500
Granville, G.													
Hariem M. & M. Co.	1.40		1.40		1.40		1.55	1.45	1.50	1.45	1.40		5,700
Hortense, S.									.12	11	.12		900
Lacrosse, G.	.15		.17	.16	.16	.15	.15	.14	.14		.14		9,600
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.	3.75	3.50	3 63	3.38	3.38	3.25	3.38	3.15	2.75		3.00	2 88	2,010
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S L.													
Ori'nt'l & Miller, S.	.16		.17	.16	.18	.17	.18	.17	.17		.17	.16	21,400
Quartz Creek	.01						.01						200
Rappahannock, G.					.09				.09		.19		3,200
Red Elephant, S.									.07	.06			700
Ruby, of Arizona													
Silver Cliff, S.									34		34		200
Sonora Con.	.50	.40	.55	.47	.51	.48	.51	.47	.48	.47	.50	.48	37,600
South Bodie, G.													
South Bulwer, G.													
South Hite					.20								100
South Pacific	.08	.07	.08	.07	.08	.07	.07		.08	.07	.07		11,500
State Line													
" Nos. 1 & 4, S.			.03	.02	.03		.03		.03		.03	.02	10,300
" Nos. 2 & 3, S.	.06				.06				.06		.08		3,000
Sutro Tunnel	.21		.20		.20		.20		.20	.19	.20	.19	8,600
Taylor-Plumas	.18	.17	.18		.18		.18		.17		.18		8,800
Unadilla, S.													
Union Cons., G. S.	4.65		4 75	4.50					3.75	3.50			710
Vandewater									.20				500
Washington													

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 142,295. Non-dividend shares sold, 204,400.

BOSTON MINING STOCKS.

	March 23.		March 24.		March 26.		March 27.		March 28.		March 29.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez			2.00		1.75		2.00				2.00		625
Atlantic							10.00				11.00		175
Aztec													
Best & Bel													
Bodie Con.													
Bonanza D.			2.50				2.31	2.25	2.25	2.12	2.00		3,350
Bowman Sil									.20	.15			1,300
Bruns. Ant.									15.00				50
Bulwer													
California													
Cal. & Hec.			242		243								7
Carbon. Hill													
Catalpa			.45				.47½	.45	.47½	.45	.47½	.45	3,350
Central Ariz													
Cherryfield													
Chrysolite													
Crescent					.22½				.22½	.21	.22½		1,200
Cumberl'd													
Decatur											.06		500
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin			.25						.24	.23	.25		800
Empire			.20						.20	.19	.19		900
Eureka Con.											5.75		20
Franklin			12.00	11.88	12.00						11.25		145
Gila County													
Hancock G.											9.00		100
Harshaw											.75		100
Homestake											15.50		10
Huron													
Indian Q'n.													
Little Pitts.													
Mammoth													
Mass. & N.M.			.10						.09		.09	.08	7,400
Milton													
Napa													
National									1.13				50
North. Belle													
Osceola			29.50		30.00		29.00				29.00		84
Penn-Breck.													
Pewabic													
Pine Tree			.10						.10		.10		3,000
Plymouth									.20		.20		200
Quincy			49.00		49.25	49.00	49.50						51
Ridge													
Robinson													
San Pedro			.50		.50		.47¼		.50	.45	.55	.50	3,525
S'ra Nevada													
S'ra Grande													20
Silver Islet									3.75				
Silver King													
Simpson Gd													
So. Pacific													
Standard													
State Line													
Nos. 2 & 3													
Sullivan											1.00		50
Sutro Tun.			.20						.20		.22		800
Sycamore													
Twin Lead.													
Vizina													

PHILADELPHIA MINING STOCKS.

	March 23.		March 24.		March 26.		March 27.		March 28.		March 29.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American				.17		.17	.16	.16	.15	.16	.15	.16	14,000
Argent										.20		.22	1,400
Arizona So.													
Aztec				.04									11,600
Battle Mt.						.02							1,500
Black Sul.													
Bodie													
Buena								.04					1,500
California													
Calista													
Cincinnati					10						.09		2,900
Comprom'e.			.82½		.30		.30		.30		.32½		11,700
Contention													
Dauntless													
Del Monte													
Denver City			.11		.12					.12			3,300
Fairview													
Eureka													
Girard			.12		.12		.11	.10	.10		.11		5,800
Golconda									.01				5,000
Golden Age													
Governor							.09		.09		.08		5,500
Grand Uni'n									.16		.16		3,000
Gunnison			.62½		.62½		.55						2,000
Hancock					.01								3,000
Iowa Gulch			.07		.07		.07	.06	.07		.07		22,500
King Bul'on													
Ledger Con.													
Little Dis'd.								.05		.06			1,500
Little Maud													
L'g & D'y Hl													
McGullough													
Magnolia								.01					1,000
Montana													
Mt. Lincoln													
Mt. Sheridan				.04		.04					.04		11,800
National								.02			.02		10,000
Orion								.15					200
Orion Pref.													
Palmetto E.													
Pembina				.20	.19	.18		.19	.18	.19		.19	10,300
Penn-Breck.								.11		.12			4,500
Permanent				.02		.02		.02		.02			9,500
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis								.40		.40			300
Rara Avis E.				.08		.08		.09		.08		.08	16,200
Record													
Rice Plan'r.													
San Pedro													
Sierra G'nde				2.55		2.10	2.05	2.00	1.75	1.85	1.75	1.82½	1.77½ 38,000
Silver Cord				1.45		1.40							1,300
Silv'r Plume													
Silver Rock													
Sovereign													
Standard				.04		.04		.04		.04		.04	19,500
Sultana													
Sutro Tun'l.								.85	.82½	.85	.82½	.82½	4,000
Tombstone													
Tranquilli'y													
Victor								.08					1,500
Yale Mt.				.07									

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summer delivery continues fair at the ruling quotations for small lots, $39 at mill, ordinary sections.

Old Rails.—Very little has been done. For Ts, immediate delivery, $23.50 is offered and $24 bid.

Scrap.—Scrap is quiet, with quotations unchanged at $25, ex ship.

Philadelphia. March 30.

Pig-Iron.—Makers are still complaining of low prices and dull demand for ordinary brands. Makers of special brands report an improving activity, though they are not satisfied with the prices obtained. Foundries run from $22@$25.50, according to number and brand, and Forge from $18@$21 at furnace. The most activity took place in the higher grades of both. The ordinary and low grades are more or less neglected. Inquiry has been quiet. Actual transactions since Monday are up to the average, and the indications point to an increasing consumption. Buyers have more evidences now than heretofore that prices have reached bottom limits, and the fact that some furnaces have gone out of blast and that others are likely to do so, will, as far as it goes, tend to stimulate prices and induce consumers to cover requirements. Average prices for Forge are $20.50 delivered; No. 2, $22.50; No. 1, $25; though there are a great many sales above and below these figures. Bessemer is without change. Scotch in the lower grades is active; in the higher grades, dull. Stocks are trifling, and inquiries are not numerous.

Merchant Iron.—Ordinary iron in country mills has been sold at 2@2·15c. according to size of order, and a good deal of business is reported, though only or from thirty to sixty days' requirements. The local manufacturers report an improving demand, though, as heretofore, orders are mostly small. Offers have been made for large lots at lower figures than manufacturers will accept. Skelp Iron is in fairly active demand. Wrought Pipes 67½@70 off. Boiler Tubes are quoted 55 off. There are inquiries in hand for large lots.

Sheet-Iron.—The leading makers of sheet-iron report a little more inquiry for future requirements; but buyer are unwilling to pay current rates, and hence business is confined chiefly to small lots. For numbers 16 to 28 in small lots, prices are 4@4½c. Thin sheets are in special demand. Some orders for Galvanized have been placed at about 35 per cent off list. The outlook for the sheet-iron interest is favorable, in view of the large building operations at hand.

Structural Shapes.—A larger amount of business was transacted this week than last. Quotations are unchanged. Angles are quoted at 2·40@2·50c.; Tees, 3·20c.; Beams and Channels, 3·40c.@3·50c. Some large business is in sight. Bridge iron is under fair inquiry.

Plate and Tank Iron.—Larger orders were placed this week than usual, but selling prices are low. Competition is active because of the scarcity of work; though at the rate business is accumulating, prices will harden in a few days. Common Plate is quoted at 2½c., though sold at a little less; Shell, 3½c.; and Flange, 4½c.

Steel Rails.—The railroad builders are moving more slowly than a year ago, and most of the business transacted is of a retail character. Negotiations for large lots are going on. Quotations are given at $39; how much less would be accepted can not be ascertained in advance.

Old Rails are almost without sale. Sellers are asking $24. There are offers from New York at considerably below these figures.

Scrap.—A number of small transactions in Scrap were closed this week at $25@$26 for No. 2, with about a dollar more for selected No. 1.

Cleveland. March 28.

The market continues in its improvement, and we think that without doubt the bottom has been reached, and for many sections, it is on the rebound.

Consumers have more confidence, and place orders for round lots, and, where possible, for delivery from two to three months; but furnaces are not at all anxious to sell for future delivery at present prices, and there is a more decided "sit down and wait" feeling among them that can not fail to be beneficial.

Stocks of good Foundry Irons are very small, and find ready sale.

There is very little doing as yet in the ore trade. We quote:

No. 1 Bessemer	$23.50@$24.00
" Foundry, all ore	22.50@ 23.50
" Foundry, cinder mixture	22.00@ 23.00
" Soft Foundry	21.50@ 23.00
" Open silvery	21.50@ 22.00
Mill Irons	19.50@ 22.00
Four months, f. o. b. cars furnaces:	
Nos. 1 and 2 Charcoal	26.50@ 27.50
Nos. 3, 4, 5, and 6 Charcoal	27.00@ 28.00
Hanging Rock Charcoal	23.00@ 26.50
Strictly Cold-Blast Charcoal	28.50@ 31.00
Four months, f. o. b. cars Cleveland:	
Bessemer ores	8.50@ 10.00
Hematite "	6.00@ 8.00

COAL TRADE REVIEW.

New York, Friday Evening, March 30.

Anthracite.

The coal companies report a fair business at prices closely approaching the circular rates; but there is apparently a considerable quantity of coal in the market at figures somewhat lower than those established by the companies. Buyers have not abandoned their policy of reserve; but there seems little prospect that their expectations will be realized. The only weak spot is Boston and the East, which seems to have become the market in which inconvenient excesses of supplies are pushed off. The coal companies have reached the tacit understanding that the following will be the idle days for the next four months: April 5th, 6th, 7th, 12th, 13th, and 14th; May 3d, 4th, 5th, 10th, 11th, and 12th; June 7th, 8th, 9th, 28th, 29th, and 30th; and July 5th, 6th, 7th, 12th, 13th, and 14th. This, of course, is subject to modification, should the demand prove in excess of the supply. It proves that the companies are in earnest about keeping out any surplus of coal, and that buyers must not expect any extraordinary concessions.

The Western shippers of anthracite coal had a somewhat stormy meeting in this city this week, and at one time during the proceedings there threatened to be a serious disagreement among them. The issue discussed was whether the carrying companies should be the ones to fix prices exclusively or not. An arrangement was effected, and a circular will be issued by the Secretary, Mr. John H. Jones, tomorrow.

From Philadelphia, under date of March 20th, a well-informed correspondent sends us the following:

Prices have been fixed for city and line for April at a decline of 10 cents per ton for egg, chestnut, and pea, other sizes remaining the same. This is an average advance of about 15 cents on opening rates last spring. The tolls from last Monday are the same as the opening rates last spring. At tide-water, the prices for shipment are also about 15 cents higher for stove, and materially the same for the rest

The local trade is healthy. The long winter has made the consumption steadily good, and the dealers have no stock. Buyers East seem to think the prices are higher than they should be on stove, but that size is not accumulating, and, no doubt, they will soon find that present rates are likely to be maintained. In Boston, a few dealers are selling at retail without any profit, and make the buyers delay purchases. Some of them get coal put on their carts cheaper than they can buy the cargo, a condition of things which can not last.

Freights are unusually low for this season of the year: $1.25 to Portland, $1.30@$1.35 to Boston, and equally low to Southern ports; 65@70c. to Richmond and 55c. to Norfolk.

Bituminous.

Business drags along without any features of interest. It is suspected that the low prices now heard of must in part be due to deliveries of coal to others than those with whom contracts were made, with the result of securing freight rates lower than the established schedules. These contracts, however, expire during the coming month, so that, if this be the cause, it is temporary only. Quotations are nominally unchanged, though it is likely that they are considerably shaded.

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended March 24th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	2,147	4,359	.....
Coal for shipment at South Amboy	21,156	172,404	152,221
Coal for distribution	22,315	186,619	152,181
Coal for company's use	4,432	37,013	31,078
Total	50,050	400,395	335,480
Increase	.....	64,915	.....
Decrease	.....	.....	.....

The Transportation of Coke over the Pennsylvania Railroad for the week ended March 24th and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	2,475	27,921
West Penn. RR.	1,881	23,980
Southwest Penn. RR	38,874	433,684
Penn. & Westmoreland Region, Pa. RR	4,385	56,139
Pittsburg, Penn. RR.	....	230
Snow Shoe (Clearfield Region)	305	3,375
Total	47,920	545,029

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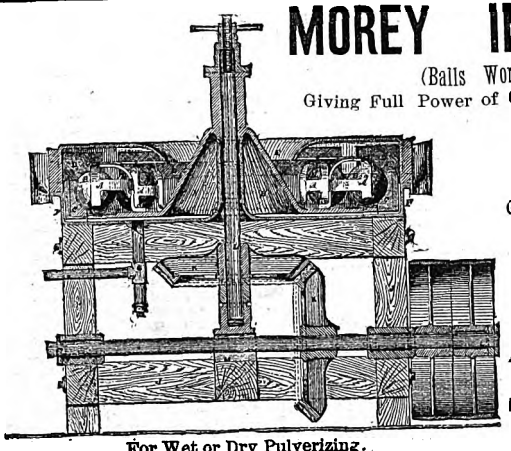
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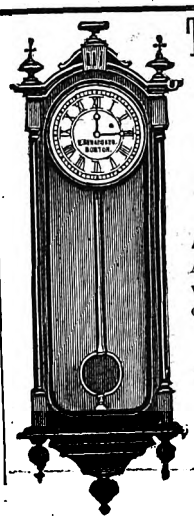
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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF Jr. M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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Mr. J. TROWBRIDGE BAILEY has left for the West on an extensive trip. Communications for him should be addressed to Idaho Springs, Colo.

IT seems, from statements that appear worthy of belief, that there is a movement among Western manufacturers of iron to provide for a scaling down of the prices paid to labor. It is well known that the relations between the finishers and the puddlers in the mills are by no means harmonious, and it is possible that a brief struggle only will decide the question of wages when brought up.

IN response to the wishes of a large number of persons, the body of PETER COOPER will be placed in All Souls' Church, corner of Fourth avenue and Twentieth street, this morning, at nine o'clock. The funeral services will take place at three o'clock in the afternoon. Seats will be reserved for the family, and the pews on the middle aisle will be kept for such committees and public bodies as have expressed a desire to be present. The remainder of the church will be open to the public.

As we go to press, we are in receipt of the annual report of the Horn-Silver Mining Company, the largest single lead-producer in this country. We shall deal with it in detail next week, and need only state now that it shows that the company had a prosperous year, having produced 44,782 tons of ore, running 37·8 per cent of lead and 34·2 ounces of silver. The receipts, notwithstanding the decline both in silver and in lead, were $3,385,811.68, while the cost of mining, smelting, and refining was $1,800,230.92. The cost of mining has been carried down from $5.15 to $4.44, that of smelting from $16.67 to $14.78 per ton of ore at the Francklyn smelter, and the cost of refining at Chicago from $11.03 to $9.05 per ton.

THE Lake Superior mines have taken a sudden turn in their policy, and are now freely offering copper at 16 cents, at which figure sales of some magnitude have been made. Other brands are correspondingly depressed, and range between 15 and 15½ cents. It is too early now to discuss the bearings of this change of policy, which was probably precipitated by the inroads which Western copper made upon the markets of Lake. While the present range of low prices continues—and it will probably last some time, before production and consumption are readjusted—it is likely that the bulk of argentiferous mattes, notably those of Montana, will seek a market abroad.

In the light of the decline in the value of the metal, it may be of interest to glance at the figures at which some of the more prominent Lake Superior companies can produce copper. The Quincy, the largest on the lake after the Calumet & Hecla, produced in 1882 5,682,663 pounds of ingot, at an expenditure of $477,980, exclusive of construction, or 8·4 cents per pound, working rock containing 3·21 pounds of ingot: including $52,000 for construction, the cost will be 9·5 cents. The Calumet & Hecla works are ranging from 5 to 6 per cent, and, exclusive of an enormous sum paid out for new machinery, gave its shareholders a profit of $2,000,000 on a product of approximately 32 million pounds of copper. It is not probable that the bare cost of producing and marketing its copper costs this great mine more than from 7½ to 8 cents, if it is not less. With its new appliances, the mine will have little trouble to make up for its falling off in revenues, by reason of a lower price realized, by an increase in the quantity produced. Among the other mines, the Osceola, with a product of about 4,250,000 pounds of ingot, paid dividends footing up to $250,000 for the fiscal year, or approximately 6 cents per pound, leaving the cost between 11 and 12 cents. The Franklin, following next with a yield of 3,264,120 pounds of ingot, worked rock containing 22 pounds of ingot per ton at a cost of 10·7 cents for mining, crushing, and washing. Adding cost of smelting, freight, marketing, and general expenses, brings the cost up to about 13 cents. The Atlantic turned out 2,631,708 pounds from rock carrying only 0·693 per cent of copper, at a total cost of $1·9082, or 13·8 cents per pound. The Allouez, hampered as it was by the absence of a good stamp-mill, produced 1,683,557 pounds of ingot from very poor rock, running 17·31 pounds per ton, at a cost for mining and crushing of $2.60 per ton, or 15·04 cents per pound, to which added the smelting, freight, and other expenses, carries the cost to 17·38 cents per pound. The Pewabic is probably the weakest of the larger producers. It turned out 1,482,664 pounds for 1882. The rock was poor, running 20 pounds of copper per ton, while the cost of treatment was $3.03, or 15·1 cents per pound. Adding about 2 cents per pound for smelting, freight, marketing, etc., would make the cost, delivered, fully 17 cents. We have no data as yet relating to the Central, while the figures for the Huron and Ridge are given elsewhere.

From this *résumé* of the cost of production of the Lake Superior copper mines, it will be seen that all the important producers, with the exception of the Pewabic, will not be threatened with ruin by a price approximating 16 cents only. As they represent a product of fully fifty millions of pounds of copper out of a probable yield of fifty-seven or fifty-eight millions, it will be seen that there is no prospect of any serious check in the output of the Lake Superior mines. In fact, it is possible that there will be a further increase, however much the dividends may shrink. How many of the Western mines will fare, with prices as low asnow, is another matter. It is practically impossible, in view of the widely differing conditions, to make any estimate of their capacity to stand the strain. The Copper Queen and the Clifton mines in Arizona, and a number of others in New Mexico, Utah, and Montana, make copper at a low figure, because either of exceptionally high grade of ore or good facilities for the receipt of fuel supplies and the shipment of metal. At a price of 15 cents in New York, black copper is worth from 10 to 13 cents at the mine only, according to rates of freight and purity of metal. In districts like the Globe, of Arizona, where English coke costs from $65 to $70 per ton and the freight to market is correspondingly high, the cost of smelting oxidized ores will not fall much below from $16 to $20 per ton, which makes the working of any ores lower than from 10 to 12 per cent practically impossible. Unless the railroad companies lend a number of the Western enterprises a helping hand in the way of a reduction from the present high rates, many works, especially those lacking a substantial backing of capital, will have to close down.

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PETER COOPER.

The departure of PETER COOPER was the peaceful close of a memorable life. If ever the contemplation of death can be not merely without terror, but even without pain, it is in such a case as this, where, surrounded by the loving circle of children to the third and fourth generation, and by hosts of warm personal friends, loaded with well-earned honors and cheered with the enthusiastic affection of the civilized world, a man who has done great things for his kind goes in the ripeness of age to his rest and reward.

PETER COOPER had long outlived his proper contemporaries; and this generation, which knew him best as a benefactor, had never known him as a bold inventor and enterprising pioneer in great business adventures—still less as an industrious mechanic, practicing a patient perseverance and a frugal economy which seem nowadays to have gone somewhat out of fashion. It is hard to realize that his life covers nearly the whole history of the United States. Born in the middle of WASHINGTON'S first presidential term, when the population of the country was about 4,000,000 souls, he lived to see it the most powerful of Christian nations, containing more than 58,000,000 inhabitants, triumphant over internal rebellion, fearless of foreign foes, and filled, from one ocean to the other, with appliances of science and monuments of human skill not dreamed of in his boyhood. Except the stationary steam-engine, which had just begun to be generally used when he was born, PETER COOPER witnessed the inception and growth of all the great material improvements which make our modern life what it is. Many of them, notably the railway and the telegraph, he essentially assisted in the days of their feeble beginnings; and his characteristic attitude toward them all was one of encouragement and hope. He was an optimist of the most wholesome type, not believing that things are well enough as they are, but full of a sublime faith that things can be bettered, and ready to welcome with sanguine support all attempts to better them.

In this, as in many other particulars, the history of PETER COOPER is distinctively American. No other country, in the early years of this century, could have given free scope to the versatile ingenuity and unconquerable perseverance with which he turned from one trade to another, until he planted his foot upon the road to fortune. Under other institutions, he would have remained a hatter, like his father, or become a brewer or a coach-maker, after once beginning in either of those trades. But in this free atmosphere, he was able to follow each path that offered itself, to master each business that he undertook, and to leave it for another that promised larger scope. He failed in nothing; each step was an advance; and when at last he took up the manufacture of glue and isinglass, the principal occupation of his life, he pursued it with an unwearied and unconquerable ardor as truly American as his versatility.

Another peculiar feature of his career was his conception of the uses and duties attached to wealth. He felt bound by the very fact of his prosperity not only to relieve the unfortunate, but also to organize agencies which should permanently benefit the city, the growth of which had been the basis of his own success, and the working-classes, by whose co-operation all great fortunes are built up. The absence of governmental endowments for charity and for learning has always rendered the claims of these objects upon individual g nerosity stronger in this country than elsewhere. Public spirit has done among us more than official action could have accomplished; and this spirit, fostered by our political system, has gathered strength through the inspiration of great examples, among which that of PETER COOPER is one of the most conspicuous, and has been perhaps the most fruitful. Notable as have been the results directly flowing from his beneficence, they are insignificant compared with the indirect consequences of the noble contagion which his enthusiasm communicated to other men. It is impossible to measure the effect of his example, showing as it does both sides: the joy and potency of a wise benevolence, and the immediate reward which it commands in the affection and praise of all mankind.

We had intended, in commencing this article, to emphasize particularly Mr. COOPER'S earlier achievements, and their relation to the progress of the arts. But goodness is more than greatness; and we feel that the universal feeling is right when it mourns to-day the departure, and rejoices in the history, not of the ingenious inventor, the successful manufacturer, or the enterprising capitalist, but of the lover of men, whose widest schemes, like his most trivial acts and words, uttered his inmost disposition. The Cooper Union, planted by his hand, and tended with daily assiduity by him to the last, bears in every part the indelible marks, not merely of the man's wisdom or philanthropy, but of the man's self. As his benign face has been for years a most frequent and familiar object within its walls, so his gentle soul pervades and inhabits it forever.

For a good many years past, it has been my pleasant duty to take charge of the Saturday evening free popular lecture course at the Cooper Union. Of the thousands who attended these lectures, not one was more punctual and regular than PETER COOPER, and his entrance upon the platform was invariably the signal for an outburst of affectionate welcome. When he spoke, which was but seldom, his simple, cordial utterance had but one burden—the lesson of good will, which his paternal bearing also mutely spoke. As I have witnessed the touching intercourse between that vast, reverent audience and their venerable benefactor, I have often been reminded of the beautiful legend of St. John, who, in his old age, carried to the assemblies of the church at Ephesus, said evermore but this: "Little children, love one another." It was fit to be the last word of an evangelist, apostle, and seer; and it was in substance the word to this generation of one whose life exhibited not unworthily the spirit of the Beloved Disciple.

It is this identification of the man's nature with his actions, rendering them the complete expression of himself, "in whom there was no guile," that wins for PETER COOPER not merely admiration and praise, but the unanimous, ungrudging, rejoicing acclamation of that voice of the people which never more truly echoed the voice of God.

"Not what we give, but what we share!
For the gift without the giver is bare.
Who bestows himself with his gift, feeds three:
Himself, his hungering neighbor, and Me!"

It is impossible, even for those who feel most nearly this bereavement, not to find greater cause for thanksgiving than for grief. The long, noble, fruitful life; the painless end; the fragrant memory; the immortal glory—these have no room for tears.

Now, God be thanked for such a gift!
A human life, so strong, so sweet,
So blessed, so blessing, so complete,
So fit before the world to lift

For pattern and encouragement;
For silent love and echoing praise;
For teaching how earth's wasting days
In heavenly uses best are spent;

What guerdon tireless toil commands;
What triumph waits our enterprise;
How he who serves his kind shall rise,
Upborne upon their grateful hands!

His goodness struck detraction dumb;
He drew the heart of all to his,
And lent unto the life that is
The brightness of the life to come!

ROSSITER W. RAYMOND.

NEW PUBLICATIONS.

THE MINERAL WEALTH OF VIRGINIA, *Tributary to the Lines of the Shenandoah Valley and Norfolk & Western Railroad Companies. By* ANDREW S. MCCREATH, *Chemist to the Geological Survey of Pennsylvania, etc., etc.* Harrisburg, 1888. Octavo, 105 pages.

This book is the result of the new management inaugurated a year ago for the important railroad system named in its title. The determination of this management to make the railroads prosperous by developing as sources of income all varieties of natural wealth in the country traversed by them led to the establishment of a Bureau of Mining Intelligence, under the charge of Mr. J. B. Austin, at Roanoke; and Mr. McCreath was selected as an expert to examine with Mr. Austin the region tributary to the roads. The selection was a good one, the work has been carefully done; and the resulting report is an interesting general survey of the subject.

We extract and tabulate, without comment, the following estimates of the cost of making pig-iron at various localities:

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
Ore.....	$4.50	$4.73	$4.79	$4.79	$3.40	$9.37	$9.00	$7.60	$9.61	$9.34	$11 81	$9.46
Fuel.....	5.25	4.46	3.69	3.25	3.88	5.02	5.40	7.00	6.67	5.30	3.39	5.64
Limestone	.30	.50	.75	.00	.50	1.00	.85	.56	.95	.77	.77	.42
Labor.....	1.50	2.00	2.10	2.00	2.00	2.35	2.10	3.00	2.45	2.33	2.00	1.59
Incid'ntals	1.00	1.25	1.25	1.25	.48	1.00				2.64		.76
Total ...	12.55	12.94	12.58	11.89	11.03	18.22	18.35	18 16	19.68	20.38	17.97	17.87

I. Cost at Milnes, Va. (2¼ tons ore, 1¼ tons coke, per ton of iron).
II. Estimated cost at Buchanan, Va. (2½ tons ore, 1⅝ tons coke).
III. Estimated cost at Roanoke, Va. (2½ tons ore, 1¼ tons coke).
IV. Estimated cost at Central, Va. (2½ tons ore, 1¼ tons coke).
V. Estimated cost on New River, Va. (2½ tons ore, 1¼ tons coke).
VI. Estimated cost in Middle Pennsylvania (fuel, coal and coke).
VII. Estimated cost at Harrisburg (2¼ tons ore, 1½ tons coal).
VIII. and IX. Estimated cost at two furnaces of the Lower Susquehanna District, a considerable distance apart and on different railroads.
X. Estimated cost in the Lehigh Valley District.
XI. Estimated cost at Pittsburg, Pa. (Lake Superior ore, 1¾ tons).
XII. Estimated cost at Phillipsburg, N. J. (fuel, anthracite).

An inspection of these figures shows that the advantages of Virginia lie chiefly in the cheapness of the ore. Mr. McCreath presents a list of mines which furnish Bessemer ores, twenty-three in number. Of these, we should be inclined to throw out nine, as coming too near the forbidden limit of phosphorus. Mr. McCreath, by the way, puts that limit at 0·14 per cent on the iron in the ore, or 0·13 in the pig manufactured. This may do for Bessemer manufacturers who make their own pig; but we have seen the requirements enforced not long ago by Harrisburg works on outside makes of Bessemer pig; and, according to our recollection, they set the maximum of phosphorus at 0·09 per cent.

In conclusion, Mr. McCreath sums up as follows the advantages for iron-making possessed by this region:

"The ores are abundant, and generally of good quality; they can be econo

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mically mined; for the country in many localities is broken up by numerous ravines affording natural openings for mining operations; most of the deposits are within convenient distance of the railroads, with easy down grades; the water supply, either for washing ore or for manufacturing purposes, is ample and permanent at all seasons; limestone for fluxing purposes exists in unlimited quantities; and the railroad facilities for reaching markets in every direction are unusually good—thus forming a combination of favorable circumstances rarely equaled."

The next meeting of the Institute of Mining Engineers is to be held at Roanoke.

*

GEOLOGICAL SURVEY OF NEW JERSEY. *Annual Report of the State Geologist for the Year* 1882. Camden, 1882. Octavo, 191 pages. (Index, and a Geological Map of the State.)

In this volume, as in each of its many predecessors, Professors Cook and Smock have presented a most useful summary of the progress of their work and the current developments of the industries of the State. The different chapters treat successively of the United States Coast and Geodetic Survey of New Jersey; Topographical Surveys; Geological Work in Progress; Seaside Developments; Climatic Peculiarities; Agricultural Development in Southern New Jersey; Drainage; Water Supply; Statistic of Ores, Clays, and Clay Products and Lime; and the publications, *personnel*, expenses, and plans of the survey. The most interesting chapters to us are the geological and statistical ones. Professor Cook is proceeding with characteristic caution and thoroughness to attack the difficult problem of the age and stratigraphical relations of the red sandstone district and its intercalated traps. In this volume, he presents a mass of observations, without professing to have collected data sufficiently abundant and precise to permit an assured induction. Concerning the geographical history of this district, he says:

"The hypothesis we are at present disposed to follow is, that the various detached portions of this general formation which are found east of the Appalachians, and extending from Massachusetts to South Carolina, were once, in some way, connected; and perhaps, also, those farther northeast in the British provinces. That after their deposition on a very uneven bottom, the underlying rock has been disturbed by a number of axes of elevation, or else of great faults, which have crossed the formation obliquely but in a direction much nearer north and south than the general trend of the formation. . . . The elevation of these axes would give a general dip of W.N.W. on one side and E.S.E. on the other, but not at right angles to the trend of the formation; and it would not require so great a thickness for the whole mass as has generally been computed. After this process of elevation was well advanced, the eruption of the trap-rocks began, and must have continued for a long period of time. The peculiar curved form of the trap ridges would necessarily occur where the upward force of the eruptive rock was applied against the inclined surface and pressure of the stratified rocks. The denudation of the surface, to the extent of from 100 feet to 600 feet or more, took place after this, but mainly before the Cretaceous period. By denudation, the softer sandstones and shales have been removed to so great an extent as to leave some portion of the Archaic and Silurian rocks entirely uncovered, to leave the red sandstones and shales in the deeper troughs between the axes of elevation, and to leave the hard eruptive rocks, which were but little above the other rocks, now standing out above the plain surface of the denuded sandstones and shales in the long, rocky, and rough ridges which are so prominent a feature of our Triassic formation."

Some trivial criticism might be applied to this statement. The ascription of force to mere "axes of elevation" is an unfortunate use of words; and the limitation of the effect of this force, or of faults, to "the underlying rocks," intimated by the language employed, is evidently not intended. We presume also that Professor Cook means "Archæan" when he says "Archaic." Apart from these small blemishes of expression, the hypothesis here suggested seems to us more probable than those of Rogers, Kerr, Heinrich, and others who have written on the subject. Elsewhere in this report, Professor Cook speaks of the rarity of clear exposures of faults in the sandstone formation. But the probability of the existence of many small dislocations is not only indicated, we think, by the rock itself, but by the analogous fractures of the crystalline rocks on the northwest. A system of oblique axes of elevation, with oblique subordinate faulting movements, is just what the phenomena of the Jersey gneisses suggest; and it is no small argument for Professor Cook's hypothesis, that it promises to harmonize the two halves of the State, by referring the structure of both to similar continental strains.

The mineral statistics of New Jersey for the year 1882 are given by the report as follows:

Iron ore carried by railroads	897,183	tons.
Received at furnaces by team	35,579	"
Total	932,762	"
An increase over 1881 (737,052 tons) of	195,710	"
Product of zinc ores (used at Newark and Bethlehem)	40,138	"
Product of clay, feldspar, kaolin, fire-sand, and molding-sand in Middlesex County	315,000	"
Ditto in Camden County	38,100	"
Total manufacture of bricks (an increase of 34,000 thousand over 1881)	150,000	thousand.

The subjects of water supply, including rain-fall, drainage, wells, etc., are treated at considerable length; and the nature and amount of the supply of the principal cities of the State are described. The principal expenditure of the survey has been for topographical work. The annual appropriation is $8000; and this book shows that a good deal is done with that small sum. Such workmen, in such a work, ought to have more means.

*

AN INDEX TO THE POPULAR SCIENCE MONTHLY. New York: D. Appleton & Co. 1883. 8vo, pp. 169. Price, $1.

The title index to the twenty volumes of the *Popular Science Monthly*, from 1872 to 1882, just issued, will be welcome to the readers of that progressive review.

THE WORLD'S PRODUCTION OF SULPHURET COPPER ORES. Issued by the Coxheath Mining Company, Boston. 8 pages.

This little pamphlet contains a good review, from the pen of Mr. Joseph W. Revere, of the principal localities from which sulphuret copper ores are obtained in this and other countries.

CAMERON'S PLASTERER'S MANUAL. Revised Edition. By K. CAMERON. New York: William T. Comstock. 1883. Sq. 12mo, 67 pages.

Mr. Cameron has published a revised edition of his Plasterer's Manual, having added a number of illustrations and recipes, and a new chapter on practical suggestions and precautions. It is intended for and well serves the purposes of apprentices, to whom a good guide of the kind will prove valuable.

OFFICIAL STATEMENTS AND REPORTS.

THE ALLOUEZ MINING COMPANY, LAKE SUPERIOR, MICH.

According to the statement of the directors of this company, the product of the mine during the year 1882 was 2,299,445 pounds of mineral, yielding 73·22 per cent, or 1,683,557 pounds of refined copper, for which, estimating the copper on hand at the close of the year (396,690 pounds) at 18 cents per pound, there was realized an average price of 17·86 cents per pound, or $300,818.19. The profit, after deducting the total working expenses, was only $8268.46; but as $20,347.05 were paid out for buildings, real estate, and machinery, there was a deficit of $12,078.59, which reduced the net surplus of December 31st, 1882, from $87,120.74 to $75,042.15 in the beginning of this year, provided the copper on hand realized 18 cents. The company did a very large amount of dead-work, which increased current expenses, and which also brought down the average yield of the rock. As the surplus consists of supplies, the company levied an assessment of 50 cents per share, or $40,000, to provide for improved machinery. The mining work embraced 327 feet of shaft sinking, at $26.93 per foot; 54 feet of winzes, at $15 per foot; 1498·4 feet of drifting, at $11.71; 51 feet of drifting for pillars, at $13.86 per foot; 813·7 fathoms of rising slopes, at $8.64; 2324·9 fathoms of stoping with power drills, at $8.05 per fathom; and 2619·3 fathoms of stoping by hand at $10.88; the cost of running the compressor and power drills, inclusive of repairs, being $10,370.51. The wages paid to timber-men, trammers, blacksmiths, etc., were $37,966.14, to which, added supplies, makes the total for underground expenses $139,069.08, or, less profit on supplies sold to contractors, $8846, $130,223.08. In all, 112,892 tons of rock were mined; 107,079 tons were hoisted, at an expense of $19,594.45, of which $2664.64 went for wire rope and supplies, $9860.80 for fuel, and $7069.01 for labor. The cost of breaking and selecting the rock was $22,698.78, a figure which seems high in view of the slight quantity of rock finally rejected, not quite 10,000 tons. The heaviest item is labor, $14,016.58, followed by $4835.60 for fuel, and $3788.75 for castings and supplies. The surface expenses were $11,742.23, including $8808.36 for salaries and wages, $2495 taxes, $1512.41 insurance, and $1550.50 supplies. The railroad carried 97,232 tons of rock at a cost of $13,203.75, which was crushed in the stamp-mill at a cost of $53,987.77, including $24,470.91 for 7528 cords of wood, or one cord per 12·9 tons, $20,396.03 for labor, $3589.36 for supplies, and $5531.47 for repairs. Among the mineral expenses, $5028.41, figures transportation to Hancock, $3783.96. Reduced to cost per ton of rock milled, those figures stand as follows:

Mining	$1·3393
Hoisting	·2015
Selecting and breaking	·2335
Surface expenses	·0867
Transportation to mill	·1358
Milling and washing	·5552
Expenses on mineral	·0517
Total per ton milled	$2·6027
Total per ton mined	2·2426

The yield of copper per ton mined was 14·91 pounds, and per ton milled 17·31 pounds, or 256 pounds of refined copper per fathom of ground broken. The cost of mining and milling copper for the Allouez was, therefore, 15·04 cents during 1882. To this, however, must be added $39,381.39 of other expenses, including $8332.08 for freight, $22,351.63 for smelting (1·33 cents per pound), $1683.75 for commissions and brokerage, and a number of sundry expenses, or 2·34 cents, making the total 17·38 cents per pound.

In the machinery purchased, we note a Rand duplex, 16½ by 30, compressor, costing, with freight and labor, $5752.91; eight Rand drills, $3628; a Worthington duplex pump for the mill; and a small Knowles pump for the mine.

Mr. Frederick Smith, the agent, speaks encouragingly of the mine. He advises the addition of the second half of the compressor, so that all underground work can be done with the power drills.

RIDGE COPPER COMPANY, LAKE SUPERIOR, MICH.

The annual report of the Ridge Copper Company is interesting, because it is one of the smaller mines whose existence is seriously threatened by the recent decline in copper. The product of the mine was 102,936 pounds of copper, which, including the mineral at the mine, realized only $17,097.44, while the mine and other expenses were $36,482.08, leaving a deficit of $19,384.64. An assessment of $10,000, or 50 cents per share, was levied; but it was difficult to collect it, 2476 shares being forfeited. The directors ask the stockholders for consent to sell, notwithstanding the urgent request of the agent, Captain S. B. Harris, to continue work. The Ridge paid $50,000 dividends on February 24th, 1873; $20,000 on February 23d, 1874; the same amount on February 8th, 1875, and $9784.50 in 1880, making a total of $99,784.50. On the other hand, assessments to the amount of $210,000 have been levied.

HURON COPPER MINING COMPANY, LAKE SUPERIOR, MICH.

The work of the Huron has been largely one of preparation, and the expenditures have been excessive on account of the necessity of hauling rock to the old Pewabic mill, the old Huron mill being almost useless. Work in building the new mill was begun on the 1st of December, and it is expected that the mill will be ready for work early in the season. During the year, 269 feet of shafts, 261 feet of winzes, and 886 feet of drifts were run, at a total expense of $57,626.87, including timber, supplies, wood, etc. Surface expenses footed up $19,581.80, and the expense of crushing 8552 tons of rock, yielding 2·52 per cent of mineral, was $10,018.39. Diamond drill explorations on the conglomerate vein cost $695.46; construction expenses, $4380.28, and all other expenses were $6329.48. The total product was 445,624 pounds of mineral, yielding 82·113 per cent of copper, or 364,037 pounds of ingot, of which 292,500 pounds were sold at an average price of 18·355 cents. The total receipts were $135,284.46, including $21,701.23 cash on hand, and a loan of $54,000, of which $32,500 were paid and were included in the expenditures, leaving the cash on hand $2425.94. The assets include copper on hand and supplies, a total of $45,510.26; the liabilities being $67,144.72. The agent's valuation of the machinery and buildings is placed at $124,201.41. Mr. J. Vivian, the superintendent, reports that a very good piece of ground has been opened on the seventh level, the lode being from 18 to 20 feet in width.

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THE NICHOLS FURNACE.

In order to lessen the cost of transportation, Messrs. Nichols & Co., of the Laurel Hill Chemical Works, Long Island, New York, some time since themselves began the smelting of the cinders obtained after roasting cupriferous pyrites in kilns, for the manufacture of sulphuric acid. Under the direction of Mr. J. B. F. Herreshoff, experiments were made with the view of improving the construction of the ordinary furnaces, and the result of these efforts was the construction shown in the accompanying illustrations. As will be seen, the furnace has the general type of modern American copper furnaces, the main point of novelty in the design being the construction of a removable outside well or hearth. The principal object is to separate from the furnace proper that part which is particularly liable to create stoppages and repairs, so that runs over long periods can be made. The entire product of the furnace flows directly into the well. Near the bottom of the furnace is an opening, 7 by 6 inches, the circle of the furnace being flattened at this point to allow of close contact with the water-jacket face of the well. The face of the well is formed by two square frames of wrought-iron, covered by soft sheet-steel or boiler-iron, in such a manner as to leave a water-space between, and the smaller inner frame corresponding in size and hight to the opening in the furnace. The well itself is built of ribbed cast plates, bolted together, lined with fire-brick and mineral wool, to prevent chilling, and mounted on wheels, with a flat-arched brick-lined cover. Near the top, on the side away from the furnace, is a regular slag-spout, and below on one side a tap-hole and spout for the metal, which can be tapped at intervals; or, in case of lead, a small outside dipping-well can be bolted on, as usual, on the furnace itself. The offset shown in the upper part of the well is not necessary. It is preferred, especially with basic slag, to have it straight, to avoid cutting by the upward flow of the slag. The well is guided to its place against the furnace by the two outside rails. Rubber hose connections are attached to the water supply pipes, and then the blast is let on to the furnace. Any slag which might naturally leak between the two faces is immediately chilled, and forms a perfectly tight packing between them.

The following is a record of a number of the furnaces at the Laurel Hill Works, for a number of days, as taken from the charging-books. The 48-inch furnace was first built; then the 60-inch, which, however, proved of too large a diameter, when the 36-inch by 66-inch furnace was erected.

As already stated, the ore was pyrites, containing between 3 and 4 per cent of copper, the fuel employed being common gas-coke. We may add that the inventors have made arrangements with Messrs. Fraser & Chalmers to build the furnaces as modified:

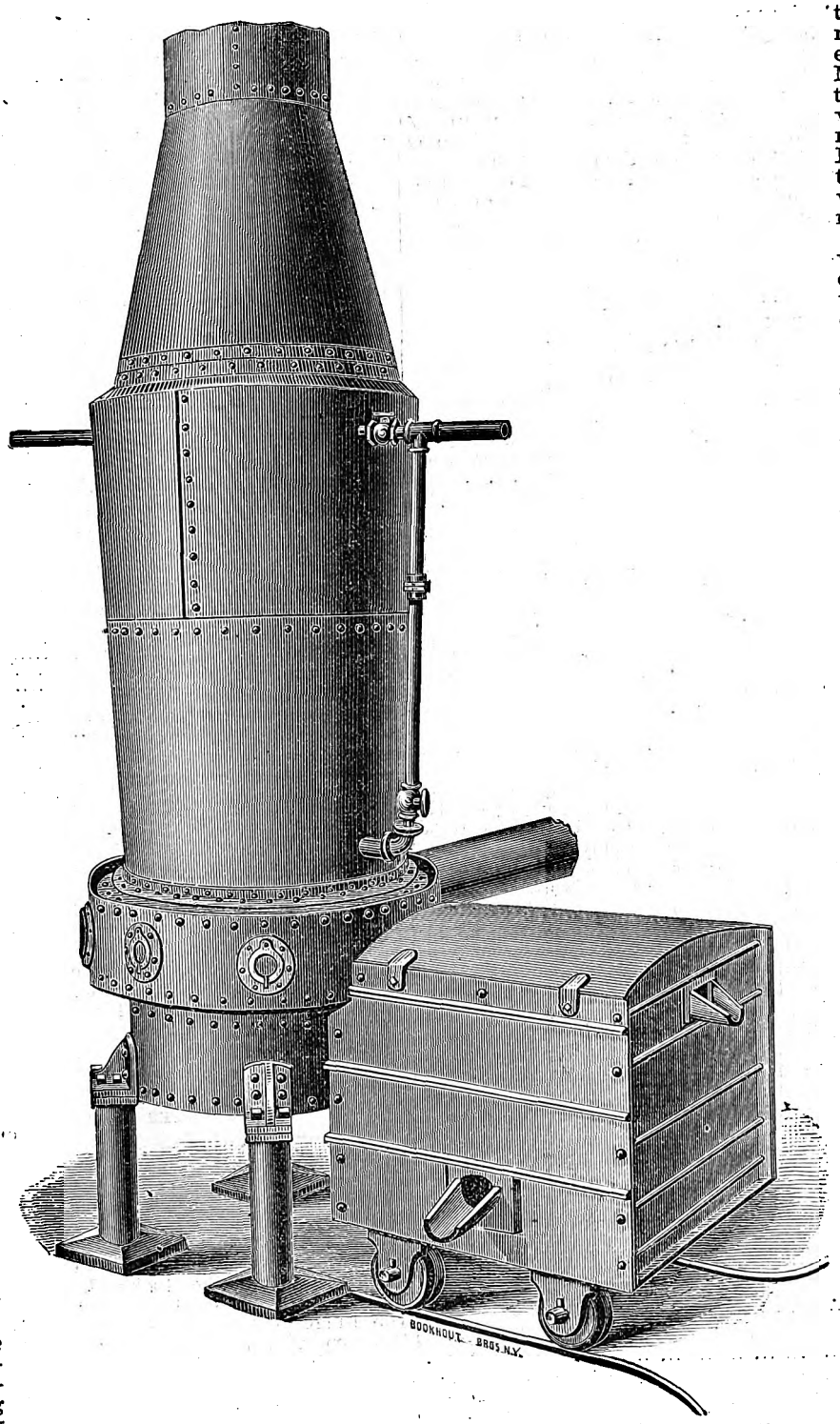


FIG. 1.—THE HERRESHOFF DETACHED FURNACE-WELL.

48-INCH CIRCULAR FURNACE.

Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	
106,640	99,680	107,310	.....	. ...	Roasted ore.
13,760	11,840	710	.....	... .	Raw fines.
22,870	21,812	24,051	.....	... .	Coke.
6,880	6,560	6,360	.....	.... ..	Common sand.

60-INCH CIRCULAR FURNACE.

Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	
127,300	130,760	132,140	132,840	135,680	Roasted ore.
13,000	18,580	16,520	19,680	16,850	Raw fines.
32,200	34,160	34,440	34,440	34,400	Coke.
23,000	24,400	24,600	24,600	24,600	Common sand.
18,400	19,520	19,680	19,680	19,680	Iron slag.

36-INCH BY 66-INCH FURNACE.

Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	
124,830	136,800	156,000	171,660	175,200	Roasted ore.
32,850	36,000	15,000	25,000	23,360	Raw fines.
30,660	33,600	33,400	30,120	40,880	Coke.
10,960	12,000	13,500	2,000	14,600	Common sand.

TESTS OF EXPLOSIVES.

In the Proceedings of the U. S. Naval Institute, Prof. Charles E. Munroe, U.S.N.A., has reviewed a report on vigorit powder, made by Lieut. W. R. Quinan, U.S.A., General Superintendent of the California Vigorit Powder Company, which contains interesting data on the methods of testing explosives employed. These Professor Munroe considers sufficiently trustworthy for the object in view, although somewhat rough and not wholly new. Professor Munroe summarizes the contents of the report, of which a copy has not yet reached us, as follows:

The iron plate and éprouvette tubes were discarded as delusive or as being advantageous to slow-burning powders, and a simple form of the "crusher-gauge," with lead cylinders, was employed. This gauge consisted of a heavy iron base, supporting four vertical wrought-iron guides, which were connected at the top by a ring. The lead plug is placed on the base; a piston weighing 12¼ pounds rests on the plug. The top of the piston is hollowed out to receive the charge, and over this is placed a 34¼ shot of tempered steel. The shot is bored through its axis, to receive a capped fuse. All these parts are between the guides; and when the charge is fired, the piston is driven against the plug, while the shot is thrown out in the opposite direction. To determine the pressure exerted in compressing the plug a given amount, a foot-pound machine was constructed similar in form to a pile-driver with a graduated scale, the shot of the pressure-gauge serving for the hammer and the piston of the gauge for the anvil. This form of apparatus realizes more perfectly than any other the conditions which exist when explosion takes place in a confined space. Tests were made of cast and drawn lead plugs. The cast lead ones were unsatisfactory, while the drawn ones gave very regular results. An apparatus similar to the foot-pound machine was used for testing the sensitiveness of the powders to percussion, and, with the addition of a gas-pipe and wooden tamping-rod, to tamping. With this tamping apparatus, the vigorit powder, as now made, withstood more than a dozen blows of 300 foot-pounds each. The ability to tamp a powder is regarded as quite important, since it enables the miner to put the powder where it will do the most efficient work; hence a powder which can be tamped freely will be found more economical than one which is too sensitive to be tamped at all.

The friction apparatus consisted of a heavy block covered with sand-paper, resting on a board covered in a similar manner. By means of a long handle, the block could be drawn backward and forward. The relative leakage of nitro-glycerine from the various powders was determined by placing equal weights upon weighed slips of bibulous paper for equal times, and then measuring the increase in weight of the papers.

Tests as to the effect of fire were made by ramming vigorit powder into an iron pipe until the pipe showed signs of yielding under the pressure. One end of the pipe was stopped by a wooden plug tightly driven in, and the open end was lighted by a match. The powder burned without explosion. Again, a large cartridge was placed in a small strong box, the lid being securely fastened with screws. A fuse passing through a small hole in the side of the box served to light it. The cartridge burned up without explosion, the box being badly charred on the inside, but not broken.

Lieutenant Quinan regards the property of deliquescence as a most serious one in mixed powders. The progress of deliquescence is thus explained

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The air confined in the cartridge contains a slight quantity of moisture, which, in uniting with the salt, causes a depression in temperature, which condenses fresh moisture from the surrounding air. This being taken up, reduces the temperature still more and brings a fresh supply, and so on. The process continues until arrested by an outside elevation of temperature, when the action is reversed. In losing moisture, the heat rendered latent is given out, raising the temperature, which causes a fresh loss of moisture and further elevation of temperature, and so on, till a change in atmospheric conditions arrests this process and induces a contrary. This gives two different and incompatible characters to a powder in which deliquescent salts are used, depending upon the particular state in which it is taken; when absorbing moisture, it is comparatively weak and insensitive to blows or compression; when losing moisture, it is comparatively strong and very sensitive to both. The temperature being already elevated, a slight blow will raise it to the exploding-point. The compression given by the tamping-rod in compacting it in the bore-hole may be sufficient to cause a premature explosion. These qualities render the powder unfit to bear climatic changes, and especially dangerous in warm or drying weather. Its constant subjection to chemical action gives it a character of instability especially conducive to disasters in handling it. The powder which is safe to-day and dangerous to-morrow is the most dangerous of all.

The effect of heat on all powders is to bring them nearer their exploding-points, and thus to increase their sensitiveness. This heat makes a slight saving of work in explosion—so that all explosives are a little stronger in warm weather. The danger of deliquescent ingredients is not in lowering the firing-point of nitro-glycerine, but of elevating the temperature of the powder to a dangerous approximation to this point.

The author holds that while in dynamite, the absorbent being inert, the force is dependent upon the amount of nitro-glycerine present, the more modern powders do not depend entirely on this. Citing the experiments of Roux and Sarrau, which showed that, if a fulminate acted through the medium of nitro-glycerine, an explosion of the first order would be produced, he argues that a mixture of nitro-glycerine with the ingredients of gunpowder will develop a much greater force than the sum of the forces of the two fired separately. In this he differs with Hill and Mowbray, while he is supported by Drinker. He also claims that any thing in a powder which interferes with the transmission of the detonating impulse or wave will cause a diminution in strength through imperfect detonation. It requires 60 per cent of nitro-glycerine to make a powder of kieselguhr which can be depended upon to explode at all. As the nitro-glycerine is increased, the strength increases rapidly, through better transmission of the impulse. Even taking 75 per cent as the utmost which the powder will safely hold, the detonation is not perfect under ordinary conditions, though it approaches it more nearly as the impulse is concentrated by stronger confinement.

A Scientific Centenarian.—Rarely in the history of science, says the *Lancet*, has a distinguished career equaled in its length that of M. Chevreul, whose name is best known in connection with his investigations on color; and it is probably altogether unique for a *savant* to be able, before one of the most distinguished scientific societies in the world, to refer to remarks which he made before the same society more than seventy years previously. Recently, M. Chevreul made a communication to the Académie des Sciences, and at its close he observed: "Moreover, gentlemen, the observation is not a new one to me. I had the honor to mention it here, at the meeting of the Académie des Sciences, on the 10th of May, 1812!"

THE MOREY PULVERIZER FOR DRY CRUSHING.

The Morey & Sperry Mining Machinery Company has recently modified the construction of the Howland pulverizer, and, with slight alterations in the design, has adapted it to dry as well as wet crushing. The principal change made consists, as shown in the accompanying section of the dry-crushing pulverizer, in the substitution of balls for rolls. Through the gearing *K K* the disk and cone *H* is rotated, carrying with it the balls *B*, which are carried by centrifugal force against the concave annular ring *C*, which is cast in one piece of chilled iron, or is made of rolled steel in the same way as locomotive tires. The balls are surrounded by cages or guards *A*, in which they play freely. To give them greater strength, they are connected by a heavy ring. At the points along which the balls slide over the disk, a piece of flat steel is dovetailed in, to protect it against wear. In dry crushing, the machine is covered with a hopper, to feed the machine, and air circulation is provided by a blower or a suction-fan, the air passing upward through an annular space behind the ring *C*.

THE CAREER OF PETER COOPER.

The venerable Peter Cooper, who died in this city after a brief illness, of pneumonia, on the 4th inst., was born on the 12th of February, 1791, his father being a hatter in this city, whose efforts in business were not successful, so that Peter, like the rest of the children, had to undergo many hardships during his youth and was denied the advantages of school except at intervals. His father moved from place to place a number of times, and engaged successively in keeping a country store at Peekskill, a hat-store, and a brewery, his son helping him in his work until he reached his seventeenth year, when he was apprenticed to a firm of carriage-makers in this city, with whom he remained until he was of age. During his four years of service, he had found work at carving wood for carriages, in which he became an expert. By doing this in his leisure hours, he was able to add to his slender income. The additional sums which he obtained he devoted to buying books and to paying for the services of a teacher in the evening. This period of his life taught him the value of evening schools, and it is said he then determined to devote his years to the accumulation of wealth, that he might found an institution where working boys and girls could find free instruction.

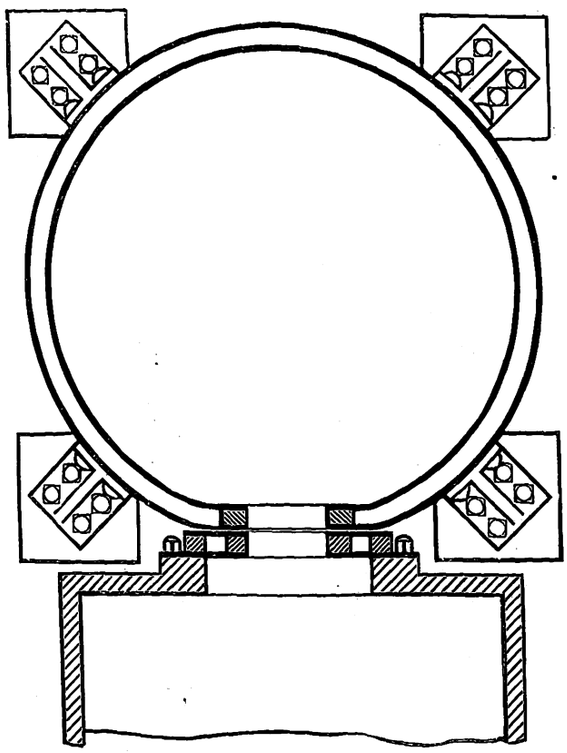


Fig. 2.—Horizontal Section Through Furnace.

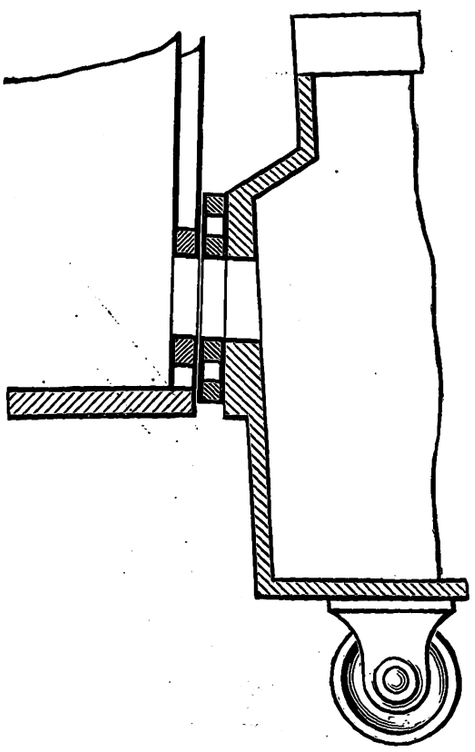


Fig. 3.—Vertical Section Through Furnace and Well.

He launched out in business after having worked in a woolen factory at Hempstead, Long Island, where he invented a machine for shearing the nap from cloth, from the sale of which he realized considerable money. Then he became a cabinet-maker, only to continue the business one year, when he sold out to open a grocery store, which he removed within a year after he opened it; and finally sold out this business to carry on a glue factory—six changes in nine years. This might be regarded as an evidence or instability and fickleness. But at every step there was a movement for the better. He lost no money; on the contrary, he constantly increased his accumulations. The last change was for a permanency. He continued his business in the same place for twenty-five years; and when he finally made an alteration, it was only to build a larger factory on cheaper ground, and to remain a glue manufacturer until he died.

Ten years of this business had made him a rich man, as wealth was measured fifty years ago. He had accumulated a large surplus capital available for investment. One day, two men proposed to him that the three make a purchase of land in Baltimore, and offered him a third interest in 3000 acres at a price of $103,000. The land was within the city limits, and took in the whole shore from Pell's Point dock for a dis-

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tance of three miles. Mr. Cooper paid his part of the purchase-money, but soon discovered that neither of his partners had paid any thing. He offered them $10,000 to withdraw, and they accepted it. The land was unprofitable; and in order to get a return for the investment, he built iron-works on the ground. He owned 400 or 500 tons of iron ore at Lazaretto Point, and determined to cut off the wood from the land and make charcoal iron. He built a rolling-mill and constructed furnaces twenty feet in diameter.

Those were the early days of railroads in America. Not a single locomotive had been constructed here. The Baltimore & Ohio Railroad Company had built only thirteen miles of its road, and was having so much difficulty with sharp curves as to think of abandoning the whole project. In the first year, they had expended all the subscribed stock, and the stockholders, thoroughly discouraged, had refused to pay any more. Mr. Cooper came to their aid by building a locomotive that would run on curves. When it was completed, he attached it to an open box-car, and with himself as engineer gave the directors a ride over the thirteen miles of road, covering the distance in one hour and twenty minutes; the returning trip was made in fifty-seven minutes. This decided the fortunes of the road, and it was then completed.

Mr. Cooper sold his Baltimore property to two capitalists, who formed the Canton Iron-Works, in the stock of which Mr. Cooper took a considerable part of the amount due him. The stock was taken at $44 per share, the par value being $100. It rapidly rose until it reached a valuation of $230 per share, when Mr. Cooper sold his interest. In New York, he built iron-works in Fourth avenue, near his glue factory, and during the next two or three years manufactured large quantities of wire. The mill, however, was used mainly in puddling and rolling iron. He then removed the iron-mill in Fourth avenue to Trenton, where he put up additional iron factories. He was the first person to manufacture railroad iron in this country. In planning his future "Cooper Union," he desired it to be fire-proof, but was unable to obtain the necessary iron beams. He then expended $75,000 in machinery for rolling beams such as are now used in building, being also the first person in the country to engage in this enterprise.

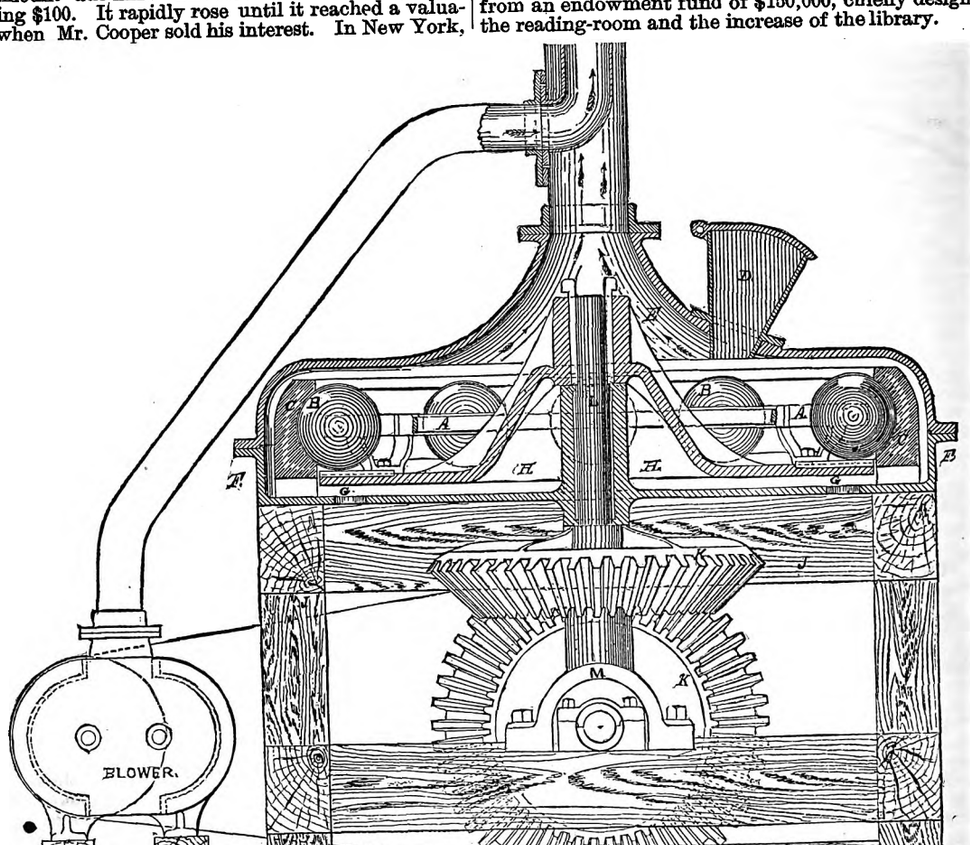
The Trenton venture proved successful, and the works were enlarged from time to time until they have become very extensive. At Phillipsburg, Pa., he built three large blast-furnaces, and he bought the Durham furnace, three miles from Trenton. The production of his mills was not confined to building and railroad iron, but included various kinds of wire, such as he had made in New York, and many other manufactures of iron. For the Durham furnaces, he paid $260,000. He also bought the Andover iron mines; and to transport the ore to his factory, he built a railroad eight miles in length over a rough country, on which he could transport 40,000 tons a year.

Mr. Cooper took an active interest in the development of the telegraph and cable system, being identified with a number of the earlier enterprises.

Twenty-five years ago, the foundation-stone to the Cooper Union was laid, and thus the enterprise realized which had been the aim of his life. A scroll was buried with the corner-stone, which bore the inscription: "The great object that I desire to accomplish by the erection of this Institution is to open the avenues of scientific knowledge to the youth of our city and country, and so unfold the volume of nature that the young may see the beauties of creation, enjoy its blessings, and learn to love the Author from whom cometh every good and perfect gift."

The school was "to be forever devoted to the union of science and art in their application to the useful purposes of life." Five years passed before the building was finished. It is a brownstone and iron structure, thoroughly fire-proof, of massive Roman architecture, an irregular quadrangle in shape, having dimensions on its four sides of 90, 146, 165, and 195 feet. Its original cost, exclusive of the site, which had been purchased about twenty-five years before for this very purpose, was $964,000. In 1869, Mr. Cooper gave a deed of trust of the property to a board of trustees, consisting of Mr. Cooper as president, Daniel F. Tiemann, Edward Cooper, Wilson G. Hunt, John E. Parsons, and Abram S. Hewitt. In the same year, $10,000 were given to meet the immediate wants of the institution, and $20,000 for the establishment of a museum. Other gifts made a total of $700,000.

Of the splendid success of the institution in supplying the want which it was intended to meet, a recent annual report of the curator gave ample evidence. Every department was full to overflowing. More than 3000 pupils had entered the various classes. Between 400 and 500 applications had been put on file, to await the retirement of those who already held places in the classes. The instruction and lectures which these pupils enjoyed were given to them absolutely without charge. The expenses of the various departments amounted to $50,769, all of which was derived from the rent of stores and offices occupying three stories of the building, from the rents of the larger and smaller halls for public meetings, and from an endowment fund of $150,000, chiefly designed for the support of the reading-room and the increase of the library.



THE MOREY PULVERIZER, FOR DRY CRUSHING.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

Bessemerizing Copper Matte in a Reverberatory Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In response to Mr. Howe's article in your issue of March 17th, allow me to state the following concerning my suggestions as to a modified plan of copper smelting.

The facts which caused me to think of my plan were the following: In the second volume of *Jern Kontorets Annaler*, 1882, translated in the *Berg- und Hüttenmännische Zeitung* the same year, Dr. A. Tamm, of Stockholm, describes how copper matte was successfully treated in a converter at Eguilles, in France, when he was there in 1881. Dr. Tamm says, page 115: The temperature is raised during the process by the oxidation of the sulphur and the iron, this being indicated by a brighter color of the tapped product. In 1881, successful experiments were carried out at Kohlsva, in Sweden, in order to make steel in an open-hearth furnace, by blowing air on the surface of the molten pig-iron. These experiments had been suggested some two or three years before by Magnus Lindberg. These two facts suggested that, if it is possible to make steel in a converter as well as in an open-hearth furnace, and if copper matte can be bessemerized in a converter, the latter can be treated also in an open-hearth furnace. The latter method ought to be better for matte, because the slag can be skimmed off and the fluxing substances be put in. To oxidize a product in an open-hearth furnace by blast through inclining tuyeres is, as Mr. Howe knows, not new. In copper smelting they

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employ in Germany and Hungary a so-called "spleiss-öfen," in which an impure coarse copper is treated by blast acting through inclined tuyeres on the surface of the bath, causing sulphur and arsenic to pass away as gaseous products, and scorifying iron, lead, tin, etc. In England, in many blister furnaces, two inclining holes are provided at each side of the furnace, near the fire-bridge, allowing the air to strike the surface of the bath, thus causing a more vigorous oxidation of the metal than when the air enters the side-door. It is obvious that this latter method is unsatisfactory. To propose heating by gas (as is now generally done in the metallurgy of iron), for the treatment of matte for blister copper, is very natural, considering that the main point in this process is a strong oxidizing flame, which is more slowly and incompletely obtained by employing a common coal furnace. The two facts, the successful treatment of copper matte in a converter in France, and the successful treatment of pig-iron for steel in an open-hearth furnace by blast through inclined tuyeres at Kohlsva, in Sweden, combined with the easily-regulated flame gained by employing gas-furnaces, were the only causes of my proposition to treat copper matte in the manner described by me.

I will now proceed to Mr. Howe's four points. When Mr. Howe read my plan and came to the two working-doors, he ought to have observed that in my description the working-doors were situated *opposite* each other, in the *middle* of the sides of the furnace. During all the time I was at Bergen Point, there was no smelting-furnace that had such doors. This had a natural cause, the furnaces being common draught-furnaces fired with coal, with one door at the side and the other at the end of the furnace. Mr. Howe thought, probably, that I was thinking of the ore reverberatory smelting-furnaces in England, where there is no need of more than one door below the flue. Mr. Howe had also a wrong idea about the two arches with a space between them. I proposed that the two arches with a space between them should go all along over the furnace. Not long ago, a beginning was made in using these furnaces in treating iron; but I do not believe that a single furnace built in this way is used in copper smelting. The so-called double arches of the furnaces at Bergen Point are only above and around the fire-place. Mr. Howe's fourth remark concerns the tuyeres. As for placing them, I can find no other reasonable way than that I proposed. As I hear from Mr. Howe, he has also tried to have them immersed and horizontal. I would not at all advise this in my plan, because, when I shut off the blast, to skim the furnace, the tuyeres would only be clogged up. If Mr. Howe will ask Mr. Gibb, Manager of the Elizabeth Copper-Works, he will tell him that he, many years ago, in England, made experiments by blowing air through inclined tuyeres on sulphide of copper, in order to hasten the oxidation. As Mr. Howe may thus see, there is nothing new in treating copper matte in a reverberatory furnace by inclined tuyeres. But I believe that no one has tried or proposed to treat copper matte as I have described it in the ENGINEERING AND MINING JOURNAL of March 3d, in a gas-furnace, using water-cooled inclined movable tuyeres. This combination I, for my part, consider to be an essential condition for the successful execution of the process. PAUL JOHNSSON.

ISHPEMING, MICH., March 26, 1883.

We have made room in the above, in fairness to Mr. Paul Johnsson, to extracts from a long letter written to us by him, so far as he raises points of technical interest. In other portions of his communication, he alleges that he spoke to different officers of the Orford Nickel and Copper Company of his plans before he knew of the fact that they had experimented in the same direction or was acquainted with the details. As this part of the subject is not one on which a discussion is likely to interest the readers of the ENGINEERING AND MINING JOURNAL, we dismiss it.—EDITOR E. AND M. J.

Rotary Pump.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Can you inform me who manufactures a centrifugal pump capable of forcing water 100 feet perpendicularly? I have seen such a pump of French manufacture working on the island of Cuba, throwing water 110 feet, and running at a speed of 400 revolutions per minute. C. B.

MANHATTANVILLE, March 31.

THE CHEMISTRY OF THE BESSEMER CONVERTER.

On March 10th, Mr. J. E. Stead, F.I.C., F.C.S., the eminent metallurgical chemist, of the well-known firm of Pattinson & Stead, delivered an interesting lecture before the Cleveland Iron Trade Foremen's Association, Middlesborough.

The lecturer began by saying that the Bessemer converter was by far the most important metallurgical instrument of modern times. It had become even more important during the last few years since the discovery and practical development of the basic process, commonly called the Thomas-Gilchrist process, from the names of the inventors. By means of that system, as is well known, immense quantities of phosphoric pig-iron which have before been deemed to be unsuitable for making steel have been rendered in a commercial as well as chemical sense available for the Bessemer process. This fact—for, notwithstanding the contrary opinions of some authorities, it is a fact—is of special importance to such districts as that of Cleveland, where there is made annually an enormous quantity of phosphoric pig-iron, which might, by means of the new system, be converted into excellent steel.

Before entering upon the chemical details, Mr. Stead exhibited a series of views showing various kinds of Bessemer plants. These were, first, the ordinary old-fashioned English Bessemer pit, with a converter on each side, blowing in opposite directions; secondly, a more detailed view of the converter, with plan of plug and arrangement of tuyeres; thirdly, a plan of the Barrow Hematite Iron and Steel-Works; fourthly, a plan of the steel-works at Rhymney, South Wales, where the converters are side by side, and blowing in the same direction. The lecturer pointed out the great convenience of the Rhymney plant, where the blown metal, after being converted into steel and run into a ladle, is conveyed upon a carriage away from the hot converting-house to the casting-house, where the center crane has the full sweep of its radius for casting. He then exhibited a section of a basic Bessemer converter of the latest type, showing how its shape differs from that of the ordinary vessel, especially as regards the even taper from the body of the vessel to the nose, instead of the turned nose of the old-fashioned converter. This alteration has been made because it has been found by experience that, during the basic process, the quantity of slag and other things thrown out collected at the mouth of the vessel, and nearly choked it up. It is in the lining of the vessel that the first departure from the ordinary Bessemer process is noticeable in the basic system. The material for lining the ordinary vessel is ganister, the composition of which is as follows:

	Sheffield ganister. No. 1.		Sheffield ganister. No. 2.		Good mixture. No. 3.	
Silica	85·0 to		92·0	per cent.	91·20	per cent.
Alumina	4·0	"	8·0	"	6·00	"
Peroxide of iron	1·5	"	2·5	"	1·70	"
Lime	·1	"	·3	"	·25	"
Oxide of magnesia	·3	"	·5	"	·25	"
Potassa	·2	"	·6	"	·28	"
Soda	·3	"	·4	"	·32	"

What is wanted is a substance which will resist the action of very high heats, and be of such a plastic nature, when damp, as to hold together when placed in the converter. Thus it is very necessary to have about 6 per cent of alumina in the mixture, or otherwise it is too sandy, and is a useless lining. It is very important that, in choosing a ganister, only such stones as are very free from the alkalies, potash and soda, are selected, because these bodies, when present only in moderately large quantities, so affect the refractory properties of the bricks as to make them readily fusible at a high temperature.

	Durham ganister.		Durham fire-clay.	
Silica	97.81	per cent.	69·18	per cent.
Alumina	1·50	"	25·90	"
Peroxide of iron	·35	"	2·50	"
Lime	·10	"	·36	"
Oxide of magnesia	·15	"	·41	"
Potassa	·16	"	1·20	"
Soda	·11	"	·45	"

In the Durham ganister, there is only 1·5 per cent of alumina. This is not enough, and such ganister is unsuitable for lining converters. The fire-clay has 26 per cent of alumina, but only 69 per cent of silica. This again will not do, because it melts away almost like treacle, because of the large quantity of potassa (KO_2) and soda (Na_2O) A suitable mixture of the two, however, does very well, and such mixtures are commonly used in the Middlesborough and other districts. In a Bessemer converter which has been used for some time blowing ordinary hematite iron, the lining, although worn away in some places, actually increases in thickness in others, large masses of very refractory slag collecting on the sides of the vessel, which it is necessary to chip off at the end of the week when the vessels are cold. This is no exceptional thing, but very common. The analysis of the material used for lining the vessels working on the basic system is as follows:

	Basic linings.			Basic linings.	
Lime	49·91	per cent.	Oxide of iron	3·46	per cent.
Magnesia	30·72	"	Silica	11·41	"
Alumina	4·50	"		100·00	"

The noticeable feature of this is, that whereas, in the ganister or acid lining, the predominating constituent is silica, in the basic lining there is only 11 per cent of silica, the great bulk of the material being lime and magnesia. Different experimenters have experienced difficulty in using ordinary lime or limestone as refractory lining; but Messrs. Thomas and Gilchrist have succeeded at last in making a basic lining that stands well. There are two or three ways of making good basic linings. The chief one is as follows: Finely-ground magnesian limestone is molded into bricks, which are then calcined in a kiln until all the carbonic acid is expelled, and the substance has shrunk down to about half its original bulk; but they are in this stage ugly, shapeless things, quite unfit for building up a lining, so they are taken to a mill and ground up to a rough powder. This powder is mixed with from 9 to 10 per cent of boiled coal-tar, that is, tar from which the water has been all removed. If any quantity of water remains, the lining is liable to burst, owing to the slacking and consequent expansion of the lime in the composition. This mixture of tar and basic material is thrown in plastic lumps into an annular space, which is formed in the interior of the vessel by the introduction of a cast-iron shell, within which a fire is placed. The basic material, as soon as it becomes hot, melts and naturally fills up the annular space, and becomes quite solid after prolonged heating. Another method is to make bricks of this plastic material in either cast or wrought-iron molds, which, while in their molds, are placed in an oven and baked, when the tar is coked and the material becomes converted into solid bricks. After cooling, the mold is removed, and the bricks of perfect shape are simply built around the inside of the converter without any mortar whatever. When the vessel is ready, molten pig is run in, and the converter being turned up, the blow begins. The following are analyses of the metal charged during the ordinary acidic process:

	Metal used 15 years ago.			Metal used now.	
Carbon	3·50 to 4·00	per cent.		3·00 to 4·00	per cent.
Manganese	·10 " 1·00	"		·10 " 1·00	"
Silicon	2·00 " 3·00	"		2·00 " 3·00	"
Sulphur	·01 " ·05	"		·05 " ·15	"
Phosphorus	·03 " ·10	"		·03 " ·10	"

Many years ago, only such spiegeleisen as contained between 9 and 10 per cent of manganese was available for Bessemer purposes, and the amount of manganese which it was possible to add without making the steel too hard was limited. Consequently the metal was required to be particularly low in sulphur; for it is a well-known fact that the effect of sulphur upon steel is to make it red-short, so that it breaks when rolling. Manganese has precisely the reverse effect. The quantity of the latter required to neutralize the injurious effect of sulphur is from six to eight times its weight; and the old German spiegeleisen being capable only of adding from ·35 to ·4 per cent of manganese, it is clear that the metal, to work well, should not contain more than ·05 per cent of sulphur. At the present time, however, since the manufacture of better class English spiegeleisen, as much as 20 per cent of manganese is obtained, and, by increasing the proportion of manganese added to the steel, a very much

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larger quantity of sulphur is admissible. Hence it possible to make excellent steel now with metal which a few years ago would have been condemned as utterly unsuitable for Bessemer purposes. During the blow, the object is to remove from the iron its silicon and its excess of carbon, so as to convert it into malleable steel. If it were possible to arrange matters with ordinary hematite pig-iron so that the exact quantities of carbon and other things could be left in the blown metal, it would be a good thing; but this can not be done, and therefore all the carbon must be blown out first of all, and afterward, by the addition of spiegeleisen, it must be replaced in proper proportion. Thus the first object is to rid the metal of its carbon and silicon, which is performed in from twenty to twenty-five minutes. The following is an approximate table of the decline in the percentage of carbon during the blowing:

		At the start.	After 5 min.	10 min.	15 min.	20 min.	25 min.
Carbon.....	Per cent...	3·50	3·60	3·3	3·25	2·00	Trace
Silicon..	" ..	2·25	1·00	0·5	0·20	0·10	Trace
Manganese..	" ..	1·00	0·35	0·2	Trace	....	.....

Thus it will be seen that the manganese all goes in fifteen minutes; the silicon begins to go immediately, and continues to burn away at about the same rate throughout; while the carbon does not begin to diminish appreciably until all the manganese has gone, and nearly all the silicon. At first, it seems as though the carbon increases, but this is not so; the carbon remains about the same in amount, and, as the quantity of other things diminishes, its proportion to the whole is of course increased. The following is a table similar to the foregoing, showing the action when very siliceous pig-iron is used:

		At the start.	After 5 min.	10 min.	15 min.	20 min.	25 min.
Carbon.....(per cent)..		3·50	3·60	3·30	2·5	1·0	trace
Silicon	" ..	3·00	1·75	0·25	0·9	0·7	0·5
Manganese..	" ..	0·75	0·25	Trace	....	...	...

Here again it will be seen that the manganese disappears first; the silicon begins at once to go rapidly—so rapidly, indeed, that the very great heat causes the carbon to commence to burn away sooner than usual, and the carbon disappears almost while there is a small percentage of silicon yet remaining. This is what was called a hot-blow; and it is desirable, during a heat of this kind, to add cold material. With such metal as this, the blower is able from previous knowledge to ascertain, a considerable time before the end of the process, that the temperature is going to be excessive, and in such cases he reduces the temperature by the addition of cold scrap or pig metal. When the temperature is not excessive, the silicon entirely disappears before the carbon; consequently the whole of the oxygen entering at the bottom of the bath goes to burn the last traces of carbon, which is therefore very rapidly effected, and the large flame of carbonic oxide at the mouth of the vessel suddenly drops, indicating at once to the blower that the operation is ended. But when silicon is present during the elimination of the last traces of carbon, the flame does not drop so suddenly; for the oxygen is then divided in its action between silicon and carbon; consequently the burning of the last parts of carbon is not so rapid, and the flame, instead of falling suddenly, fades gradually away. When this happens, the blower knows that he has silicon left in the bath, and continues to blow until dense brown fumes appear, which is an indication that the oxygen entering at the tuyeres, after burning all the silicon, is beginning to burn the iron. The sulphur and the phosphorus in the ordinary acidic process are not affected to any extent; they apparently increase; but this is only relative, and is owing to the disappearance of the other ingredients. It will be observed from the foregoing remarks that, as the temperature of the metal increases, the relative attractions of silicon and carbon for oxygen approach each other. At first, when the metal is cool, the whole of the oxygen, practically speaking, is taken up by oxidizing silicon; but after a certain period, when the temperature is considerably increased, the carbon begins to burn along with the silicon, and toward the end of the blow it will be seen, from the analysis of the siliceous blow, that the attraction of carbon for oxygen is as great as or greater than that of silicon. This question of temperature is of the very greatest importance in making steel castings free from blow-holes; for if the carbon has a greater attraction for oxygen than silicon has, the addition of silicon to the bath, for the purpose of producing sound steel, will be of no benefit whatever, and the so-called Terrenoire process of making sound castings must necessarily depend as much upon the correct temperature of the metal as upon the chemical constituents. Mr. Stead strongly advises that very much greater attention be paid to the proper adjustment of temperature at the time of casting, in order that uniformly solid and homogeneous steel may be produced. The following tables show the changes which take place when metal containing about 3 per cent manganese is used:

		At the start.	After 5 min.	10 min.	15 min.	20 min.	25 min.
Carbon	Per cent.	3·52	3·60	3·30	2·50	1·00	Trace
Manganese....	"	3·00	2·00	1·25	0·75	0·65	0·35
Silicon.....	"	1·25	0·60	0·20	0·10	Trace	.....

It will be seen from this that a considerable quantity of manganese remains in the steel at the end of the blow after all the carbon is removed; and in practice, where such metal is used, they can, by the aid of the spectroscope and by taking samples of the slag and metal a few minutes before the perfect elimination of the carbon, ascertain exactly when the proper proportion of carbon remains, at which point the metal is simply poured out of the ladle and cast in the ordinary way, no addition whatever of spiegeleisen being necessary. As manganese in burning gives out a considerable amount of heat, it is not necessary, when it is present, to have more than half the usual quantity of silicon in order to give the heat necessary for the proper conduct of the process.

Mr. Stead, turning his attention to the basic process, gives the following table, showing the composition of the metals commonly used in that process:

METALS FOR BASIC PROCESS.

	No. 1.	No. 2.
Carbon	3·35 per cent.	3·50 per cent.
Manganese	·60 "	1·00 "
Silicon	1·30 "	1·00 "
Sulphur	·15 "	·12 "
Phosphorus	1·75 "	2·75 "

The special difference between this metal and that which is charged in the ordinary converter is the large percentage of phosphorus; and it is to effect the removal of this element that the basic system was called into existence. When the metal is charged into the vessel, from 15 to 17 per cent of well-burned lime is also put in, for the purpose of absorbing the silica and phosphoric acid produced by the oxidation of silicon and phosphorus, which, if no lime were present, would assert themselves by eating away the lining of the converter, which would in such a case be rapidly destroyed. The following table gives the approximate rates at which the various substances disappear from phosphoric pig-iron during the blow:

		At the start.	After 5 min.	10 min.	15 min.	18 min.
Carbon	Per cent.	3·50	3·55	2·35	0·07	Trace
Silicon....	"	1·50	0·50	0·09	Trace	.....
Manganese..	"	0·71	0·56	0·27	0·12	Trace
Phosphorus.....	"	1·57	1·60	1·43	1·22	0·08
Sulphur...	"	0·16	0·14	0.13	0·12	0·10

From this it will be seen that, as in the ordinary acid process, the carbon at first increases slightly, and afterward rapidly burns away, while the silicon is speedily eliminated during the first few minutes of the blow. The manganese also is burnt out before the end of the operation, but not quite as rapidly as in the acid-lined vessel. Practically, no phosphorus is eliminated until the whole of the carbon has been removed. The reactions which really take place in the basic process have been very carefully and systematically investigated, and are of great interest to those concerned in the chemistry of the process. The Bessemer converter had always been classed as a great oxidizing apparatus, and, looking at it as a whole, it is so; but it would be quite as logical to state that the blast-furnace, which all consider to be a reducing machine, is also an oxidizing apparatus. The fact is, that both are oxidizing and reducing. In the blast-furnace, the oxygen entering in at the tuyeres oxidizes the carbon in the coke, producing heat; but in the higher reaches of the furnace, the gases so formed, and the unoxidized carbon, are very powerful reducing agents, and effect perfect reduction of the iron ore charged. In the Bessemer converter, there is also a lower or oxidizing part and an upper reducing region. At the lower part, near the tuyeres, the oxygen rapidly enters into combination, not, as some would suppose, with the elements exactly as in the order shown in the ultimate analytical tables, but with the whole of the constituents all together, in the proportion in which they are present, producing a very highly basic oxide of iron cinder. This cinder, passing upward through the column of metal, which, owing to the rushing of air through it, is in violent agitation, reacts upon the silicon and manganese, and at the same time also upon phosphorus, producing silicate of iron, silicate of manganese, and phosphate of iron. As the cinder is more and more intimately brought into contact with fresh portions of metal, the greater part of the oxide of iron is reduced, the iron returning to the bath at the same time that the silicon and manganese are oxidized. These reactions may very briefly be described by means of chemical symbols; thus:

1. $Air + Fe_n = FeO_n + N$
2. $2FeO + Si = SiO_2 + Fe_2$
3. $FeO + Mn = MnO + Fe$
4. $6FeO + 2P = FeO,P_2O_5 + 5Fe$
5. $FeO,P_2O_5 + 6C = Fe + P_2 + 6CO$
6. $FeO,P_2O + 3Si = 3SiO_2 + P_2 + Fe$

It will be seen from the last two reactions, Nos. 5 and 6, that, as long as carbon and silicon are in the bath, there being a large head of metal over the tuyeres, practically no phosphorus can be eliminated. If, however, the bath were shallow, or the tuyeres were caused to inject air forcibly upon the surface of the metal, there being on the surface at the same time a quantity of lime, ready to absorb any silicic or phosphoric acid produced, the phosphorus might be and has been perfectly removed before the elimination of the carbon. Thus, at the Blaenavon Works, where Messrs. Thomas and Gilchrist made their first experiments in a stationary converter in which the tuyeres were certainly not more than a few inches from the surface of the metal, in almost every case the whole, or at least a very great proportion, of the phosphorus was eliminated by the time that the last portions of carbon were removed from the bath. The question might be asked, why the oxide of iron produced by surface oxidation is not reduced, remembering that the metal during the blowing process must necessarily be in a violent state of agitation, and therefore brought into intimate contact with the cinder formed at the surface. The explanation is very simple. When the phosphate of iron is formed at the top of the bath, it instantly afterward comes in contact with the highly-heated lime, which completely decomposes it, phosphate of iron and lime reacting on each other and forming phosphate of lime and free oxide of iron, and this phosphate of lime is incapable of reduction by the carbon in iron or by carbonic oxide gas. Hence no reduction takes place. From the point of the termination of blowing forward, the operations in the acid and basic processes are similar; only in the case of basic steel, the greater part of the surplus oxygen contained in the bath is removed by Mr. E. W. Richards's process of adding fluid hematite pig-iron containing silicon. To the blown metal is added spiegeleisen, by means of which the necessary carbon and manganese are put back into the metal (and by means of which, in the case of acidic steel, the surplus oxygen is also removed), which is thereby converted into malleable steel. The following are analyses of spiegeleisen:

	Old German.	New English.
Carbon.....	4·50 per cent.	5·20 per cent.
Manganese.....	10·00 "	20·00 "
Silicon.....	·50 "	·50 "
Sulphur.....	Trace	Trace
Phosphorus...	·10 "	·10 "

The reason why phosphorus can not be removed in the ordinary silica or acid converter is made perfectly clear by the following equations:

$$3CaO,P_2O_5 + 3SiO_2 = 3CaO,SiO_2 + P_2O_5$$
$$FeO,P_2O_5 + SiO_2 = FeO,SiO_2 + P_2O_5$$
$$P_2O_5 + 5Fe = 5FeO + P_2$$

These reactions show that phosphate of iron or lime, if found in the presence of silica, is decomposed, silicate of iron or lime being formed, and free phosphoric acid being produced. But this free phosphoric acid can not exist as such, but is reduced, not only by the carbon and silicon, but even by the metallic iron itself. If a rod of pure iron is simply dipped in phos

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phoric acid, and heated to redness while in contact with it, a fusible drop of phosphide of iron forms at the extremity of the rod. Comparative analyses of the slags produced in the two processes are as follows:

	Ordinary slag.	Basic slag.
Protoxide of iron (FeO)	15·62 per cent.	9·13 per cent.
Peroxide " (Fe_2O_3)	1·57 "	.... "
Metallic iron (Fe)	.... "	.... "
Alumina (Al_2O_3)	1·02 "	2·10 "
Oxide of manganese (MnO)	5·33 "	4·32 "
Silica (SiO_2)	75·70 "	16·60 "
Lime (CaO)	0·94 "	47·08 "
Oxide of magnesia) MgO)	0·09 "	4·62 "
Sulphur (S)	0·01 "	0·12 "
Phosphoric Acid (P_2O_5)	Nil. "	16·03 "
Bases	14·57 per cent.	65·15 per cent.
Acids	75·71 "	34·85 "

A very great proportion of the present waste is due to projections from the nose of the vessel, which is liable to be carried away with the rubbish of the Bessemer house. An analysis of an accumulated mass of such projections yielded the following:

BESSEMER PROJECTIONS.

	Per cent.
Free iron (Fe)	70·30
Peroxide of iron (Fe_2O_3)	14·50
Manganese (Mn)	0·11
Carbon	1·01
Silicon	0·63
Sand	13·18
Phosphorus	0·05
Sulphur	0·06

According to careful analytical data, not more than 2 per cent of the metallic iron in the charge is actually burnt. If no loss occurs either in projections, scrap, or iron mechanically carried away entangled in the slag, the yield of steel should be 92·5 per cent of the metal charged. In practice, however, the yield averages from 3 to 4 per cent less than this. In the basic converter, the theoretical yield is about 2 per cent less than from the ordinary vessel; but in practice, owing to the large amount of slag produced, more particles of metallic iron are liable to be carried away with the slag, so that a yield of 85 per cent is considered very satisfactory. The comparative composition of basic steel and ordinary acidic steel is shown by the following analyses:

	Acid.	Basic.
Iron	98·33 per cent.	98·46 per cent.
Carbon	0·35 "	0.35 "
Manganese	1·11 "	1·01 "
Silicon	0·08 "	0·03 "
Sulphur	0·06 "	0·11 "
Phosphorus	0·05 "	0·04 "
Copper	0.02 "	Trace

From these it will be seen that the steel produced is very similar in both cases. The basic process is making rapid progress in a commercial sense, not so much in England (although there are several new works arranging for the process near completion) as on the continent. Mr. Gilchrist, one of the patentees, has recently estimated that the make of that steel last year every where was about half a million tons, and that the make of the forthcoming year will probably be double that quantity.

SOME CAUSES OF RED-SHORTNESS AND COLD-SHORTNESS IN IRON.*

By William Metcalf.

I do not propose to discuss the well-known red-shortness and cold-shortness of iron caused by sulphur and phosphorus respectively, nor the well-known effect of oxygen in producing red-shortness in steel. In fact, the latter is not altogether proved. For instance, in walking through an establishment with my partner, where some large steel ingots were worked, we noticed that the ingots were unevenly heated in a sharp oxidizing flame, and the corners were cracking badly and being chipped in every ingot. Upon calling attention to the matter, one of the gentlemen in charge replied, "Oh! that is not burnt; that's sulphur." As the gentleman had been in the business several months, we meekly closed our mouths. On the contrary, Mr. Park, who has been noted as a steel-maker for more than twenty years, charged all of the evils in steel to "wind," during a discussion before this society.

For the purpose of provoking a discussion, I have prepared a table, of analyses, showing some odd results. After explaining the table, I hope the members will explain the results.

	Siemens Direct.		Dupuy Direct.	United States Series.		Lucy.		Titan.	
	Iron.	Steel.		Mn.	Phos.	Pig.	Muck	Pig.	Bar.
	1.	2.	3.	4.	5.	6.	7.	8.	9.
Silicon	·038	·004	·460	...	·048	·790	·142	2·170	·081
Phosphorus	trace	·011	·010	...	·435	·090	·032	·054	trace
Sulphur	·046	·016	·027	....	·002	·038	·003	·008	·015
Manganese	·000	·000	....	·694	·019	....	....	....	....
Copper	·030	·020	....	....	·003	....	....	·000	·010
		Estimate							
Carbon	·033	·300	....	2·36	·312	....	....	....	....
Dissolved oxide	·300	. ....		....	..	....	....	....	....
Oxides or cinder	.....	.....	·796	....	....	....	·113	....	....
Tensile strength	38,556	87,400	....	Tried for	Tried for				
	40,824	.....	....						
				Mn. 1·5 Carbon low.	P. ·5 Carbon low.				

No. 1 is an analysis of some Siemens direct iron, made at the Black Diamond Steel-Works. The two tensiles given were obtained, the first from the iron once hammered and rolled, the second from the iron twice hammered and rolled. This iron was excessively red-short.

No. 2 is steel made from No. 1 with no addition to the iron except a little manganese, and whatever carbon the pot may have given it. This steel was not at all red-short; and you will observe, by the tenacity, that it was not cold-short.

No. 3 is some Dupuy direct iron. This was excessively red-short. Steel made from this iron of about ·90 carbon, was not only not red-short, but it was remarkably strong and fine—the record says, quite equal to Jessup's Best and Black Diamond, which we happened to be criticising about that time.

Nos. 4 and 5 are steels made for the United States Test Board.

No. 4 was an effort to produce a manganese steel containing 1·5 per cent of Mn and carbon very low. You see how well we succeeded. This steel was very hot-short, and very cold-short, and not at all red-short. This proves that the Bessemer men are all right when they go in for manganese and lively rail-rolling.

No. 5 was one of a phosphorus series we tried to make. In this case, we aimed at P ·500 and C low. We were not so wide of the mark this time. This steel hammered well at a good heat.

A piece $1\frac{1}{4}\times\frac{1}{8}$ inches could not be hardened, and although little flakes could be knocked off easily with a hand-hammer, the whole bar would bend cold to a right angle before fracture. It was not hot-short, nor cold-short to excess, notwithstanding an amount of phosphorus that, to say the least of it, was large.

No. 6 is Lucy Bessemer pig, and No. 7 is the resulting muck iron. These analyses will bear close inspection for their good qualities, and yet No. 7 was the most extremely red-short bar of iron I ever saw. It was for that reason that it was analyzed. As 2 per cent of cinder and from ·023 to ·025 of sulphur are quite common in good neutral muck iron, this is the case of red-shortness I wish to have explained. No. 8 is Titan charcoal pig, and No. 9 is the resulting muck iron rolled down to $2\frac{1}{2}\times\frac{1}{4}$. This muck iron was very clean, granular, and highly lustrous in the fracture. It worked perfectly under the hammer, from welding to red heat. It looked hard, and I first thought it was a sort of puddled steel; but it proved to be dead soft; the more it was heated almost white and quenched, the softer it seemed to be. This bar was so cold-short that a piece a few inches long could be held in the fingers and crumbled to pieces on the anvil by light blows of a hand-hammer. It was for this reason that it was analyzed, in a search for the cause of the cold-shortness.

*Paper read before the Engineers' Society of Western Pennsylvania, March 16th, 1883.

PROGRESS IN SCIENCE AND THE ARTS.

An Electric Thermometer.—M. Becquerel has been engaged during the winter in experiments, the object of which was to ascertain whether snow had the effect of protecting the ground from frost. In carrying out these experiments, he pressed electricity into his service in a most ingenious manner. Before describing his apparatus, we may, however, state that the result of his experiments was as follows: That a covering of snow does not protect the soil and seed from freezing, but only hinders to a certain degree the too extensive radiation of heat from the soil, and is converted into water at 32 degrees, which sinks into the earth and somewhat raises its temperature. Also, that a heavy sod does more to protect the soil and raise its temperature than ever so thick a layer of snow. The experiments were carried out in the Jardin des Plantes, Paris, and in the following manner: Two covered wires of unlike metals—copper and iron—were soldered together at both ends, which were left uncovered for this purpose; otherwise they were covered their whole length, for the purpose of insulation, with gutta-percha and silk. On the soldered ends of these double wires being exposed to different temperatures, a current is generated in them, and the greater the difference in temperatures, the stronger the current; but the current ceases when both are exposed to the same temperature. This electric current was caused to act on a magnetic needle suspended so as to move freely over a graduated circle. The copper wire formed a vertical frame around the needle parallel to its normal direction. As long as both ends of the double wire are at the same temperature, the needle continues to point to the north, being subject only to the earth's magnetism; but as soon as there is any variation in temperature, the needle is sure to move instantly and take another position, which it will keep until some other change of temperature takes place. The application of this apparatus to the measurement of soil temperatures was made as follows: One of the soldered joints was buried in the earth to a depth at which it was desired to take the temperature, and the other end was put in a water-bath at any desired distance from the first. The temperature of the latter could be increased or diminished at pleasure, and was measured by a very sensitive thermometer. To ascertain the temperature in the soil where the other end was buried, is was only necessary to raise or lower the temperature of the water-bath until the magnetic needle stood at zero, and then read the thermometer.

FURNACE, MILL, AND FACTORY.

The Lancaster Manufacturing Company has been organized under the laws of the State of New York, with a capital stock of $250,000. The officers of the company are: James H. Lancaster, President; John Pickering, Treasurer and John Q. Maynard, Secretary. The facilities for manufacturing the Lancaster tools will now be considerably increased. The company has acquired the sole right to manufacture and sell in the United States and Canada the patented inventions of James H. Lancaster, consisting of stocks, dies, and adjustable pipe-guides; twin pipe-cutters with burr-scrapers; combined pipe and nut-wrench; combined pipe-cutter, wrench, and burr-scraper; combined punch, shear, wire-cutter, and anvil; pipe inside burr-reamers. Other improved tools will be added to this list from time to time.

The Hartman Steel Company, of Beaver Falls, Pa., has started a portion of the machinery in its new wire mill, and, according to present accounts, it is working very satisfactorily. The company has just placed contracts for its merchant steel and rod trains.

A new rolling-mill is in course of construction at Toledo, Ohio, by a company known as the Maumee Rolling-Mill Company, with $500,000 capital. H. S. Walbridge is President; I. Droege, Vice-President and General Manager; H. S. Worthington, Treasurer; E. H. Van Hoesen, Secretary. It expects to be in operation by the end of the year.

Forty rollers and heaters employed in the pudding-mill of the E. & G. Brooke Iron Company, at Birdsboro', have stopped work on account of a reduction in their wages ranging from 11 to 12½ per cent.

The St. Louis Ore and Steel Company, owner of the Vulcan Iron-Works, has taught the members in that city of the Amalgamated Association of Iron and Steel Workers a lesson. The result of it all will be the dissolution of the latter, as far as St. Louis is concerned. When the Vulcan, some time ago, announced a

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reduction of wages to these high-priced workmen, but not to others, they promptly struck and quit work. The company put new men on, and after a little time taught them their work. The company will not now employ union men on any terms.

It is expected that, at the meeting of stockholders of the Union Iron and Steel Company on April 14th, the announcement will be made that sufficient capital has been obtained to enable the company to reopen the mills. A creditors' meeting will be called soon after the stockholders' meeting, and those most interested believe that at that time the difficulties will all be settled. It is known that the company has a very large stock of pig-iron and ore on hand ; that the works are in excellent condition ; and that there are contracts holding good for a heavy output of rails.

The rebuilding of the Grasshopper mill at Youngstown, Ohio, and erection of all the machinery, have been completed, and it is running full time. With their mill, the Arms, Bell & Co. have more than sufficient capacity to roll the iron needed to supply all the nut and bolt machines operated by the company in both its establishments.

The Coosa Furnace Company has begun operations at Gadsden, Ala., on the Coosa River, and is building a 12-foot furnace. It is equipped with iron stoves, and is now about completed. This is an old furnace, that has been moved here from Terre Haute, Indiana. The intention is to use charcoal, but the furnace will first be put in blast with coke, which will be procured on the line of the Cincinnati Southern Railroad.

The Vesta Furnace, near Marietta, Lancaster County, Pa., owned and operated by Watts, Twells & Co. Limited, has had a most exceptionally good blast since December, 1881, when it was blown in; not a day's yield of iron has been lost, and it has turned out regularly nearly 1000 tons per month, not ten tons of which were under grade of No. 3. This furnace has now a most enviable reputation for the superior quality of the iron, both for mill and foundry use. Henry M. Watts & Son are making arrangements to put their Marietta furnace No. 1 in blast.

A sale has been closed for one of the heaviest rock-breakers ever built. It was a Buchanan, weighing 60,000 pounds, and was bought by the Park Commissioners.

Messrs. John A. Roebling, Sons & Co., recently sent from Trenton, N. J., to San Francisco, a wire rope, 1⅛ inches in diameter and over four miles long. It is for a cable street railroad in San Francisco, and it is asserted that it is the longest and heaviest rope wire ever made in the United States. The rope weighed about twenty-five tons, and was loaded on two flat cars, secured together by chains, in addition to the usual coupling.

The Cummer Engine Company, Cleveland, Ohio, is now fairly under way in all departments, and its present capacity is crowded to its fullest extent to fill the orders. The company employs about 175 men, and will gradually increase its force to 300 men, the full capacity of its present plant. The factory, when completed and equipped, will consist of two molding-rooms, 360 by 80 feet, and a machine-shop 400 by 60 feet, two stories. Altogether the buildings and grounds will be 400 by 350 feet, and accommodate 500 workmen.

There is a strike among the puddlers and helpers at the Pencoyd Iron-Works, West Manayunk, Pa., owing to the attempt of the company to reduce the scale of wages from $4.25 per ton to $3.75.

At Shawnee, Ohio, the New York is doing nothing, and the XX is doing next to nothing. The Mauley is loading from four to six cars a day. The Shawnee Coal and Iron Company has shipped 8000 tons more coal during the past three months than during the corresponding period of 1882. The Fanny furnace has been operating one stack very successfully since the February rains, which supplied the needed water.

The Columbus & Hocking Coal and Iron Company, at Columbus, Ohio, with its fifteen mines, seven furnaces, and ten stores, is just closing the first month's operations under the new *régime*. Only three of the furnaces have been in operation ; but these are now very busy in filling the company's orders. The coal trade has of course been light ; but Mr. Longstreth, who has charge of the coal department, and Mr. Crafts, the superintendent of the iron department, are each looking into and systematizing the details of their respective departments, in order to be in good shape for business when the lake season opens.

The Hercules Iron-Works, of Chicago, have just shipped to the Streator, Ill., coal mines two of the Murphy Champion ventilators.

The Chicago Rawhide Manufacturing Company's goods are becoming widely known. On the 14th of March, it shipped a large invoice of its rawhide leather belting to Sydney, Australia.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following patents were issued by the General Land-Office under date of April 1st, 1883 :

ARIZONA.

TUCSON DISTRICT.

Marshall Blinn, Shorty and Ecstasy lodes.

CALIFORNIA.

HUMBOLDT DISTRICT.

Stone Lagoon Gold Mining Company, placer.

MARYSVILLE DISTRICT.

John Stokes, placer. Isaac W. Kitchen, Carlton placer. William Hooper, Sand Bluff gravel placer.

SACRAMENTO DISTRICT.

George E. Williams, Long quartz mines. James O. Groves, Groves gold quartz mine. Philip Molter, Mammoth placer. S. C. Farnham, Farnham gold quartz mine.

SAN FRANCISCO DISTRICT.

Samuel Schwartz, El Devisadero lode. Nathan Goldtree, El Salto mine.

STOCKTON DISTRICT.

William H. Guion, Bonita quartz mine and mill-site.

SUSANVILLE DISTRICT.

G. W. Meylert *et al.*, Nigger Gulch placer mine.

COLORADO.

CENTRAL CITY DISTRICT.

S. E. Gordon, Keystone lode. Michael J. McKinley *et al.*, Little Max lode. William Linsley, Next President lode. George W. Cox *et al.*, Bismarck lode. Cascade Mining and Development Mining Company, Prussian lode. Dennis Faiore *et al.*, Calvin lode. George W. Cox *et al.*, Cataract lode. Cascade Mining and Development Company, Magna lode. Consolidated Mining and Development Company, Comanche lode.

DURANGO DISTRICT.

C. H. Byfield *et al.*, Franklin lode. George U. Ingersoll *et al.*, Dives lode.

LAKE CITY DISTRICT.

John L. Kinsey *et al.*, Mountain View lode. Philip N. Nicholas, Lulu lode. James F. Steinbeck *et al.*, Fannie lode.

LEADVILLE DISTRICT.

Oliver C. Obey *et al.*, Sierra Nevada lode. Stephen H. Pease *et al.*, Little Earl and What Is It lodes. Ephraim C. Gilman *et al.*, New York lode. Liverpool Gold and Silver Mining Company, Centennial lode. C. W. Baker, Flume lode. Colorado Consolidated Mining Company, Oriental and Rattler lodes. Silver Cord Combination Mining Company, Silver Cord and Eagle lodes. S. W. Miller, Victory lode. Ballarat Mining Company, Tip Top and Ballarat lodes. Dyer Mining Company, Dyer and Hawthorne lodes. Gilbert W. Packer, Pacific lode. Charles T. Limberg *et al.*, Mystic lode. Robert J. Coleman *et al.*, Warrior and Rams lodes. Charles B. Farwell (trustee), Mineral Fame lode. A. C. Spencer, Bonanza King lode. Coal patent for Strong P. Johnson.

PUEBLO DISTRICT.

George P. Gould *et al.*, Elematah lode. James H. Kerr, Little Horn lode. Wet Mountain Mining Company, North half of the Silver Cliff lode. Consolidated Mining Company of Seven Mines, Black Cloud, Dover, and Donnelly lodes.

MONTANA.

HELENA DISTRICT.

William Chumrasero *et al.*, Hamlet lode. Anthony H. Hedley *et al.*, Adirondack lode. James A. Talbott *et al.*, Broker lode. George H. Long *et al.*, Tecumseh lode.

NEVADA.

EUREKA DISTRICT.

A. McMahon *et al.*, Magnolia lode. A. L. Fitzgerald, Don Ricardo lode and mill-site.

OREGON.

LE GRAND DISTRICT.

James P. Faull, Faull quartz mine.

UTAH.

SALT LAKE DISTRICT.

William H. Menerary *et al.*, Brooklyn lode. John J. Daly, Winooka lode. Frederick Auerbach, Sentinel lode. Apex Mining Company, Brave Columbia, Monroe Doctrine, Constitution, Cumberland and Hanna lodes. Joseph Pugsley, coal. Philip Pugsley, Jr., coal. Richard A. Margett, coal. Joseph S. Barlow, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

LIMA CONSOLIDATED.—This company owns three locations, the Green Cloud, the Lima, and a fragment called the Old Necomis. Considerable work has been done on the two former claims. The shaft has attained a depth of 265 feet, and is sunk on the ledge. This ledge has the very same direction as the Grand Central and Contention mines, nearly north and south. Four levels have been started, at 85, 135, 190, and 250 feet, from each of which drifts have been run in on the ledge, that on the 135-foot level being run 60 feet north and the same distance south. The ledge from the surface down shows good and strong, and, as depth is attained, widens out, until, at the 250-foot level, it is five feet in width. From the bottom of the shaft, ore was hoisted, and from the north drift, 250-foot level. The ore, which is mixed with a good percentage of manganese, contains chloride and horn-silver, and a fair average of the ledge may be put at $35, while with a little sorting, an average of $80 is obtained.

GRAHAM COUNTY.

COPPER KING.—This company owns five claims, which are named Union No. 1, Union No. 2, New England, Montezuma, and Arizona Boy. Union No. 2 has had considerable work done on it. An open cut 68 feet long and 30 feet deep has been made on the vein. The ore is copper glance, and gives good assays. Six hundred tons of ore are now on the dump, taken from this cut. This claim has also a tunnel 30 feet long, showing good indications. But little work has been done on the other claims except on the New England. On that, a shaft has been sunk near the vein 40 feet, which will drift to the vein. About two tons of high-grade ore, carrying considerable native copper, were taken from the surface. The vein is from 25 to 30 feet in width, and is considered the mother lode. These properties are about two miles from Oro, and five miles from Clifton in a northerly direction. A force of men will soon be put to work to develop them. The vein on which Nos. 1 and 2 are situated has claims located on it 23,000 feet.

CALIFORNIA.

CALAVERAS COUNTY.

HOOSIER CONSOLIDATED.—The Calaveras *Chronicle* states that this company own the Mary Lory, the Way Ground, and the Hoosier. Four tunnels have been run at intervals along the course of the lead, besides prospecting-shafts, in all of which were found good rock and the indications of the existence of a true fissure-vein. The rock from three of the tunnels which were run several years since, was conveyed with great difficulty and expense a long distance to the river below, where it was worked by the arrastra process. Prior to the erection of the mill, the rock on the old dump was thoroughly prospected, with a view of getting as nearly as possible a correct estimate of the value of the rock. According to the results, the estimate was placed at the lowest—$5 per ton. The rock was not selected, but taken just as it came from various parts of the dump. With this estimate, it was calculated that the rock in sight, which is in quantities to last several years of milling, could be worked with a fair compensation, together with very flattering prospects in the development of the mine. A tramway 118 rods in length, with a grade of one foot to the rod, was constructed, reaching from the Hoosier tunnel to a point above the mill, by which it is connected with another tramway, 300 feet in length, directly down the hillside, which slopes at an angle of about 45 degrees. The first run of 75 tons of the ore from the old dumps exceeded the estimate made, and yielded $7 per ton. The indications are, that the present run will equal if not exceed that figure. The cost of milling the rock does not exceed $2.50 per ton. But ten stamps have been put up for the present, but the frame-work was constructed so as to permit the addition of ten stamps more. The mill is run by a hurdy-gurdy water-wheel, the necessary pressure being easily obtained by a ditch tapping the Calaveras River a comparatively short distance above, and supplying free water for running and all other mill purposes.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended March 24th shows : Tons of ore crushed, 156·78 ; average assay value of pulp, $86.54 per ton ; of tailings, $4.32. East cross-cut, 1000 level, was driven 12 feet. The flow of water has lessened a little, so that the pumps are running at the rate of about 7¾ strokes a minute. The north drift, 800 level, is 307 feet long. South drift, 770 level, is 78 feet long. From the north drift, 700 level, a rise, No. 22, has been made on the Fortuna, and this is now 37 feet long, as measured on the dip of the vein. The north drift from winze No. 6, 672 level, is now in 40 feet.

BULWER CONSOLIDATED.—The west cross-cut from the north drift, 700-foot level, has been advanced during the week 11 feet ; total length, 115 feet. The face is still in hard blasting ground.

STANDARD CONSOLIDATED.—The official report for the week ended March 24th shows : Tons of ore shipped to mills, 1291. West cross-cut, 1000 level, is in 1285 feet. South drift, from east cross-cut, 700 level, is in 592 feet, and shows 2½ feet of vein. West cross-cut from south drift is 115 feet long, and is in hard blasting rock. North drift No. 1, 500 level, is in 588 feet, where the vein is about 12 feet wide. North drift from south uprise No. 1 is 111 feet long, and the vein

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is 6 feet wide. South drift No. 2, 385 level, is in 379 feet, and shows the vein 6 feet wide. The stopes are looking well.

SAN BERNARDINO COUNTY—PROVIDENCE DISTRICT.

Rich discoveries have been recently made, and the prospects promise a most prosperous future for this district.

BONANZA KING.—The reports from this mine continue to be favorable.

TROJAN.—Work has been begun on this mine, an adjoining property of the Bonanza King.

CANADA.

PROVINCE OF MANITOBA.

The Winnipeg *Mining Index* reports as follows:

BRITISH AMERICAN.—This company has recently been organized to carry on operations in Keewatin District. The capital stock is $500,000, divided into 50,000 shares of $10 each. The company will develop a location situated about a mile and a half from Rosslyn station and eleven miles from Rat Portage. The vein is a strong one, carrying a reddish quartz showing copper and iron pyrites. The surface yield is fair. Nothing much will be done at present beyond getting out timber and erecting buildings; but when the snow leaves, sinking will begin.

KEEWATIN.—A rich body of ore was recently struck. Work has been going on steadily.

LAKE WINNIPEG.—This company is working a location near Big Island, on the east shore of the lake, with very promising results. The vein is a large one, and assays very well in both gold and silver. The shaft has attained a depth of twenty-five feet.

SASKATCHEWAN.—This company was formed to dredge for and wash the auriferous sands of the river Saskatchewan. It has not been able to begin operations yet on account of the ice; but the company has purchased the necessary machinery, and every thing is in readiness to start as soon as the river is clear. Dredging and sluicing were tried unsuccessfully some little time ago, although the failure was more on account of having very primitive machinery than a lack of the precious metal, as, during the one day in which the machine did work, about $84 worth of gold was saved at very little expense.

WINNIPEG CONSOLIDATED.—The vein has been increased by another feeder from the hanging-wall, and the bottom of the shaft looks well. Over 200 tons of quartz are on the dump ready for milling, and work on the mill is pushed vigorously.

COLORADO.

CLEAR CREEK COUNTY.

A dispatch from Idaho Springs to the Denver *Republican* says that large blocks of copper ore, carrying native copper, have been discovered near the Old Chief, on Soda Creek.

PAY ROCK.—It is expected that the new concentrator will start by the middle of April.

POLAR STAR.—The water that heretofore proved so troublesome is under control. An engine and pump to clean the 128-foot shaft from the lower level are fitting up. The 65-foot shaft at the mouth of this level is going down steadily under the contract with J. Thomas & Co. A drift east has been started sixty feet down.

SEVEN-THIRTY.—The mineral continues of good quality in the 310-foot level west. Six tons milled assayed 125, 135, and 350 ounces per ton according to class, the whole lot averaging $147.83 per ton. The breast of the 310-foot level east shows three feet of solid mineral. The main shaft is sinking day and night, and is down about 60 feet below the 310-foot level. The mineral continues in it all the way down, and is apparently improving in quality. The last run from No. 2 west brought 334 ounces per ton.

DOLORES COUNTY.

Mr. Linwood O. Towne, of Rico, under date of March 28th, sends us the following notes:

GARFIELD.—In this mine, situated up Horse Gulch, a most encouraging strike of fine gold-bearing quartz has just been made. Work has been steadily going on at this property all winter. There is a well-defined vein from which come specimens assaying as high as 152 ounces in gold, with some silver.

NEWMAN GROUP.—Work is rapidly pushed by the leaser, Mr. Frederick Reed. Some of the richest ore ever taken from the group, showing wire silver, has recently been obtained in quantity from the Swansea, and shipped to the Grand View smelter.

GRAND COUNTY.

PIONEER.—Some excitement was occasioned the other day by a rich strike in the Toponis mine, the property of this company. From eighteen inches to two feet of mineral were uncovered, and the ore has every appearance of being high-grade, carrying gray and yellow copper and a very fine galena. Six men are steadily employed at the mine, and the pay-streak continues to increase in width.

WOLVERINE.—The company has decided to build at the Gaskill mine.

GUNNISON COUNTY.

NATIVE SILVER NO. 2.—A strike of Ruby and brittle silver was made in this lode, near what is called Mineral Ranch, four miles from camp. The vein is several feet wide, and has a streak of ore which will run from 1000 ounces up. The ore, on being roasted, is literally covered with globules of silver. The vein is in the solid formation.

SILENT FRIEND.—In the north drift of the ninety-foot level of the mine, a cave was opened which proved to be 225 feet deep and from three to fifteen feet wide. It has been explored, and its walls are found to be all mineral galena and lead carbonates, and it is estimated there is $50,000 worth of ore lying loose at the bottom, which has fallen from the sides and roof. The company will immediately arrange to hoist the loose boulders, which are mostly carbonates.

TERRIBLE.—This mine has been sold to J. S. Lawrence, of the Gunnison First National Bank, for $80,000 cash.

HINSDALE COUNTY.

CROOKE'S SMELTING-WORKS.—The works have not been making full time lately, owing in part to short water supply, and in part to the fact that little or no stoping has been done at the mine, the concentrator chiefly treating the dumps, which do not yield sufficient to supply the roasters. The seventh level of the Ulé mine, which is the property of this company, is running northeast and southwest from No. 2 shaft, and is about 25 feet on each side. Winzes are sinking which show about the usual body and character of ore. Stoping is also going on in the Ute, but no new ground has been opened as yet. The company is considering the subject of putting up an elevated tramway, to run the ore from the mine to the concentrator. We are informed that the announcement that contracts have been let and tram ordered is premature, although there is little doubt that the directors will favorably consider the matter.

LAKE COUNTY.

Late Leadville exchanges contain the following:

BROOKLAND.—Work has been resumed on this property after putting in a new plant of machinery. The work of development will be pushed and shipments begun shortly.

CHRYSOLITE.—The new sampling-works will be in operation shortly. In the mean time, the mine is worked unobtrusively, but with a generally satisfactory result. Four leases are running on various parts of the property. First, the Marden lease, which covers the burnt district in the old Carboniferous, Chrysolite, and Vulture claims. This lease, without proving an absolute bonanza, has paid very fairly. The lessees have shipped nearly an average of 90 tons a week, by gleaning where the miners had gone before them, and must have realized several hundred dollars each a month. Secondly, the Ayres lease, which includes the old workings on the Muldoon, and parts of the Pandora and Vulture. These lessees have as yet shipped no ore. Thirdly, the Webb lease, which is on part of the Vulture, and the old Eaton workings. The lessees have been very fortunate. They have shipped about 50 tons of ore per week, and must have realized several thousand dollars. Fourthly, the Church lease, which is on the Colorado Chief No. 1, and the edge of the Pandora. The lessees have as yet shipped no ore, although they have a considerable quantity in the ore-bins. From these four leases, the company is realizing about $5000 a month. Two of them run out in October, and the other two in February next. Simultaneously, Manager Clark is doing a little mining on company account, which nets enough to pay the current expenses of the mine, including the cost of driving the new incline on Colorado Chief No. 2—say $11,000 a month. The prospects of the company depend largely on the completion of this incline.

LITTLE ELLEN.—This mine, the property of the American Smelting Company, is steadily worked. The property is developed by an incline, which has reached a depth of 750 feet. The company intends to put a new plant of machinery on this incline, and has ordered a large double hoister, engine, and boiler. The property is doing well, and the new strike which is reported to have been made in the adjoining Trade Dollar, which belongs to the company, will add materially to its value.

MIKE & STARR.—Work has been started up, and sinking is vigorously prosecuted. A winze forty feet in depth has been sunk in the main level, from which a cross-cut is run thirty-five feet—striking a body of mineral seven feet in thickness. The ore, as in the past, is refractory, but sample assays have been made which returned from sixty to seventy ounces silver and from fifteen to twenty per cent copper. A three-inch drill is worked in the bottom of the main shaft, and is sinking at the rate of eight feet per day. It has passed through twenty feet of white quartz, and is still in the same matter.

NEW PITTSBURG.—During the past month, the territory in the neighborhood of the Lent shaft has been developed, and with very gratifying results. From this shaft, a drift has been run in a northwesterly direction about eighty feet. From about this point, a drift has been run a short distance to the north, developing three feet of good ore. In a west drift from near the same point, two feet of ore have also been opened up. About a foot of ore has also been shown up in a drift almost due north from the shaft. The ore recently discovered assays from 25 to 90 ounces in silver, and will average about 30 ounces in silver and forty per cent in lead, making it an excellent smelting grade. During the month, about three hundred tons of ore and iron have been shipped, and regular shipments from the new ore-bodies will begin on the first of April.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—Mr. Greer's lease, which runs to March, 1884, is very elaborate, and the royalty varies from 30 to 60 per cent, according to the grade of the ore, and its location in the mine. The mine is now shipping about 20 or 25 tons a day of ore from the new ore-body, which is opening by the incline from the winze on the twelfth level, and is looking better daily. The ore averages about thirty ounces.

TEN MILE DISTRICT.

THE MAXIMUS AND BERNADOTTE.—The Leadville *Herald* reports as follows: Among the mines which have lately come to the front on Fletcher Mountain, Ten Mile, are the Maximus and Bernadotte, owned by the Colorado Land and Mineral Company. It has been reported that a rich strike was recently made in this property, and on calling on the manager, it was learned that such was the case. The Maximus is developed by two tunnels. Tunnel No. 1 has been driven 200 feet, with cross-cut to the north, which is in ore. Tunnel No. 2 is in a distance of 120 feet, and has exposed some very high-grade ore. From the No. 1 tunnel, at a distance of 85 feet from the mouth, a cross-cut has been run west fifty feet, cutting the Bernadotte vein, running parallel to the Maximus vein, and a drift has been run on the vein for a distance of 130 feet to where the important strike was made. The vein in the breast of the tunnel shows about three feet of high-grade ore. No ore can be shipped at present, and what is extracted in development-work is stacked up until the shipping season opens. The property is well arranged for working, with iron tracks in the tunnels, and other conveniences, and from the amount of ore yielded by the development-work alone, it is evident that it will make a good producer as soon as it is sufficiently opened up, and the shipments are begun.

DAKOTA.

A dispatch from Deadwood to the New-York *Tribune* says that new or additional works are projected as follows: Homestake Company, 200-stamp mill; Trojan Company, 100-stamp mill; Lancaster, 100-stamp mill; Caledonia, additional 40 stamps to its present 60-stamp mill; Golden Summit, 20 additional stamps; Florence silver mill, 20 additional stamps; Oro Fino, hoisting-works and 20 additional stamps; and a patent concentrator for Silver Creek property owned by a La Crosse company now organizing. In addition, there is talk of purchasing the Standby 60-stamp mill and connecting it by a narrow-gauge railroad with the Minnesota, five miles distant; of large reduction-works by the King Solomon Company; a mill for the Bengal Tiger; another for certain Box Elder property owned by a company now organizing in New York; and still another by the Berkshire Company. These latter, however, are not fully assured.

FATHER DE SMET.—The superintendent writes under date of March 19th as follows: Herewith express company's receipt for bar No. 155, 886·60 ounces gold, the result of run of mill for first half of March. On the 15th inst., I drew on Laidlaw & Co., for $18,000, which amount was for all February expenses. The north end tunnel is progressing slowly—only four men at work. I have no word of encouragement for this portion of the mine. On the second level, I have started a cross-cut west from Cook's chamber, which is now in ore, after passing through about 12 feet of slate. The third level header has not yet connected with the Italian winze, lacking about 8 feet of surveyed distance. Face of header in very poor material. The prospects for a large body of ore back of face of header and to the east of header are very good indeed. The rise from west cross-cut tramway level is progressing very slowly in very low-grade ore. In fact, I need not tell you that all our ore is very low grade; but there are large bodies of it, and by economical working we shall continue to make some money for a number of years at least.

NIGGER HILL.—This company has resumed word on its 40-mile ditch, and expects to have every thing in readiness for hydraulicking by July 1st.

PORTLAND.—The company's mill, Bald Mountain, is now repairing, and the stamps will drop in about two weeks. The company's property has been idle for a long time, although it is considered valuable by all familiar with it.

SUMMIT.—The first clean-up of the mill (thirteen days' run) amounted to $3600, or about $25 a ton.

GEORGIA.

COLUMBIA.—The grading is finished, together with all the trestling. A reservoir has been completed this week, and another is digging. The lumber for building the flume is mostly on the line, and building already begun. It is expected that the mill will commence work by the 1st of May.

FISH TRAP.—Work has been resumed at this mine.

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IDAHO.

BLACKBURN MINING DISTRICT.

A correspondent of the Salt Lake *Tribune* states that this district promises to become a lively place this season. It is located on Little Lost River, seventy miles northwest of Blackfoot, and can also be reached from Camas Station, on the Utah & Northern, the distance being between sixty and seventy miles. Assays made of four lots of ore of the Ingersoll mine show results as follows: No. 1 went 18 per cent copper and 1570 ounces silver; No. 2, 189·58 ounces silver; No. 3, 157·76 ounces; and No. 4, 174·98 ounces.

The Daisy Black claim has developed so well that a smelter is to be built this spring to reduce the ores of this property, and also of the Great Northern.

The Tyndall is located on the Tyndall lode, which has been prospected between five and six miles. This great lode varies in width from 25 to 100 feet on the surface, and the outcroppings are well defined the entire distance prospected. Nine tons of ore from there were sold in this city at $118 per ton. The lay of the country, its excellent supply of water and timber, and its location in a country having good grazing lands, makes the district a desirable one, and it is attracting much interest among prospectors and mining men.

SAWTOOTH.—The stockholders, at a meeting in Ogden recently, elected the following officers: M. H. Beardsley, President; W. P. P. St. Clair, Vice-President; J. M. Langsdorf, Treasurer; A. C. Emerson, Secretary. The following gentlemen were elected directors for the ensuing year: Messrs. J. W. McNutt, J. W. Millis, W. H. Broadhead, W. Callahan, M. Buckmiller, F. A. Hall, R. J. Hill, William Van Dyke, and P. H. Emerson. The financial affairs of the company were found to be in good condition, and it was determined to prosecute development with renewed vigor.

MAINE.

CHERRYFIELD.—Work at this mine has been suspended.

STEWART.—The new machinery is all in place, and work has started up. The new pump is set seventy feet from the surface, and does excellent work. Good progress will now be made in sinking and drifting, as the plant is complete, and every piece of machinery is of the very best workmanship.

MEXICO.

The Pachuca courts have decided that the by-laws of a mining company are binding on stockholders, irrespective of the State code of mining laws.

BATOPILAS.—The new lixiviation-works have been completed. Rich silver was recently struck in an old working of the Veta Grande vein lately cleaned out. Some of the silver is nearly pure, and the vein has yielded steadily ever since. Eighty feet above a tunnel, another chute has just struck what seems to be a new chimney of silver, and the ore is very rich. Rails, etc., have arrived, and will be laid at once to connect the company's San Pedro and Martinez mines with the large reduction-works. This will enable it to deliver large quantities of ore to the mill, and much of the ore yields 200 ounces per ton. Another of the company's mines, the Giral, is giving large amounts of low-grade ores, running from 50 to 75 ounces per ton. The thirty additional stamps have arrived, and will be in operation by the end of May.

GUADALUPE.—The reduction-works at Pachuca are to be started in about a fortnight.

SANTA GERTRUDIS.—This mine has been thoroughly inspected by the members of the commission appointed at the last general meeting, and they are perfectly satisfied with the prospects of the mine. The various points show an abundance of high-grade mineral, and no cause is apparent for the suspension of dividends, so far as the production of the mine is concerned.

MICHIGAN.

A find of copper ore was made recently north of Ishpeming. The discovery is testing as regards its extent. It is very rich in copper, though the deposit is thought to be but a small pocket.

DEER LAKE.—The company is supplying its furnace with flux from the limestone deposit on the lands of the Ropes Gold and Silver Company. This flux gives better results than any other yet tried by this company, and its close proximity to its works enables it to procure it more cheaply than it could get it from any outside source.

ROPES.—The shaft has attained a depth of thirteen feet. At the bottom of this shaft, the quartz vein proper measures exactly 45 inches, having increased four inches in width from surface. The quartz is a white crystalline, heavily charged with mineral, and shows a large amount of native gold and silver. The whole width of the vein carries gold and silver, and is not confined to a streak of a few inches, as is often the case in gold-bearing rock, though the usual characteristic of being richest along the "hanging," is apparently the case here. The vein casing, which is of slate, shows a large amount of mineral, the first few inches on each side of the lode appearing as rich as the quartz.

MONTANA.

The mining operations of the past week, says the Butte *Miner*, may be characterized as active. While several smaller mines were shut down for repairs and the Dexter mill stopped for a clean-up and general overhauling of machinery, the principal mines and mills, like the Moulton, Alice, Lexington, Silver Bow, and Shonbar, were running with their accustomed regularity and producing their regular output.

NEVADA.

ALBION.—The Eureka *Sentinel* states that a strenuous effort has been made to get all the attaching creditors of the Albion to sign the agreement, which has already been much discussed, and by which the miners, laborers, and mechanics would receive money for their wages and the mine be opened for work. The only signature lacking to complete the list was that of Tredennick, who declined all overtures to join the other creditors in their action under the proposed agreement. The presumption is, that this renders impossible the settlement that has been looked forward to with so much confidence. If an agreement can be had, the men will be paid off immediately, as the money is already here and in hand for that purpose.

MARTIN WHITE.—The superintendent's letter states that the ore discovered near the old Black chamber does not continue to look so well. The ground is still favorable for ore, and another cut or two may bring it in as strong as ever again. There is no particular change to report from the F. F. The west drift shows some improvement, and there is some very good ore coming in at the extreme west end, and appears to be going down toward the east.

NAVAJO.—The official report of March 22d shows: Total depth of shaft, 510 feet; progress since last report, 10 feet; cut a small seam of ore; no material change to note in the formation. Drift south, 350 level, advanced 19 feet; total length, 186 feet. The face shows a large width of vein-matter, yielding low assays, and altogether looking favorable. No material change in south drift, 450 level. The stopes are looking well at all points. Average battery assays of ore milled during the week, $285.62 per ton. Mill was closed down two and a quarter days, to make some necessary repairs.

NEW MEXICO.

There is a mineral belt lying northeast and east of Albuquerque, beginning with the Cerillos Mining District and running southwestwardly to the mouth or western outlet of the Tijeras Cañon, which is for the second time beginning to attract a measure of attention in some degree commensurate with the extent and richness of the deposits of valuable minerals there found. For some twenty miles south of the town of Cerillos, those deposits are largely of gold and coal. Of coal there are immense beds, both hard and soft, much of it suitable for coking, and all of it of excellent quality, the depth of the beds varying from three to seven feet, and averaging fully four feet.

SAN PEDRO & CAÑON DEL AGUA.—In 1880, the Crescent Company began operations, and since then two new tunnels have been run and some 6000 feet of chambers and leads excavated. The vein is now known to be 36 feet in thickness, and it has been traced for two miles in the face of the mountain. While it is known distinctively as a copper mine, some portions of it also carry considerable gold, sufficient to pay for working. The ores are known as carbonates and sulphides. Sixty men are regularly employed at the mine, taking out ore and doing development-work. The smelting-works consist of a large building about 60 by 200 feet, containing two smelters with a capacity of thirty tons each; twenty-five stamp-mill, or crushers, including two Blake crushers and one Cornish roller; two engines of eight horse-power each; an upright eighth engine of eighty horse-power for the stamp-mills; two blowers, No. 5½, Wilbraham make.

UTAH.

According to the Salt Lake *Tribune*, the Reed & Benson tunnel, begun six or seven years ago, is now in 2039 feet, and has evidently entered the peculiar limestone formation which produces, or in which is found, the Emma ore-bodies. The tunnel is as straight as an arrow, of grade sufficient so that a car will run out by gravity It is 1200 feet, vertical, below the croppings, and there are 500 feet, vertical, of virgin ground above it. At one time, the rock was so hard that it required five months to excavate 100 lineal feet of this tunnel. The same force now excavates 81 lineal feet in a month. There was ore of the usual high grade of this mine in four places in the bottom of the old workings, and it is of course anticipated that this same ore will be found to extend from those localities to the tunnel level and below. When Mr. F. C. Reed took charge of the work, he extracted, with 40 men, 1000 tons of ore in one winter, working from the top. The next winter he took out 900 tons, with six men, in the same time, working through a Reed & Benson opening to the surface lower down. He anticipates taking out ore, whenever he cuts it, for comparatively nothing. The tunnel has cost all the way from $4 to $21 per foot.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED MARCH 6TH, 1883.

273,275. Amalgamating-Furnace. William E. Harris, New York City.
273,299. Steam-Boiler and other Furnaces. Orel D. Orvis, New York City.
273,300. Magnetic Ore-Separator. John Rae, New York City.
273,311. Blast-Furnace Plant. Jacob Reese, Pittsburg, Pa.
273,354. Brick-Kiln. John E. Gamble, East Liverpool, O.
273,367. Apparatus for Returning and Feeding Water to Boilers. Timothy J. Kieley, New York City.
273,397. Hydraulic Mining Machine. Jay E. Russell, San Francisco, Cal.
273,409. Drilling-Machine. Franz Voos, Solingen, Prussia, Germany.
273,421. Steam-Boiler Furnace. John Abell, Woodbridge, Ontario, Can.
273,477. Ore and Rock-Crusher. Miles B. Dodge, San Francisco, Cal.
273,478. Rock-Crusher. Miles B. Dodge, San Francisco, Cal.
273,583. Ore-Separator. Hiram P. Minot, Columbus, O., Assignor to Chester Minot, same place, and Samuel Watson, Cambridge City, Ind.
273,623. Method of and Apparatus for Making and Raising Salt-Brine from Deep Veins. George H. Smith, New York City.
273,661. Gas Combining and Heating Block for Furnace Bridge-Walls, etc. Robert R. Zell, Baltimore, Md.
273,662. Apparatus for Amalgamating and Concentrating Ores. John Alves, Dunedin, New Zealand.
273,679. Apparatus for Generating and Carbonating Hydrogen Gas. Leroy S. Groves, Afton, Iowa, Assignor of one half to John W. Shute, same place.

GRANTED MARCH 13TH.

273,703. Machinery for Separating the Ores of the Precious Metals. Thomas P. Benton, La Crosse, Wis.
273,742. Blast-Furnace. William Kent, Alleghany, Pa., Assignor of one half to John Scott, Jersey City, N. J.
273,775. Dry Amalgamator. Isaac Stead, Philadelphia, Pa.
273,799. Furnace for Effecting the Protection of Iron and Steel Surfaces. Frederick S. Barff, Kilburn, County of Middlesex, and George Bower and Anthony S. Bower, St. Neats, County of Huntingdon, England; said Barff Assignor to said George and Anthony S. Bower.
273,840. Copper-Smelting Furnace. John B. F. Herreshoff, Brooklyn, N. Y., Assignor to himself and George H. Nichols and William H. Nichols, both of New York City.
273,917. Manufacture of Furnace Linings. Herman Ulsmann, Konigshütte, Prussia, Germany, Assignor to Edward Cooper, New York City.
273,965. Pumping System for Surface-Condensers. Charles W. Copeland, Brooklyn, N. Y.
273,969. Machine for Amalgamating and Concentrating Ores. George Dean, St. Louis, Mo.
274,035. Rock-Drill. Richard V. Rogers and James M. Allen, Larkinsville, Ala.
274,050. Pulverizing-Machine. Stephen P. M. Tasker, Philadelphia, Pa.
274,051. Hopper for Pulverizing-Machines. Stephen P. M. Tasker, Philadelphia, Pa.
274,055. Bessemer Converter. Sidney Gilchrist Thomas, Tedworth Square, County of Middlesex, England.
274,083. Apparatus for Separating Gold. John A. Cable, St. Louis, Mo.
274,090. Hopper for Pulverizing-Machines. Hermann B. Feldmann, Philadelphia, Pa., Assignor to Stephen P. M. Tasker, same place.

GRANTED MARCH 20TH.

274,211. Amalgamator. William T. McGinnis, New York City.
274,215. Ore-Crushing Machine. Franklin Morey, Brooklyn, N. Y., Assignor to Oscar W. Turner, Oak Park, Ill.
274,243. Drilling-Machine. Edward J. Worcester, Worcester, Mass.
274,320. Regenerating-Furnace. Isaac Harper and Samuel Harper, Pittsburg, Pa.
274,357. Fire-Brick. William S. McKenna, Pittsburg, Pa., Assignor to Harbison & Walker, same place.
274,403. Metallurgic Furnace. Samuel P. Spooner, Bucklin, Assignor of fifty-one seventy-seconds to Daniel B. Holmes, Robert H. Drennon, William C. Duvall, and Emil Werk, all of Kansas City, Mo.
274,450. Furnace for Consuming Smoke and Heating Water. Edward Livermore, New York City, Assignor to Horace Galpen, same place.
274,453. Furnace for Burning Pyrites. James Mason, Eynsham Hall, Whitney, County of Oxford, England.

GRANTED MARCH 27TH.

274,524. Continuous Rolling-Mill. Martin V. Smith, McKeesport, Pa.
274,525. Continuous Rolling-Mill. Martin V. Smith, McKeesport, Pa.
274,581. Dry-Ore Concentrator. Willard B. Farwell, New York City, Assignor of five eighths, by direct and mesne assignments, to John Landers and J. M. Taylor, San Francisco, Cal.
274,587. Cinder-Car. Frederick W. Gordon, Pittsburg, Pa., Assignor, by mesne assignments, to himself and James P. Witherow, same place.
274,667. Feed-Hopper and Bell for Blast and other Furnaces. Edwin Shepard, Goshen, Va.
274,678. Apparatus for Bending Rails and Bars. Ladislav Vojacek, Sinichov-Prague, Bohemia, Austria-Hungary.
274,717. Apparatus for Purifying Iron. Thomas H. Burridge, St. Louis, Mo., Assignor of one third to William L. Reynolds, same place.
274,740. Expansion Rotary Drill. Samuel W. Douglass, New York City, Assignor to the American Diamond Rock Boring Company, same place.
274,747. Apparatus for Separating Slate from Coal. John Fern, Hyde Park, Pa.
274,786. Cinder-Car. William Kelly, Scottdale, Pa.
274,829. Gas-Generator Stove. Nicholas H. Schilling and Hans Bunte, Munich, Bavaria, Germany, Assignors to Stettiner Chamottefabrik Actiengesellschaft, formerly Didier, Stettin, Germany.
274,856. Rolling-Mill. Richard Uren, Houghton, Mich.
274,882. Apparatus for Detecting Mineral Ores. Frederick H. Brown, Boulder, Colo.
274,884. Turbine-Wheel. Nathan F. Burnham, York, Pa.
274,889. Manufacture of Iron and Steel. James Henderson, Bellefonte, Pa.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, April 6.

The mining market has been very dull, and depression has seemed the ruling feature. Sonora Consolidated has been the most active stock dealt in, and it was manipulated up and down at times in quite a lively manner. Robinson and Sierra Grande have been rather dull, and both stocks show weakness. The other stocks mostly dealt in were Amie, Decatur, Elko Consolidated, Lecrosse and Oriental & Miller. There is no material change in their prices. Below will be found a summary of the market. The total number of mining shares sold at all the Exchanges aggregates 421,415, as against 346,695 last week.

The Comstock shares have been very quiet at steady prices. California was quiet and steady, selling from 22@20@21c. Consolidated Virginia records a moderate business, and was a little stronger; it sold from 45@52 50c. Sierra Nevada had a small business at steady prices, selling from $2.20@$2.30. Union Consolidated was dealt in to the extent of 200 shares at $3.50@$3.40. Mexican was steady, under a small business, and sold at $2.88 @$3.13. Ophir sold at $2.25, with one small transaction. Sutro Tunnel was active and steady; it sold from 18@21c., the business aggregating 14,750 shares.

The Leadville stocks were also quiet and steady. Amie records a very active business, and suffered a slight decline from recent prices; it sold from 26@21c. Chrysolite was quiet and irregular, selling from $1.15@$1.25. Dunkin sold from 23@20c., with a business of 900 shares. Hibernia was quiet and a little weak at 4@3c. Iron Silver had a small business at steady prices, selling from $2.85 @$2.90. Leadville was quiet and steady; it sold from 71@68c. Little Chief records a business of 3000 shares at 39@42c. Big Pittsburg sold at 17@15c., under a small business. Climax was dealt in to the extent of 5000 shares at 9@7c.

The Bodie stocks were quiet and steady. Bodie Consolidated was quiet and steady, selling from 80@90c., assessment unpaid, and from $1.40@$1.45, assessment paid. Standard records strong prices under small transactions, and sold from $6.50@$7. Bulwer was quiet and a little weak, selling from 88@80c.

The Tuscarora stocks were almost neglected, and prices generally were weak. Grand Prize sold at 75c., assessment paid, and at 45c., assessment unpaid. Argenta was very quiet at 36c. Belle Isle records a small business at irregular prices, selling from 50@60 @50c. Navajo has grown weaker, declining from $3.60@$3.@$3.30 under a business of 4750 shares. North Belle Isle sold at 35c., with one transaction. Elko Consolidated was very active and a little weak, selling from 13 9@10c., with a business of 20,100 shares.

In the miscellaneous list, Alice has been quiet and steady; it sold from $2.85@$2.90. Eureka Consolidated developed a small business and was a little weak, selling from $5.25@$4.50@$4.75, assessment unpaid, and at $6@$6.25, assessment paid. The Green Mountain stocks were quiet and a little weak. Gold Stripe sold at 7@5c. Green Mountain was strong, selling from 75@82c. Rising Sun sold at 5@4c. and Cherokee at 3@2c. Horn-Silver records a small business, and was steady; it sold from $7.50@$7.88. Northern Belle showed signs of weakness, under a moderate business, declining from $10@ $8.63@$8.75. Robinson Consolidated was very active, and continues to grow weaker; it sold from 77@ 64c., closing at 67c. to-day, the sales amounting to 38,725 shares. Sierra Grande has been active and very irregular, selling from $1.85@$2@$1.80. Silver King records a small business at about steady prices, selling from $11@$10.75.

Alta-Montana was quiet and steady at 9@8c. Bradshaw records a small business at steady prices, selling from 30@28c. Central Arizona was quiet and steady; it sold from 30@33c. Decatur had an active business and was irregular, selling from 6@ 4@5c. Durango was quiet and steady at 5@6c. Harlem Milling and Mining Company had a fair business and continues strong; it sold from $1.40@$1.50@$1.45. Lacrosse was active and steady, selling at 15@14c., with a business of 12,600 shares. Oriental & Miller was also quite active and was strong; it sold from 15@18@17c. Rappahannock sold at 8c. under a small business. Red Elephant was steady at 7@6c. Silver Cliff records a small business and sold at 33@35c. Sonora Consolidated had a large business, and was very irregular; it sold up from 46@53c., then down to 40c., up again to 45c., closing weak at 35c. South Hite, new, was quiet and steady at 20@28c. South Pacific was active and steady, and sold at 6@5c. The State Line stocks were quiet and steady; Nos. 1 & 4 sold at 3@2c., and Nos. 2 & 3 at 6@4@5c. Taylor-Plumas records a small business at steady prices, selling from 18@ 17c.

The Directors of the National Petroleum Exchange have issued a circular to their members in regard to the proposed consolidation with the New York Mining Stock Exchange. It gives the terms of consolidation, points out the advantages to be derived, and concludes by stating that a general meeting will be held on Tuesday, April 10th, between eleven A.M. and four P.M., at which members will vote for necessary amendments to the by-laws and constitution of the Exchange, in order that the consolidation may be effected.

MEETINGS.

Bulwer Consolidated Mining Company, Room, 29, No. 309 Montgomery street, San Francisco, Cal. Annual meeting of stockholders and election of trustees, April 11th, at one o'clock P.M.

Fletcher Gold and Silver Mining Company, No. 211 Pearl street, New York City. Annual meeting of stockholders, April 10th, at twelve o'clock M.

Spring Valley Hydraulic Gold Company, No. 61 Broadway, New York City. Special meeting, called by a resolution of the Board of Trustees. Matters of importance will be presented. April 23d, at twelve o'clock M.

DIVIDENDS.

The Castle Creek Gold Mining Company, of Idaho, has declared its regular monthly dividend (No. 11) of three per cent, payable April 16th.

The Holyoke Mining Company, of Idaho, has declared its regular monthly dividend (No. 7) of two per cent, payable April 13th.

The Mount Pleasant Mining Company has declared a dividend of ten cents per share, payable at the office of Laidlaw & Co., No. 14 Wall street, New York City, April 16th.

The Navajo Mining Company, of Nevada, has declared a dividend of twenty-five cents per share.

The Standard Consolidated Mining Company, of California, has declared a monthly dividend of twenty-five cents a share, payable on April 12th, at the Farmers' Loan and Trust Company's office.

The Yellow Jacket Mining Company, of Nevada, has declared a dividend of twenty cents per share.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, brokers in Petroleum and Mining Stocks, No. 55 Broadway, report as follows for the week ended April 6th:

On Saturday, March 31st, oil opened at 94½c., and closed stronger at 95⅝c. Monday, it sold up to 96c. Tuesday and Wednesday, the fluctuations were chiefly between 94½c. and 95½c., and transactions were limited. Yesterday (Thursday), prices broke to 91¼c., rallied to 93⅞c. and reacted to 92c., and to-day the market was featureless at from 91 to 92¾c. There does not appear to be a well-defined idea concerning the wells lately opened up. That they have at least temporarily increased production is conceded; but from the history of the wells in the same formation, no great expectations are entertained of the permanence of the new production. The "mystery" which the owners of the Murphy well made has given way to the reliable report that its first day's product is 140 barrels, or relatively small; but as it lies inside the territory of the Cooper tract, greater significance is attached to it than would otherwise be the case. The latest candidate for honors as a "market-smasher" is the Welch well, about which conflicting reports have been circulated, but from present indications it will not prove a large producer.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
March	31....	$0.94	$0.96¼	$0.94	$0.95⅝	537,000
April	2....	.95¼	.96⅛	.93¾	.94⅛	542,000
	3....	.94⅛	.95⅛	.93⅛	.95	633,000
	4....	.95⅛	.96⅜	.94¼	.94⅛	621,000
	5....	.93⅛	.93¾	.91¼	.92	864,000
	6....	.91⅞	.92⅜	.90¾	.91	722,000
Total sales.....						3,919,000

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has not developed any material changes this week. The Comstock shares have been steady in price throughout, although a strong "boom" was developed in Hale & Norcross, made through a fight for the control of the company. The Yellow Jacket Company has declared a dividend of twenty cents per share. The Savage Company, on the other hand, has levied an assessment of $2.25 per share. The Tuscarora stocks have been weak, and show a decline. There are good reports from the mines, especially Navajo, but notwithstanding this, the stock has fallen off.

SAN FRANCISCO MINING STOCK QUOTATIONS

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Mar. 30.	Mar. 31.	April 2.	April 3.	April 4.	April 5.
Albion	....	....	....	....	....	1¼
Alpha	1¼	....	....	1¼	....	1⅛
Alta	11-32	....	11-32	13-32	13-32	11-32
Bechtel	....	....	....	....	....	....
Belcher	¾	21-32	19-32	....	21-32	11-16
Belle Isle	9-16	½	9-16	....	9-16	7-16
Best & Belcher	3¾	3¾	3¾	3¾	3¾	3¾
Bodie	27-32	27-32	27-32	¾	13-16	1⅝
Bullion	....	....	....	....	....	....
California	¼	....	3-16	....	¼	¼
Challar	....	....	....	....	....	....
Con. Virginia	7-16	½	½	½	½	½
Crown Point	15-16	29-32	29-32	....	27-32	51-16
Elko Cons	....	....	....	3-32	....	....
Eureka Con	5	4¾	5	5¼	5¼	5¼
Exchequer	....	¼	....	....	¼	¼
Gould & Curry	2½	2½	2⅝	2⅝	2⅝	2½
Grand Prize	½	7-16	7-16	....	½	7-16
Hale & Norcross	2½	2½	2⅝	3¼	3½	3¼
Independence	13-32	....	13-32	....	11-32	11-16
Martin White	5-16	5-16	5-16	....	5-16	5-16
Mexican	2⅞	3	2⅞	3	2⅞	3
Mono	....	....	....	....	....	....
Mount Diablo	2¾	2¾	....	3½	2⅝	....
Navajo	3⅝	3¼	3½	3⅝	3¼	3⅜
Northern Belle	9½	9½	9⅝	9	8½	8⅞
North Belle Isle	5-16	....	11-32	....	....	....
Ophir	2¼	2⅜	2¼	2⅜	2⅜	2⅜
Overman	....	....	....	....	....	....
Potosi	....	29-32	15-16	1⅛	1⅛	1⅛
Savage	....	....	....	....	....	....
Scorpion	....	....	....	....	....	....
Sierra Nev	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜
Silver King	....	....	....	11	....	....
Tip Top	....	....	....	....	....	....
Union Con	3⅝	3⅝	3½	3⅝	3½	3½
Wales Con	¼	¼	3-16	¼	3-16	3-16
Yellow Jacket	2½	2½	2⅝	2¾	2¾	2⅞

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, April 5.

To-day being Fast-day, there have been no quotations, the Exchanges being closed. Our report is made up to the close of business on the 4th. The decline in ingot copper to 16c. per pound for Lake has had a depressing tendency on the market for copper stocks; and although the decline has not been very marked as yet, any efforts to sell large blocks of stocks would result in much lower prices than we have seen for some years. Calumet & Hecla has ruled dull, with small sales at $242@$241. Franklin declined from $12@$11. Although the latest advices from the mine are favorable, yet the lower price of ingot copper will doubtless prevent the payment of a dividend the coming year. Pewabic declined from $6 (March 22d) to $5. The outlook for this company is not as favorable as its friends would desire. Quincy started off this week with an advance from $49⅛@$50, with a gradual decline from this figure to $49¼, and has held quite firm at $49 bid. The March product of this mine was 225 tons, against 195 tons last year. Osceola declined from $29@26, with a subsequent recovery to $27. There is more of this stock offering than usual, and a further decline would not be unexpected. Atlantic, on a small sale, advanced from $11@$12. Huron, the last sale of which was on March 7th, at $1½, showed exceeding weakness to-day by selling at 50c. Advices from the mine, under date of March 24th, state that the mine is looking as well as ever; but we suspect that later news has something to do with the decline and pressure to sell the stock to-day. Allouez sold at $2¼, an advance of 25c.

In silver stocks, Bonanza advanced from $1@$2¼. Catalpa declined from 45@40c., but later advanced to 47½c., closing at 45c. bid. San Pedro advanced from 50@60c. Harshaw sold at 75c., and Sullivan at $1. At the Mining Exchange, there was no special feature. Prices are generally lower, and business dull and uninteresting.

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DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.			$		Highest and Lowest Prices per Share at which Sales were Made. March 31. H.	March 31. L.	April 2. H.	April 2. L.	April 3. H.	April 3. L.	April 4. H.	April 4. L.	April 5. H.	April 5. L.	April 6. H.	April 6. L.	Sales.
1	Alice, s. c.	Mont	$10,000,000	400,000	$25	*				$400,000	Dec.	1881	.10		1	2.90	2.85	2.90	2.85	2.90								600
2	Amie Con., s. L.	Colo.	5,000,000	500,000	10	*				305,000	May	1880	.10		2	.26	.24	.24			.25	.28		.21	.21	.21		26,000
3	Atlantic, c.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	220,000	Feb.	1883	$2.00	B.	3												
4	Argents, s	Nev.	10,000,000	100,000	100	225,000	Nov	1882	.25	40,000	Feb.	1880	.20		4			.30									
5	Barbee & Walker, s.	Utah	1,000,000	100,000	10	*				60,000	Nov	1880	.10		5												300
6	Bassick, g. s.	Colo.	10,000,000	100,000	100	*				125,000	Apl.	1883	1.00		6											9.50		
7	Belle Isle, s.	Nev.	10,000,000	100,000	100	65,000	May	1882	.10	300,000	Dec.	1879	.25		7			.50		.60						.50		40
8	Black Bear, g.	Cal.	3,000,000	30,000	100	15,000	Sept	1879	.50	89,000	Sept	1882	.30		8													800
9	Belcher, g. s.	Nev.	10,400,000	104,000	100	2,564,000	Sept	1882	.25	15,397,000	Apl.	1876	1.00	S.F.	9													
10	Birdseye, g.	Cal.		15,000							Dec.	1882			10													
11	Bodie Con., g.	Cal.	10,000,000	100,000	100	175,000	Mch	1883	.50	1,295,000	Nov	1882	.20	S.F.	11	.85	.80	.85								1.45	.90	1,150
12	Bonanza Developm't	C&M	3,000,000	300,000	10					135,000	Oct.	1882	.15		12													
13	Boston & Mont. g.	Mont	2,000,000	200,000	10	*				810,000	Jan.	1883	.05		13													
14	Breece, s.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01	P.	14													
15	Bulwer, g.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	155,000	Apl.	1883	.05		15	.88	.87				.86	.85	.88	.80				
16	California, g. s.	Nev.	54,000,000	540,000	100	746,000	Feb.	1883	.20	31,920,000	Dec.	1879	.50		16						.22	.21	.21	.20	.21			1,500
17	Calumet & Hecla, c.	Mich	2,500,000	100,000	25					22,850,000	Feb.	1883	5.00	B.	17													2,700
18	Carbonate Hill, s. L.	Colo.								30,000	Apl.	1883	.05		18	1.20		1.20						1.30	1.25	1.10	1.00	2,400
19	Caribou Con., s.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10		19	.14												200
20	Carolina Queen, c.	N. C.	200,000	100,000	2					8,000	Oct.	1882	.02		20													
21	Castle Creek, g.	Idah.	100,000	100,000	1					33,000	Apl.	1883	.03	B.	21													
22	Catalpa, s. L.	Colo.	3,000,000	300,000	10	*				210,000	Dec.	1882	.10		22													
23	Central, c.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,670,000	Feb.	1883	3.00		23													
24	Christy, s.	Utah	6,000,000	60,000	100					90,000	Jan.	1883	.10	B.	24													
25	Chrysolite, s. L.	Colo.	10,000,000	200,000	50	*				1 600,000	Dec.	1881	.50		25													
26	Con. Gold Mining, g.	Ga.	500,000	100,000	5	*				92,000	Mar.	1883	.04	S.F.	26	1.25	1.15	1.20	1.15	1.15		1.25	1.15	1.20		1.25	1.10	3,680
27	Con. Virginia, g. s.	Nev.	54,000,000	540,000	100	897,000	Aug	1882	.30	42,930,000	Aug.	1880	.50		27	.48	.45	.48		.49	.48	.52	.50	.50		.51	.50	3,325
28	Contention, s.	Ariz.	12,500,000	250,000	50					42,274,000	Mch.	1883	.25		28													
29	Copper Queen, c.	Ariz.	2,500,000	250,000	10	*				975,000	Apl.	1883	.50	S.F.	29													
30	Crown Point, g. s.	Nev.	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00		30													
31	Deadwood Terra, g.	Dak.	5,000,000	200,000	25	*				†900,000	Jan.	1883	.10	B.	31													
32	Dunkin, s. L.	Colo.	5,000,000	200,000	25	*				200,000	July	1881	.07½	S.F.	32	.23	.20											
33	Eureka Con., g. s. L.	Nev.	5,000,000	50,000	100	150,000	Mch	1883	1.00	4,797,500	July	1882	.25		33	5.25	5.00	5.00	4.50	5.13		6.00	4.75			6.25		900
34	Evening Star, s. L.	Colo.	500,000	50,000	10	*				1,225,000	Oct.	1882	.50		34													990
35	Excelsior, g.	Cal.	10,000,000	100,000	100	300,000	Jan.	1882	1.00	875,000	Oct.	1880	.25		35													
36	Father de Smet, g.	Dak.	10,000,000	100,000	100					570,000	Feb.	1883	.20		36	4.50										4.63		125
37	Franklin, c.	Mich		54,000		360,000	Jun	1877		243,000					37													
38	Freeland, s.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.25		38													
39	Fresno Enterprise, g	Cal.	5,000,000	100,000	50					110,000	July	1882	.10	S.F.	39													
40	Gem, s.	Colo.	125,000	125,000	1					21,250	Mch	1883	.02	S.F.	40													
41	Glass-Fendery, s. L.	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10		41													
42	Glen, s.	Colo.	100,000	100,000	1					6,000	Mch	1883	.01		42													
43	Gould & Curry, g. s.	Nev.	10,300,000	103,000	100	3,476,000	Sept	1882	.50	3,826,000	Oct.	1870	10 00	S.F.	43													
44	Grand Central, s.	Ariz.	1,000,000	100,000	10					625,000	Dec.	1882	.25		44													
45	Grand Prize, s.	Nev.	10,000,000	100,000	100	445,000	Mch	1883	.25	450,000	Sept	1880	.25		45			.75				.45						
46	Granite, s.	Colo.	125,000	125,000	1					5,000	Mch	1883	.01		46													200
47	Great Eastern, g.	Dak.	300,000	300,000	1	*				16,000	July	1880	.01		47							.02						
48	Great Western, Q.	Cal.	5,000,000	50,000	100	35,500	Aug	1873	.15	262,500	Oct.	1882	.25		48													1,300
49	Green Mountain, g.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½		49	.76	.75	.80	.75									
50	Hale & Norcross, g. s	Nev.	11,200,000	112,000	100	4,006,000	Sept	1882	50	1,598,000	Apl.	1871	5.00		50											.82		1,800
51	Hall-Anderson, g.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.05		51													
52	Hecla Con., s.	Mont	1,500,000	30,000	50					387,000	Jan.	1883	.50	S.F.	52													
53	Henriett, L.	Colo.		270,000							Feb.	1883		B	53													
54	Hibernia, s. L.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40		54							.04		.04		.08		
55	Holyoke, g.	Idah.	200,000	200,000	1					28,000	Apl.	1883	.02		55													2,800
56	Homestake, g.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	1,915,500	Mch	1883	.40		56	15.75												
57	Hope, s.	Mont	400,000	8,000	50	*				91,124	Mch	1883	1.50		57													10
58	Horn-Silver, s. L.	Utah	10,000,000	400,000	25	*				2,000,000	Feb.	1883	.75		58	7.75		7.50		7.63	7.70	7.75		7.88	7.75			1,125
59	Hukill, g. s.	Colo.	1,000,000	200,000	5	*				210,000	Dec.	1878	.10		59			.16		.16		.14						2,000
60	Idaho, g.	Cal.	310,000	3,100	100					3,341,250	Feb.	1883	2.50		60													
61	Independence, s.	Nev.	10,000,000	100,000	100	215,000	Mch	1883	.30	225,000	Sept	1879	.25		61	.32												50
62	Indian Queen, s.	Nev.	250,000	125,000	2					365,000	Nov	1882	02	B.	62													
63	Inyo, g.	Cal.	500,000	100,000	5	*				45,000	Apl.	1882	.05		63													
64	Iron-Silver, s. L.	Colo.	10,000,000	500,000	20	*				1,000,000	Mch	1883	.20	S.F.	64	2.90				2.90		2.85				2.90		1,500
65	Jocuistta, s.	Mex.	10,000,000	100,000	100					870,000	Feb.	1883	.50		65													
66	Kentuck	Nev.	3,000,000	30,000	100	342,000	Nov	1881	.30	1,252,000	Mch	1883	.10		66													
67	La Plata, s. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30	E.	67													
68	Leadville, s. L.	Colo	4,000,000	400,000	10	*				270,000	Jan.	1883	.05		68													
69	Leeds, s.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15	S.F.	69	.71	.68					.70	.68	.68				3,400
70	Little Chief, s. L.	Colo.	10,000,000	200,000	50	*				700,000	Aug.	1880	.50		70	.40	.39			.40	.39	.40	.39			.42	.40	3,000
71	Little Pittsburg, s. L.	Colo.	20,000,000	200,000	100	*				1,050,000	Mch	1880	.50		71											.62		100
72	Marguerite, g.	Cal.	500,000	25,000	20					18,750	Oct.	1882	.25	S.F.	72													
73	Martin White, s.	Nev.	10,000,000	100,000	100	975,000	Mch	1883	.25	90,000	July	1879	.30	B.	73													
74	Minas Nuevas, s.	Mex.	300,000	100,000	3	*				20,000	July	1882	.10		74													
75	Morning Star, s. L.	Colo.	1,000,000	100,000	10	*				565,000	Dec.	1882	.25		75													
76	Napa, Q	Cal.	700,000	100,000	7					390,000	Jan.	1883	.10		76													
77	Navajo, g. s.	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	200,000	Apl.	1883	.25		77	3.60	3.55	3.50	3.25	3.45	3.40	6.25		3.15	3.00	3.30	3.10	4,750
78	New York Hill, g.	Cal.	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10		78													
79	New York & Colo., g.	Colo.	1,250,000	50,000	25					25,000	July	1879	.10		79													
80	Northern Belle, s.	Nev.	5,000,000	50,000	100					2,375,000	Mch	1883	.50	B.	80	9.88		10.00	9.75	9.75	9.25	9 38		8.75		8.75	8.63	1,135
81	North Belle Isle, s.	Nev.	10,000,000	100,000	100	75,000	Nov	1882	.20	80,000	Aug.	1881	.15		81			.35										550
82	Ontario, s. L.	Utah	15,000,000	150,000	100					4,925,000	Jan.	1883	.50		82	24.13						27.50		27.75		27.50	27.13	220
83	Ophir, g. s.	Nev.	10,000,000	100,000	100	3,495,000	Dec.	1882	1 00	1,595,000	July	1882	1.00	B.	83							2.25						20
84	Osceola, c.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	895,000	Mch	1883	1 00		84													
85	Oxford, g.	N. S.		100,000						5,000	Mch	1883	.05		85													
86	Pleasant Valley, g. s.	Cal.	10,000,000	100,000	100					30,000	Dec.	1882	.05	S.F.	86													
87	Polonia, s.	Colo.	200,000	8,000	25					12,000		1883	1.50		87													
88	Prussian, s. L.	Colo	1,500,000	150,000	10					132,000	Jan.	1883	.10		88													
89	Quicksilver, pref., Q.	Cal.	4,300,000	43,000	100					654,000	July	1882	6.00	P.	89													
90	" com., Q	Cal.	5,700,000	57,000	100	200,000				151,000	July	1882	.40		90													
91	Quincy, c.	Mich	1,200,000	40,000	25		Dec.	1862	5.00	3,570,900	Feb.	1883	6.00	S.F.	91							8.25				8.50		200
92	Renfrew, g.	N. S.	60,000	30,000	2					4,800	July	1882	.02		92													
93	Richmond, s. L.	Nev.	1,350,000	54,000	25	*				3,907,587	Jan.	1883	2.50	E.	93													
94	Rising Sun, s.	Dak.	750,000	150,000	5	*				52,000	May	1881	.07½		94	.05					.05		.04		.05	.04		3,400
95	Robinson Bar, g.	Cal.	100,000	100,000	1	*				9,000	Dec.	1882	.03		95													
96	Robinson Con, s. L.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50		96	.77	.70	.76	.70	.75	.73	.74	.72	.72	.70	.71	.61	88,785
97	Robert E. Lee, s. L.	Colo.	250,000,000	500,000	500					100,000	Dec.	1882	.10	E.	97													
98	San Francisco, c.	Cal.		50,000						25,000	Jan.	1883	.05		98													
99	Savage, s.	Nev.	11,200,000	112,000	100	5,736,000	Apl.	1883	2.25	4,460,000	July	1869	3.00	B.	99													
100	Shoshone, g.	Idah.	150,000	150,000	1					6,000	Mch	1883	.01		100													
101	Sierra Buttes, g.	Cal.		22,500	10					1,429,683	Oct.	1882	.25	E.	101													
102	Sierra Grande, s.	N. M.	10,000,000	400,000	25					900,000	Apl.	1883	.25		102	1.90	1.85	2.00	1.85	1.90	1.85	2.00	1.95	1.95	1.90	1.80		18,100
103	Sierra Nevada, g. s.	Nev.	10,000,000	100,000	100	5,250,000	Mch	1883	1.00	103,000	Jan.	1871	1.00	P.	103	2.25				2.25		2.38	2.20			2.30		555
104	S'a P'mas Eureka, g	Cal.		40,625							Apl.	1882		B.	104													
105	Silver King, s.	Ariz.	1,000,000	100,000	100					1,200,000	Mch	1883	.25	S.F.	105	11.00				11.00		10.75						150
106	Silver King, s.	Colo.	1,000,000	500,000	2					50,000	Aug.	1881	.10		106													
107	Smuggler, s. L.	Colo.	600,000	60,000	10					27,000	Mch	1883	.10		107													
108	Socorro, c.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾	B.	108													
109	Spring Valley, g.	Cal.	200,000	200,000	1	*				50,000	Jan.	1881	.25		109													
110	Standard, g. s.	Cal.	10 000,000	100,000	100	*				4,125,000	Apl.	1883	.25		110													150
111	Stormont, s.	Utah	200,000	200,000	1	*				155,000	Nov	1881	.05		111					6.75		7.00	6.50					
112	St. Joseph, L.	Mont	1,000,000	100,000	10	*				390,000	Dec.	1882	.20		112													
113	Tip Top, s.	Ariz.	10,000,000	100,000	100	195,000	Mch	1883	.25	100,000	Nov	1881	.20		113													
114	Tombstone, g. s.	Ariz	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10	B.	114													
115	United Gregory, g.	Colo.	300,000	300,000	1					26,250	Oct.	1882	.50		115													
116	United Gold Min. Co.	Colo.									Oct.	1883	.05		116													
117	Vizina, s.	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1883	.10	E.	117													
118	Yellow Jacket, g. s.	Nev.	12,000,000	120,000	100	5,358,000	Feb.	1882	1.00	2,208,000	Apl.	1883	.20	B.	118													
119	Yuba, g.	Cal.	5,000,000	200,000	25					4,000	Sept	1881	1.00		119											2.00	1.88	400

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ This company, as the Western, up to December 10th, 1881, paid $1,475,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British mines. Dividend shares sold, 140,655.

3. P.M.—There was no special feature to the market this afternoon. Below are the closing prices: Allouez, $2@$2¼. Atlantic, $10¼@$12. Antimony, $14@$15. Bonanza, $2⅛ bid. Calumet & Hecla, $240 bid. Catalpa, 45c. bid. Crescent, 20@25c. Franklin, $10¾@$11. Harshaw, $1 asked. Huron, 50c. bid. National, $1⅛ asked. Osceola, $25@$27. Pewabic, $4@$5. Quincy, $49@$49¼. Silver Islet, $2½ bid. Sullivan, $1 asked. San Pedro, 55@60c.

METALS.

New York, Friday Evening, April 6.

Copper.—During the week, the leading Lake companies astonished the trade by offering Lake copper freely at 16c., and some sales, aggregating possibly 400,000 pounds, were made at that figure, and it is rumored at even less. This action clears the sky for the time being; and after consumers have become convinced that they will not be able to do much better, a livelier buying movement will be inaugurated. In consequence of the constant decline in the price of the raw material, values of manufactured goods, though nominally prices were unchanged, have fallen off steadily, and the cutting which has gone on for months has demoralized the customers. The opportunity is now offered to restore confidence, and then

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			March 31. H.	March 31. L.	April 2. H.	April 2. L.	April 3. H.	April 3. L.	April 4. H.	April 4. L.	April 5. H.	April 5. L.	April 6. H.	April 6. L.	Sales.	
1	Advance M & M. Co.																						S. F.
2	Albion, S. L.	Nevada	$15,000,000	150,000	$100	$547,500	March	1883	.50														B.
3	Allouez, C.	Michigan	2,000,000	80,000	25	200,000	January	1883															S. F.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50														S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	1,392,090	January	1883	.25													7,500	
6	Alta-Montana, G. S. L.	Montana	5,000,000	500,000	10					.09	.08	.08	...	.09	.08	.09	.08	....	....	.08	....	100	
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25					.03				....	....	....	....	900	
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*				.17	....	.15	....	.15	....	....	....	....	....	....	....	....	
9	Battle Creek																						S. F.
10	Bear Creek	California	300,000	300,000	1																		S. F.
11	Beauce																					1,700	
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10														
13	Best & Belcher, G. S.	Nevada	10,080,000	100,800	100	1,345,790	November	1882	.50					.17	.15	.16	.15	....	....	....	....	....	
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																	
15	Black Jack, G.	California	250,000	100,000	2½																		
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	
17	Bonanza King, G. S.	California	1,000,000	10,000	100	*																	
18	Bondholder	Colorado	500,000	200,000	2½				.25														
19	Boston Con., G.	California	10,000,000	100,000	100	95,000	October	1882														5,800	
20	Boulder Con.	Colorado								.30	....	.30	....	.30	....	.30	29	.30	.28	....	....	1,100	
21	Bradshaw, S.	Arizona	2,250,000	225,000	10					.33	....	....	....	.02	....	....	....	.02	....	.02	....		
22	Buckeye	Colorado	2,000,000	400,000	5	*																	
23	" preferred	Colorado				*																	S. F.
24	Bull-Domingo, S. L.	Colorado	10,000,000	200,000	50																	1,700	
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,747,000	October	1882	.50														
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	
27	Calaveras, G.	California	500,000	500,000	1	*																	
28	Cal. W'r & M. Co., G.	California								.02	....	.02	....										
29	Caledonia, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15														
30	Catskill, S.	Nevada	1,500,000	300,000	5																		
31	Central Arizona, S.	Arizona	10,000,000	100,000	100					.33	.32	.33	.30	.31	.30	....	....	.30	....	.33	.30	3,300	B.
32	Chaparral	California																				19,600	
33	Cherokee, G.	California	1,500,000	150,000	10					.08	....	.03	.02	.02	....	.02	....	.02	....	.02	....	....	S. F.
34	Chollar, S.	Nevada	11,200,000	112,000	100	521,000	March	1883	.50														
35	Colorado Central, S.	Colorado	3,000,000	300,000	10																		
36	Columbia Con., G. S.	Nevada	5,000,000	500,000	10																		
37	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,425,000	January	1882	.10														
38	Con. Pacific, G.	California	6,000,000	60,000	100	141,000	August	1882	.25														B.
39	Crescent, S. L.	Colorado	3,000,000	300,000	10	*								.03	....	.04	....	....	....	....	....	4,700	
40	Crowell, G.	North Car.	500,000	500,000	1					.04	....	....	....										
41	Dahlonega, G.	Georgia	250,000	250,000	1	*																	
42	Dardanelles, G.	California	1,000,000	100,000	10																		
43	Decatur																						
44	Dunderberg, S.	Colorado	1,500,000	150,000	10	*																	
45	Durango, G.	Colorado	500,000	500,000	1	*																	
46	Eastern Oregon																						
47	Elko Con., S.	Nevada																					
48	Empire, S.	Utah	10,000,000	100,000	100					.06	.05	.06	.05	.06	.04	.06	.05	....	....	.05	....	36,100	
49	Enterprise	Colorado														.25	....	....	....	....	....	100	
50	Exchequer	Nevada	10,000,000	100,000	100	630,000	January	1882	.25													2,800	
51	Fannie Barret, S.	Colorado								.06	.05	.05	....	.03	....	.06	....	.70	....	.75	....	2,400	
52	Globe Copper	Arizona																					
53	Gold Placer, G.	Colorado	5,000,000	200,000	25	*				.13	.12	.11	.10	.10	.09	.11	.10	....	....	.10	.09	20,100	B.
54	Goodshaw, G.	California	10,000,000	100,000	100	200,000	October	1882	.10														
55	Granville, C.	North Car.	300,000	300,000	1	*				.25	....	.24	....	.25	.24	.26	.25	.27	.26	.29	.27	15,100	
56	Harlem M. & M. Co., G.	California																					
57	Harshaw, S.	Arizona	10,000,000	100,000	100					.25	....	.24	....	2.25	2.20	2.20	....	....	....	....	....	700	
58	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20														
59	Hortense, S.	Colorado	2,000,000	200,000	10					2.20	....	2.20	....										
60	Julia, G. S.	Nevada	11,000,000	110,000	100	1,394,000	January	1882	.20														
61	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15					.04	....	....	....	....	....	....	....	1,500	
62	Lacrosse, G.	Colorado	1,000,000	100,000	10	*																	
63	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														
64	Lucerne, S.	Colorado	5,000,000	500,000	10	*																	
65	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881															
66	" common, G.	California	10,000,000	100,000	100	1,975,000	February	1883	.25														
67	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20														
68	Mayflower, S.	Colorado	10,000,000	100,000	100	*																	
69	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,269,000	February	1883	1.00	3.00	2.88	3.00	....	3.13	2.88	3.13	2.90	3.00	2.88	3.13	3.00	3,710	S. F.
70	Michoacan Synd.	Mexico														.02	....	.02	....	....	....	300	
71	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																	
72	Miller	Nevada	5,000,000	200,000	25																		S. F.
73	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20														
74	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																	
75	Moulton, G. S.	Montana	10,000,000	400,000	25	*																	
76	Nevada Syndicate																						
77	North Standard, G	California	10,000,000	100,000	100	20,000	November	1881	.10														S. F.
78	North Horn-Sil., S. L.	Utah		400,000																			
79	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00														
80	Old Dominion, C.	Arizona	20,000,000	200,000	100	*																	
81	Oriental	Nevada	2,000,000	200,000	10																		
82	Oriental & Miller, S.	Nevada	10,000,000	400,000	25					.16	.15	.16	.15	.15	.16	.15	.16	.15	.16	.15	.18	32,100	
83	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25														S. F.
84	Potosi	Nevada	10,200,000	112,000	100	500,640	November	1882	.25														S. F.
85	Quartz Creek																	.02	.01	.02	....	4,500	
86	Rappahannock, G.	Virginia		250,000		*																1,400	
87	Red Elephant, S.	Colorado	500,000	500,000	1	*				.08	....	.08	....	.08	....	....	....	.06	....	....	....	3,300	
88	Retort M. & M. Co.	Colorado			10					.07	.06	.07	....	.07	....	.07	....	....	....	....	....		
89	San Pedro, G. S. L.	New Mex.		400,000																			
90	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*				.35	.33	.35	....	.35	....	....	....	....	....	....	....	1,300	B., P.
91	Silver Islet	Canada	1,000,000	40,000	25																		
92	Soncra Con.	Mexico								.48	....	.47	.46	.50	.46	.53	.48	.52	.40	.45	.35	39,800	
93	South Bodie, G.	California		100,000		100,000	March	1882	.15														
94	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25					.25	.20	.23	....	....	....	....	....	2,500	
95	South Hite	California	10,000,000	100,000	100		January	1883	.05														
96	South Pacific	California			5					.06	....	.06	.05	.05	....	.06	.05	....	....	.06	.05	11,000	
97	State Line, No. 1, S.	Nevada	200,000	200,000	1																		B.
98	" No. 2, S.	Nevada	5,000,000	200,000	25																		
99	" No. 3, S.	Nevada	5,000,000	200,000	25																		
100	" No. 4, S.	Nevada	5,000,000	200,000	25																		
101	" Nos. 1 and 4, S.	Nevada																					
102	" Nos. 2 and 3, S.	Nevada																					
103	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25														
104	Sutro Tunnel	Nevada		2,000,000		*				.03	.02	.02	....	....	....	....	....	....	....	....	....		
105	Taylor-Plumas	California			10					.04	....	.04	....	.04	....	....	....	....	....	....	....		
106	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10														
107	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														
108	Unadilla, S.	Colorado	50,000,000	500,000	100					.12	....	.11	....										
109	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,570,000	January	1883	1.00														
110	Utah, S.	Nevada	2,000,000	20,000	100	1,380,000	February	1883	1.00														
111	Vandewater	Nevada	20,000,000	200,000	100	*																	
112	Washington	Arizona	2,000,000	200,000	10																		
113	Whalen Copper	Nevada	2,500,000	100,000	25																		
114	Wide West																						
115	Willshire	California	250,000	50,000	5	*																	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F., San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 280,760. Total shares sold, 421,415.

greater steadiness in the market of the metal may be expected. Other brands are offered at prices varying from 14·90@15·75c. We learn that a large Western producer of standard copper declined an offer for export from a point on the southwestern coast, and sold one million pounds to an Eastern refiner. If, as we learn, the price for export was a little better, it is to be regretted that such an important lot was not sent away. English quotations are unfavorable, Chili Bars having fallen off to £64@£64 10s. against £65 10s. last week, while Best Selected remains nearly the same, £72@£72 5s. Lake generally brings considerably more than Best Selected, the last sale, a few weeks ago, of 1500 tons, realizing £77. We discuss editorially some of the points suggested by the situation.

Under date of March 22d, Vivian, Younger & Co., of London, quote ores and regulus at Liverpool or Swansea, 13s.@18s. 6d. per unit, delivered in warehouse.

Tin.—The market has been unsettled, with little business transacted. London dropped to £94 yesterday, but reacted to £95 10s. to-day. At the close, 20¾c. is bid and 21⅛c. asked for spot Straits.

Lead.—The situation is unsettled temporarily, and, during the first four days of the week the continuance of negotiations between a pool of buyers offering to take 3500 tons at 4·40c., of Richmond lead, kept matters in suspense. Since then, common lead has been offered freely for April delivery at 4·40c.; but

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as most large consumers are tolerably well stocked for this and a part of the coming month, it has not resulted in any business. Refined is procurable at 4·55@4·60c. During the month, 700 tons of Germania lead are due, which will probably be sold on arrival.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

We note eight sales, during the early part of the week, of 110 tons Refined, at 4·12½c. and 4·15c., and Wednesday, 230 tons of Chemical Lead, at 4·12½c. Receipts were 600 tons, against 500 tons last week.

Spelter.—This market is very quiet, with values falling off slightly. We quote: 4·70@4·80c. for Common Domestic.

Preliminary estimates of the production of spelter in Siberia for 1882 place the make at 69,964 metric tons, compared with 67,547 tons in 1881, an increase of 2417 tons.

Antimony.—Business has been slow, our quotations being 10c. for Hallett's and 10⅞@11c. for Cookson's.

BULLION MARKET.

NEW YORK, Friday Evening, April 6.

The completion of a small continental order for silver, and a decline in India exchange, have induced lower rates in London; but an advance in sterling exchange here has nearly met this, as our figures show. The market is not strong.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
March 31..	*	110⅝	April 4....	50¾	110
April 2....	50⅞	110⅛	5....	50¾	110⅛
3....	50 13-16	110⅛	6....	50¾	110¼

* 51@51 1-16.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended April 6th, as compiled from various sources, amounted to $236,000, as against $146,644.34 reported for the previous week. The receipts from January 1st, 1883, to date are $3,818,208.08.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended March 31st	$539,700
Corresponding week last year	310,450
Since January 1st, 1883	4,144,610
Corresponding period last year	13,061,753

Imports.

Week ended March 31st	$693,798
Corresponding week last year	144,044
Since January 1st, 1883	8,846,467
Corresponding period last year	1,085,613

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the rate of discount, which remains 3 per cent. The outside rate is fully up to the bank rate. The bank lost during the week £378,000 bullion, and the proportion of reserve to liabilities was reduced from 38¼ last week to 34 5-16, against 36⅝ at the same time last year. The weekly statement of the Bank of France shows a decrease of 1,850,000 francs in gold and 500,000 francs in silver.

Silver Coinage Allotments.—Owing to the large accumulation of silver coin at the San Francisco Mint, the Director of the Mint has ordered that the coinage allotment for that mint for the month of April be fixed at $400,000, which is $200,000 less than the allotment for March. The coinage at the Philadelphia and New Orleans mints will be correspondingly increased.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 6.

At the Wall Street Iron and Metal Exchange, the following directors were elected: Theodore Sturges, President; John C. Cook, Treasurer; William Allen Smith, Secretary; A. W. Humphreys, James Hall, F. L. Lehmann, B.F. Judson, J. Fred. Pierson, William Houston, Daniel F. Cooney, Morton B. Smith, T. D. Hazard, James E Pope.

American Pig.—Apathy still continues, but still prices are tolerably well maintained on the part of increasing stocks. The demand, however, is slacker at the seaboard than in the interior, where large quantities of forge iron are used, and of the sale of which we hear little. There is an entire absence of speculation, and the producers and consumers, being pretty wide apart in their views, show no inclination to give up their respective positions. The makers of other than standard brands of foundry irons are, however, weaker and make concessions. We quote $22.50@$24.50 for No. 1. Foundry, ordinary to choice; $21.50@$22.50 for No. 2; and $19@$20 for Gray Forge. Bessemer pig sales aggregating 10,000 tons are reported at a price equivalent to $21.75 here; quotations range from $21.50 bid to $22 asked. Spiegeleisen has been more active, at $32 for 20 per cent, and $26 for 12 to 15 per cent.

Scotch Pig.—The only feature worthy of special comment is the falling off in the arrivals. Freights are still low from Glasgow; they have, however, stiffened from Liverpool to 10s. Business is on a small scale only. We quote Coltness and Langloan, $24@$24.50; Glengarnock, $22@$22.50; and Eglinton, $21@$21.50. At the Wall Street Exchange, the following cables were received to-day: Carnbroe, 55s. 3d.; Gartsherrie and Summerlee, 61s. 6d.; Coltness, 64s.; Langloan, 64s. 3d.; Glengarnock, 54s. 9d.; and Eglinton, 49s. Warrants are 46s.

Rails.—There is a fair inquiry for small lots, and we note sales aggregating from 5000 to 6000 tons at $39 at mill.

Old Rails.—No business of any magnitude has been done, except a sale of 300 tons of D. Hs. at $28. We quote Ts $23.50@$24, and D. Hs. spot $28, with very little here.

Scrap.—Scrap is dull and lifeless at $25 ex ship.

Philadelphia. April 6.

Pig-Iron.—Representatives of standard brands of pig-iron have made a number of satisfactory sales at $20 for Gray Forge, $24.50@$25 for No. 1, and $24 for poor quality, with occasional transactions at less. No. 2 sold higher and lower this week than usual. The concessions which pig-iron men have been finally induced to make led to a good deal of businesss, and more is going through. Furnace stocks have been pretty well depleted by contracts placed, but deliveries extend over the second quarter of the year. Some mill iron sold at $18.50@$19 at furnace.

Merchant Iron.—The rolling-mill owners are not satisfied with current rates for finished bars, but they can not help themselves at present. The average price for Refined Bars is 2·25c.; Ordinary 2@2·10c. A strike is not out of the question, as the Western manufacturers contemplate a 10 to 20 per cent reduction. Such a course would bring about an artificial scarcity, and in view of possible complications, a number of inquiries for large supplies have been heard of. Skelp iron is 2¼@2½c., with concessions. Nails are in good demand at $3.15@$3.30. Bridge and boiler plate is active, and inquiries for summer requirements for common plate and structural iron are under consideration.

Sheet-Iron.—Plain and galvanized has met with more inquiry, but the general character of trade is retail.

Steel.—Steel is improving, but sales of large lots are made at concessions.

Steel Rails.—Some few large orders have been placed in Bessemer mills under $39. The total sales for the week reported from all quarters are large. Small lots, $39@$40.

Old Rails.—Tees are quoted $24.50 in small lots, and Double Heads, $28.

Scrap.—Moderate demand at $25@$26 for No. 2; $27@$28 for No. 1.

COAL TRADE REVIEW.

Anthracite.

NEW YORK, Friday Evening, April 6.

The situation has not materially changed. Not withstanding the unshaken determination of the great coal companies to keep the production within the limits of the demand, and the inference to be drawn from it that they will not go lower in prices, consumers appear almost to a man to have the idea that they will do much better by waiting. How far this policy is a wise one remains to be seen, especially when it is considered that freights are exceptionally low, charters being made to Boston at $1 and to Providence at 70 cents. The Eastern trade so far has been a disappointment, much more so than the local trade, which has been fair in the aggregate. Here the complaints come principally from the middlemen, who appear to be left out in the cold. Coal is accumulating now, waiting for the opening of lake navigation, when a strong movement to the West is expected; those markets being practically bare of anthracite.

The production of the present year is creeping up at a rate of increase over the last of about 15 per cent. The restriction ordered by the coal companies, however, will keep this increase within the bounds set by the growth of the demand.

Bituminous.

As a slightly encouraging sign after the deadness of the past few weeks, it may be noted that there are at least occasional inquiries. We understand that several of the larger contracts are in the market, but none has as yet been closed. Low offerings of coal continue to be made, some of the figures we hear of being surprising. They can only be accounted for, so far as Cumberland is concerned, by the low cost of putting coal on board at Georgetown, where coal is held at $3.20@$3.25, leaving a good profit for shippers. We quote Clearfield nominally $4.40@$4.50, and Cumberland $4.50@$4.60, though we hear of transactions at lower figures.

From Philadelphia, a correspondent sends us the following, under date of April 5th:

This is a short week, and it has been decided to continue the curtailment next week. The purchasers are not coming forward as it was natural to expect they would, after a long winter and active consumption. A feeling that coal may be lower prevails, notwithstanding the determination shown by the trade not to crowd the market with surplus coal. The prices, particularly of stove, both at tide and to the local trade, are higher than last year at this time, and account for the reluctance of buyers to order freely. The companies are waiting, knowing they will have to come; and it is expected that the moment the Western outlet is open, buyers will get a practical demonstration that rates can be maintained.

Vessels are scarce, but orders not being plenty, the freights remain what they were last week, and low freights seem to be expected by the best informed.

Horsford's Acid Phosphate.

Overworked Nervous Systems.

Dr. EDWARD L. DUER, Philadelphia, says: "I have used it for several years, considering it valuable in overworked nervous systems and in the exhausted condition following protracted fevers."

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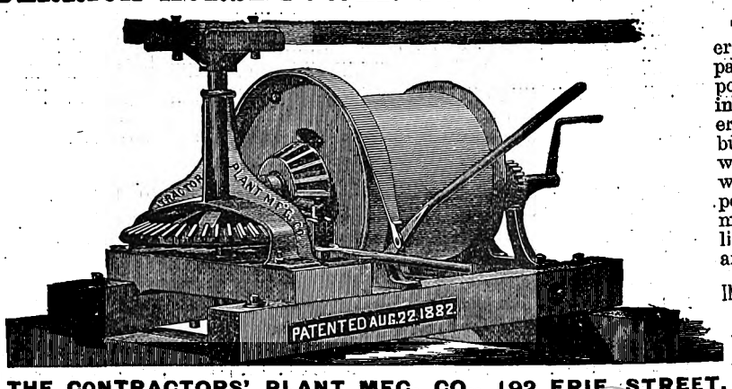
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While the stock lasts, good bargains are open for Miners, Water-Works, Rolling-Mills, Furnaces, or any one needing to move fluids by steam. Call upon or address

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THE ENGINEERING AND MINING JOURNAL

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF Jr. M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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THE next meeting of the American Institute of Mining Engineers will be held at Roanoke, Va., during the first week in June.

GEN. S. V. BENÉT, Chief of Ordnance, announces that, as Congress has failed to appropriate money, he can not pay the freight charges on material sent for testing to the Watertown Arsenal.

MR. C. M. ROLKER will leave for the West about the beginning of May, to examine some mining properties. Those desiring to communicate with him should address him at No. 63 Broadway until May 5th, and care of Messrs. HAGEN & BILLING, No. 1 Wall street, after that date.

SPAIN appears to be forging ahead as a great mineral-producing country. The exports of the years 1881 and 1882 were, according to recent statistics, as follows, the unit being the metric ton :

	1881.	1882.
Metallic copper	17,710	22,708
Quicksilver	1,779	1,067
Iron	37,903	40,115
Lead	105,809	116,132
Zinc ore	30,604	25,832
Copper ore (presumably pyrites)	452,475	571,442
Iron ore	3,137,083	4,021,761

The increase in copper and pyrites, in pig-lead, and in iron ore is striking ; while on the other hand, the falling off in the export of quicksilver is very great.

PROF. L. GRUNER, of the Paris School of Mines, the great French mining engineer and metallurgist, died last month. He suffered a few years ago from a severe attack of sickness, and had since then, though he partially recovered, been able to do comparatively little work. He was one of the honorary members of the American Institute of Mining Engineers, in whose progress and prosperity he took a great interest.

THE TRANSMISSION OF POWER BY ELECTRICITY.

There has been a great deal of misapprehension and error in regard to the transmission of power by electricity, and earlier experiments, notably those made at Munich, have failed to furnish data of value. The results of a series of tests, carried on with great accuracy by M. TRESCA and Dr. HOPKINSON at Paris, and now published, will, therefore, be welcomed, as furnishing indications where the principal losses of power are to be sought, and how far they may be avoided. To those engaged in mining and metallurgy, they are particularly interesting, because the special circumstances under which operations in those industries are carried out are such as to open a wide field for usefulness. We print elsewhere the records of two instances where the electrical transmission of power was employed in French mines, and shall in the future add others relating to Austrian and German mines.

The Paris experiments, at which a plant put up by M. MARCEL DESPREZ was used, consisted of two machines, the generator and the motor, placed side by side, but connected with a four millimeter or No. 9 Birmingham gauge telegraph wire, carried to Bourget, a suburb of Paris, and back again, a distant of 10½ miles ; but as the two poles of the machines were connected by a short conductor, the conditions were the same as though the power had been transmitted a distance of 5¼ miles.

During the first series of experiments, the average of six trials showed that of 6·21 horse-power developed at the dynamometer, the generator, the producer of the electric current, running at a speed ranging from 571 to 633 revolutions, developed an electric power at its terminals of 4·43 horse-power. The power consumed in the transmission of the current through the wire to the motor was 1·31 horse-power, leaving the electric wire in horse-powers at the terminals of the motor 3·12, the motor running at a speed varying between 315 and 418 revolutions. The loss at the motor was 1·09 horse-power, and only 2·03 horse-power were transmitted to the brake, thus showing the efficiency of the entire plant to be only 32·6 per cent.

In these experiments, it was therefore shown that the efficiency of the three parts of the plant, the generator, the conductor, and the motor, was closely 70 per cent for each, and that approximately one third of the power applied to the generator may, under the conditions of the plant used, be made applicable to the driving of machinery at a distance of 5¼ miles.

A second series of experiments was conducted with the same plant, but so modified as to drive the generator with greater speed, ranging between 705 and 883 revolutions per minute. On an average of four trials, the motive power measured at the dynamometer was 10·389 horse-power, of which 8·193 horse-power was actually transmitted to the generator, which consumed 1·498 horse-power, leaving 6·799 horse-power, which, by the conversion of electricity into heat during the passage of the current from the generator, through the wire transmission to the motor, was reduced by 1·373 horse-power. Out of the 5·426 horse-power left, 2·123 horse-power was consumed by the resistance of the motor, thus carrying down the power transmitted to the brake to 3·304 horse-power, equal to an efficiency of 31·9 per cent, or 40·8 of the power communicated to the spindle of the generator. The loss of power in the generator and the motor can be only partly traced to its source. In the second series, where, by the way, these losses were relatively heavier, it has been computed that the electrical power consumed by the conversion of electricity into heat was 0·549 horse-power in the generator and 0·814 horse-power in the motor, leaving a loss of 0·844 and 1·309 horse-power respectively as a supplementary loss of work, which is due to a variety of causes, and which careful study of the conditions will probably reduce.

The efficiency of a plant for the transmission of power may be considerably increased also by the use of conductors offering less resistance and well isolated. By generating electricity of high tension, the thickness of the conductor and its cost may be reduced ; but, on the other hand, this expedient has its drawbacks that may counteract its advantages.

From the data at present available, it appears that the best economy is to bestow much attention and invest a greater outlay in the construction of the conductors.

The possibilities of the use of the transmission of power by electricity are undoubtedly great, and there are many localities where the utilization of a head of water above or below ground will prove valuable, even though the loss and the investment of capital may be great. It may be expected to compete successfully with compressed air, wire-rope transmission, or water under pressure.

It may be of interest to call attention to the fact that the Mansfeld Copper Mining Company, of Germany, has recently offered a prize of 5000 marks, or about $1200, for the best design of a plant to transmit power under ground to a considerable distance, 1700 to 3200 feet or more.

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The conditions are, that the power available shall not be less than ten-horse; and it is left to the designer to employ a motor below ground, or to transmit the power from the surface, upon the condition that the rotating parts of the transmission shall not have a speed exceeding 100 revolutions, the cost not to exceed the use of steam-power. It is probable that a very interesting series of designs, bringing out the relative points of the various methods of transmitting power, will be offered, there being no restrictions as to the method chosen, and we trust that the leading representative designs will be published.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Working of the Nichols Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: We notice in your last week's issue a description of the furnace in use at our works, in which some figures are given of different days' runs. We should like you to mention, in explanation of the apparent burden carried by the coke, that the latter, besides being of very ordinary quality (gas-coke), contained about fourteen per cent of moisture, having been exposed in our yard for a long time. It was also very dirty. In the runs given of the 48-inch and 36 by 66-inch furnaces, there is no mention made of old slag also used in the charges. These explanations make a better showing for the work of the furnace than is apparent on the figures presented by you last week. Yours truly, G. H. NICHOLS & CO.

NEW YORK, April 10.

The New York Metal Exchange and the "Iron Age."

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: A very spirited article in the *Iron Age* of April 5th announces that they have at last waked up at 83 Reade street, and are making a praiseworthy effort to find out how much they are behind the times. Their ideal of a metal trade seems to be some half a dozen merchants who shall act as local agents of the manufacturers by buying contracts of metal and peddling it out in retail lots in faithful adherence to the quotations in the *Iron Age*. This plan might work to advantage if this valuable organ was only published in Oshkosh or in Skowhegan; but the New York market, unfortunately, long since gave up in any way regarding the prices that the *Iron Age* solemnly sends forth once a week, with a calm disregard of intermediate fluctuations. The paper still keeps up an air of benevolent patronage of the trade; and when, a year ago, the movement to start an Exchange began, there was quite a scare in Mr. Williams's office at the idea that the "organ of the metal trades" was to be robbed of the controlling influence that it still fondly believed it exercised. When the split came that resulted in the formation of two Exchanges, confidence was restored, and after a most courteous treatment of both sides, the *Iron Age* ignored the existence of both, and went on quietly in its old way, sure that the two Exchanges would destroy each other, and that there was no necessity for enterprise or a remodeling of the methods that this venerable journal has pursued for a quarter of a century.

And now comes another rude shock. All the differences between Pearl street and Wall street having been satisfactorily adjusted, a plan of consolidation is agreed on, and the *Iron Age* finds itself confronted afresh with the necessity to adapt itself to the changed conditions that have been developed since it really was a power, and to make some effort to progress with the expansion of the metal trade consequent on the enormous growth of New York's commerce. It finds all its predictions disproved and its most cherished prejudices disturbed. The effort is too great, and the usual refuge of the inveterate conservative is sought in denial of every thing that is before it. The editor loses none of his genial politeness in his editorial, but in his most suave manner announces —as I heard suggested to-day—"that here are four hundred fools, and he alone the wise man" of the metal trade. He complains most pathetically that the prices at Pearl street have not always agreed with his quotations; but surely it was a little unreasonable to expect them to. He tells us, in his knowing way, that all four hundred of us are very much dissatisfied with our experiment of one year, and do not want to try it for another. We do not agree with him, and are proving it by proceeding to try; but possibly we are all wrong, and he is right. The arguments that he uses we remember faintly to have heard a year ago, and as they have not been proved by experience, we see no reason why this new strong organization should not be of as great service to our trade as other exchanges have been to other lines of business in the facilitating of transactions, the authoritative settlement of disputed points, and the drawing to New York, as the definite center of the metal trade of America, of much business that is now scattered to other points.

If we disturb the rooted traditions of Reade street, it is sad but unavoidable; and the *Iron Age* should remember that progress and growth are very apt to be uncomfortable for somebody. Yours truly,

NEW YORK, April 5, 1883. EDWARD J. SHRIVER.

THE COINAGE OF SILVER AT THE MEXICAN MINTS.—In the fiscal year 1880–1881, the following were the amounts of silver coined at the Mexican mints, according to *La Libertad*:

Zacatecas	$5,977,000
Mexico	5,691,000
Guanajuto	4,135,250
San Luis Potosí	2,315,750
Guadalajara	1,363,241
Culiacan	1,219,083
Chihuahua	1,178,534
Durango	977,964
Alamos	905,663
Hermosillo	711,250
Oaxaca	142,660
Total	$24,617,395

OFFICIAL STATEMENTS AND REPORTS.

THE HORN-SILVER MINING COMPANY, FRISCO, UTAH.

The second annual report of this company has been issued, and contains many facts that are interesting, not only to the stockholders of the company, but also to the mining public in general. The Horn-Silver is the greatest single producer of lead, and, with the exception of the Richmond Company, of Nevada, is the only one which mines, smelts, and desilverizes. The figures submitted are exceptionally full and complete, and therefore make the Horn-Silver report a document which will be studied with profit, particularly those parts relating to smelting and refining.

In extracting 47,232 tons of ore, and driving 1808 feet of levels and cross-cuts, 121 feet of uprise, and sinking shafts 472 feet, the following amount of labor was done:

	Days' work.
Surface engineers	1,118¾
Firemen	646¾
Blacksmiths	436¾
Carpenters	1,149¾
Timber-men	647
Car-men	1,536
Laborers	9,082¾
Watchmen	58
Miners on ore	17,048¾
Miners' dead-work	4,301
Total	36,024¾

In the distribution of the dead-work in the different levels, there has evidently been some error. We find the sixth level credited on the one hand with 19 days' labor for dead-work, while elsewhere we are informed that it has been extended 210 feet. In the main shaft, 172 feet were sunk with 605 days' work; and in No. 4, 300 feet, with only 318 days' work.

The supplies used stand as follows:

Coal	140,000 pounds.
Wood	863 cords.
Candles	713 boxes.
Powder	703 kegs.
Fuse	54,500 feet.
Timber	1,233,082 feet.
Illuminating oil	464¼ gallons.
Lubricating oil	126 "

The total cost of mining 47,232 tons was $209,535.08, or say $4.44 per ton. The various parts from which the supplies of ore were drawn are shown in the following table:

	Net tons of ore.	Average assay. Lead, p. c.	Silver, ounces.
First level	2,533·85	36·8	52·8
Second level	23,344·34	37·0	31·5
Third level	18,788·52	38·9	36·3
Fifth level	115·42	34·2	15·8
Total	44,782·13	37·8	34·2

The bulk of this ore, 41,808·90 tons, went to the Francklyn smelter; but as a certain amount was also smelted at the Frisco smelter, it is not possible, from the data given, to present a full account of the quantity of materials used and the cost.

Mr. A. Raht, the superintendent, gives the following statement of the materials consumed, we presume by both smelters, in 1882:

	Tons.
Ore	42,748
Limestone	20,657
Iron ore	9,652
Morgan slag	3,754
Coke	15,679
Charcoal	534
Stone coal	1,708
Frisco matte	613
Scrap-iron	114

The product was 14,329·8 tons of bullion, carrying on an average 100·4 ounces of silver, the loss being 9·71 per cent of lead and 2·10 per cent of silver. Closer work, it is stated, would unduly increase the cost. It will be noted that the quantity of limestone used was very high. Mr. Raht speaks very well of the steel jackets which he uses now in his Francklyn furnaces. He places the average cost of smelting at Francklyn at $14.78 and at Frisco at $29.41. From the financial statement, we take the following, giving an itemized account of the expenditures at the two works:

	Frisco. (5176 tons.)	Francklyn. (43,374 tons.)
Labor, supplies, and expenses	$33,228.36	$160,892.23
Iron ore	45,081.92	86,032.43
Limestone	721.59	33,262.15
Charcoal	30,243.24	11,184.09
Coke	32,329.44	323,953.41
Wood	6,990.50	.....
Coal	.....	9,738.66
General expenses	3,600.00	4,800.00
	$152,195.05	$635,852.97

Assuming that the ore was very nearly the same in character, it will be seen that the cost of flux at Frisco, where iron ore was almost exclusively used, was $8.85 per ton; while at Francklyn, where a large proportion of limestone was substituted therefor, it was $2.75. We are not sufficiently familiar with the sources of the supply of iron ore and limestone at the two smelters to judge how much of this large saving is due to differences in cost of transportation; nor is it possible, in the absence of data, to determine how largely the great difference in the cost of smelting at Frisco and at Francklyn is counterbalanced by the cost of shipping the ore farther. We find only this item: "Freight on bullion and ores to Salt Lake, $287,168.70." Mr. Harry C. Hill, general manager, states that the Utah Central Railroad reduced the freight charges on ore to the smelter one dollar per ton; but no reduction seems to have been made on coke, fluxes, or bullion. It is expected, however, that the completion of the Denver & Rio Grande Railroad to Salt Lake will in some measure relieve the company from the high rates paid.

According to reports by Mr. Frederick Honkamp, of the Chicago refinery, 16,082 tons of bullion were treated at a cost of $9.05 per ton. This cost, which is low, considering the fact that the plant, as we understand, is not equal to more modern works, is not itemized. The only

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figures showing how it is distributed are the following: Fuel, $42,981.39; labor; $61,640.93; and expenses, $40,782.81; total, $145,405.13. Last year, we found occasion to doubt the correctness of the allowance for loss on lead, 7¼ per cent. This year, Mr. Honkamp, we are pleased to see, has carefully estimated the actual amount of lead in drosses, etc., and with their aid shows that his loss was 4·915 per cent, which, taking into account the loss still to be incurred in working these intermediate products, would carry it to nearly 5 per cent, which is the usual allowance to desilverizers. So far as silver is concerned, his statement is less clear. He has carefully estimated the quantity of silver on hand in bullion, skimmings, drossbars, and test bullion, which items also appear in the lead statement; but has apparently made up his deficiency of silver by putting down 21,803·65 ounces of silver as "in furnaces, process of refining, and drosses." Even if all of this silver should represent the loss, it would be low, being little more than one ounce per ton of bullion. It is an extremely difficult matter for the manager of a desilverizing works, without stopping the establishment and overhauling every furnace and every stock-pile, to make a close estimate of his silver on hand; and in the aggregate the small quantities discovered by a close search are generally larger than are expected. Still we doubt whether all of the silver thus carried as an asset will in reality be recovered. We have gone into this question, not with the object of criticising Mr. Honkamp's work, which is shown by the figures to have been excellently carried through, but because it is of interest to arrive approximately at the loss in silver in an American desilverizing works. The usual allowances are five ounces per ton, while in some foreign works, we believe, often a small excess over the assay is recovered.

The lead sales of the Chicago refinery were 29,135,597 pounds, which sold at an average of 4·55 cents—we presume at Chicago. The net receipts were $1,326,664.23. The silver sales yielded $2,010,125.77; the ore sales, $32,879.87; and the bullion sales, $443.77; making, with interest on call loans, $3,385,811.68. The disbursements were:

Mining	$209,805.08
Smelting	788,048.02
Freight on ore and bullion to Salt Lake	287,168.70
General expenses	13,565.60
Exchange	5,591.75
Bullion purchased	454.83
Freight on bullion to Chicago and New York	328,944.41
Refinery	145,405.13
New York office	21,247.35
Call loans, etc	536,194.91
Construction	32,313.71
Supplies on hand	64,620.15
Utah Central	1,744.57
Dividends	1,200,000.00
Cash	44,902.82
Total	$3,680,007.08

The assets, including supplies, call loans, cash and ore, bullion, silver, and lead in course of treatment, aggregate $1,137,297.29, while there are no liabilities.

THE SIERRA GRANDE MINING COMPANY, LAKE VALLEY, NEW MEXICO.

The directors of this famous mine have submitted to the stockholders a brief financial statement, dated March 16th, from which we extract the following notes on the receipts and expenditures of the company from July 20th, 1881, to that date:

The Sierra Grande sold silver bars to the extent of $1,048,436.59 and ores netting $37,266.52, which, together with $10,000, a working capital subscribed to begin development, carries the total receipts to $1,095,703.11. In the payments we note $31,000 for additional mining property, and the heavy sum of $173,518.92 for construction account. The twenty-stamp mill cost $47,388.52 for machinery and $51,859.57 for labor and freight, or $99,248.09; the water-works, $36,070.51 for plant and $20,851.15 for labor and freight, or $56,921.66; and the thirty-ton smelter and cupelling furnaces, $7415.50 for machinery and $9933.67 for construction and freight, or $17,349.17. The supplies and repairs for running the mill cost $108,231.41 and the labor, $28,430.77; the water-works, $2545.67, and the smelter, $375.60. In the mine, the supplies, including the cost of the hoisting-works, called for the payment of $26,174.16, while the labor for the mine development cost $91,470.07. Other items included in working expenses are: Freight on supplies, $7206.88; expressage on bullion and freight on ores, $14,013.65; expert examination, $2200; insurance, $1500; and interest account, $6584.46 on capital borrowed for construction and development, and repaid in full. Salaries, telegraphing, advertising, office and telegraphing expenses, $36,573.99. Including $500,000 dividends, the total expenditures were $1,029,825.58, leaving a balance of $65,877.53, to which added $75,000 bullion on hand unsold, made the total cash assets on March 13th, 1883, $140,877.53, out of which a dividend was paid on March 20th of $100,000.

The report contains no details as to the condition of the mines, or as to the working of the ores, which, it is understood, has not been an easy problem to solve. The only remark of interest is, that "the new Mill shaft has penetrated an ore-body at a depth of 300 feet, from which the inference may be drawn that the vein is continuous from the present workings, a distance of 600 feet, to the new shaft, pitching at an angle of about 45 degrees; and that there remains, entirely undeveloped, a large tract of mining property owned by your company, characterized by sure indications of the presence of the same formation of silver chlorides." Mr. Robert Bunsen, formerly of Leadville, has now taken charge of the mines.

THE CENTRAL MINING COMPANY, LAKE SUPERIOR, MICH.

The report of this company, one of the dividend-paying Lake Superior copper mines, has just been published. The product of the mine shows a further falling off, the yield having been 1,165,945 pounds of stamp copper, 399,885 pounds of kiln copper, and 98 masses, weighing 237,970 pounds—a total of mineral of 1,803,800 pounds. The quantity smelted was 960,787 net tons, yielding 70·44 per cent, or 1,353,597 pounds, of refined copper, of which 775,054 pounds were sold at an average of 17·80 cents, giving $138,014.66, leaving 578,543 pounds on hand, valued at 17 cents, or $98,352.31. The receipts for silver were $1126.02, making the total receipts $237,492.99, to which are added $5050.61 for interest, and deducted $11,767.50 for depreciation of value of mineral at mine, making the net receipts $230,776.10. The working expenses at the mine were $157,908.37, and the cost of smelting, freight, and other expenses was $33,850.15—a total of net operating expenses of $191,758.72, leaving a profit of $39,017.58, against $47,620.06 in 1881. The directors, however, sold timber lands on the Tobacco River for $100,000, payable in installments running over three years, and received in 1882 $40,000 on account. Against this they have written off $20,988.25, the cost of all the lands owned by the company, exclusive of the mine location, and they have thus added $19,011.75 to the profits of the year, enabling them to pay a dividend of $60,000. After the payment of the 1881 dividend, the surplus was $198,236.77, making the net surplus at the end of 1882 $277,254.35, less the dividend paid in February of this year, as above.

A large amount of work was done in the mine; but the vein has continued to be small in size, and although fairly productive in stamp rock and small pieces of copper, it has been almost destitute of large masses, hitherto so characteristic of it. In all, 4097 fathoms of ground were broken in openings and stopes, the average yield of mineral per fathom being 440 pounds, and of ingot 310 pounds. The average cost of sinking in shafts and winzes, 278 feet, was $28.09; drifting on the vein, 1288 feet, $10.50; drifting on the conglomerate, 149 feet, $12.11; sinking on the conglomerate, 192 feet, $16.29. Stoping on the vein, 1659 superficial fathoms, cost $15.26; and 37 cubic fathoms, $22.98; and on the conglomerate, 283 superficial fathoms, $23.62. The stamp-mill, in treating 18,639 tons of rock, running 24 heads 142 days, or 5·4 tons per day per head, required the following outlay:

Labor	$6,774.59
1913 cords of wood	6,217.25
Lights, oil, shovels	411.26
Repairs, materials, fixtures	2,653.44
Lumber, freight, and teaming	425.94
	$16,482.48

The cost of breaking and selecting the rock and tramming it to the mill was 11·6 cents, and the cost of washing and stamping per ton was 88·43 cents. The stamp rock ran 3·12 per cent of mineral, or 2·20 per cent of ingot. As the Central does not produce stamp copper exclusively, it is impossible to estimate the cost of mining this grade of copper from the data given. The mine yielded 1,803,800 pounds of mineral, running about 70·44 per cent of ingot, or about 1,270,596 pounds of copper, at a cost, including mining, crushing, smelting, and marketing, of $198,676.77, or 15·64 cents per pound, which shows, that the Central can meet present prices, even if it does not do better this year than it did last.

Mr. James Dunstan, the agent, in concluding his report, makes the following interesting statement: "The compressor and its accessories contribute materially to the reduction of our expenses, and enable us to drive, sink, and stope much more rapidly than was before possible. We now sink 100-foot lifts, and with underground engines, worked by compressed air, raise the rock from the bottom of the shaft to the first level above, which was impracticable, or at least expensive, with windlass and hand labor."

COAL USED IN THE MANUFACTURES OF THE UNITED STATES.

Aside from the great industries with which the coal trade is closely allied, statistics have been published in the Census Compendium on other branches of manufacturing which are worthy of attention. Thus, we find that in 1880 there were in the United States 5631 brick and tile-making establishments working with a capital of $27,673,616, and a force of 59,032 men, 268 women, and 7055 children, to whom the sum of $13,443,532 was paid. The yards used 1,157,522 cords of wood, $5,750,803 worth of other materials, and turned out products valued at $32,833,587.58. They made 3822 millions of common brick, 163 millions of fire-brick, 210 millions of pressed brick, $2,944,239 worth of tile, $1,765,428 worth of drain-pipe, and $729,926 worth of other products.

In looking over other industries, we find that the carpet mills used 60,641 tons of coal, the manufacturers of chemicals burned 273,161 tons of anthracite and 310,398 tons of bituminous coal, the works dyeing and finishing textiles used $1,904,551 worth of fuel, the manufacturers of felt goods consumed $77,437 worth of coal and wood, while the mills making hosiery and knit goods used fuel to the extent of $209,669. The manufacturers of mixed textiles burned 34,712 cords of wood and 134,362 tons of coal, while the salt-works used 541,179 cords of wood and 453,846 tons of coal, a small quantity being required besides in grinding salt. The silk factories use but little fuel, taking only $173,283 worth, while the woolen mills took in 1880 142,250 cords of wood and 359,769 tons of coal. For worsted goods, 72,779 tons of coal, valued at $308,421, were required. No details, unfortunately, are given as to the consumption by the glass-works.

The requirements for fuel are, of course, closely dependent in many industries upon the use of steam for power. The following table will show how the use of steam has been gaining ground during a decade in a number of industries:

	1880.	1870.		1880.	
	Total power.	Water-power.	Steam-power.	Water-power.	Steam-power.
	p. c.	p. c.	p. c.	p. c.	p. c.
Cotton goods	275,504	67·84	32·16	53·99	46·01
Flouring and grist-mills	771,201	70·74	29·26	60·94	39·06
Iron and steel	397,247	9·72	90·28	4·16	95·84
Lumber, sawed	821,928	50·03	49·07	33·91	66·09
Paper	123,912	78·25	21·75	70·70	29·30
Silk and silk goods	8,810	41·29	58·71	17·73	82·27
Woolen goods	106,507	62·17	37·83	50·33	49·67
Worsted goods	16,437	57·81	42·19	38·34	61·66

In the 85,923 industrial establishments in the country in 1880, there were in use 55,404 water-wheels, with an aggregate power of 1,225,379 horse, and 72,304 boilers and 56,483 engines, with an aggregate reaching 2,185,458 horse-power.

The merchant steam-ships of the country, to the number of 5139, with a tonnage of 1,221,206, used 3,827,993 tons of coal and 794,775 cords of wood, divided in groups as follows:

	No. steamers.	Tonnage.	Coal, tons.	Wood, cords.
New England	463	118,553	375,080	8,568
Northwestern lakes	947	222,290	488,610	255,629
Upper Mississippi	366	83,918	525,331	93,318
Ohio	473	107,472	676,347	16,474
Middle States	1,459	432,803	1,272,857	12,642
Lower Mississippi	315	48,303	184,951	112,254
Gulf of Mexico	126	41,610	41,993	62,556
South Atlantic Coast	266	30,883	64,995	66,835
Pacific Coast	319	97,005	146,407	103,446
Upper Missouri	44	12,099	6,281	53,063

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ELECTRICAL TRANSMISSION OF POWER IN MINES.

As the question of the transmission of power by means of electricity is engaging a great deal of attention just now, we think the following abstracts of two recent articles will be interesting. They are taken from *Abstracts of Papers in Foreign Transactions and Periodicals*, Vol. LXXI., Part I., published by the Institution of Civil Engineers.

The first is entitled "An Application of Electricity to the Transmission of Power at the Mines of La Péronnière," by Messrs. Charousset and Bague, and is abstracted from the *Bulletin de la Société de l'Industrie Minérale*, Vol XI., 1882, p. 5:

The energy in this case is transferred through conductors 1200 meters (1309 yards) long, from the mouth of the pit to the head of an incline 110 meters (120 yards) long, where it is employed to drive a windlass and draw the coal-tubs up the incline. There are two generating dynamos and two receiving dynamos, connected by the four conductors so as to form two independent systems and circuits, of which it is not generally found necessary to employ more than one at a time. The connection between the Gramme dynamos and the driving machinery at one end, and between the dynamos and the intermediate gear of the windlass at the other end, takes place by means of friction-pinions made of compressed paper. The machines ride upon a center situated below each of their octagonal frames, and are kept up to more or less intimate contact by screws in the case of the generators, and by a sytem of levers, under the immediate control of the attendant, in the case of the receiving machines, care being taken to provide against excess of pressure by a stop. As these machines, when receiving a current, always run in the same direction, whatever may be that of the current, the intermediate gearing contains a system of conical sliding-pinions for reversing the motion of the winding-drum.

The four machines employed are all octagonal and similar to one another. The ring is divided into four parts, passing successively before as many magnetic poles, alternatively positive and negative. Each pole is formed by two coils whose cores are formed at right angles to each other, and have one pair of similar ends brought thus together.

The other ends of these eight cores are fixed in the octagonal frames, which therefore serve to connect opposite poles. Each of the four poles nearly completes the quadrant of a circle; and from the quadruple character of the magnetic field, four brushes are necessary to each machine. The coupling is in series; that is, the entire current flows through the electro-magnet coils of both the generating and the receiving machine.

The conducting cables are formed of sixteen copper wires of 1·1 millimeters in diameter, the metal employed being perfectly pure. At the beginning of operations, these wires, placed in juxtaposition, were first covered with a thickness of paraffined cotton, which again received two envelopes of cloth treated with Chatterton's compound, and was inclosed in India-rubber and tarred. But, in spite of these precautions, the insulation did not remain perfect, on account of the damp situations in which parts of the cable had to be placed. A covering of lead was tried in damp places, but this turned out dangerous in practice, and the cables finally adopted were as follows:

16 wires of copper 1·1 diameter,
2 coats of paraffined cotton,
1 coat 5 millimeters thick of gutta-percha,
2 windings of Chatterton cloth,
1 thick coat of tarred cotton;

and the purchasers themselves finally covered the tables with a paste of the following composition:

57 pints of Norwegian tar,
38 " resin,
5 " suet,

in order to protect them, as well from heated gases as from damp.

The original cable, still maintained in the dry parts of the mine, cost 1·25 francs per meter; that finally employed in the damp situations, 3 francs per meter.

The trouble which arose before the question of the cables was finally settled was instructive. When the cheaper cable was employed for the whole circuit, the insulation in damp situations became defective in about one month. Shocks were received by the miners even through the rock in the neighborhood of the conductors, and these shocks finally caused the rupture of the cables themselves. The nature of these ruptures was peculiar. The ends of the wires exposed were untwisted, and the surface had lost its polish, being honeycombed with little cavities filled with a brown, or sometimes black, dust. The paraffined cotton, which was very white when the cable was new, presented a green color, and this discoloration extended to the exterior of the cable, and even to the walls of the pit. At four or five centimeters from the ends, the wires were found to be intact. The oxide and carbonate of copper indicated a chemical action going on between the copper wires and the water in contact with the external envelope, under the influence of the electric current. It was on account of these ruptures that the lead covering was applied, but the safety of the cable was not found to be increased by this means. On one occasion, the men below observed some large sparks in the pit, which greatly frightened them. The driver, warned by the galvanometer that something unusual was taking place, stopped the engine, and an investigation showed that the lead had been melted in several places and thrown against the walls of the pit. Where the lead had been thus removed, the Chatterton cloth was calcined, and the wires presented globules of metal which had been fused. All this occurred in a quarter of an hour, the receiving dynamo running free at the time. Since the application of gutta-percha to the cables, no such mishap has occurred. The following case of leakage occurred one day: The hauling cables, which are of iron wire, are attached to cast-iron projections on the drum, and by this means were in metallic connection with the bed-plate of the whole underground part of the installation. These cables were observed suddenly to be electrified, and at the same time a current passed through the telephone wire and set the bell ringing. Otherwise, nothing abnormal took place in the running of the machinery. The phenomenon lasted two hours, during which it was impossible to touch the hauling cables without producing small disturbances, the effect increasing with the distance from the drum. On the bed-plate itself, no shock was forthcoming.

The sudden disappearance of the phenomenon shows that it was due to some passing cause—perhaps to the presence of metallic dust on the India-rubber washers separating the bed-plate from the circuit traversed by the electric current; or, it may be, to the contact of one of the cables at a faulty point with the earth; for it was at that time that the cables began to show faulty insulation.

On a subsequent occasion, a fault in the bottom insulation of one of the machines certainly caused a derived current, and the hauling cable, then no longer attached to the metallic framework of the drum, was electrified more strongly than on the previous occasion.

It is very necessary to keep the nuts which secure the brushes firmly in the sleeve or holder quite tight. The neglect of this once caused the loosening of the brush, with the generation of large sparks.

The needle of the galvanometer indicated a much stronger current than usual, and the steam-engine was pulled up as if by a brake. The paper friction-gear became at the same time heated.

The following table gives the usual performance of these machines. It is based upon an average of experiments. The galvanometer used is simply a needle, placed over the conducting cables. It will be observed that its indications are proportional to the squares of the difference of velocities:

Machines.	Work indicated in engine-cylinder per minute.	Useful work in coal raised per minute.	Indications of galvanometer.	Speed of generating dynamo. Revs. per minute = V.	Speed of receiving dynamo. Revs. per minute = v.	Difference of speeds V − v.	Practical efficiency.	Electrical efficiency = $\frac{v}{V}$
	Ft.-lbs.	Ft.-lbs.	Degrees.				Per cent.	Per cent.
1. Steam engine quite unloaded	135,402	.....	.....	.....	.....	.....	.....	.....
2. Steam-engine in gear	198,763	.....	.....	.....	.....	.....	.....	.....
3. Steam-engine driving generating machine with circuit open	224,802	.....	.....	.....	.....	.....	.....	.....
4. Receiving-machine running unloaded	230,009	.....	4·5	1,280	.....	.....	.....	.....
5. Windlass running, with no coal-tub	264,728	.....	9·0	1,280	975	305	.....	.....
6. Windlass running, with one coal-tub	455,679	55,549	16·0	1,280	880	400	12·2	677
7. Windlass running, with two coal-tubs	526,776	96,778	19·5	1,280	830	450	18·6	64·8
8. Windlass running, with three coal-tubs	594,553	137,572	20·0	1,280	810	470	23·1	63·2
9. Windlass running, with four coal-tubs	663,989	173,592	25·5	1,280	780	500	26·1	61·0

The second abstract is taken from an article by M. Graillot, in the same *Bulletin*. It is entitled "Experiments on the Transmission of Power by Electricity at the Mines of Blanzy," and reads as follows:

These experiments were instituted in order to arrive at a knowledge of the efficiency to be expected in transmitting the energy of a steam-engine above ground to machinery in the mine. The motor employed was a condensing Watt engine, without expansion, whose efficiency was assumed to be, during the experiment, constantly at 0·60. An intermediate shaft, with pulleys and belts, conveyed the motion of the engine to the generating dynamo.

The distance, 634 meters (691 yards), was represented by two coils of cable, each 604 meters long, and composed of nine copper wires, 1·1 millimeter in diameter, enveloped successively in cloth, in India-rubber, and in lead. The remaining 30 meters (33 yards) were made up by a brass wire 5 millimeters in diameter. The receiving dynamo actuated the winding machinery by frictional contact with the intermediate gearing. The course of investigation adopted was to make a series of observations, by cylinder-diagrams, of the power necessary to drive the intermediate gearing alone at different velocities. This, reduced in the proportion of 10:6, was in each case deducted frem the power (reduced in an equal ratio) required in the various experiments with loads. The balance was taken to be the power transmitted to the generating dynamo, and this is finally compared with the useful work by the windlass in weight raised.

The results obtained are open to the criticism, passed upon them indeed by M. Rossigneux, that they rest upon the assumption of the constancy of the efficiency coefficient of the steam-engine under varying loads; but the results obtained are valuable, as showing the variation in the useful work when other conditions remain fairly uniform, and as qualifying the dogma that, as the work given out diminishes, the efficiency increases. The length of the conductors within the limits of these experiments seemed to have no sensible influence upon the efficiency. When the work to do was small, the efficiency was small, and rose as the work approached in value that for which the machinery was designed. Thus, with the long conductors, when the work utilized was 0·73 horse-power, the efficiency was 17·25 per cent; at 1·15 horse-power, it varied between 26 and 34 per cent; at 2 and 2¼ horse-power, between 40 and 51 per cent; and at 3¼ and 4 horse-power, between 37½ and 51 per cent. With the short conductors, at 1½ horse-power of useful work the efficiency was 28 per cent; and at 2 from to 3 horse-power, it varied from 40 to 51½ per cent.

A French authority gives the following summary of the number of cities in the world possessing telephones, and the number of subscribers:

Europe	161	cities.	30,066 subscribers.
Asia	7	"	420 "
Africa	4	"	240 "
America	186	"	56,090 "
Australasia	5	"	897 "
Total	363	cities.	87,713 subscribers.

The United States leads with 47,960 subscribers, followed by Great Britain with 7287, Italy with 5507, Canada with 5250, France with 4437, and Germany with 3613 subscribers.

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CONCENTRATING ORES IN SOUTHWEST MISSOURI.

Written for the Engineering and Mining Journal.

Missouri produced, during the year 1883, 26,000 tons of pig-lead. Of this amount, 11,000 tons were smelted from lead ore mined in the southwestern part of the State, and partly in Cherokee County, the southeastern corner of Kansas. These mines yielded during the same time 57,000 tons of zinc ore, of which 50,000 tons were zinc-blende, and 7500 tons silicate of zinc. Of this amount, 25,000 tons were shipped to the zinc-works at La Salle, Peru, and Collinsville, in Illinois, and the rest went to the zinc-works at St. Louis, Rich Hill, and Joplin, in Missouri, and to Weir City and Pittsburg, in Kansas.

A large number of deposits of lead and zinc ore were opened during the year, and it may be safely stated that this year will witness a greater activity in mining than ever before. These deposits of lead and zinc are found in the Keokuk group of the Sub-Carboniferous limestone formation, and are very irregularly heaped and distributed. As the lead and zinc ore in these deposits is more or less mixed with flint and lime-rock, a marketable product can only be made by separating the lead and zinc from each other and from the gangue. This work is mostly done in a very crude way by pounding the disseminated ore with hammers and separating in Cornish hand-jigs. As this method is a very slow and imperfect one, it is losing ground, and well-constructed concentrating-works take its place. A good many modern plants have been erected during the past few years, and are in successful operation. Many more are projected.

This mining region, like many others, has been infested by patent-right men with patent machinery; but all their attempts and promises have proved failures, and large quantities of their machinery may be found in the rubbish-piles.

The first modern concentrating-works in this region were erected in 1878 in Webb City. Its capacity was 125 tons. Then followed those of the Granby Mining Company, in Lone Elm, near Joplin, and in Oronogo, each of 125 tons capacity. They are similar in construction to those of the Hecla Consolidated Mining Company, in Montana, built lately, and described in the ENGINEERING AND MINING JOURNAL of Deember 9th, 1882, page 306. Afterward, many smaller concentrating-works, most of them from 60 to 75 tons capacity, were built. All these works are well constructed, the machinery used being of the Clausthal or Hartz style. They all use the Blake breaker and crushing rollers for crushing the raw ore. For sizing the crushed material, revolving sizing screens in connection with hydraulic classifiers are used. The usual sizes made by screens are 15, 10, 7, 5, 3, and 2 millimeters; 2 millimeters and less subdivided by hydraulic classifiers into 2, 1, and ½ millimeters. For separating the sized stuff, the concentrators generally use the single Clausthal plunger-jig, in most cases four-sieved. Slide motion is employed for operating the plunger of the jigs for coarser, and eccentric motion for the finer grades. The Rittinger continuous side-discharge is used on jigs for coarser and middle grades—bottom-discharge for the finer ones.

All the slimes are treated on jigs running at very high speed and having very low beds. Besides the single Clausthal or Hartz plunger-jig, a double-acting jig-machine of the same principle is largely used. It differs from the single one in having three or four sieves on both sides of the jig-box, and the plunger compartments in the center. The plunger-rods are forked, and have a plunger on each side. One of these jigs forms in fact two complete three or four-sieved jigs, driven by one shaft. As one of these double jigs does not occupy much more room than a single one, it is possible to have works of large capacity in a small building.

Nearly all these concentrating-works in Missouri are constructed and built by F. De Stwolinski, at present connected with the Fort Scott Foundry and Machine-Works, Fort Scott, Kansas.

COAL MINING IN GREAT BRITAIN IN 1882.

The coal produce of the United Kingdom for the past year is now officially made known. Under the old arrangement, says the *Colliery Guardian*, the returns made to the mine inspectors of the output of coal were kept secret till the presentation of the full details to the Home Office. The Secretary of State has, however, announced his intention of publishing as early as possible statistical abstracts of the whole returns, and thus we are at this early date in possession of some most important information touching the coal trade of the past year. This information is conveyed in six summaries of the statistics for the twelve districts. The first summary shows the number and ages of the male persons employed both above and below ground, and also the number and ages of the females employed above ground, together with the quantity of mineral raised in each of the twelve inspection districts. It appears that 503,987 persons were employed in and about the mines under the coal mines act. Of these, 406,192 were employed underground, and 97,795 (of whom 4652 were females) employed above ground; thus showing, as compared with the respective numbers employed during the year 1881, an increase of 8510. Summary No. 2 gives the mining produce either in districts or counties, by which it appears that 156,499,977 tons of coal, 2,209,036 tons of fire-clay, 11,505,447 tons of ironstone, and 1,119,572 tons of shale, etc., were produced in the mines classed under the coal mines regulation act, including some iron pyrites, etc., found in working these mines, which is given separately in the respective districts. Comparing the above quantities with the output of 1881, an increase is shown in coal of 2,315,677 tons; fire-clay, an increase of 312,129 tons; ironstone, a decrease of 353,319 tons; and an increase of 99,614 tons in the quantity of shale, etc. No. 3 summary contains an account of fatal accidents and lives lost during the year 1882 in and about all the mines under the coal mines regulation act. The fatal accidents amounted to 876, and the deaths occasioned thereby to 1126, showing an increase, when compared with the summary of 1881, of thirty-two in the number of fatal accidents, and an increase of 172 in the number of lives lost. No. 4 summary shows the proportion which the accidents and deaths bear to the number of persons employed and the quantity of minerals raised. It appears that on the average, during the year under review, there was one fatal accident among every 575 persons employed in and about the mines, and one death by accident among every 447 persons employed, and that for each fatal accident 195,586 tons of mineral were raised, and 152,161 tons for each death by accident. During the year 1881, for every 587 persons employed there was one fatal accident, and for every death by accident 519 persons were employed, and for each fatal accident the larger quantity of 200,189 tons were raised, and for each death by accident also the larger quantity of 177,106 tons.

The following table, which we compile from the elaborate returns by districts, gives in detail the causes of fatal accidents and the mortality for the years 1881 and 1882:

	1881.		1882.	
	Number of accidents.	Deaths.	Number of accidents.	Deaths.
Explosion of Fire-Damp	31	116	35	250
Falls in Mine.				
Falls of side	114	114	127	129
Falls of rock	325	336	332	339
Total	439	450	459	468
In Shafts.				
Overwinding	5	5	3	3
Ropes and chains breaking	2	2	6	9
While ascending or descending by machinery	26	27	18	24
Falling into shaft from surface	5	5	6	6
Things falling from surface	6	6	7	8
Falling from part way down	30	30	23	26
Things falling from part way down	5	8	8	8
Miscellaneous in shafts	27	27	30	32
Total in shafts	106	110	101	116
Miscellaneous—Underground.				
Explosions of gunpowder	17	17	11	11
Suffocation by gases	6	10	4	15
Irruptions by water	...	...	1	1
On inclined planes	43	45	54	55
By trams and tubs	83	86	99	98
By machinery underground	8	8	6	6
Sundries underground	24	24	22	22
Total underground	181	190	197	208
On Surface.				
By machinery on surface	18	18	9	9
Boilers bursting	1	2	2	2
Miscellaneous on surface	68	68	73	73
Total on surface	87	88	84	84
Gross total	844	954	876	1,126

THE ORIGIN OF CRYSTALLINE IRON ORES.

At two recent meetings of the New York Academy of Sciences, Dr. Alexis A. Julien and Dr. J. S. Newberry presented papers on the origin of crystalline iron ores, and discussed points connected with the subject. The following is an abstract of Dr. Julien's paper as printed in the proceedings of the Academy:

Theories of two classes have been advanced, referring the origin of the crystalline ores to extraneous and indigenous origin. Under the first class, three may be mentioned:

1. *Meteoric fall*—This was suggested in reference to the huge hematite deposit of Cerro de Mercado, in Mexico.

2. *Eruption as dikes.*—A theory advanced to account for many foreign deposits, and also those of Huronian age in the vicinity of Lake Superior, etc.

3. *Sublimation into fissures.*—A theory founded on the observation of crusts of specular oxide of iron in the lavas of Vesuvius, etc.

Objections to these theories were briefly presented. The theories attributing the origin of crystalline ores to indigenous origin are of two kinds, chemical and mechanical. Several chemical theories have been proposed:

4. *Concentration from ferriferous rocks, or lean ores:* if siliceous, by thermal solutions; if calcareous, by carbonated waters. Sub-aërial processes of this kind can not account for the origin of submarine sediments, such as the crystalline iron ores.

5. *Saturation of porous strata by infiltrating ferriferous solutions.*—Such a process could not produce huge bodies of pure ore, nor the alternation of pure materials in the lean laminated ores.

6. *Infiltration into subterranean chambers.*—The form, lamination, and coincidence with the bedding planes separate the ore-bodies of crystalline character from recent deposits formed in this way.

7. *Derivation from deep-sea deposits.*—The form and structure of the nodules in the ooze differ widely from those of the ores under discussion, while the strata associated with the latter are evidently shallow-water deposits.

8. *The metamorphism of ancient bog-ores.*—This theory, now commonly accepted and taught in all the text-books, is unsatisfactory, from the absence of evidence, within the crystalline strata, of any terrestrial or sub-aërial surfaces on which such bogs or marshes could have rested: all the surfaces appear to be submarine.

9. *Violent abrasion and transport, by volcanic agencies combined with powerful currents.*—To this it has been properly objected that the results of such violent agencies would be altogether conglomeritic.

10. *Concentration and metamorphism of iron-sands.*—Abundant instances of such concentration are shown along our coasts, and the deposits found along the St. Lawrence often contain but five or six per cent of siliceous impurity. As the loose sands so concentrated consist at various localities of quartz, garnet, chrysolite, menaccanite, magnetite, etc., so we find in the metamorphic rocks their indurated counterparts, quartzite, garnetite, dunite, menaccanite, magnetite, etc. The intermixture of garnet with magnetite, or its intercalation in separate alternating beds, is as common in the rocks as in the present oceanic sands. The thin interlamination of magnetite, martite, or hematite with jasper, in the Huronian jasper-schist, corresponds with the still more frequent association now found along our sea-beaches. The abundance of ore-beds of pure magnetite, free from apatite, in the strata of the Lower Laurentian of Ontario, and of menaccanite, more or less mixed with the other ore, in those of the Upper Laurentian of Quebec, Canada, appears to correspond with the general distribution of magnetite grains through the gneisses of the former, and grains of menaccanite through the anorthosites and traps of the latter formation. In bog-ores, no concentra-

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tion of titanic acid has ever been found; its abundance in the form of menaccanite seems necessarily to involve a mechanical origin, and a vast source of that mineral is presented in its form of fine distribution through the rocks mentioned.

In the discussion, Dr. J. S. Newberry said that he would not claim that the chemical theory best explained the origin of all bodies of iron ore, but he thought it was applicable to most. It was not limited to mere terrestrial deposits like bog-ores, but equally well accounted for marine deposits like the Clinton ore, which in his view was most like the magnetites and hematites of the Archæan rocks. At various places, iron-sands are accumulating on our present coasts, as at Moisé, on the St. Lawrence, on Long Island, and on the coasts of Japan and New Zealand. It is only reasonable to suppose that such accumulations took place in ancient times, and that these were represented in some of the ore-beds now known. The suggestion of Mr. Julien was new and important; but various facts, such as the presence of phosphorus, the absence of foreign minerals, and the retention of limonite structure, seem to indicate that nearly all of our important iron ore deposits had been formed by chemical rather than organic processes.

At a later meeting, Dr. Newberry elaborated his views in a paper of which the following is an abstract:

At a recent meeting of the Academy, Dr. Julien read an interesting and instructive paper on the origin of crystalline iron ores, in which he attempted to show that they are the product of mechanical rather than chemical agencies. In bringing this subject again before the Academy, it is not my purpose to attempt to refute, but rather to supplement and limit, the theory of Dr. Julien.

I will not deny that some of the beds of magnetic iron ore described by Dr. Julien, in the Alleghany belt, have been formed by the sorting power of shore-waves, and that he has made an important contribution to the literature of iron, by his careful study and description of these beds; but that such cases, if they exist, are exceptional, and do not affect the truth and validity of the organico-chemical theory. I shall endeavor to prove by a brief report of some facts which have come under my observation.

The most important deposits of iron ore known to exist in the United States may be grouped as follows:

1. Magnetic ores of the Laurentian rocks of Canada, the Adirondacks, and the Alleghany belt.
2. The Huronian hematites of Lake Superior and Missouri.
3. The crystalline ores of the Rocky Mountains and the Wahsatch.
4. The limonite ores of the Atlantic slope and the Mississippi Valley.
5. The Clinton ores.
6. The carbonates of the Coal Measures.
7. The spathic carbonates of New England, Idaho, etc.

The Laurentian magnetites form lenticular sheets, sometimes more than one hundred feet in thickness, and extending half a mile or more. In many instances, they are inclosed in walls of gneiss, slate, or marble. They often contain much titanium, and have, as almost universal impurities (somewhat vicarious with titanium), pyrite and apatite. Some of the beds are also highly charged with manganese; they usually contain but little silica and alumina, and are the richest of our iron ores.

The characters they present which seem incompatible with the theory of mechanical accumulation are the following: First, their great magnitude, combined with their prevailing purity. Secondly, the large quantity of apatite contained, which we must regard as of organic origin, and therefore supporting the chemical theory, and so different from the magnetite in gravity as to be impossible to be mingled with it by any mechanical agency. Thirdly, the occurrence of great sheets of magnetite between strata of limestone, like the Franklinite ore, or inclosed in layers of limestone and argillite, like the bog-bed at Marmora, Canada. The fact that the slate and the limestone are deposits from deep and quiet water seems incompatible with the view that these strata have been brought into their present association by mechanical means. Fourthly, the frequent impregnation of magnetites with manganese, a material of much lighter gravity, and an almost constant constituent of limonite, goes far to prove such magnetic beds chemical rather than mechanical deposits. Fifthly, the aluminous magnetites, like that of Croton Landing, which contain almost no silica, could hardly have been formed by the agency of shore-waves, which always mingle more or less sand with whatever they deposit.

For these reasons, I must consider the mechanical theory as inadequate to account for the genesis of most of the magnetites of Canada and of the Eastern States.

The specular ores of Lake Superior and Missouri offer objections to the mechanical theory, in both their regularity of deposition and their mineral character. First, they are sometimes interstratified with jasper —once fine siliceous sand—in layers of great regularity and of extreme thinness, a structure which would be the natural product of sedimentation, but hardly of mechanical washing. Secondly, they could never have been deposited as hematite by shore-waves, since this mineral forms an impalpable powder which never accumulates by itself. We must therefore suppose that all these great iron ore-beds are pseudomorphs after magnetite, or that they are the result of sedimentation by organic agencies and subsequent metamorphism.

The iron ore of Iron Mountain is inclosed in "porphyry"—probably a metamorphosed sediment really fused in place; but some of the masses of ore are thickly set with crystals of apatite, which afford an equally conclusive argument against the volcanic and the mechanical theory. In the ore of Simmons Mountain, masses of magnetite occur which retain perfectly their radiated, limonite structure, and there can be no question but that this has been deposited by a chemico-organic process.

The deposits of magnetic iron in Southern Utah—the most extensive of which I have any knowledge—are in places very conspicuously and evenly stratified, and thus exhibit all the signs of having been deposited as sediments. They are associated with limestone and a granitoid metamorphic rock. Along certain lines, the ore is thickly set with crystals of apatite, and some of the largest masses are in great part composed of magnetite, which shows everywhere limonite structure. From these facts, it is easy to see that these great deposits have not been formed by mechanical agencies.

In regard to the sparry carbonates which form vein-stones and the earthy carbonates of the Coal Measures, there can be no question of their origin. They have all been formed by chemical precipitation.

The Clinton ores are interstratified with limestone, form continuous sheets of great extent, and constitute on the whole the most considerable deposits of iron ore in this country. They were apparently formed in the same way that the granular lake ores are now deposited, by the precipitation of iron from solution in a water-basin, surrounded by land having a ferruginous drainage. The quantity of phosphorus they contain, derived from the organic matter deposited with them, is a conspicuous feature in the composition of the Clinton ores, and apparently explains its abundance in many of our crystalline ores. After a careful study of the structure, composition, and surroundings of our most important deposits of magnetic and specular ores, I am compelled to conclude that they have generally been derived from stratified deposits, accumulated by chemico-organic agencies, and once closely resembled our stratified ores of the Upper Silurian and Devonian; and that any beds which accumulated as iron sand on beaches must be rare exceptions to the general rule.

In the discussion, Mr. A. A. Julien pointed out that the theory thus presented by Dr. Newberry was a new one, and might be designated as the "lake-ore theory," in contradistinction to the marsh or bog-ore theory, now commonly accepted. The difference is sharply defined in the following quotations from the *Manual of Geology*, by Prof. J. D. Dana. In his discussion of the Upper Silurian deposits, that author states (p. 231): "The beds of argillaceous iron ore . . . *could not* have been formed in an open sea; for clayey iron deposits do not accumulate under such circumstances. They are proof of extensive marshes, and, therefore, of land near the sea-level. The fragments of crinoids and shells found in these beds are evidence that they were, in part at least, salt-water marshes, and that the tides sometimes reached them." Again he remarks (p. 357), concerning the American continent during the Carboniferous age: "It may have been long a region of barren marshes, and in this condition it might have received its iron ore-deposits, as now marshes become occupied by bog-ores."

In reference to the Laurentian deposits (p. 155), he states: "Limestone strata occurred among the alternations, and argillaceous iron ores, though vastly more extensive." And again, "The argillaceous iron ore has become the bright hematite or magnetite, and it is banded by or alternates with schist and quartz, etc., which were once accompanying clay and sand-layers."

However, it is hard to conceive the growth of crinoids and shells in salt-water marshes, even if reached by the tides, in the free abundance indicated by the crowded organic forms in the Clinton ore-beds, and of these the lake-ore theory presents a more satisfactory explanation. It also well accounts for the origin of the enormous ore-deposits of hematite, of magnetite still retaining a pseudomorphous structure after limonite, and of all iron ores rich in calcium phosphate. This theory is not necessary to account for the presence of pyrite, since the presence of any vegetable matter, for example, algæ growing and decaying in sands or mud, is always likely to produce the deoxidation of sulphates and iron oxide; nor does it account at all for the abundance of titanic acid and alumina in many iron ores.

On the other hand, the mechanical accumulation of iron sands, by agitation of the waves and currents, would appear to account more simply for the smaller but more numerous deposits thickly dispersed throughout the crystalline rocks, varying in size from scattered grains to little flakes and lenses a few centimeters in length, and even thick ore-beds many meters in thickness and diameter. The close association, often observed, of materials of widely different specific gravity—for example, shale and limestone with the magnetic ores—need not appear anomalous, since they may all have a shallow-water origin, deposited by marine currents differing in force and direction at different times. The absence of such mechanical deposits from the sedimentary formations is not established, since even some of the hematites and bog-ores may represent the results of oxidation and hydration of original magnetite sands; while, on the other hand, the huge beds of menaccanite found in Canada and elsewhere, which have not yet found their parallel among the sedimentary strata, may indeed show a certain difference of conditions during the deposit of the ancient crystalline rocks. The comparative regularity of the thin alternating laminæ which make up the ferruginous jasper schists of Huronian terranes appears analogous to that everywhere prevailing in a cross-section of beach sands along our oceanic border; while the mountain masses of this rock, with laminæ of magnetite, or of octahedra of martite after magnetite, or of hematite in triangular scales after martite—all these ores being remarkably free from calcium phosphate—are most simply explained by the accumulations upon a sea bottom, strewn alternately with fine siliceous silt, and with octahedra of magnetite. The presence of manganese oxide in iron ores may often be due, as at the Buckhorn mine in North Carolina,* merely to the decomposition of a manganese garnet originally concentrated as a mechanical sediment, while the concentration of titanic acid and of alumina in many iron ores is perfectly explained by the accumulation of heavy sands of menaccanite, corundum, etc. In a magnetic iron ore of specific gravity 4·5, occurring in serpentine at South Ham, Quebec, Canada, the percentage constitution reported † (Fe 44·69, Cr_2O_3 8·31, TiO_2 21·64) is equivalent to a mixture of three minerals known to occur in iron sands: magnetite 50, chromite 13, and menaccanite, 37 per cent.

The consideration of these facts would lead to the conclusion that the mode of genesis of a bed of magnetic iron ore may be often determined by the following diagnosis:

When the ore presents structural characteristics allied to those of limonite, or when hematite occurs in included masses, or when the ore contains a notable amount of phosphorus, a chemical origin is probably indicated.

When the ore is almost free from phosphorus or is rich in titanic or chromic acid or alumina, or closely associated or mixed with granular garnet or olivine, a mechanical origin may be inferred.

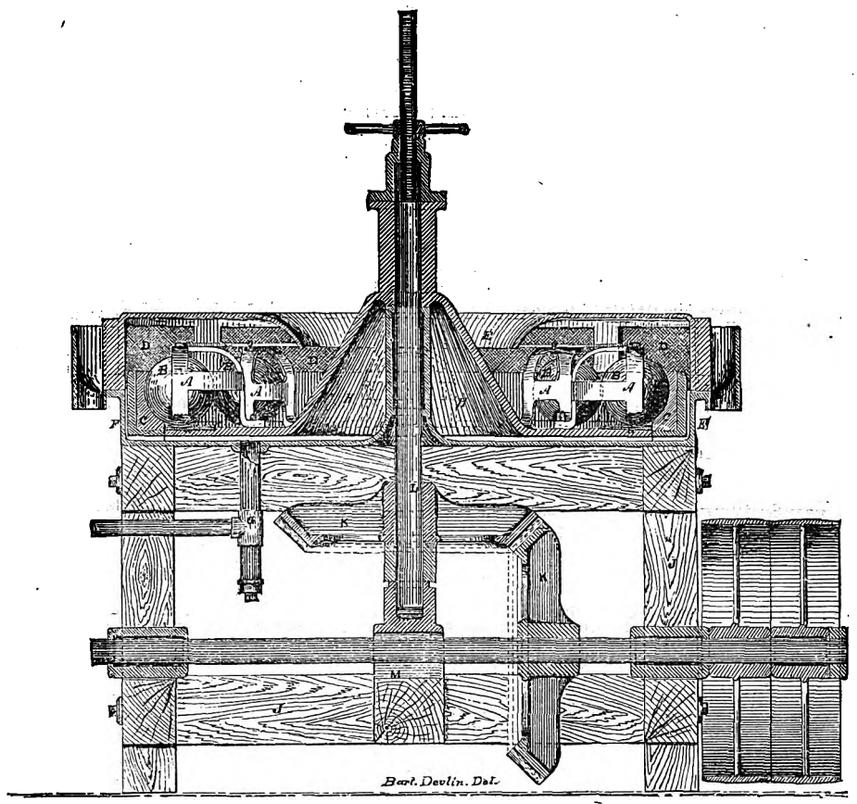
Mr. N. F. Darton stated that he had found over two per cent of chromic acid in the limonite ores of Staten Island, and Mr. N. L. Britton, from 1·6 to 3 per cent in the ores of the same region.

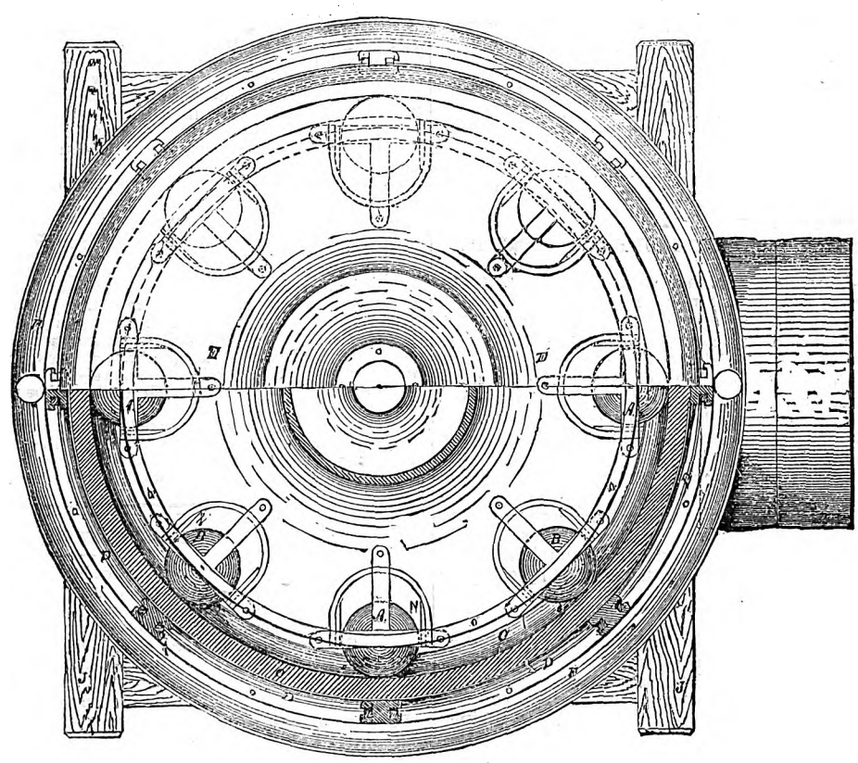
* W. C. Kerr, Geology of North Carolina, 222.
† B. J. Harrington, *Canadian Naturalist*, 1881, IX. 309.

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THE MOREY PULVERIZER FOR WET CRUSHING.

In our last issue, we described the pulverizer for dry crushing recently brought out by the Morey & Sperry Mining Machinery Company, which we erroneously designated as a modification of the Howland pulverizer. We illustrate this week the wet pulverizer, working on the same general principle, the object being to reduce the friction and the loss of motion in the earlier machines of the same general type, and at the same time to overcome the mechanical difficulties of other constructions with which it has some features in common. The attrition of the material is brought about by the impact of the balls, propelled by centrifugal force and moving freely in their guards against the concave annular ring. The latter is 2¼ inches thick, and weighs about 900 pounds; the principal wear, however, being on the balls, the ring, we presume, being to some extent protected by the ore forced by the rotation of the machine against its inner surface. Water is carried from below through the pipe *G* into the machine, the pulp being discharged through an ample screen surface *D* into gutters.





SECTIONAL PLAN.

Three sizes of machines are made: No. 1, having a ring five feet in diameter; No. 2, three feet; and No. 3, two feet. In the largest size, which we illustrate, eight balls, each weighing 70 pounds, are used. For the two others, the number of balls is respectively six and four, the corresponding weights being 47 and 20 pounds. When running at a speed of 200 revolutions per minute, the five-foot machine has an estimated capacity of from 1 to 1·5 tons of ordinary quartz through a 40-mesh screen, and requires from 12 to 15 horse power; while the three-foot pulverizer, it is estimated, puts from 0·5 to 0·75 ton through the same screen, with an expenditure of 8 horse-power, the rock being previously crushed in a breaker to about one half or three quarter inch size. The pulverizers use from 1000 to 1200 gallons of water per ton of rock, and weigh respectively, No. 1, 7000 pounds; No. 2, 3000 pounds; and No. 3, 1000 pounds; the weight of the heaviest part of the two larger sizes being 950 and 500 pounds respectively.

The operation of pulverizing is the same in wet as in dry crushing, the modifications of detail being such that facility of getting at and exchanging screens, balls, and the ring are provided.

A New Coal-Cutter.—An item is going the rounds of the press to the effect that an ingeniously contrived device for coal-cutting has been introduced in England, the machine being, practically, a combination of inclined circular saws mounted upon a revolving rod, so that the groove cut by each saw runs into the groove cut by the next, thus thoroughly undercutting a seam. The saws are set on the rod obliquely, provision being made for retaining them at a proper distance from each other, and in the most suitable position on the rod, the end of which has a screw thread cut upon it, by means of which it is fastened into the spindle and bearings. In another form, the cutting apparatus is made from a flat bar of steel, with saw teeth along both of its outer edges, and so twisted that the toothed edges are formed into spirals. By this arrangement, the cutter readily clears itself from the slack which it cuts away. The cutters can be driven either by hand power or by compressed air, as may be desired.

THE COKE INDUSTRY.

Mr. Joseph D. Weeks, of Pittsburg, Special Agent of the Census Bureau, three or four weeks ago completed and filed with the proper authorities his report of the coke industry. This report is believed by Mr. Walker, Superintendent of the Census, to be the first one ever made officially on this subject; and, we may add, it will constitute the first complete report of any kind ever published on the subject. We give herewith a brief summary of the report. The original report gives the States in detail, dividing them into counties where manufactories exist.

There are 149 coke establishments in the United States, representing a capital of $5,545,058. The industry gives employment to 3142 people, 3068 of whom are males above sixteen years of age; 3 females above fifteen years; and 71 children and youths. The total amount of wages paid during 1880 was $1,198,654. During this year, 4,360,110 tons of coal were used, costing $2,761,657. The value of other material used was $233,784; total value, $2,995,441. Total amount of coke produced during the year, 2,752,475 tons; valued at $5,359,489. The coke establishments are distributed in ten States, as follows: Alabama, 4; Colorado, 1; Georgia, 1; Illinois, 4; Indiana, 2; Ohio, 15; Pennsylvania, 104; Tennessee, 4; Virginia, 2; West Virginia, 12.

The four establishments in Alabama represent a capital of $13,500; hands employed, males above sixteen years, 64; paid in wages in 1880, $38,500; materials, coal, 67,376 tons, valued at $75,314; value of other materials, $1304; total value, $76,618; total amount of coke produced during the year, 42,035 tons, valued at $148,026.

Colorado's one establishment has a capital of $150,000, and employs 75 hands, all males above sixteen years. Wages paid in 1880, $13,500; materials, 29,500 tons of coal, valued at $29,500; value of other materials, $600. Total values, $30,100. Total amount of coke produced during the year, 18,000 tons, valued at $90,000.

The one establishment in Georgia has a capital of $80,000, and employs 107 hands, all males above sixteen years. Wages paid in 1880, $13,837; materials 117,000 tons of coal, valued at $120,000; value of other materials, $4900; total value, $124,900. Total amount of coke produced, 70,000 tons, valued at $140,000.

The four establishments in Illinois represent a capital of $205,000; hands employed, 1670, and all above sixteen years except two children. Wages paid in 1880, $9347; materials, 15,000 tons of coal, valued at $15,000; value of other materials, $420; total value, $15,420. Total amount of coke produced during the year, 76,000 tons, valued at $124,000.

Indiana's two establishments represent a capital of $80,000; hands employed, four, all over sixteen years of age, all males. Wages paid in 1880, ——; materials, 1500 tons of coal, valued at $2025; value of other materials, $200; total value, $2225. Total amount of coke produced, 1000 tons, valued at $3000.

Ohio's fifteen establishments represent a capital of $144,012, and employ 153 hands, 150 males above sixteen years, and three youths. Wages paid 1880, $51,977; materials, 193,848 tons of coal, valued at $228,482; value of other materials, $5399; total value, $233,881. Total amount of coke produced, 109,296 tons, valued at $334,546.

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Pennsylvania leads them all. Her 104 establishments represent a capital of $4,262,525, and employ 2444 hands, 2379 of whom are males above sixteen years, three females above fifteen years, and 62 children and youths. Wages paid in 1880, $983,431; materials, 3,608,095 tons, valued at $2,031,305; value of other materials, $209,849; total value, $2,241,154. Total amount of coke produced during the year, 2,317,149 tons, valued at $4,190,136.

The four establishments in Tennessee represent a capital of $200,021, and employ 114 hands, all males above sixteen years. Wages paid in 1880, $38,820; materials, 179,311 tons of coal, valued at $124,137; value of other materials, $8092; total value, $132,229. Total amount of coke produced, 91,675 tons, valued at $212,493.

The two establishments in Virginia, representing a capital of $30,000, were not operated during 1880.

The twelve establishments in West Virginia represent a capital of $330,000, and employ 163 hands, 159 males above sixteen years and 4 youths. Wages paid in 1880, $48,952; materials, 148,480 tons of coal, valued at $135,944; value of other materials, $3020; total value, $138,954. Total amount of coke produced, 95,720 tons, valued at $216,588.

Since the publication of Mr. Weeks's figures in the Census Compendium, the Secretary of Internal Affairs of Pennsylvania has printed his statistics for the coke industry in that State for the year 1882. His total shows a product of 3,216,544 tons of coke from 10,063 ovens. Fayette County leads, with 5522 and a product of 1,764,585 tons; followed by Westmoreland, with 3281 ovens and 1,075,305 tons. Somerset County reports 209 ovens and 64,525 tons; Huntingdon County, 200 ovens and 49,232 tons; Alleghany County, 159 ovens and 24,562 tons; Cambria County, 119 ovens and 39,438 tons; Blair County, 88 ovens, and 36,032 tons; and Clearfield County, 86 ovens and 20,281 tons.

THE DEPOSITION OF GOLD BY CHARCOAL.

In a long paper on the use of charcoal for precipitating gold from chlorine solutions, Mr. William Morris Davis, the patentee of the process, gives the results obtained during six experimental runs in the chlorination-works at the Yadkin mine, near Salisbury, N. C. Our attention has been called by a gentleman who carefully examined the figures to some slight errors in calculation and one important misprint. We give the tables as corrected:

Number.	Tons worked.	Assay per ton.	Value of ore.	Gold, mint returns.	Compared with assay.
1	17½	$11.90	$208.25	$216.33	+ 46 cts.
2	30½	11.90	362.95	383.34	+ 67 "
3	9	25.20	226.80	237.99	+ 124 "
4	559	3.61	2,017.99	2,802.00	— 67 "
5	265	5.04	1,335.60		
6	1,082	7.25	7,844.50	7,513.16	— 30⅝ "
	1,963	$6.11	$11,996.09	$11,152.82	— 43 cts.

Mr. Davis, on page 285 of the Franklin Institute *Journal*, where his paper is printed in full, gives the following statement of cost of the process, labor, and other charges in a single filter:

Fourteen bushels charcoal at 5 cents	$0.70
Grinding and screening, ½ day at 60 cents	.30
One boy, regulating flow, 4½ days, at 25 cents	1.12½
One man burning coal, one day, 60 cents	.60
Reduction by crucible, fluxes, etc	1.50
Total, 80 tons	$4.22½
Or per ton	5·3c.

This, of course, is based on very low prices for labor and material.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Alabama Mineral Lands.—In view of the passage at the last session of Congress of a bill "to exclude the public lands in Alabama from the operation of the laws relating to mineral lands," the Secretary of the Interior has written to the district land officers in Alabama in part as follows: "In order to carry out the provisions of said act, it will be necessary to prepare a list of all public lands heretofore reported as mineral that have not been entered, and have them offered by President's proclamation. In the mean time, you will be careful not to allow an entry to be made for any lands lists of which were transmitted to your office October 23d, 1879, nor of other tracts that have been since investigated and reported as valuable for minerals. All existing *bona-fide* entries under the homestead laws may be perfected, regardless of the mineral character of the land. Any contest pending before you, where the *only* allegation is the mineral character of the land, must be dismissed. The law requires the offering to embrace all lands heretofore reported as containing coal or iron that remain undisposed of by entry or sale."

THE PULSOMETER IN GERMANY.—Herr Bartling, of Hanover, Germany, has communicated to a local society the results of a series of tests made with a pulsometer somewhat modified in construction. There is a special air-valve, which, by providing for a stratum of air between the water and the steam, reduces the condensation of the latter. In lifting to a hight of 32·81 feet, and running at 42 pulsations a minute, the water was heated only three degrees Celsius, in the old German style; while with the Ulrich modified pulsometer, it was heated only 1·5 degrees when running at 72 pulsations, and used about 5·5 pounds of steam to every 35·35 cubic feet of water delivered. In making comparative tests between pumps and the pulsometer, one kilogram of steam did 1800 kilogrammètres of effective work in the pumps, and 2560 kilogrammètres in the pulsometer, although the steam was moist, and the test was therefore disadvantageous to the latter. The greatest lift admissible for this pulsometer is given as 39·4 feet; but the maximum effect was obtained with 9·8 feet. The lift, of course, depends upon the steam pressure. High lifts, however, may be obtained with low-pressure steam by using several pulsometers one above the other. Thus, three of them delivered to a hight of 344·5 feet with steam of 4·5 atmospheres pressure. Horizontally, the suction-pipes may be carried as far as 900 feet.

FURNACE, MILL, AND FACTORY.

The Deane Steam Pump Company, of Holyoke, announces that it has secured a warehouse at Nos. 620 and 622 North Main street, St. Louis, Mo., from which it will make punctual distribution of its machinery to the Southwest, where its business has largely increased.

The Niles Furnace, at Niles, Ohio, has been leased by the Arnold Furnace Company for a term of years. The plant will be used in the manufacture of a special brand of iron, particularly adapted for stove plate and light machine castings.

Chicago claims to have 266 establishments engaged in the manufacture of iron, of which 8 are barbed wire works, 15 wire works and wire-cloth works, 28 machinery manufactories, and 4 car-wheel works. Capital invested, $17,400,000; workmen engaged, 18,600; value of product, $45,255,000.

The Scranton Steel Company, of Scranton, as we are informed by the president, has not yet started. It has merely been making a few preliminary heats, to test various points in connection with the works. It will be some time before it starts.

A representative of some of the principal mines in Chili recently visited San Francisco for the purpose of familiarizing himself with the improvements in copper smelting on the coast. After a thorough investigation of the whole matter, an order was placed for one of the Pacific copper smelters of Rankin, Brayton & Co., of San Francisco and Chicago, with the assurance that, if such results are obtained in Chili as are given in this country, they will adopt them for their whole system of working.

The St. Louis Furnace Building and Construction Company is getting out plans for two Siemens heating-furnaces and eight gas-producers for the new mill of the St. Louis Bolt and Iron Company at East St. Louis.

Capt. C. Hinsdale, general Western agent for the Berryman feed-water heater, has taken an order for a No. 5 heater from the Allouez Mining Company, of Allouez, Mich., and one from the Saginaw Mining Company, Saginaw, Mich.

Among the improvements to be made at the mill of Summers Brothers & Co., of Youngstown, Ohio, this spring, will be the erection of another set of sheet-iron rolls, a box-furnace for annealing iron, a scrap-furnace, and a set of new boilers.

Stokes & Parrish, of Philadelphia, are now turning out an unusually large amount of work in their particular line, and though they have enlarged their works considerably during the past two years, they are taxed to their fullest capacity. Among orders recently entered, we mention a furnace hoist, with its complete outfit, for the Everett Iron Company, whose furnace is at Bedford. The same company was supplied with a mining hoist for a 200-foot shaft. The firm has also just completed a furnace hoist for the Woodward Iron Company, at Wheeling, Jefferson County, Ala., and one for the Shenandoah furnace, at Milnes, Page County, Va. Considerable activity is also displayed in turning out hydraulic passenger elevators.

It is understood, says the Portsmouth *Register*, that the contracts for building the Kelly nail mill were let last week. The Messrs. Kelly state that the enterprise has reached a point of assured certainty, and the work will be pushed forward to completion as rapidly as possible. The contracts, we learn, were awarded to some three or four parties, with a view to securing the completion of all the work at the earliest moment, by dividing it. It is estimated that the machinery and other iron work will be on the grounds inside of *six* months. Messrs. Lambert Brothers have been awarded the contract for a portion of the work, which they expect to finish in half that time. The nail factory will have room for 120 nail machines, 60 of which will be put up at the start.

The Link-Belt Machinery Company has just shipped to the Patent Asphaltum Company, of Sydney, New South Wales, a car-load of link-belting and wheels and elevators for handling lime and crushed stone. The first-named company has also shipped a large quantity of belting to the Forest Fiber Company, of Berlin Falls, N. H., and lately placed two more sawdust conveyers in the mills of the Berlin Mills Company, of Berlin Mills, N. H., an elevator for handling shot in the works of Merrie, Verhage & Co., Cincinnati, Ohio, and a bran-conveyer with 160-foot centers and a capacity of 1000 pounds per hour, in the establishment of Robison & Co., Maysville, Ky. It has also orders for three conveyers and one pulp-elevator for the Hudson River Water-Power and Paper Company, of Mechanicsville, N. Y.

The Ryse Manufacturing Company, Indianapolis, Ind., is putting the machinery into its new shop to manufacture drop-forgings, pipe-wrenches, pipe-stocks, and dies.

The Ohio Powder-Works, of Youngstown, has completed its plant, and is turning out 250 kegs of powder per day.

The McTighe Electric Light and Manufacturing Company, capital $300,000, will erect a large manufactory in Pittsburg, Pa. Among the incorporators are F. B. Laughlin, of Jones & Laughlin, William N. Riddle, of the Pennsylvania Bank, Matthew McMullen, J. M. Patterson, and Thomas J. McTighe.

The Lechner Manufacturing Company, of Columbus, Ohio, has sent ten coal-cutters to the Pratt mines, at Birmingham, Alabama.

Messrs. Shields & Brown, manufacturers and sole proprietors of Bradley's insulated air-coverings for boilers, steam, gas, and water-pipes, are removing to new and more commodious quarters, at Nos. 78 and 80 Lake street, Chicago. By reason of the adoption of entirely new and improved machinery in their manufactory, the quality of their goods will be much improved, being finished up in better style than heretofore.

Henry R. Worthington, the well-known pump manufacturers, announce that on May 1st they will remove to their new stores, Nos. 86 and 88 Liberty street, in this city, and on the same day will transfer their St. Louis office from No. 707 Market street to No. 419 North Third street.

GENERAL MINING NEWS.

ARIZONA.

At the annual meeting of the Total Wreck Mining Company, held in this city, the following gentlemen were elected for the current year: John W. Shaw, President; A. E. Outerbridge, Vice-President; J. M. Requa, Treasurer; Edward Annan, Charles Spear, William H. Power, Walter L. Vail.

CALIFORNIA.

HOMER DISTRICT.

During the past winter, work, with the exception of a limited amount of prospecting, was entirely suspended in the district. Heretofore it has not been deemed expedient to attempt the working of the mines during the winter months, and until the present year the resumption of operations before the middle of May or June has been impossible. But this season, the mildness of the weather has made it possible to make an early start. There are numerous properties in the district that show up well, and many prospects are lying uncovered, whose owners are unable, from lack of financial backing, thoroughly to develop their mines.

INYO COUNTY.

A correspondent of the Inyo *Independent* says that the Defiance mine was located in the latter part of 1874. Two 30-ton furnaces were erected at a distance of three quarters of a mile from the mine, and were run for about a year at a loss to the owners. This was due principally to the high cost of transportation and the depreciation in value of lead. The cost of transportation then amounted to $80 per ton from and $47 per ton to San Francisco. The rates of freight are now much less, and for the past two years the mine has paid well. It has been worked to the depth of 212 feet, 500 feet in length, and 60 feet in

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width. The company (known as Reddy, Gorman & Co.) proposes to carry this working down to the depth of 600 feet as speedily as possible. The facilities for doing this are good. The total yield of ore from the mine up to the present time is 18,000 tons, which produced 3500 tons of bullion—5·10 tons of ore producing one ton of bullion. The average value of the bullion has been $200 silver and $6 gold per ton. One notable fact is worthy of observation: The ore in the lower workings is of much higher grade than near the surface, carrying a larger per cent of both gold and silver. Assays have been made that gave a result of 820 ounces silver and $175 gold per ton. It is not the intention of the company to run its furnaces until August, as it prefers waiting until the railroad is completed to Owens Lake and thereby secure cheaper rates for the transfer of bullion. Nearly all the ores in the Defiance mineral belt contain gold. To the north of and adjoining the Defiance is the Cuervo mine. A fine-looking ledge of copper has been lying vacant for years but a short distance from Darwin. A location has now been made upon it, and the ore exhibited is of high grade, principally red and black oxides, assaying from 30 to 60 per cent copper.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—There were only 81 tons of ore hauled to the mill during the week ended the 31st ultimo, the snow-storm having interfered with transportation. The mill crushed 126·24 tons. The average assay value of the pulp was $32.95 per ton; that of the tailings was $5.02.

PLUMAS COUNTY—GREENVILLE DISTRICT.

TAYLOR-PLUMAS.—A dispatch to the New York *Tribune* states that the mill is running well. We are having a big rain and snow-storm. Outlook most encouraging. The secretary of the company says: The mill has been in operation since March 15th, and we may now look for a clean-up any day.

CANADA.

The abundant deposits of apatite in the Laurentian rocks of Canada are at present receiving the attention of investors. In Ottawa County in the Province of Quebec, preparations are making for extensive mining by the Union Phosphate Land and Mining Company, composed chiefly of Philadelphians. The property of this company was formerly owned by Mr. Preston, one of the pioneer phosphate miners. It is well selected, and will probably prove one of the best mines in the district. Application has been made to the Ontario government for incorporation, under the joint-stock company act, of the Northern Ontario Phosphate Land and Mining Company, by New York parties who own some very valuable tracts in the county of Renfrew, Ontario. The average analysis of several specimens taken from different beds or veins in this county shows 83·4 per cent bone phosphate of lime. The width of the veins, which are numerous, varies from 18 inches to six feet solid apatite. Another company is forming for the purpose of working some large deposits of apatite which have been found quite recently in the same county. The increase in shipments of phosphate to the English markets the coming season will be very large, and notwithstanding this, the great demand for high-grade apatite will, it is believed keep the price up. Prices quoted now in Liverpool and London are one shilling and five pence per unit for 80 per cent, the ruling price in Montreal being from $22 to $25 per ton. Considerable English capital, and not a little American, is going into this branch of industry, which certainly recommends itself.

At Charleston Lake, in the county of Leeds, large deposits of metallic oxide of iron have been discovered. Parties interested in the manufacture of mineral paint are examining them. A fine quality of specular iron ore has been discovered near Brockville in the same county. The Dominion government has provided in its recent changes of the tariff a bounty on pig-iron of $1.50 per ton for three years and $1 for the succeeding three years. This is done as an incentive to the establishment of furnaces. Brockville is considered one of the best locations in Eastern Ontario for a furnace. Its shipping facilities are second to none. There is railroad and water connection from all points; specular and magnetic ores in close proximity; and the country to the north is well wooded, so that an almost inexhaustible supply of charcoal can be had.

PROVINCE OF MANITOBA.

CANADA.—The shaft, recently started, is down eight feet. The vein, from present indications, has a scattered appearance, being divided into numerous small feeders, but so far no well-defined lode. Several pieces of rich-looking rock have been taken out, but the vein has no uniform character. At the bottom of the shaft, there are about two feet of antimonial iron, which carries a small percentage of silver.

WINNIPEG CONSOLIDATED.—The mill has begun crushing ore, and works satisfactorily. Arrangements have been made for the addition of five more stamps, and it is expected that they will be in operation within six weeks.

COLORADO.

BOULDER COUNTY.

We are in receipt of the following letter:

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In common with several other mining districts, Boulder County is enjoying (?) its semi-occasional "excitement." The Jamestown rush has already assumed larger proportions than any thing of the kind in the past history of the county, though, to blurt it right out, no new discoveries have been made that are paying.

Jamestown has had existence as a tenth-rate mining camp for about seventeen years. It is in the "telluride belt," though the new strikes are said to be of the character of the Leadville carbonates. The village is fourteen miles west of the thriving town of Boulder, which is the distributing point for the dozen mining camps of the county. Hitherto all that has kept the camp up has been the Golden Age mine, and some spasmodically-worked telluride veins.

Hayden, in his geologic map, puts all this foot-hill country under the head of "Metamorphic Rocks," and in his Report says nothing of eruptive rocks or sedimentary deposits existing in this region. There is, however, at Jamestown an apparent "blanket" formation, or something of that nature; for in the Buckhorn, Argo, and many other shafts, a supposed horizontal bed of low-grade lead ore has been struck. As yet no walls have been found, and the dip is uncertain. After sinking through a few feet of soil, in most instances alternate strata of yellow and red sand and clay are passed through, until, at from twenty to forty feet, the lead ore is met with. Out of a large number of assays made by one gentleman, the highest gave $37, and the next best $12 in silver ore. Returns of more than $100 per ton are, however, said to have been made for several lots of the ore shipped to the sampling-mill.

This, then, is the foundation upon which the "Second Leadville" is to be built, and in truth, at the present rate of increase, there will soon be people enough on the ground to make a city out of the hitherto quiet little community. Already the little eddy of two months ago has widened and deepened into a grand whirlpool of three thousand people.

The writer has passed through a number of similar experiences, and this is simply a repetition of the old story: Hills covered with survey-stakes, roads leading to camp crowded with people, hotels overflowing, saloons and keno "doing a land-office business," lots "sky-high," dance-houses building in hot haste, and every body excited except a few old settlers, who go about in a dazed way, and wonder what it is all about.

In a country full of veins of ore, it would be a marvel if not one among thousands of prospectors should discover any thing of value, and good finds will doubtless be made—possibly before this reaches you; but so far, nothing has been struck to warrant the excitement.

Meanwhile, other parts of the county are producing considerable ore of good grade. The tellurides have not "petered out" yet. Such mines as the Slide, Emancipation, Prussian, Inter-Ocean, Ingram, Keystone, Smuggler, and Cold Spring are almost daily shipping ore which runs—first-grade, from one to twenty thousand dollars per ton; second grade, from two to eight hundred; third grade, from sixty to two hundred; while the poorest part is successfully concentrated on Frue vanners.

For economy and facilities for working, for climate, for fuel, and for the advantages of civilization, Boulder County certainly surpasses any other mining district of the State of Colorado. It is remarkable, too, that the ores of almost all the other counties are represented here. Clear Creek and Gilpin mines have something like counterparts in Caribou and Ward; San Juan resembles that of Camp Albion; and Jimtown *may* turn out "carbonates." In the production of tellurides, however, Boulder has a monopoly, and the patent right covers not only this State, but the whole country; the Bassick mine and the California tellurium mines not yielding enough to mention in comparison. From the fact that, only five years ago, Professor Dana himself was ignorant that such tellurides as calaverite, sylvanite, petzite, etc., were mined in the United States in quantity, it is probable that comparatively few mineralogists are aware that to-day, in Boulder County, not less than fifty mines are producing such ore, or are capable of yielding it.

The report of the State Geologist for 1881 and 1882, just issued, gives a list of 246 minerals found in Colorado; of the fifty which are gold and silver-bearing, thirty-five are mined in Boulder County, the remaining fifteen being for the most part rare and commercially unimportant.

The two narrow-gauge railroads now building up Boulder and Four Mile and Left Hand cañons will touch at or near most of the mining camps before summer. The former is already running a construction train to within a few miles of Caribou.

THOMAS L. WOOD.

BOULDER, COLO., March 24.

CHAFFEE COUNTY.

STONEWALL.—The main shaft is sinking at present; and from the depth of 150 feet to the bottom of the shaft, 165 feet, the streak of good ore has widened from two inches to two feet, showing an increased percentage of copper, which indicates a higher value per ton in silver. The vein, fully thirty feet in width, carries an excellent quality of low-grade galena running from twenty-five to forty dollars per ton, and is all susceptible of successful concentration. While the ore is not entirely free from refractory elements, it is believed that it can be successfully treated on the spot.

CLEAR CREEK COUNTY.

The Colorado *Miner* gives the following as a portion of the ore-shipments from Georgetown during the month of March:

Boston & Colorado	440 tons.
Silver Plume sampling-works	130 "
Miners' sampling-works	70 "
Mendota mine	58 "

The Boston & Colorado agency paid out $57,559 during March for ore.

ATLAS.—The new low-grade ore-mill at Empire Station started up April 1st, and has been working successfully. The present capacity is from twenty-five to thirty tons daily, which will be increased to 200 tons if developments justify it.

GARFIELD COUNTY.

A correspondent of the Leadville *Herald*, in speaking of the Defiance Mining District, which is at present attracting so much attention, says: Fifteen miles of the approach to this camp must be made on snow-shoes, where the snow is at present from six to eight feet in depth. No prospecting can be done here for from six weeks to two months; prospectors who arrive here before that time can do nothing. There are at present about a dozen men in the camp, some of whom will go out within a few days. The formation here is limestone. Half a dozen mines or prospects are worked which all show well. The ore is a hard carbonate and galena, which is low grade and free smelting. The deepest shaft, and the only one of any depth that is worked at present, is seventy feet in depth. It is claimed by parties familiar with the camp that carbonate float can be found over an area of several miles around the mines that are now working. The best ore I have seen was a genuine carbonate of lead taken from a claim three miles from Carbonate City. The ore lies in perpendicular veins as far as development has yet proved. Prospectors and parties acquainted with the surrounding country claim that the limestone is only a cap-rock about two hundred feet thick, which lies on quartzite, the evidence of which can be seen in deep cañons which lead to the Grand River.

GILPIN COUNTY.

The placer mines along North Clear Creek and in Russell and Lake gulches are beginning operations for sluicing.

KEYSTONE.—The lessees are prosecuting development-work, and are gradually opening up a large amount of ground which will be removed by back-stoping. There are four shafts down at intervals along the vein, having depths of from 40 to 115 feet. The mill-dirt treated at Colonel Randolph's stamp-mill in Black Hawk is averaging 4 ounces gold per cord. It is estimated that there are probably $15,000 or $20,000 ore in sight.

KING.—Sinking will be resumed as soon as the machinery has been arranged. The shaft is to be continued on down 100 feet deeper, before driving any more levels.

ROLLINS.—Preparations are making to drive the lower cross-cut tunnel under Perigo Mountain, from its present heading. The company has a fine plant of air-compressors and power drills on the ground, which will be used instead of the slow method of hand-drilling.

WILLIAMS.—This mine, the property of the Gilpin County Mining Company, has improved lately, the mill-dirt averaging over 5 ounces gold per cord. Sortings from the old dump-pile are sent to the stamp-mill, yielding a good profit.

GUNNISON COUNTY.

GUNNISON.—Sinking is going on on the vein of the Comet lode. The shaft is about seventy-five feet below the tunnel level, making a depth of over 140 feet from the surface. The quartz or pay-streak is about eighteen inches wide, which shows some brittle silver. The quartz is crystallized, containing some white iron, and indications are very favorable for striking a body of mineral. The water is coming in very fast, caused by the snow melting. It is very probable that work will be suspended for a while on that account.

HINSDALE COUNTY.

CROOKE'S SMELTING-WORKS.—The smelter has been shut down for a limited period. Mr. H. W. Geist, of the Pueblo Smelting and Refining Company, has recently examined the Ute and Ulé ores, and as his works needed the lead which these ores contained in such rich proportion, he made an unusually flattering offer for them, which resulted in a contract to deliver 20 and 25 tons per day of the concentrates. This will take the present output of the concentrator. But it is expected that, when sufficient water can be had to run the concentrator full time and capacity, there will be a large excess over this amount, which will be treated here unless other arrangements should be made, in which case it is hoped that the smelter can be started again. It will not, however, be started until it is certain that sufficient ores can be had to guarantee a steady and uninterrupted run. The mines are in fine condition. The recent rich strike in the seventh level, west, of 2½ feet of mineral carrying largely gray copper, is not only encouraging but gratifying. The stopes in both the Ute and Ulé are yielding largely.

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LAKE COUNTY.

Late Leadville exchanges contain the following product for the quarter ended April 1st:

Arkansas Valley	$485,562
American Mining and Smelting Company	333,040
A. R. Meyer & Co.	381,221
Shields Mining and Milling Company	18,000
Harrison Reduction-Works	467,694
La Plata Mining and Smelting Company	636,584
Tabor Milling Company	33,275
Grant Smelting Company	779,512
Leadville Gold and Silver Milling Company	46,410
Cummings & Finn	480,363
Other sources	1,000
Total	$3,662,662

The value of silver is taken at $1.10½ per ounce; gold, at $20 per ounce; and lead, at $92 per ton, or 4·6 cents per pound. The basis of computation throughout 1882 was silver at $1.14 per ounce and lead at 5 cents per pound. To the depreciation in the price of these metals may be chiefly attributed the falling off from the product the first quarter of last year.

ÆTNA.—A large body of excellent fluxing iron has been opened up in this mine on Carbonate Hill. It was encountered in running a level from the Chadbourne shaft at a depth of 250 feet, and an uprise of thirty feet and a winze forty feet in depth have failed to show its top or bottom. Although low-grade in silver, this iron is of excellent quality for fluxing. In the old workings, a body of high-grade ore, similar to that found in the north shaft, has been struck, from which some very satisfactory shipments have been made.

BROOKLAND.—The shaft has attained a depth of 500 feet, and has passed through sixteen feet of mineral. The shaft being clear of water, drifting upon the mineral will begin.

MILES-AUGUSTA.—The lessees are at present working on a body of mineral which was opened recently in the ninety-foot level. The assays show that the iron carried 16 ounces in silver while the sand specimen returned 18 ounces in silver and 41 per cent of lead. The shaft is 250 feet deep, and is free from the water annoyance. Shipping will be commenced shortly.

M. R.—This company owns several mines on Mount Elbert, prominent among which are the M. R. and Boulder claims. Considerable development has been carried on for some time, and the building of a fine ten-stamp mill and concentrator at Twin Lakes has just been completed. Large contracts for ore have been lately closed, so that an abundance of mineral for treatment at the mill is assured.

ONLY CHANCE.—This mine, which is located in California Gulch, and which is operated under a lease, is now producing from twelve to fourteen tons of mineral per day, which carries about ten ounces in silver and forty per cent of lead. There is a 350-foot shaft, with a west drift of 60 feet, an east drift of 75, and a north drift of 50. Shipments are now made from the upper levels.

SUMMIT COUNTY.

FELICIA GRACE.—A vein four feet wide was recently opened up in the old incline. The workings heretofore have been mainly on the surface, as the vein was lost at a certain depth.

WHEEL OF FORTUNE.—Regular shipments are made from this mine. From three to seven car-loads are shipped every day. Heavier shipments will be made as soon as the roads are in proper condition.

DAKOTA.

BLUE LEAD.—A forty-ton smelter has been ordered and will be put up shortly. The ore uncovered thus far will yield, it is stated, at least 40 per cent copper.

CALEDONIA.—The mill is running sixty stamps on $7 ore, yielding a net profit of $5.50 a ton. The lower winze is steadily sinking, with no change in the general good character of the ore-body.

DEADWOOD HYDRAULIC COMPANY.—This company owns all the valuable placers but one in Deadwood Gulch. Last winter, it constructed a magnificent and costly bed-rock flume, purchased rights of way and much material preparatory to extensive work by the hydraulic process. Operations, however, have been delayed by the action of the owners of the excepted claim, who obtained an injunction restraining the company from taking water from its reservoir above the excepted claim, to the deprivation of the owners of the latter. This procedure is considered a sort of blackmail, as the claim has been worked repeatedly, and is pronounced barren.

ESTRELLA DE NORTE.—This property is in a good shape for an early resumption of work and a prosperous season. Its ground on Castle Creek was found rich wherever worked; but owing to depth of bed-rock and a superabundance of water, it has been only superficially prospected.

FATHER DE SMET.—The superintendent's report from March 23d to April 1st shows: Ore extracted from first, second, and third levels, 2950 tons. Ore milled, 3000 tons. North end tunnel in 856 feet. Third level header in 177½ feet. Golden Gate North header in 55 feet. West cross-cut in 27 feet. Third level header connected with Italian winze.

ORO CACHE.—This company, which owns promising and well-developed locations on Spruch Gulch, contemplates the erection of a mill at an early day, but has not decided between a 40-stamper at the mine, where water is limited, or a 120-stamper on Whitewood, at the mouth of Spruce Gulch, 1½ miles distant. The latter will doubtless be agreed upon, in which event a narrow-gauge railroad will connect mine and mill.

ORO FINO.—At present, there is no prospect of an early resumption of work. It is understood that the company has decided to put up hoisting-works, in accordance with the recommendation of the superintendent. If it does, the mill may possibly start up by the 1st of July.

SAM.—A vein of quartz was recently discovered, which in richness is said to exceed any thing that has heretofore been found in the mine.

THE HERMANN O'BRIEN & WARDNER COPPER COMPANY.—A smelter of thirty tons capacity has been ordered, and will probably be put in blast about the end of May. The ores of this mine are carbonates and oxides easily smelted. The uncovered portion of the vein is more than sixty feet, averaging 16 per cent copper. The owners state that the present plant is but a forerunner, as they confidently expect to quadruple their present capacity within the year.

TROJAN.—It is stated that this company will erect a 100-stamp mill on Spearfish this spring, work to begin at the earliest possible moment. The works will be about four miles from the mines, but connection will be made by means of a narrow-gauge railroad.

IDAHO.

According to the Wood River *Times*, the value of the ore ready for shipment and on the dumps at the mines is stated to be as follows: On the Eureka, $65,000; Bullion, $55,000; Mayflower, $62,000; Jay Gould, $25,000; O K, $48,000; Bates & Boyd, $30,000; Idahoan, $75,000; Mountain View and Rough & Ready, $20,000; Point Lookout, $15,000; Red Elephant, $8000. Total, $403,000. Large reserves are in sight in all the mines.

EUREKA.—A strike has been made in this mine, situated about nine miles from Hailey. The find so far consists of hundreds of tons of float which assays high in silver and is milling and roasting ore. Boulders are found, on the surface and partly covered, of all sizes and up to ten tons in weight, but no ledge in place. The course of the float deposit is northwest and southeast, and it is traced for miles. An open cut will be run on the bed-rock, to endeavor to cross the vein.

MAYFLOWER.—The first load of this company's ore was shipped to Omaha on the 24th ultimo. Shipments will be made regularly after this.

MAINE.

Our correspondent, "Dirigo," writes us as follows, under date of April 10th:

Captain Moyle, of the Blue Hill, has been West on business this spring, and now, I understand, has gone to England. During his absence, Captain Ludlow, formerly superintendent of the Young Hecla, will have charge of the mine. The company is sinking on the incline. The smelter is not running at present.

The Stewart has got a 12-inch by 36-inch engine in place for hoisting, running pump, etc., and work underground will now be resumed. Shaft No. 3 is down about 160 feet, and the first level will at once be started.

The Douglass has been laying a tramway in the incline; therefore no sinking has been done for some time. The self-dumping skip is running and works finely. The refining-furnace will soon be completed. The concentrating-works have been running through the winter. After breaking and roasting, the ore is crushed by Cornish rolls, of which the mill has three sets. The soluble portion of the copper is then leached out. The ore is then passed over Bradford jigs. I hope to give a full description of the process soon. The long winter and great amount of ice, suspending navigation for so long a time, have made the coal run short; therefore the smelters are not running at present, but will start up soon. The company will probably take about 1500 tons of rock per month from the mine this season, running 2½ per cent of copper. The company has an extensive plant and good management, and I see no reason to doubt its ability to get along without levying further assessments.

MICHIGAN.

The Houghton *Mining Gazette* reports the shipments of the following mines for March as follows:

	Tons.	Lbs.
Calumet & Hecla	1853	1555
Quincy	225	520
Atlantic	164	825
Franklin	160	210
Allouez	90	540
Pewabic	70	500
Peninsula	59	1630
Grand Portage	40	458

RED RIDGE.—A dispatch from Escanaba says that a cave-in occurred at this mine, between Quinnesec and Iron Mountain, carrying down the engine-house and also eight men. These men were on the surface. No one was at work in the mine. The cave-in embraced a space of seventy-five by fifty feet, and besides the men engulfed, took in all the mining machinery, including four large boilers, which fell a distance of 100 or 200 feet. It is believed that all the men are dead, and it is estimated that the recovery of the bodies will require a week or more.

MONTANA.

BOZEMAN TUNNEL.—The tunnel penetrates the mountain 700 feet from the east side, and about 450 feet from the west, making altogether about 1150 of tunneling finished, out of the 3600 feet necessary to complete the work. The track of the Northern Pacific is now this side of Bozeman two or three miles, and coming along rapidly.

KIT CARSON.—The owners have been at work for the past two years developing the mine, and besides a large quantity of good ore which they are reserving for home reduction, they have taken out enough rich shipping ore to about pay the development expenses. The prospects are reported to be favorable.

SUMMIT DISTRICT.

ALICE.—The *Inter-Mountain* says that developments are progressing as usual. On the 100-foot south level, 20 tons of free ore are extracted daily. From the 200-foot station, a south cross-cut was run during the past week, which has intersected the vein mentioned above. East and west drifts have been started. The ore-body is about the same width as in the level above, but is a sulphuret instead of a free ore. On the 700-foot level, nothing new is to be reported. The sinking of the winze, which is now 60 feet deep, is slowly but steadily progressing on good ore all the way down. The Magna Charta is producing daily 60 tons of ore. The most important development of the past week is the striking of the pay-chute on the 500-foot level at a point 90 feet west of the cross-cut, where three feet of 40-ounce ore are exposed. All other workings are looking as usual. The sinking of the pump-compartment of the main shaft, which is now 150 feet deep, will soon be resumed.

LEXINGTON.—Above the 300-foot level, the mine is well opened and shows good ore-reserves. The 400-foot level is also explored, one chute four feet wide and assaying $100 a ton having already been opened for 120 feet. The other workings of this level are also looking well. The mill is running satisfactorily.

MOULTON.—The new surface strike on the south vein is developing with splendid success, the bottom of the shaft, which is now about thirty feet deep, being all in ore of exceptionally fine quality, bucket samples assaying from 75 to 100 ounces. In the stopes between the 200 and 100-foot levels, the ore-body retains its width and richness, and the miners are extracting about 30 tons of forty-ounce ore per day. On the 300-foot level, explorations actively continue, and on the south vein, which was struck in the south cross-cut from the main level on the middle vein, a fine quality of ore is extracted. The chute is proving richer as it is opened westward. Where it was first intersected, the ore was of low grade.

NEVADA.

BERRYMAN TUNNEL AND MINING COMPANY.

This company has been organized for the purpose of developing six mining claims, each 1500 feet long by 600 feet wide, upon Silverado Mountain in Pinto Mining District. Work on the property will be begun at once. None of these mines has been prospected to any great depth, but recent developments, particularly in the Diagonal mine, show that the ore-bodies continue as depth is attained. The intention of the company is to thoroughly prospect its ground, and by vigorous work this spring and summer determine its value. The surface ground is rich in fine float-rock, and is broken up and mineralized at almost every point.

GEDDES & BERTRAND.—This company employs at present 40 miners and 60 mill hands. Last month, about 58 tons of dry ore were worked per day in the mill. Developments continue to be made, and work at the different shafts and levels is pushed with vigor. The ore dips at an angle of 40 degrees from the main shaft, and is principally antimonial silver.

NAVAJO.—The official report for week ended March 29th shows total depth of shaft, 520 feet; rock continues very hard; no water yet encountered. Drift south, 450 level, extended 16 feet; no material change to note. South drift, east lateral vein, 350 level, advanced 19 feet. Stopes and other workings throughout the mine are without material change. The ore milled during the past week averaged $239.01 per ton.

UTAH.

The Salt Lake *Tribune* says:

EMPIRE.—The sale is postponed until the middle of April. Hopes are expressed that the company will be able to keep its mine, and that capital will be put up to work it, without further difficulty.

MAMMOTH.—Pay-day passed without the needful remittances from England, and the employés took matte and other property in their possession pending settlements, which will doubtless be made within a few days. The furnaces are not in operation, but are bedded down, and can be started up at any time.

ONTARIO.—All the operations at the mine go forward well, and with a definite purpose. The water has become somewhat heavier than for a while back; but whether this is caused by the melting snows from the surface or by percolations from the Empire can not be definitely stated, there being partisans to both theories.

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FINANCIAL.

Gold and Silver Stocks.

New York, Friday Evening, April 13.

The mining market has been almost exclusively confined to dealings in Sonora and Robinson stocks, and the remainder of the market affords but little interest. It has been a fight to "squeeze out" the "short interest" in Sonora, and in consequence, the price of that stock has been manipulated up to far above its real value. After the third call to-day of the Mining Board, over three thousand shares of the stock were sold out "under the rule," showing that the "squeeze" had been successful in a small way. Robinson Consolidated has been manipulated in sympathy with Sonora. Amie, Elko Consolidated, and Decatur record large dealings, but were generally weak. Below will be found a complete summary of the market. The total number of mining shares sold at all the Exchanges aggregates 344,094, as against 421,415 last week.

The Comstock shares were very quiet at steady prices. California sold to the extent of 2285 shares at 20@22@21c. Consolidated Virginia was a little weak, under a small business, selling from 51@46c. Sierra Nevada records a small business at steady prices, selling at $2.25@$2.30. Union Consolidated had one small transaction at $3.75. Mexican had a moderate business and was irregular; it sold from $3.25@$2.88. Savage sold at $2.25, Yellow Jacket at $3.15, and Best & Belcher at $3.75. Sutro Tunnel was very quiet and steady, and sold at 20@21c.

The Leadville stocks were quiet and steady. Amie Consolidated records an active business, and was a little weak; it sold from 24@20c. Chrysolite was quiet and a little weak, selling from $1.20@$1.15. Dunkin records a small business at steady prices, selling at 23@25c. Hibernia sold at 3c. Iron Silver had a small business and was irregular; it sold from $2.80 @$2.95@$2.85. Leadville was quiet and steady, selling from 64@70c. Little Chief was moderately dealt in at irregular prices; it sold from 41@48@45c. Little Pittsburg was dealt in to the extent of 1400 shares at 60@65c. Big Pittsburg was quiet and steady at 17@15c. Climax sold at 6c.

The Bodie stocks were almost neglected. Bodie Consolidated was quiet and steady; assessment-paid shares sold at $1.40@$1.45, and assessment-unpaid shares at 95@85c. Standard has gained a little strength, under a small business; it sold from $6.50@ $7, with a business of 1305 shares.

The Tuscarora stocks were quiet and steady. Argenta sold at 85c., under a transaction of 100 shares. Navajo was moderately dealt in, and gained a little strength; it sold from $3.25@$3.40. Independence was quiet and steady at 65c. North Belle Isle records transactions to-day of 700 shares at 35@30c. Elko Consolidated has been very active and has been weak. This is owing to the assessment recently levied. It sold from 9@5c., the transactions aggregating 36,400 shares.

In the miscellaneous list, Alice has been quiet and strong, selling from $2.75@$3. Bassick sold at $9.75. Eureka Consolidated was irregular under a small business, selling from $6@$5.50@$5.75, assessment paid, and at $4.50, assessment unpaid. The Green Mountain stocks were quiet and a little weak. Gold Stripe sold at 5c. Green Mountain sold from 83@ 80c. Rising Sun sold at 3c., and Cherokee at 2c. Hall-Anderson records a fair business at very irregular prices; it sold from $1.50@$1.85@$1.55@ $1.85, the business amounting to 6100 shares. Homestake declined from $15.50@$15, with a small business. Horn-Silver was quiet and strong, selling from $7.75@$8. Northern Belle rallied from its recent weakness, and was strong at $9@$9.50 under a small business. Robinson Consolidated records a very active business at irregular prices; it rallied to-day, however, and was strong, closing firm; it sold from 69@88@84c., the transactions amounting to 94,800 shares. Sierra Grande was rather quiet at irregular prices, closing weak to-day; it sold from $1.75@$1.95@$1.75. Silver King continues to grow weaker, and this week declined from $10.50@$10 under a small business. Spring Valley, under small transactions, was strong, selling from $1.50@$1.85@$1.75.

Alta-Montana has been quiet and steady, selling at 8c. Bradshaw records a small business at steady prices, selling from 30@28c. Bull-Domingo sold at 7c., with a very small business. Central Arizona was dealt in to the extent of 300 shares at 30c. Decatur was active and irregular, selling from 4@6@ 5c. Eastern Oregon sold from 50@60c. Harlem M. & M. Co. was moderately dealt in at strong prices; it sold from $1.50@$1.45. Lacrosse sold from 14@11@13c., with transactions of 10,500 shares. Oriental & Miller was very quiet and was steady; it sold from 18@16c. Silver Cliff records but a small business, and was steady at 35c. Sonora Consolidated has been active and very strong; it sold from 37@$1.45, closing to-day at $1.25, the business amounting to 69,400 shares. South Pacific was quiet and steady at 6@5c. The State Line stocks were quiet and steady; Nos. 1 and 4 sold at 2c., and Nos. 2 and 3 at 5@6c. Taylor-Plumas declined from 17@13@14c., under a small business.

MEETINGS.

The Centennial Copper Company, No. 1 Pearl street, New York City. Annual meeting of stockholders and election of directors, April 23d, at twelve o'clock M.

The Hite Gold Quartz Company, Room 88, No. 35 Broadway, New York City. Annual meeting of stockholders and election of trustees, April 19th, from twelve to one o'clock P.M.

DIVIDENDS.

The Homestake Mining Company, of Dakota, has declared a dividend (No. 56) of $50,000, payable April 25th. Transfer-books close on the 20th. Total amount of dividends paid to date $1,962,500.

The Northern Belle Mining Company, of Nevada, has declared a dividend of 50 cents per share.

The Oxford Gold Mining Company, of Nova Scotia, has declared a dividend (No. 2) of five per cent on the capital stock, payable April 20th. Transfer-books close April 14th, and reopen April 21st.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, Petroleum and Mining Brokers, No. 55 Broadway, report as follows for the week ended April 18th, at noon:

At the date of our last report, oil was selling about 91⅛c., and the decline which had been in progress for a week was not arrested until Monday, the 9th, when prices touched 88c. From that point, a recovery began, and on April 11th, the market, which opened at 89⅝c., closed at 96¼c. On Thursday, the 12th, the market opened at 98⅛c., and during the day sold down to 95⅝c., closing at 96⅛c. This morning, it opened at 95¾c., sold down to 93¼c., and closed at 93⅜c. bid for the noon session.

The influences that operated to depress the market from $1.10, the price which prevailed three weeks ago, were, first, a desire by long holders to realize, and the creation of a considerable short interest in view of the new wells which were expected in the Balltown District. These wells, the Welch, the Murphy, and Grand in No. 6, were held over the trade as a *bête noire*, and the idea was, that if these wells became producers, it would extend the area of productive territory. As a matter of fact, they did start off with a pretty good production, but this soon fell off. The decline in the production of these wells, and the increasing shipments to the seaboard from the oil region, started a buying movement that may advance oil to higher figures during the month, with occasional reactions meantime. It is understood that the Standard Oil Company, which heretofore has made contracts for refined oil for the summer months, declines to make such contracts at the present rate for refined later than May 1st. The German and foreign buyers are holding off for lower figures; but the presumption is, that the Standard will be interested in marking up the price of crude oil, in order to make a demand for refined, which can be more advantageously disposed of when the crude market is strong and advancing.

On Tuesday last, the members of the National Petroleum Exchange voted to adopt the amendments to the constitution necessary to effect a consolidation with the New York Mining Stock Exchange. The vote stood 335 for and only six votes against them. A vote was taken on Thursday for the fifteen members of the governing committee of the consolidated Exchange to which the Petroleum Exchange is entitled, and the following ticket was elected: Three years—Charles G. Wilson, Henry H. Truman, J. S. Stanton, Emil Schalk, and James F. Hughes; two years—Randal H. Foote, C. F. Schramme, Howard Bird, W. J. Osborn, and S. S. Sonneborn; and one year—F. H. O'Connor, James E. Little, E. H. Bunker, H. A. Heiser, and C. G. Fales.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
April 7....	$0.91	$0.92⅜	$0.91	$0.91¼	340,000
9....	.92¼	.92½	.88⅞	.89⅝	633,000
10.....	.89	.91¼	.89	.90	794,000
11.....	.90	.96½	.89¾	.96	959,000
12.. ..	.97⅝	.97⅞	.95⅝	.96¼	623,000
13.....	.95¼	.96⅞	.93⅝	.94½	683,000
Total sales.					4,032,000

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been dull. The principal business done was in the shares of the middle Comstocks, and they were quite active at advanced prices. The remainder of the Comstock market was quiet and weak. Outside stocks were but moderately dealt in and were steady. The Yellow Jacket Company has rescinded the dividend recently declared, owing, it is said, to legal difficulties. The following assessments have been levied during the week: Alta-Montana, twenty-five cents per share; Elko Consolidated, fifteen cents per share; and Scorpion, ten cents per share.

SAN FRANCISCO MINING STOCK QUOTATIONS

Daily Range of Prices for the Week.

Name of Company.	Closing Quotations. April 6.	April 7.	April 9.	April 10.	April 11.	April 12.
Albion						
Alpha	1¼	1⅛	1⅛	1¼	1¼	1¼
Alta	7-16	11-32	11-32	5-16	¼	¼
Bechtel						
Belcher	27-32		13-16	21-32	11-16	13-16
Belle Isle	9-16	9-16		⅛	7-16	7-16
Best & Belcher	3¾	3¾	3⅞	3¾	3⅝	3¾
Bodie	1⅝	1⅝	1⅝	1⅝	1¼	1¼
Bullion						
California	3-16		3-16		¼	3-16
Challar						
Con. Virginia	9-16	½	½	7-16	½	7-16
Crown Point	1⅛	1⅛	1⅛	1⅛	1⅛	1¼
Elko Cons				3-32		3-32
Eureka Con	5⅛	5	5	4¾	4¾	4⅛
Exchequer	¼	¼	¼	¼	¼	¼
Gould & Curry	2⅛	2⅛	2⅛	2⅛		
Grand Prize	⅛	⅛	⅛	⅛	⅛	⅛
Hale & Norcross	3⅛	3⅛	3⅛	2¾	3⅛	3
Independence	11-16			11-16	29-32	
Martin White	5-16	5-16	¼	¼	¼	
Mexican	3⅛	3⅛	3¼	3	3	2⅞
Mono		3-32				
Mount Diablo			3⅝	3¾	3¾	3¼
Navajo	3⅝	3¾	3¼	3⅝	3⅝	3⅝
Northern Belle	8⅝	8¾	8⅝	8¾	9	9¼
North Belle Isle						¼
Ophir	2⅝	2⅝	2⅝	3⅛	2⅜	2¼
Overman						
Potosi	1¼	1½	1¼	15-16	1	15-16
Savage	2¼	2¼	2¼		2⅛	2
Scorpion						
Sierra Nev	2½	2½	2⅝	2½	2⅜	2⅝
Silver King	10⅛	10¼	10⅛	10		10¼
Tip Top			13-32			
Union Con	3¾	3¾	4	3¾	3¾	3⅝
Wales Con		¼	¼	3-16		3-16
Yellow Jacket	3	2⅞	2⅞	2¾	2¾	2⅞

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, April 12.

The market for copper stocks continues dull, with prices still tending downward, and the outlook is far from encouraging. The dealings are confined to a few specialties, and there seems to be a greater desire to sell on the part of holders, who see in the future a reduction of dividends, and a possibility of some of the mines being obliged to pass dividends altogether. Ingot copper continues weak, and one party said yesterday that it could not be bought below 16 cents, and was hard to sell at that price. This tendency, of course, checks all speculation in copper stocks for the present; but those who hold on to their stocks will doubtless see a turn in the market within the next six months, and be enabled to sell at better prices. Calumet & Hecla declined to $239½, against $241 last week, and closed offered at $240. Franklin declined from $11¼ to $10½, with later sales at $11, which was bid. Some exceptions have been taken to our remark of last week, "that the decline in ingot copper would doubtless prevent the payment of a dividend the coming year." We are told by a party who ought to know that a dividend will no doubt be forthcoming, notwithstanding the lower price for ingot. Time will show which is correct. Pewabic is almost entirely out of the market. The call for another dollar assessment on this stock does not hold out much inducement to buyers, and those who are holders are obliged to keep their stock and pay the assessment, or let it go by default. The only sale the past week was 10 shares at $4. Quincy is weak, and shows a decline from $49¼@$46½, and closed at $46½ bid. A considera-

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ble amount of this stock has changed hands the past week, every effort to sell being followed by lower prices. Osceola has been fairly active and quite firm at $27@$26½, being offered at the latter price to-day, and no bid. Huron, which declined last week to 50c. per share, has shown a fair degree of activity, and advanced to 87½c; but the announcement of another assessment of $1 per share caused it to weaken and decline to 62½c. National declined from $1⅛@75c., probably in sympathy with its neighbor, the Huron, and a fear that they may be treated to a similar "Irish dividend." Allouez declined from $2¼@$2.

In silver stocks, about the only feature is the activity in Catalpa, which has advanced from 47½@70c. on sales of 16,000 shares. The advance is said to be due to the improved outlook of the mine. Bonanza declined from $2¼@$2½. Silver Islet sold at $3, same as before. Crescent, 22½c. San Pedro, 57⅛@60c.

At the Boston Mining and Stock Exchange, business continues to rule dull and featureless. The public manifests no anxiety to operate in mining stocks as a rule, and most of the transactions recorded are made by room traders. In Catalpa, Crescent, and other stocks dealt in by the old Board, there is more or less doing every day as between the Boards; but in the specialties of the Mining Exchange, the trading is very limited. Massachusetts & New Mexico, which formerly was an active stock and generally looked upon as a first-class mine, seems to have literally melted away; the stock selling at 7@8c., with an assessment of 5 cents per share paid. Empire, also an old-time favorite, has settled down to 16@17c., and is barely held at these figures by its friends. Bowman Silver, recently listed and put upon the market at 16@17c., has been hammered down to 9@10c. Brunswick Ship's Berth Company is dealt in quite extensively, and offers by its fluctuation, a good margin for "turns."

3 P.M.—At the afternoon Board, Catalpa advanced to 75c., but later sold at 72½c. Crescent sold at 25c. Huron declined to 50c. again. Quincy declined to $46. San Pedro, 57½@60c. Closing prices:

Allouez, $2½ asked. Atlantic, $11@$12 asked. Bonanza, $2@$2½ asked. Antimony, $14@$15 asked. Calumet & Hecla, $240 asked. Catalpa, 75c. asked. Crescent, 25c. asked. Franklin, $10½@$11. Harshaw, $¾. Huron, 50c. bid. Osceola, $26½. Pewabic, $5. Quincy, $46 bid. San Pedro, 55c. bid. Silver Islet, $2½ bid, $3 asked. Sullivan, $⅛@$⅜.

METALS.

NEW YORK, Friday Evening, April 13.

Copper.—Buyers apparently have not got over the shock of the recent decline in Lake, and hesitate, it would seem, because they expect a further decline. We hear that there have been sales of Lake equivalent to 15⅞c. here, at Waterbury, but little has been done here. English advices state that the quantity of Lake copper placed there is 7000 tons. In other branches, little is doing at the range of 14⅛@15½c., according to quality. As indicating the export movement of "furnace material," we may state that to date there have been shipped for this month alone 12,309 sacks, or fully 600 tons.

Messrs. Richardson & Co., of Swansea, quote, under date of March 31st, ores and regulus 12s. 9d.@13s.3d. per unit, while Messrs. French & Smith, of London and Liverpool, quote ore 12@13s. net.

The private sales at Swansea, during the month of March, consist of 315 tons of New Quebrada yellow ore at 12s. 6d.; Cueva de la Mora precipitate, 330 tons, for delivery in Liverpool, at 13s., 1163 tons at 12s. 9d.; and 32 tons of Aljustrel a t12s. 7½d. per unit.

We note that Wyoming copper, reported to be very good-looking metal, has for the first time made its appearance in this market.

England, by cable, is unchanged, quotations being £64@£64 5s. for Chili Bars, and £70@£70 10s. for Best Selected.

Lead.—The movement to depress the market having ceased, this metal has nominally reacted, though there is no business to report. We quote Common lead nominally 4·50@4·57c.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day:

Our market is firm. Sales on Monday were 140 tons of Refined at 4·20c., and 200 tons at 4·23c. for April delivery; on Tuesday, 80 tons of Hard lead at 4·12½c.; on Wednesday, 300 tons Refined for May delivery at 4·23c.; and to-day, 180 tons Chemical lead at 4·12½c.

Tin.—The market has been dull and business of a limited character, with a tendency to lower figures based upon Singapore and London. We quote Straits spot 21c. cash. London cables £94.

Spelter.—We have no transactions of any magnitude to report. We quote: Common Domestic, 4·70@4·85c.; and Silesian, of which there is very little here, 5⅛@5¼c. London cables £15 5s.@£15 10s.

Antimony.—The market has been very quiet. We quote 9⅞@10c. for Hallett's, and 10⅞@11c. for Cookson's.

BULLION MARKET.

NEW YORK, Friday Evening, April 13.

The absence of strength, noted in our report of the silver market last week, has become more marked, and the indications are, that lower figures will be made the coming week.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
April 7....	50¾	110¼	April 11....	*	109⅞
9....	50⅝	110⅛	12....	†	109⅞
10....	50⅝	110⅛	13....	†	‡

* 50⅛@50 9-16. †50 9-16@50½. ‡ 109⅞@109¾.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended April 13th, as compiled from various sources, amounted to $254,505.45, as against $236,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,072,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended April 7th	$383,224
Corresponding week last year	925,500
Since January 1st, 1883	4,527,834
Corresponding period last year	13,987,253

Imports.

Week ended April 7th	$938,039
Corresponding week last year	24,988
Since January 1st, 1883	5,784,506
Corresponding period last year	1,110,601

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of March.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	.....	$147,807
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	7,432
Bodie, G. S.	Cal....	21,459	66,257
Bodie Tunnel, G.	"	12,747	34,849
*Bonanza King, G.	"	64,000	177,132
*Boston & Montana, G.	Mont...	.....	34,936
*Central Arizona, S.	Ariz..	.....	15,627
*Christy, S.	Utah...	20,086	65,924
*Chrysolite, S. L.	Colo...	.....	57,435
*Contention, S.	Ariz..	85,713	284,259
Crescent, G.	Cal....	.....	13,000
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak...	.....	84,556
*Derbec Blue Gravel, G. S.	Cal....	.....	16,602
*Father de Smet, G.	Dak....	.....	69,189
*Frisco M. and S. Co., G. S. L.	Utah...	.....	43,923
*Homestake, G.	Dak. ..	.....	211,348
*Hope, S.	Mont...	.....	20,574
Horn-Silver, S. L.	Utah...	285,000	764,000
*Independence, G. S.	Nev....	.....	10,173
*Kentuck, G. S.	"	.....	4,262
Lexington, S.	Mont...	.....	192,365
*Little Pittsburg, S. L.	Colo...	.....	11,875
*Marguerite, G.	Cal....	.....	25,900
*Martin White, G. S.	Nev....	35,166	121,453
*Moulton, G. S.	Mont...	.....	88,588
Mount Diablo	Nev ...	9,857	9,857
*Navajo, G. S.	"	68,833	211,980
Northern Belle, S.	"	46,225	267,315
*Ontario, S. L.	Utah...	.....	364,067
*Oxford, G.	N. S....	6,620	15,143
*Pinal Cons., S. L.	Ariz ...	.....	$49,810
*Satemo, G.	N. S...	.....	2,500
*Silver Bow, G. S.	Mont...	.....	34,246
Standard, G.	Cal....	74,727	263,006
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah...	19,770	54,604
Syndicate, G.	Cal....	.....	9,217
Tintic M. and M. Co.	Utah...	.....	7,632
*Tip Top, S.	Ariz....	.....	‡22,983
*Tombstone, G. S.	"	.....	123,452
Yellow Jacket, S.	Nev....	69,797	98,753
Total amount of shipments to date			$4,185,322

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 13.

Mr. Edward J. Shriver, Secretary of the New York Iron and Metal Exchange, has compiled the following statement of the stocks in bonds in New York, Philadelphia, Baltimore, and New Orleans:

	Jan. 1.	March 1.	April 1.
Pig-iron	6,330 tons.	8,872 tons.	9,268 tons.
Spiegel-iron	4,131 "	3,674 "	3,388 "
Old rails	5,504 "	6,019 "	5,186 "
Scrap-iron	1,384 "	2,809 "	3,062 "
Scrap-steel	456 "	456 "	306 "
New iron rail	6,642 "	6,821 "	6,225 "
New steel rails	4,816 "	5,213 "	4,698 "
Grand total	29,263 tons.	33,864 tons.	32,133 tons.
Decrease during March, 1883			1,731 tons.

American Pig.—The dullness of the past months has developed into complete stagnation, and we do not hear of a single transaction of any thing above a jobbing character, and furnace-men are apparently not even accorded the poor consolation of an occasional inquiry. The makers of standard brands appear to hold firmly to their prices; but unless a reaction sets in, some of them will be forced to move some of the accumulating stocks at lower figures. Outside brands are offered at greater concessions. We quote for American Foundry, No. 1, at tidewater, $22.50@$24, nominally, for ordinary to choice; $21@$22 for No. 2; $18.50@$19.50 for Gray Forge; and $16@$17 for White and Mottled. In Bessemer pig, we hear of no transactions, $22 being asked for American. Spiegeleisen is unchanged at former quotations, $32 for 20 per cent, and $26 for 12 to 15 per cent.

Scotch Pig.—Practically nothing has been done The arrivals are light—600 tons—but only part of them have gone into consumers' hands, which is a discouraging symptom. Freights from Glasgow are 5 shillings. We quote nominally, Coltness and Langloan, $24@$24.50; Glengarnock, $22@$22.50; and Eglinton, $21@$21.50. At the Wall Street Exchange, the following cables were received to-day: Carnbroe, 55s. 3d.; Gartsherrie and Summerlee, 61s. 3d; Coltness, 63s.; Langloan, 64s.; Glengarnock, 54s. 9d.; and Eglinton 48s. 6d. Warrants are 47s. 1d., a little higher.

Rails.—During the week, sales aggregating about 30,000 tons have been made in one large lot and several small lots, at prices varying from $38@$39 at mill, which we quote, 20,000 tons having been taken by one Pennsylvania mill at the lowest figures stated. England is lower. The statistics of track laid during the first three months of the current year, as compiled by the *Railway Age*, are not encouraging to this interest, though the severe winter told against active work in some of the sections where the additions to the mileage are heaviest. The total for the first three months of 1882 is only 766 miles, against 1200 miles during the corresponding period of 1881.

Old Rails.—Business is restricted, spot lots of Ts ranging from $24@24.50, while for future delivery the quotations are lower. Double Heads are scarce.

Scraps.—We have no business of magnitude to report, the market being dull and lifeless at $25 for No. 1 asked, ex ship.

Philadelphia. April 13

The fact is becoming more widely recognized that the producing capacity is so much larger than the consuming capacity that a further decline in iron and steel is only a question of time, and that restriction in some form or other, voluntary or through strikes, will become a necessity. Iron-making capacity has been restricted from 10 to 15 per cent, according to some estimates, and a further restriction is thought probable unless some relief is obtained through an increasing demand.

Pig-Iron.—The market is not weaker than usual; in fact, the transactions during the past week indicate that the consumers of forge iron especially have a good deal of confidence in the future of trade, because they have been purchasing with a good deal of freedom, and for deliveries from sixty to ninety days distant in a few cases. Inferior irons are sold at a sacrifice in some cases, and only the very best of the standard irons command any thing like full prices. Two or three are held near $21, but the most irons are selling in the neighborhood of $19, and some from 50 cents to $1 less. Concessions are readily extended, and buyers have been covering future requirements for from thirty to sixty days. Foundry irons are selling almost altogether in small lots, those of 100 tons being exceptional transactions. To-day's quotations run from $23.50@$24.50 for No. 1, and $21.50@$22.50 for No. 2. There is less inquiry, and buyers are not disposed as a rule to go beyond their immediate requirements.

Foreign Irons.—English is to be had between $20 and $21, and retail lots of Scotch have been going all

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 7.		April 9.		April 10.		April 11.		April 12.		April 13		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.			2.80		2.85	2.80	2.75				3.00		700
Amie Con., Co.	.23	.22	.23	.23	.24	.21	.21	.20	.20		.20		24,900
Argenta, Ne.									.85				100
Bar. & Walker, Ut.													
Bassick, Co.			9.75										100
Belle Isle, Ne.													
Bodie Cons., Ca.	1.45	1.40	.95		.85		1.65		1.45	1.40			521
Breece, Co.													
Bulwer, Ca.													
California, Ne.	.20				.21				.22		.21		2,285
Cal. & Hecla, Mich.													
Carbonate Hill	1.10	1.00											1,200
Caribou Con., Co.													
Chrysolite, Co.	1.20	1.15			1.20		1.20		1.20		1.20	1.15	2,275
Cons. Va., Ne.	.51	.50			.51		.48		.49		.46		3,800
Crown Point					1.05		1.05						250
Deadwood-Terra, Dk.													
Dunkin, Co.					.23				.25				300
Eureka Cons., Ne.	6.00				6.00		5.50		4.50		5.75		285
Excelsior, Ca.													
Father de Smet, Dk.			4.50				4.50						200
Findley, Ga.													
Gold Stripe, Ca.	.05		.05										1,100
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.													
Green Mountain, Ca.					.85	.82					.80		800
Hale & Norcross, Ne.													
Hall-Anderson, N. S.	1.70	1.50	1.80		1.85	1.70	1.65	1.55	1.75	1.70	1.85	1.75	6,100
Hibernia, Co.					.03								100
Homestake, Dk.	15.50		15.50		15.50				15.00				600
Horn-Silver, Ut.			7.88						8.00	7.75			155
Hukill, Co.							.13	.10					1,900
Independence, Ne.	.65				.65		.65						400
Iron Silver, Co.	2.90				2.90		2.90	2.80	2.95	2.85	2.85		1,940
La Plata, Co.													
Leadville C., Co.	.68				.68		.64		.70	.64			468
Little Chief, Co.	.41		.48	.42			.46	.42			.45		3,000
Little Pittsburg, Co.	.60										.65	.60	1,400
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	3.25		3.25		3.25				3 40				700
Northern Belle, Ne.					9.00				9.50				30
North Belle Isle, Ne.											.35	.30	700
Ontario, Ut.	27.00				26.50								300
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.					44.50	44.00							300
" Com., Ca.													
Rising Sun, Ca.									.03				100
Robinson Cons., Co.	.79	.69	.87	.80	.83	.80	.80	.77	.83	.76	.88	.82	74,800
Savage, Ne.							4.25						50
Sierra Grande, N. M.	1.85		1.85	1.75	1.80		1.90		1.95	1.90	1.90	1.75	5,400
Sierra Nevada, Ne.							2.25		2.30				110
Silver King, Ar.			10.50		10.00		10.00						335
Spring Valley, Ca.	1.50				1.85		1.75						250
Standard, Ca.	6.50		6.75		7.00						7.00		1,305
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket	3.15												225

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 7.		April 9.		April 10.		April 11.		April 12.		April 13.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance											.16	.15	1,300
Albion, s. L.											.18	.17	1,200
Alta-Montana, G.	.08		.08		.08		.08		.08		.08		4,500
Am. Flag, s.													
Barcelona, G.	.13		.13	.12			13		.12				4,800
Bear Creek													
Bechtel Con., G.													
Best & B'lcher, G. S.							3 75						10
Big Pittsburg, S. L.					.17		16				.15		1,600
Bradshaw, S.	.28		.30								.28		1,700
Buckeye													
" pref.													400
Bull-Domingo, S.L.	.07		.07										
Bye and Bye													
Calaveras, G.													
Clav'r'g W. & M. Co.													
Cal., B. H., G.													
Carbonate Hill, S.L.													
Catskill													
Central Ariz'na, S.	.30				.30								800
Chapparal													
Cherokee, G.			.02		.02								900
Climax, Co.	.06												2,100
Cons. Imp'ri'l, G.S.	.06												200
Con. Pacific, G.													
Crowell, G.	.04				.04		.04						3,100
Dahlonega, G.							.02				.08	.02	2,800
Decatur	.05		.05	.04	.06	.05	.06	.05	.06	.05	.05	.04	12,800
Durango, G.	.06	.05											1,200
Eastern Oregon			.50				.60				.60		500
Elko Cons.	.09		.09	.08	.09	.07	.08	.07	.07	.06	.06	.05	36,400
Enterprise	.29	.28											3,000
Fannie Barret									2.20				200
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.45		1.50	1.45	1.50	1.45	1.45		1.50		1.45		3,500
Hortense, S.			.12										400
Lacrosse, G.	.14		.14				13		.12		13	.11	10,500
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.	3.25	3.13					3.00	2.83					650
Miner Boy					.02								100
Mono													
North Standard, G.													
N. Horn-Silv'r, S.L.													
Orl'nt'l & Miller, S.	.18		.18	.17	.17		.17		.18	.17	.17	.16	3,900
Quartz Creek	.02	.01	.02	.01	.02		.02		.02		.03	.02	12,700
Rappahannock, G.													
Red Elephant, S.			.07						.07				800
Ruby, of Arizona													
Silver Cliff, S.							.35				.35		200
Sonora Con.	.90	.87	.62	.46	.65	.45	1.00	.64	1.10	.98	1.45	1.05	69,400
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific	.05						.05		.06		.06		2,700
State Line, 1 & 2, S.	.02		.02		.02								5,600
" Nos. 2 & 3, S.	.06		.06		.05		.06		.06				5,700
Sutro Tunnel			.21	.20	.21		.21		.21	.20	.21		6,400
Taylor-Plumas	.17		.17		.15				.14	.13	.14		1,400
Unadilla, S.	.04	.03											50
Union Cons., G. S.									3.75				
Vandewater													
Washington													

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 139,384. Non-dividend shares sold, 204,710.

BOSTON MINING STOCKS.

	April 6.		April 7.		April 9.		April 10.		April 11.		April 12.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez							2.25	2.00			2.13	2.00	450
Atlantic													
Aztec													
Bodie Con.													250
Bonanza D.	2.13						2.00						12,700
Bowman Sil			.12	.10	.12		.11	.10	.12	.09	.11	.09	
Bruns. Ant.													
Bulwer													
California													72
Cal. & Hec.	240		239½		239½		240	259½	240		240	239½	
Carbon. Hill													20,475
Catalpa			.55	.50	.70	.55	.70	.65	.66	.60	.75	.65	
Central Ariz													
Cherryfield													
Co. Virginia									.50				200
Copper F'ls											1.00		100
Copperop									.06				500
Crescent			.22		.22		.24	.22½			.25		1,000
Cumberl'd					.70								200
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin			.25				.26		.25		.25		1,650
Empire							.19	.16	.17				3,400
Eureka Con.													
Franklin					11.00		11.00		10.50		11.00		615
Hancock G.													
Harshaw													
Homestake													
Huron	.75	.50	.75				.87½	.75	.62½		.50		1,155
Indian Q'n											1.31¼		100
Little Pitts													
Mammoth			.05										1,000
Mass. & N.M.					.08		.08		.09	.08	.09	.08	9,950
Milton													
Napa													
National	.75		.87½										350
Ontario					27.00								10
Osceola	27.00	26.50	27.00	26 50	27.00		26.50		26.50				296
Penn-Breck.													
Pewabic											5.00	4.00	60
Pine Tree													
Plymouth							.20						200
Quincy	49.00		48.50	48.00	47.75		48.00	47.50	47.25	47.00	47.50	46.00	454
Ridge													
Robinson													
San Pedro	.60		.60				.57½		.57½		.60	.55	1,850
S'ra Nevada													
S'ra Grande													
Silver Islet	3.00		3.00						3.00				215
Silver King											10.00		50
Simpson Gd													
So. Pacific													
Standard													
State Line, Nos. 2 & 3													
Sullivan							.87½						100
Sutro Tun							.21				.21		700
Sycamore													
Twin Lead			.10		.13	.12			.14		.15		9,500
Vizina													

PHILADELPHIA MINING STOCKS.

	April 6.		April 7.		April 9.		April 10.		April 11.		April 12.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American													
Argent	.19		.18		.18		.17		.17		.17		13,100
Arizona So.													
Aztec													
Battle Mt.							.04		.04				2,000
Black Sul.													
Bodie													
Buena	.03		.03		.03		.03		.02				12,175
California													
Calista													
Cincinnati	.10	.09	.10				.11		.09				7,900
Comprom'e.	.30		.30		.30		.30		.30		.27½		11,900
Contention			4.25										100
Dauntless													
Del Monte													
Denver City											.13		4,100
Fairview													
Eureka													
Girard	.11		.10	.09	.10		.10		.11	.10			12,300
Golconda													
Golden Age													
Governor	.08	.07	.08		.07		.08	.07	.08				15,500
Grand Uni'n	.18		.20		.22	.20	.23	.20	.25		.23		23,000
Gunnison											.57½	.50	2,300
Hancock													
Iowa Gulch	.08		.07		.07		.07		.08	.07	.07		35,900
King Bul'on													
Ledger Con					.01								3,500
Little Dia'd													
Little Maud	.05		.05										6,300
L'g & D'y Hl													
McCullough													
Magnolia													
Montana													
Mt. Lincoln					.01								1,000
Mt. Sheridan			.06		.05				.05				11,400
National			.01		.01		.01		.02				25,500
Orion	.06				.05	.04	.06	.05	.06		.05	.01	18,700
Orion Pref.													
Palmetto E.													
Pembina					.17	.16	.16		.16		.15		5,700
Penn-Breck.	.10		.11		.11		.12		.11		.12	.11	8,800
Permanent	.02		.02				.03						6,800
Pizarro													
Pizarro Ex.									.01				1,500
Potosi													
Rara Avis			.35										100
Rara Avis E.			.09	.08	.08		.09		.09		.09		9,200
Record													
Rico Pion'r													
San Pedro													
Sierra G'nde	1.90		1.90	1.87½	1.82½	1.75	1.80	1.77½	1.90		2.00	1.85	23,615
Silver Cord	1.55		1.60										2,100
Sil'r Plume													
Silver Rock													
Sovereign													
Standard													
Sultana	.04						.04		.04		.04		5,500
Sutro Tun'l							.20						500
Tombstone	.80	.77½	.77½	.75	.75		.77½		.77½		.80		7,325
Tranquilli'y													
Victor											.02	.01	21,500
Yale Mt.					.06		.06		.06		.07		2,000

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the week at prices from $20@$25. The founders can not be induced to take hold in large lots, as they expect to buy domestic irons at more favorable rates. Bessemer iron can be sold at $21@$21.50. The selling prices are one dollar above this. Buyers are holding off.

Charcoal Blooms are firm at $64@$65 for the best makes, and $60@62 for some inferior products. Anthracite Blooms have sold between the limits of $53@$57, according to quality and size of order.

The Merchant Iron market is still sluggish. The store-keepers report a fair amount of business transacted, and 2·30c seems to be the best price obtained for small lots, but 2·25c. is not exceptional. Mill-owners generally agree that the demand is not active, and that it is a difficult matter to maintain prices at remunerative limits. Refined Bar has been booked at 2·20c. and from that down to 2c. for large lots. Consumers are purchasing for immediate requirements, and consider that the outlook is favorable to still lower prices, although manufacturers say that present rates are the lowest possible. Nothing but a further decline in pig-iron will weaken Merchant Bar below 2@2·20c., and furnace-men would rather blow out than quote lower than the figures given. A number of furnaces are now idle. Skelp Iron is under fair inquiry for summer and fall delivery between 2·10@2·40c.

Sheet-Iron is active in small lots at 3¾@4½c. for light and heavy sheets, according to gauge, and large shipments of galvanized iron have just been made on old orders at 35 per cent off. Prices are weak, and for large orders there is an active competition among makers. Considerable improvement is noted in Common and Refined plate for building purposes; but prices are lower than usual. Common Plate is quoted at 2·40c.; Shell-Iron at 3¼@3·40c.; and Flange Iron, all the way from 4@4·40c.; Fire-Box, 5@5¼c. There is an active competition for business in Plate-Iron.

Structural Iron.—Bridge Iron has been inquired for in large lots, and orders have been booked at low figures. Quotations are given at 2½c. for Angles; 3@3¼c. for Tees; and 3¼@3½c. for Channels and Beams. The manufacturers have a large amount of business in sight; but the active competition for it is likely to depress selling prices a little lower than quoted now.

As to labor troubles, it is too soon to say very much. The Amalgamated Association has not yet named its committee to confer with the manufacturers' committee; but from the tone of expressions made at the meetings of the respective parties, it is thought that an amicable adjustment will be effected, though it must be on the basis of a further decline in wages.

Steel is moving in larger lots this week, because consumers have been holding off for a good many weeks for lower prices. The concessions have been made, and requirements for a month or two are filling.

Steel Rails are in active demand at $39, with concessions for larger lots, and the volume of business placed is sufficient to prevent any further competition.

Old Rails.—Movements in old rails are exceedingly dull, and a few lots have been sold at $25 for Tees. Offers are made by sellers at $28 for Double-Heads, but no buyers have come around. Negotiations are in hand for summer shipment at a dollar per ton off.

Scrap-Iron has sold in large lots at $25 for No. 2, and $26@$27 for No. 1, and business is done in cargo lots for shipment at $25.

The general tone of the market is less encouraging than some time ago; but the consumption is still large, and the only obstacle in the way of a heavy demand is as to bottom prices. With more iron making than there is an apparent demand for, the tendency is toweakness; and buyers, instead of anticipating requirements as they do on a rising market, wait for sellers to move, and hence give prices a downward tendency.

Cleveland. April 12.

We note for the past week a fair trade in pig-iron and as a rule at firm prices. Consumers are not yet agreed that the uncertainty as to the course of the market is over, and in consequence are not willing to buy far ahead. On the other side, furnaces do not wish to make contracts for future delivery at ruling figures, as they see little or no profit at present cost of manufacture. The developments of the next two or three weeks as to the labor scale on finished iron will determine the course of many managers about purchases of ore, etc. Until that cause of distrust is removed, it is not probable that any great activity either in ores or pig-iron will be seen.

We quote as before.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 13.

Anthracite.

The market is considerably duller than it has been, and while the companies, so far as known, are firmly adhering to their prices in this market, there is considerable pressure to sell on the part of individual operators, and middlemen, in their anxiety to retain trade, are cuting down their commissions, occasionally entirely giving them up to buyers, who are thus encouraged in their policy of holding off.

All the companies are stocking coal more or less, but not by any means to an extent that would make them anxious to reduce their stocks. The Eastern market is still in an unsatisfactory condition, while the Western trade will not begin for some time to come. The coal movement from Buffalo by lake is not likely to be open for several weeks, while last year lake navigation opened on the 26th of March. The stock of anthracite ready for shipment on the docks does not exceed 150,000 tons.

Bituminous.

According to all indications, matters in the bituminous coal trade are rapidly approaching a crisis, and the happenings of the next week or two will probably decide whether or not the hopes of consumers that concessions will be possible are well founded. The hesitation shown in delaying the award of a number of some of the largest contracts for which bids were opened during the past two weeks is attributed to efforts made by the parties using the coal to engineer a break in the railroad rates. The statements which are brought forward to convince each one of the two vast roads which has entered into the agreement, that the other has not adhered to its provisions, are calcuted to put a severe strain upon the compact. On the one hand, Cumberland coal appears to have been sold at low figures in the Eastern market, a fact which, it is urged, can not be entirely explained away by pointing to the lower rates at which this coal can be put down at Georgetown via canal. On the other hand, large contracts have been made by Clearfield operators, one of 15,000 tons within the last ten days, at a figure alongside in this harbor, which would leave a direct loss of 20 cents per ton, estimating the cost of delivering the coal into cars at the mine at 75 cents.

These are some of the considerations that enter into this knotty problem. Its solution, whether by violent or other means, is, we believe, near at hand. Should it lead to a break, the bituminous operators will be afforded an opportunity to largely widen their market, particularly in the East.

During the week, a number of smaller contracts have been closed. Current business, however, is slack and prices are low. We quote nominally, $4.35@$4.50for Clearfield, and $4.40@$4.60 for Cumberland, according to quality.

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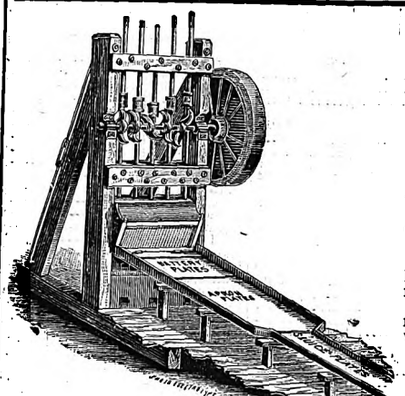
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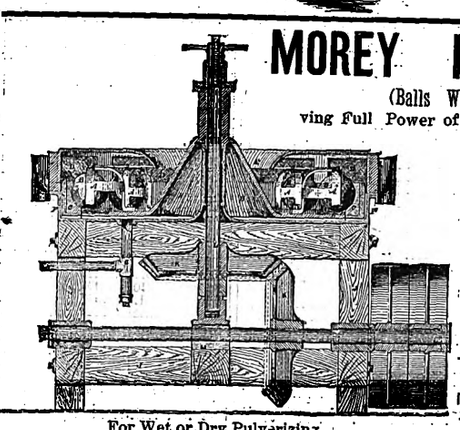
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AN important piece of news, as affecting the future of the Tombstone District, comes to us from a reliable source, a body of low-grade ore, 22 feet wide, having been found on the 600-foot level of the Contention mine. We are informed that it follows a stratum of limestone, and is regarded as assuring the continuation of the ore in depth.

AMONG the papers read at the Washington meeting of the National Academy of Sciences was one by Professor LE CONTE on the genesis of metalliferous veins ; one by Prof. GEORGE F. BARKER, on the efficiency of storage batteries ; one by Dr. T. STERRY HUNT, on the decay of rocks, geologically considered ; and one by Mr. W. FERRELL on a tide-predicting machine, which is very highly spoken of.

HAVE the engineers who propose to build the great Quaker Bridge dam 230 feet high from bed-rock considered the relative cost and safety of masonry and concrete or *béton* ? Experiments that we made some years ago upon the impermeability of *béton* to water under pressures up to 150 pounds per square inch were highly satisfactory, and convinced us that monolithic dams of *béton* could be made both safer and cheaper than those of masonry.

THE investigating committee of the San Francisco Stock Exchange, from which we quote elsewhere, takes a comparatively cheerful view of matters on the Comstock lode, while deploring the secrecy with which the results of exploration-work, notably that conducted with the diamond drill, are guarded. So long as the too well-known present *régime* holds sway, the general public, cautioned by painful experience, will keep aloof.

IN our issue of the 24th of March, we printed a letter by a correspondent in Boulder County, Colo., on the telluride ores of that section, which, while reliable as to the character of the deposits, contained erroneous statements as to the losses in assaying of this class of ores, and the returns made by smelters to the miners. We are convinced from the statements submitted to us that the grievance of our correspondent and of those who may share his opinions are imaginary, and have little if any foundation in fact.

WE published last week a sharp letter from Mr. SHRIVER, of the Pearl Street Metal Exchange, replying to the recent criticisms of the *Iron Age* upon the proposed union of the two exchanges. The views expressed by the *Iron Age*, and also, a year ago, by this journal, are based on the impression that a speculative exchange in iron and metals, like those which exist in stocks and produce, is not needed or wished by the trade. Last year, we opposed this sort of a metal exchange, and favored as an experiment the more conservative and social one inaugurated in Wall street. It was a foregone conclusion that two could not thrive, so long as the question was still in doubt whether any was needed. The *Iron Age* now restates the old argument, reinforcing it with conclusions drawn from the experience of the past year. We, on the other hand, do not care to discourage further an honest experiment, which may, if it be prosecuted without dissensions and with discretion, have a better chance of success than the divided and semi-hostile enterprises of last year. If it succeeds and benefits the metal trades, we shall be glad of it—and we have no doubt the same can be said for every other organ of any of the trades concerned.

THE NEW YORK WATER SUPPLY.

Our esteemed and usually well-informed contemporary, the *Sanitary Engineer*, in referring to our remarks on the above subject, in the ENGINEERING AND MINING JOURNAL for March 17th, makes some statements which betray a lack of practical knowledge of the subject as well as a lack of candor in its criticism. The ENGINEERING AND MINING JOURNAL has no pet scheme to advocate, and no job in iron or any thing else, as our contemporary insinuates. We expressed surprise that the Aqueduct Commission had not, in the report we had seen, referred to such other methods of carrying water as siphon-pipes, and to other sources of supply than the Croton water-shed. We have since been favored with copies of the engineers' reports, in which we note that it is proposed to use siphons to cross Harlem River and other depressions.

We fully concur with Mr. NEWTON, the Engineer of the Croton Board, that a tunnel, where practicable, is better and safer than an elevated aqueduct, and where the water has to be carried with so slight a fall as is proposed (less than one foot per mile), a large section tunnel aqueduct is necessary ; but we are surprised that other sources of supply, offering advantages in economy, which have been proposed, are not even mentioned by the Aqueduct Commission.

We have no personal knowledge of the correctness of the figures given by either Mr. NEWTON and others concerning the Croton water-shed or of those given by Mr. WILLIAM J. MCALPINE, General VIELE, and others concerning the Ramapo water-shed ; but these gentlemen assert that a supply of some 200 or 250 million gallons a day of most excellent water can be secured in that district at an available elevation of about 480 feet above tide, or say 300 feet above the Central Park Reservoir, into which the new aqueduct is to discharge. The *Sanitary Engineer* ignores the effect of head in securing a larger discharge through comparatively small and inexpensive pipes ; and assuming a length and head to suit and a maximum diameter of three feet, it declares that it would require thirty-two such pipes to discharge the same amount as the 12-foot aqueduct under the conditions proposed by Mr. NEWTON. On this fictitious basis, it raises a nightmare of 200,000 tons of iron and an enormous cost. This method of making estimates is ingenious, but can scarcely aspire to the title of engineering, or even "popular science." Without having verified his figures, we quote Mr. MCALPINE, the engineer who reported on the Ramapo plan, who states that, with an aggregate fall of 132 feet in 31 miles, a pipe, varying in size from 7 feet to 5 feet 3 inches, according to the inclination, will deliver from 65 to 70 million gallons a day ; and he proposes using several such pipes.

We do not know where the *Sanitary Engineer* has found that three feet is the possible limit in size of wrought-iron or steel pipes ; but even if our contemporary has never heard of a larger size being made, why should it

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consider this impossible when it accepts so readily as safe the much more difficult engineering work, a masonry dam 230 feet high from bed-rock, a hight much greater than has yet been built, or than a number of well-known examples, such as the Habra (Algiers), 112 feet; De Tibi (Spain), 146 feet; Puentes (Spain), 152 feet; Del Gasco (Spain), 188 feet, which gave way with a much less pressure than that proposed at Quaker Bridge?

The ENGINEERING AND MINING JOURNAL'S "neat aphorism," that no common masonry can be counted on to prevent filtration under a pressure of 100 pounds per square inch, and no dam that leaks can be considered perfectly safe, is *practical science*, not "popular science," and is "good engineering." Our contemporary's preference for a dam that leaks is certainly not shared by engineers who have had any practical experience in these matters; but when it is stated that "it is not true that a dam which leaks is unsafe, *provided* that the water passing through does not carry with it the material composing the dam," the *proviso* will probably be found to cover every case of common masonry under a pressure of 100 pounds to the square inch.

Our suggestion of using siphon-pipes was connected with the advantages of utilizing a high head; and assuming the statements made by the engineers who have examined it, that the Ramapo shed affords a sufficient supply, and that the distances are correct, we maintain that the cost of bringing the water through iron or steel pipes would be *far less expensive*, and no more subject to serious accident than the aqueduct plan.

We have no interest in any "private enterprise," and we believe the city should own its own water-works, and that they should have an abundant capacity; but we do not think it is to the interest of the city to rush through an enterprise which, unless all past experience is reversed, will become a gigantic job, without even considering other and far less costly and more quickly executed plans, which have been proposed upon respectable engineering evidence, and which involve far less risk than is involved in the building of a masonry dam 23 feet high—though we do not consider that impossible.

SEWAGE AND SEWERAGE.

The report of Mr. JAMES T. GARDINER to the N. Y. State Board of Health on the methods of sewerage for cities and large villages is a most valuable and interesting document. Mr. GARDINER begins with an unqualified condemnation of the system of privy-vaults and cess-pools; pronounces "dry removal" by means of earth-closets or pails to be much better, but open to serious objections, as requiring constant vigilance and intelligence on the part of householders; declares the ordinary method of combined sewerage, in which both the sewage proper and the much larger volume of storm-water are conveyed together in subterranean sewers to be, from the sanitary stand-point, a failure; and finally praises, as the best plan yet devised, the separate sewerage, by which *excreta*, slops, and waste-water are removed through mains, while storm-water is either provided with separate conduits of large dimensions, or led off on the surface to natural channels of outflow. The most perfect example of this system is found in the sewerage of the city of Memphis, designed by Col. GEORGE E. WARING, the eminent sanitary engineer, and operated since 1880 with complete success. Mr. GARDINER quotes at length from a report of Mr. C. H. LATROBE, who examined the Memphis system for the city of Baltimore.

The most striking points of Mr. GARDINER'S paper are these:

1. There is probably no such thing as a poisonous "sewer-gas," to which the diseases caused by the admission of sewer-air into dwellings may be ascribed. No proof exists that ammonia, sulphureted hydrogen, or any other gaseous products of organic decomposition, do or can cause zymotic diseases. On the contrary, there is much evidence going to show that these diseases are produced according to the so-called "germ-theory," by *bacteria*, the germs of which are developed in the sewer-air under the favoring conditions of heat, moisture, darkness, and the presence of ammonia, and growing thus on the damp walls of sewers, may float off and be borne like dust on the atmospheric currents.

The reader's first impression may be, that this is a distinction of little practical importance. What difference does it make to the victim of bad plumbing, to be told that he is poisoned, not by the gas from the sewer, but by germs in the gas from the sewer? The practical difference to the moribund victim may indeed be nothing; but it is highly important to prudent people not yet about to die, and to sanitary engineers. For it follows, first, that the odor of sewer-gas, though a useful warning of its presence, is not a measure of its poisonous character. A slight odor, given by air from a large and ventilated sewer, may accompany the maximum proportion of *bacteria*. Again, since damp exposed sewer-walls favor the multiplication of these low organisms, it is evident that large brick sewers, which run full in a heavy rain, and half full or nearly empty at other times, are the worst that can be used for this purpose, and not the best, as many engineers have supposed, and as indeed would be the case, if the dilution of the sewer-gas with air were an efficient means of rendering it harmless.

2. The large sewers have been adopted for this reason partly, and partly because they were required to convey sudden accumulations of storm-water, and it was thought a good thing to combine the two things, and secure a periodical natural flushing of the sewers. But it now appears that the best possible conduit for *excreta*, grease, and waste-water would be one exposing a minimum interior surface, and also permitting, by its small size, the use of enamel on that surface. This smooth material is easily kept clean, and the conditions for the growth of *bacteria* along the walls are greatly diminished or destroyed.

3. But such small sewer-mains would be totally inadequate to carry the storm-water, which is, during violent rains, nearly fifty times the ordinary sewage. Hence the necessity of a separate disposal of the storm-water. For the great majority of towns, no sewers would be needed for this purpose. The clean storm-water could be left to flow away to natural channels, as it does in the open country. In such cases, the cost of the small sewer-system would be from one fifth to one third only of that involved in the combined system. The estimates for the latter type in Memphis, ranged from $800,000 to $2,225,000; the actual cost of the separate system was $137,000. For towns which require short storm-water sewers to lead the rain-fall to natural channels, the expense would still be generally less than that of the extended and comprehensive combined sewerage. Finally, there are, no doubt, a few large cities, where complete underground systems of storm-water drainage are required. In these cases, the expense of a completed double system will be about one quarter greater than that of the combined system; but the sanitary gain will be worth its cost.

This subject is one of great and growing importance to all cities, and particularly to those which are beginning to organize water-supply and drainage. They will find great economy in beginning right; and the light which modern sanitary science has thrown on the subject comes none too early for them.

The articles on the sanitary condition of New York, contributed by Colonel WARING, some months ago, to the *Century* magazine, should not be overlooked in this connection. Together with Mr. GARDINER'S paper, they contain more "solid sense" on the subject of sewerage than many bulky volumes.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Basic Brick.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you have the kindness to inform us whether basic brick, so frequently spoken of in your columns, can be had in this country, and where?

W. G.

SOUTH STRAFFORD, VT., April 16.

So far as we have been able to learn, no basic brick have as yet been manufactured in this country. We presume that in many cases, probably also in that of our correspondent, it would be best to use the mixture of highly calcined dolomitic limestone and tar, which is now quite generally employed in European basic Bessemer works.—ED. E. AND M. J.

The Transmission of Sound through Rock.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to a notice in the ENGINEERING AND MINING JOURNAL for March 17th, 1883, I beg leave to quote the official report on the geological survey of the St. Gothard Tunnel by Dr. F. M. Stapf. (*Geologische Tabellen und Durchschnitte über den Gothard Tunnel; Special-Beilage zu den Berichten des schweizerischen Bundesrathes über den Gang der Gotharduntern ehmung.* Bern, 1874–1882), where you will find the following on page 197 (North Side):

"On the 28th of February, 1880, at a quarter of seven A.M., the Airolo sounding-drill unexpectedly pierced the wall of from 2·6 to 2·8 meters thickness, which still separated the two headings. Carpenters in the northern adit believed that they heard the blasts from the southern adit, in the night of the 24th to 25th of December. At that time, the thickness of the intermediate rock was 415 meters (1361 feet). Another similar observation in the night of the 27th to 28th of December proved erroneous; but there was no doubt about the observation made on the Göschenen side, on the 29th of December, early in the morning, exactly at the time when the Airolo blasts were discharged. The thickness of the intermediate rock was 394 meters (1292 feet). Afterward, the blasts from the opposite headings were frequently heard; not as detonations, but as cracking in the rock and shaking shortly before they met. To the strength of the dynamite in use must be attributed the fact that the waves of sound are transmitted so far; and it is remarkable that they did so even through the fissured, rotten, decomposed but highly compressed rock near the center of the tunnel line. Forty meters (131 feet) in the rear of that ground, I heard, at 7439 meters (24,400 feet) from the northern entrance, on the 27th of January, the cracking from the Airolo blasts. At that time, the northern heading was in 7616 meters (24,980 feet), or 210 meters 689 feet) distant from the southern.

"A direct measurement of the velocity of transmission of sound through the rock was not possible without chronographs and a direct telegraph wire from one heading to the other. But it may be mentioned that

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in hard solid rock, as, for instance, the granite gneiss of Göschenen, at a distance of some hundred meters from the blasts, the cracking (sound transmitted through the rock) is heard a moment before the detonation (sound transmitted through the air). In loose and not compressed rock, no cracking is perceived, and the detonation of the blasts sounds dull and hollow. On several occasions, I have tried to make out (by the help of a sound-watch) how much the cracking outruns the detonation; and as a fair mean, I have estimated the difference to be one third of a second per 200 meters (656 feet) distance. The velocity of sound through damp air of 30 degrees C. (86 degrees Fahr.) may be rated at 350 meters (1148 feet) per second, or 0·57 second per 200 meters (656 feet; consequently, the velocity of transmission of sound through 200 meters (656 feet) rock is 0·57 — 0·33 = 0·24 seconds, or 833 meters (2732 feet) per second.

"A feeble shock of the earth, which was felt on the 4th of July, 1880, through a great portion of Switzerland, at nine o'clock 21½ minutes A.M., in Airolo, and before the entrance of the tunnel, was not noticed at all in its interior."

F. M. STAPF.

WEISSENSEE, BERLIN, March 31, 1883.

Bessemerizing Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: May I again trespass briefly on your space, to clear up a matter which Mr. Paul Johnsson's letter in your issue of April 7th tends to obscure? He truly says that to oxidize a product in an open-hearth furnace through inclining tuyeres is not new; but neither is it Bessemerizing. Bessemerizing is oxidizing by a blast of air *so rapidly* as to generate a great quantity of available heat, materially lowering the fuel requirement, or increasing the temperature. This is but a few years old, and was, I believe, first described in print by Mr. Hollway as applied to rotating Bessemer converters, and first by myself as applied to reverberatories.

He considers an essential condition to be a gas-furnace using inclined removable water-tuyeres. A gas-furnace with inclined removable tuyeres was designed by Mr. W. E. C. Eustis and myself years ago, and was nearly completed. Water-tuyeres were considered by us; but we preferred, and still prefer, protecting the tuyeres otherwise. This combination, our prior invention, I do not consider essential, though probably generally desirable. It appears to me quite as strange as before, that, under the peculiar circumstances, Mr. Johnsson either did not know that our invention long antedated his, or that, knowing it, he described it as his own, without referring to our having antedated him.

The four points of construction claimed by Mr. Johnsson, which I stated in my letter of March 17th to have been already employed by the Orford Company, I still consider identical in principle with those employed by that company, with trivial difference in detail. It has used a reverberatory with a complete double roof, and years ago I smelted copper ores and matte in a reverberatory with doors opposite each other on the two sides of a furnace, which had in addition a door at the end as usual.

HENRY M. HOWE.

BOSTON, April 18, 1883.

OFFICIAL STATEMENTS AND REPORTS.

THE STANDARD CONSOLIDATED MINING COMPANY, BODIE, CAL.

The report of the Standard, the leading mine of Bodie, has just reached us, carrying the account of the affairs of the company to February 1st, 1883. The receipts for bullion were $1,175,728.01. The Bodie assays yielded $1,070,611.31 of gold, and $126,677.59 of silver; but the refining value was only $1,181,981.08, $1,072,482.49 of gold and $109,498.59 of silver—a difference of $15,327.82, to which must be added $6253.07 refinery charges, leaving the net amount as above, against $2,049,521.53 for the last fiscal year. On the credit side of the balance-sheet there are, besides $3494.25 unpaid dividends, $18,844.13 drafts, being the entire indebtedness of the company, $302,039.56 balance, profit and loss, and some minor items. The dividends paid during the year amounted to $675,000, against $975,000 during the preceding year. On the 1st of February, 1883, the dividend payments were on 130 shares only in San Francisco, while they were on 99,870 shares in New York.

According to the statement of the superintendent, Mr. William Irwin, the cost of mining 62,514 tons of ore was $282,539.17, or $4.51 per ton. In this, the cost of labor seems again only to include the cost of labor in stoping, $170,092 only; and $31,868 spent for wages in drifts, cross-cuts, and uprises is entirely left out of the calculation. This is unusual, and is misleading, the cost of dead-work being generally included in estimates of cost of mining. Among other items properly chargeable are $2444 for labor in connection with pumping, and $3206.36 in the new shaft. Fuel cost $24,058.75, including 2107 cords of wood at $11, and 3053 bushels of charcoal at 25 cents. The lumber and timber used was worth $22,806.53, while freight on supplies was $1480.22. Supplies were consumed apparently to the extent of $61,001.67, while, during the preceding year, there had been an apparent excess of $9126.06. Among the supplies purchased at Bodie for the mine we note $11,398.02 for powder, caps, and fuse, and $2010.40 for oil.

The Bulwer-Standard mill, one half of which is owned by the Standard Company, and for the use of the other half of which the company pays a very round sum, treated the bulk of the ore, 41,385 gross tons, or, allowing for 10 per cent moisture, 37,246 tons, at a reported average cost per ton of $3.40, according to Mr. Irwin's figuring. He takes only the amount of labor absolutely required for the crushing in the mill, dropping such an item as $2317.25 for improvements, repairs, etc., and not including $10,497.25 for transporting the ore—an item which the management of the Bulwer-Standard mill must, it seems, pay, and which makes the discrepancy less striking between the cost and the rate paid by the Standard mine to the mill, $11 in February last, $8 in the six months following, and $6 in the four months ended January 31st, 1882. The expenditure for fuel in the mill was $36,839 for 3349 cords of wood and $246.75 for 987 bushels of charcoal. Exactly what the quantities of different supplies required by the mill were can not be traced from the statements submitted. Among the heavier items of purchases at Bodie we note $2001.40 for 95,756 pounds of salt, at 1½, 2, and 2·3 cents per pound; 229,257 pounds of soda, at 1¼ cents per pound, or $4012.01; $2381.02 for oils; and $8964.58 for pan-shoes, dies, mullers, etc. At San Francisco, there were bought for the same mill 215 flasks of quicksilver, at a price ranging between 35½ and 37½ cents, a total of $6051.15; steel wire battery cloth, $1010.44; belting, $948.40; and pan-shoes and dies, from Pittsburg, Pa., $1588.70.

In a similar way, the cost of treating 20,929 gross tons of ore at the Standard mill is given as $96,636.31, or $4.61 per gross ton. The average assay of the ore worked in the Bulwer-Standard mill was $20.306 of gold and $3.284 of silver, the yield being $19.303 of gold and $2.297 of silver. The Standard mill ore ran $19.696 in gold and $3.204 in silver, and yielded $18.666 of gold and $2.184 of silver per ton on an average.

STATISTICS OF THE AMERICAN IRON TRADE IN 1882.

We are indebted to Mr. James M. Swank, Secretary of the American Iron and Steel Association, for advance-sheets of his annual report, which, we are pleased to note, he has been able to bring out nearly a month earlier this year, in spite of the arduous additional work which the tariff agitation of the past year must have heaped upon his shoulders.

Some of the data contained in the present report Mr. Swank has anticipated in bulletins, the main figures of which, relating to rails and pig-iron respectively, we printed in our issues of February 24th and March 24th. We quote from the report as follows:

Since the beginning of the present year, the condition of our iron and steel industries has not improved. January and February were dull months, a specially depressing influence being the uncertainty of tariff legislation at Washington. Consumption is now, however, more active since the adjournment of Congress and the opening of spring than during the winter months; but prices are very low, competition is sharp, and the market for most products is in favor of buyers rather than sellers. Some leading influences which unfavorably affected our iron and steel industries in 1882 still remain, particularly the interruption to new railroad projects and the tendency to overproduction in certain leading branches, to which must now be added the late reduction of duties, which goes into effect on the 1st of July. It seems to be absolutely certain that prices must for some time to come rule extremely low. This condition of affairs in the great industries under consideration may have its advantages in stimulating consumption at a time when the country is blessed with an abundance of good money, and in checking the erection of new rolling-mills, blast-furnaces, and steel-works which experience has shown are not needed; but it is greatly to be regretted that it brings also low wages, with no compensating benefits to those who receive them. It is not true, as a certain class of political economists persistently teach, that, when wages are reduced, other things are correspondingly reduced in price; but, even if this were so, low wages and low prices always suggest hard times. We do not, therefore, regard it as a propitious sign that prices of iron and steel are now so low as they are. Good prices and good wages were far better. But the fact can not be altered that low prices for iron and steel now prevail, and we can only hope that wages will be adjusted upon a scale that will be mutually satisfactory to manufacturers and their workmen.

Prices of Iron and Steel in 1882 *and* 1883.—The following table will show the range of prices for all leading iron and steel products in 1882 and in the first quarter of 1883. Monthly quotations are given, averaged from weekly quotations. The prices quoted are for a ton of 2240 pounds, except for bar iron and nails, which are quoted by the pound and the keg respectively. Where the asterisk occurs, there were no quotations to give, because no sales were reported:

MONTHS	Old T rails at Philadelphia.	New iron rails, at mills in Pennsylvania.	Steel rails, at mills in Pennsylvania.	Foreign Bessemer pig-iron, at Philadelphia.	No. 1 anthracite foundry pig-iron, at Philadelphia.	Gray forge pig-iron, at Philadelphia.	Common bar iron, at Pittsburg. Per pound.	Nails (gross price), at Pittsburg. Per keg.	Gray forge pig-iron, all lake ore, at Pittsburg.	Gray forge pig-iron, lake ore mixed, at Pittsburg.
January, 1882.....	$30.00	$48.50	$58.00	$27.50	$26.00	$24.00	2·5c.	$3.35	$28.00	$25.00
February.....	30.50	48.50	55.00	25.75	26.00	24.00	2·5c.	3.40	27.50	26.00
March.....	29.25	47.50	54.00	23.75	25.75	23.75	2·5c.	3.40	27.50	25.50
April.....	28.50	47.00	52.75	24.50	25.50	23.50	2·45c.	3 30	26.50	25.00
May	26.75	44.75	48.75	23.50	25.50	22.75	2·35c.	3.15	26.50	24.00
June	26.25	44.75	48.25	24.00	25.50	22.00	2·5c.	3.50	*	*
July.....	26.50	45.00	48.00	24.75	25.50	22.50	2·5c.	3.55	*	24.00
August.....	26.50	45.00	47.00	24.50	25.50	21.50	2·5c.	3.60	*	24.00
September.....	27.00	*	45.00	24.25	26.00	22.00	2·5c.	3.40	*	23.00
October	27.50	*	44.25	23.75	26.25	22.25	2·5c.	3.40	*	22.50
November.....	27.25	*	42.00	23.25	26.00	21.75	2·2c	3.40	24.00	21.75
December.....	27.00	*	39.00	22.25	25.75	21.25	2·2c.	3.40	23.00	21.50
January, 1883 ...	26.50	*	40.00	22.25	25.00	21.00	2·2c.	3.40	23.00	21.00
February	26.00	*	39.50	22.25	24.50	20.50	2·c.	3.40	22.50	20.50
March.....	25.00	*	39.00	*	24.00	20.00	2·c.	3.40	21.00	20.00

This table shows a material decline in all prices, except for nails, which have not been produced in excess of the demand.

The Production of Iron and Steel in 1831 *and* 1882.—The production of iron and steel in the United States in 1882 is given in the following table, in comparison with that of 1881:

PRODUCTS.	Net tons. 1881.	1882.
Pig-iron.....	4,641,564	5,178,122
All rolled iron, including nails and excluding rails.....	2,155,346	2,265,957
Bessemer steel rails.....	1,330,302	1,438,155
Open-hearth steel rails.....	25,217	22,765
Iron rails.....	488,581	227,874
Kegs of cut nails and spikes, included in all rolled iron	5,794,206	6,147,097
Crucible steel ingots.....	80,762	85,089
Open-hearth steel ingots.....	146,946	160,542
Bessemer steel ingots.....	1,539,157	1,696,450
Blooms from ore and pig-iron	84,606	91,293

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There was a large decrease in the production of iron rails in 1882 over that of 1881, and a small decrease in the production of open-hearth steel rails and crucible steel ingots; but in all the other articles enumerated, there was an increase in 1882 over 1881. With the single exception of pig-iron, however, this increase was in no instance large, and even in pig-iron it was only 11 per cent.

Imports of Iron and Steel.—The foreign value of the imports into the United States from all countries of iron and steel and manufactures thereof, including tin plates, has been as follows in the twelve years from 1871 to 1882. An increase in 1882 over 1881 will be noted in contrast with the marked decline in 1881 over 1880:

Years.	Values.	Years.	Values.
1871	$57,866,299	1877	$19,874,399
1872	75,617,677	1878	18,013,010
1873	60,005,538	1879	33,331,569
1874	37,652,192	1880	80,443,362
1875	27,363,101	1881	61,555,077
1876	20,016,603	1882	67,075,125

In the following table, we give the quantities of all the *leading* iron and steel products imported into the United States from all countries in the twelve years from 1871 to 1882, except steel in all forms other than rails, for which statistics of values only are obtainable, and which are included in the table given above.

The following table shows, in net tons, the details of our imports in the last five years:

Commodities Imported.	Net tons of 2000 pounds.				
	1878.	1879.	1880.	1881.	1882.
Pig-iron	74,484	340,672	784,968	520,835	604,978
Castings	69	61	114	632	2,079
Bar-iron	33,346	48,840	126,987	47,820	79,220
Boiler-iron	1	91	168	290	175
Band, hoop, and scroll-iron	7	1,031	25,322	827	6,021
Railroad bars of iron	....	19,090	132,459	137,013	41,992
Railroad bars of steel	10	25,057	158,230	249,308	182,135
Sheet-iron	838	5,459	11,412	8,121	12,985
Old and scrap-iron	6,225	248,429	694,273	151,107	164,591
Anchors, cables, chains, etc.	646	892	1,393	1,520	1,530
Tin plates	120,808	172,760	177,015	204,966	239,665
Total	236,434	862,352	2,112,341	1,322,439	1,335,371

The figures given in this table show a nominal increase in the tonnage of 1882 over that of 1881; but if the quantities as well as the values of all kinds of steel could be obtained, it would doubtless appear that the total tonnage of 1882 was greatly in excess of that of 1881. This will appear the more probable if we reflect that foreign values were lower in 1882 than in 1881. We know definitely that the importation of steel wire rods was much larger in 1882 than in 1881, aggregating in the former year probably 100,000 tons, the duty (30 per cent) being so low that our own steel wire rod mills were practically idle.

An increase in 1882 over 1881 is observable in all the articles named except boiler-iron and iron and steel rails. The decrease in rails was large—due mainly to the fact that our rail-producing capacity was more than equal in 1882 to the demand, whereas in the three preceding years it had been unequal to it.

Imports of Iron Ore.—The following statement shows the quantities and values of iron ore imported into the United States during the calendar years 1880, 1881, and 1882, by custom districts:

Districts.	1880.		1881.		1882.	
	Gross tons.	Values.	Gross tons.	Values.	Gross tons.	Values.
Baltimore	170,308	$506,560	375,798	$1,005,496	243,182	$654,629
Boston	2,155	13,359	716	2,867	1,664	3,322
Buffalo Creek	13,554	36,426	2,492	7,320	273	755
Champlain	.....	.....	.....	.....	2	7
Cuyahoga	13,858	48,463	10,500	37,675	9,420	33,181
Detroit	456	1,169	617	1,646	48	98
Genesee	5,390	16,274	8,716	25,961	6,851	21,651
Huron	72	258	264	770	264	677
Newark, N. J.	269	798	.....	.....	.....	.....
New York	148,987	432,678	196,419	641,344	145,909	421,776
Oswegatchie	7,553	21,052	3,418	10,650	905	2,783
Oswego	4,185	7,860	13,612	44,026	37,635	120,008
Perth Amboy, N. J.	5,444	15,968	13,671	48,323	31,558	101,859
Philadelphia	120,619	335,119	155,564	394,952	111,944	279,818
Puget's Sound	400	412	1,100	1,622	.....	.....
Cape Vincent	158	413	.....	.....	.....	.....
Total	493,408	$1,436,809	782,887	$2,222,652	589,655	$1,640,564

Previous to 1879, the importations of iron ore into this country did not exceed 100,000 tons annually. In that year, they amounted to 284,141 tons, valued at $681,467. In 1880, there was a large increase, and in 1881 a still larger increase, but in 1882 there was a decrease of nearly 200,000 tons. We anticipate in 1883 a continued decrease, owing partly to an increase in the duty after July 1st from 20 per cent to 75 cents a ton, and partly to the lowering of the prices for domestic ores and to the opening of new sources of domestic supply. It will doubtless happen, however, that we shall hereafter annually import from Spain and other countries a considerable quantity of foreign ore, for use in connection with our Bessemer steel-works, not specially because of its cheapness, but because of its richness and purity, in these respects surpassing the product of many American mines. A peculiarity of the trade in foreign ores is, that it would not probably have attained its recent proportions if it had not been profitable for European vessels which come to this country for grain to bring with them cargoes of iron ore in default of other freight.

A company of capitalists in this country has recently acquired possession of extensive deposits of iron ore of great richness and purity in the province of Santiago, in the southeastern part of Cuba, within four miles of the coast, and fifteen miles distant from the port of Santiago, where there is a good harbor. The company is known as the Juragua Iron Company, Limited, and its chairman is Dr. G. B. Linderman, of the Bethlehem Iron Company. Its acquisitions embrace several low mountains of slightly polarized hematite iron ore, which will average about 66 per cent of metallic iron and about ·025 of phosphorus. The ore is exposed in every direction, and can be mined, or rather moved, at slight cost. A railroad will be built from the mountains to the nearest point on the coast, or possibly to Santiago, and docks for the accommodation of vessels will also be constructed. The development of this important enterprise has already been actively commenced; but shipments of ore will probably not take place during the present year. The company will invest about a million dollars.

Domestic Exports of Iron and Steel.—The value of the exports from the United States to all countries of domestic iron and steel manufactures thereof in the twelve years from 1871 to 1882 was as follows:

Years.	Values.	Years.	Values.	Years.	Values.
1871	$11,836,137	1875	$16,092,906	1879	$12,470,448
1872	10,030,125	1876	11,798,459	1880	12,960,995
1873	12,129,939	1877	16,659,675	1881	15,782,202
1874	15,389,807	1878	13,200,369	1882	19,029,759

Bessemer Steel.—The production of Bessemer steel ingots in the United States in 1882 was 1,696,460 net tons, or 1,514,687 gross tons, an increase over 1881 of 157,293 net tons, or 140,440 gross tons. The increased production in 1881 over 1880 was 335,984 net tons, or 299,985 gross tons. A decided check to the progress of this great branch of our steel industry is discoverable in the figures of 1882. The production of Bessemer steel ingots in this country in the eleven years from 1872 to 1882 has been as follows, in net tons:

Years.	Net tons.	Years.	Net tons.
1872	120,108	1878	732,226
1873	170,652	1879	968,972
1874	191,933	1880	1,203,173
1875	375,517	1881	1,539,157
1876	525,996	1882	1,696,450
1877	560,587		

The works of the Colorado Coal and Iron Company, located at South Pueblo, Colorado, made their first blow on April 11th, 1882. The new works at Chicago, owned by the North Chicago Rolling-Mill Company, were first put in operation on June 14th, 1882; they are located at some distance from the company's old works, and hence virtually form a separate establishment, although not classified as such. New Bessemer steel-works at Scranton, Pennsylvania, are expected to go into operation this year; they made a trial heat on the 29th of March. A comprehensive exhibit of the fifteen Bessemer steel-works of the country which were completed on the 1st of April last is as follows:

Names of Companies.	Converters.
Albany & Rensselaer Iron and Steel Company, Troy, New York	two 7-ton
Bethlehem Iron Company, Bethlehem, Pennsylvania	four 7-ton
Pennsylvania Steel Company, Steelton, Pennsylvania	two 7-ton, three 8-ton
Lackawanna Iron and Coal Company, Scranton, Pennsylvania	two 5-ton
Scranton Steel Company, Scranton, Pennsylvania	two 4-ton
Cambria Iron Company, Johnstown, Pennsylvania	two 6½-ton
Carnegie Brothers & Co., Limited, Bessemer, Pennsylvania	three 10-ton
Pittsburg Bessemer Steel Company, Limited, Homestead, Pennsylvania	two 4-ton
Pittsburg Steel Casting Company, Pittsburg, Pennsylvania	one 5-ton
Cleveland Rolling-Mill Company, Cleveland, Ohio	two 10-ton
North Chicago Rolling-Mill Company, Chicago, Illinois (2 plants)	two 6-ton, three 10-ton
Union Iron and Steel Company, Chicago, Illinois	two 6-ton
Joliet Steel Company, Joliet, Illinois	two 5-ton
St. Louis Ore and Steel Company, St. Louis, Missouri	two 7-ton
Colorado Coal and Iron Company, South Pueblo, Colorado	two 5-ton
Total number of converters	38

The following table shows the production of Bessemer steel rails in the United States and Great Britain in the last three years:

Countries.	1880. Gross tons.	1881. Gross tons.	1882. Gross tons.
United States	852,196	1,187,770	1,284,067
Great Britain	739,910	1,023,740	1,235,785
Excess of United States	112,286	164,030	48,282

The following table shows the production of Bessemer steel ingots in the United States and Great Britain in the last three years:

Countries.	1880. Gross tons.	1881. Gross tons.	1882. Gross tons.
Great Britain	1,044,382	1,441,719	1,673,649
United States	1,074,262	1,374,247	1,514,687
Excess of United States	29,880	.....	.....
Excess of Great Britain	.....	67,472	158,962

Crucible Steel.—The production of crucible steel ingots in the United States in 1882 was 85,089 net tons, a decrease of 4673 tons upon the production of 89,762 tons in 1881. Here, again, we discover a check in 1882 to the progress of our steel industry. Seven States made crucible steel in 1882, namely, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Ohio, and Illinois.

The following table gives the production of crucible steel ingots in various sections of the country from 1874 to 1882, in net tons:

States.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
New England	1,509	1,620	1,098	1,974	1,602	1,608	660	2,780	1,000
New York	2,696	2,300	2,300	2,032	2,800	2,300	3,500	4,961	4,693
New Jersey	8,164	7,098	6,806	6,749	7,377	8,651	10,387	14,500	12,400
Pennsylvania	23,289	26,615	28,217	27,983	30,585	43,614	57,077	66,290	65,139
Western States	570	1,500	700	1,400	480	605	800	1,231	1,857
Southern States	100	268	261	292	62	2	.....	.....	.....
Total	36,328	39,401	39,382	40,430	42,906	56,780	72,424	89,762	85,089

Open-Hearth Steel.—The production of open-hearth steel ingots in the United States in 1882 was 160,542 net tons, an increase of 13,596 tons upon the production of 146,946 tons in 1881. This was a much less proportionate increase than had taken place in any year since we first began to make open-hearth steel. The product of 1882 was made in eight States,

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namely, New Hampshire, Vermont, Massachusetts, New Jersey, Pennsylvania, Ohio, Tennessee, and Illinois.

The following table gives the production of open-hearth steel ingots in the United States by districts from 1874 to 1882, in net tons:

STATES.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
New England...	5,300	3,010	6,085	6,652	8,228	14,660	20,560	24,600	25,536
New Jersey and Pennsylvania.	1,700	4,240	7,547	7,771	12,231	19,575	50,736	68,363	73,222
Western and Southern.....	.....	1,800	7,858	10,608	15,667	22,055	41,657	53,983	61,784
Total.....	7,000	9,050	21,490	25,031	36,126	56,290	112,953	146,946	160,542

Blister, Puddled, and Patented Steel.—The following table gives the production of blister, puddled, and patented steel in the United States from 1874 to 1882, in net tons. It seems to be unnecessary to further continue from year to year the details of so unimportant a branch of our steel industry:

STATES.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
New England.....	376	1,500	.....	.....	192	950	72	200	.....
New York.....	200	.....	139	.....	220	215	617	.....	.....
New Jersey.....	.....	100	652	.....	.....	.....	.....	.....	.....
Pennsylvania.....	4,417	7,340	7,601	9,870	8,069	3,004	6,658	2,113	2,114
Western States.....	1,300	.....	1,700	2,034	75	1,000	1,018	734	900
Southern States.....	60	3,667	214	20	.....	295	100	.....	.....
Total.....	6,353	12,607	10,306	11,924	8,556	5,464	8,465	3,047	3,014

The small quantity of blister, puddled, and patented steel that was made in this country in 1882 was produced in Pennsylvania and Ohio.

Production of Bars, Shapes, Plates, Sheets, and other Rolled Iron in 1882.—In the term rolled iron we include (1) cut nails and spikes; (2) bar, shaped, bolt, rod, skelp, and hoop iron, and rolled axles; (3) plate and sheet-iron; and (4) all sizes of iron rails. Bessemer steel rails are not classed among rolled iron products.

The production of all kinds of rolled iron in the United States in 1882, including iron rails, was 2,493,831 net tons, against 2,643,927 tons in 1881, showing a decrease of 150,096 tons, all of which decrease is, however, accounted for by the great shrinkage in the production of iron rails in 1882. Omitting iron rails, the production of which decreased from 488,581 net tons in 1881 to 227,874 tons in 1882, our production of rolled iron in 1882 was 2,265,957 tons, against 2,155,346 tons in 1881, an increase of 110,611 tons. This was not a large increase; but if we consider the long strike of 1882 in the Pittsburg and Western rolling-mills, the wonder is, that there was any increase at all. At the same time, it must frankly be admitted that our rolling-mill capacity has for some time been in advance of the consumptive wants of the country, and that the check to the overproduction of rolled iron which was afforded by the strike of 1882 was in no sense a calamity to the manufacturers.

In the following table, we give detailed statistics of the production of the different forms of rolled iron in each of the States in 1882, in net tons:

STATES.	Bar, rod, bolt, hoop, skelp, and shaped iron. Net tons.	Plate and sheet-iron, except nail plate. Net tons.	CUT NAILS. Kegs.	CUT NAILS. Net tons.	Iron rails. Net tons.	Total. Net tons.
Maine.....	10,537	.....	.....	.....	325	10,862
New Hampshire.....	3,508	.....	.....	.....	.....	3,508
Massachusetts.....	46,086	35,688	592,276	29,614	.....	111,388
Rhode Island.....	11,877	.....	.....	.....	.....	11,877
Connecticut.....	20,676	.....	.....	.....	.....	20,676
New York.....	131,226	3,023	166	8	4,284	138,541
New Jersey.....	76,408	2,016	360,340	18,017	.....	96,441
Pennsylvania.....	685,049	258,603	1,949,405	97,470	82,476	1,123,886
Delaware.....	25,366	12,895	.....	.....	.....	38,261
Maryland.....	17,067	16,590	.....	.....	.....	33,657
District of Columbia.	121	29	.....	.....	.....	150
Virginia.....	31,554	.....	169,806	8,490	.....	40,044
Alabama.....	8,460	.....	.....	.....	728	9,188
West Virginia.....	5,494	7,991	1,023,711	51,186	1,436	66,107
Kentucky.....	35,247	16,380	149,382	7,469	2,000	61,096
Tennessee.....	10,589	.....	171,413	8,751	19,610	38,770
Indiana.....	23,177	542	394,682	19,734	28,173	71,626
Illinois.....	48,932	.....	462,956	53,148	21,863	93,943
Ohio.....	253,933	49,182	796,857	39,843	18,650	361,608
Missouri.....	12,090	6,055	.....	.....	.....	18,145
Michigan.....	8,004	3,820	.....	.....	.....	11,824
Wisconsin.....	39,611	.....	.....	.....	24,685	64,296
Kansas.....	10,800	.....	.....	.....	7,067	17,867
Nebraska.....	.....	.....	60,000	3,000	.....	3,000
Colorado.....	3,934	.....	16,103	805	.....	4,739
Wyoming Territory..	3,235	.....	.....	.....	13,253	16,488
California.....	22,807	.....	.....	.....	3,036	25,843
Total.....	1,545,788	412,814	6,147,097	307,355	227,874	2,493,831

The following table gives the production of all kinds of rolled iron in the United States from 1872 to 1882, in net tons:

YEARS.	NET TONS OF 2000 POUNDS. Iron rails.	Other rolled iron.	Total.
1872.....	905,930	941,992	1,847,922
1873.....	761,062	1,076,368	1,837,430
1874.....	584,469	1,110,147	1,694,616
1875.....	501,649	1,097,867	1,599,516
1877.....	467,168	1,042,101	1,509,269
1878.....	332,540	1,144,219	1,476,759
1879.....	322,890	1,232,686	1,555,576
1880.....	420,160	1,627,324	2,047,484
1881.....	493,762	1,838,906	2,332,668
1882.....	488,581	2,155,346	2,643,927
	227,874	2,265,957	2,493,831

Forges and Bloomaries in 1882.—As we have heretofore explained, blooms and billets from ore are made chiefly in the Champlain District of New York, and blooms from pig and scrap-iron are made chiefly in Pennsylvania. There has been a steady increase in their production in the last four years.

The following table shows the proportion of ore blooms and billets made in New York in the past eight years, and the proportion of pig and scrap blooms made in Pennsylvania in the same time:

YEAR.	NET TONS OF 2000 POUNDS. Ore blooms and billets made in New York.	Total make of ore blooms and billets.	Pig and scrap blooms made in Pennsylvania.	Total make of pig and scrap blooms.
1875.....	23,666	24,416	19,032	24,827
1876.....	20,202	20,784	13,401	23,844
1877.....	23,466	24,227	16,517	23,073
1878.....	22,829	24,130	15,121	25,906
1879.....	27,290	30,282	23,956	32,071
1880.....	34,351	40,652	24,319	33,937
1881.....	39,892	45,369	28,342	39,237
1882.....	43,911	48,354	29,408	42,939

AN ELECTRIC WIRE TRAMWAY.

"Telpherage" is the name given by Mr. Fleeming Jenkin, the well-known electrician and professor of civil engineering in the University of Edinburgh, to a system which he has devised for transporting vehicles, containing goods and passengers, to a distance by the electric current independently of any control exercised from the vehicles themselves.

The system, says *Engineering*, has been patented, and it is to be hoped that a practical trial of it will soon be made. Professor Jenkin's idea is to employ strained metal cables, which will serve both to sustain the load and convey the electric current. The frames or trucks supporting the load run along the cable on wheels, and the cars or loads are suspended below them from the axles of the wheels.

In the simplest arrangement of the line, there is a break of continuity at each post supporting it; and the sections of cable are themselves insulated from each other and the earth. They are, however, capable of being connected by movable coupling-pieces, actuated by the train, so that all the sections receive the exciting current and form part of the general circuit.

The current is supplied to the line by a stationary dynamo-electric machine driven by a steam-engine or other motor; and since the line is elevated from the ground on insulating standards, the same dynamo will supply a considerable length of line, as the leakage need not be excessive if proper precautions are taken. With ground lines of electric railroad, like that of Siemens or Edison, the leakage is very marked, and Mr. Edison has adopted the plan of dividing the whole line into short sections of a few miles, with stations and feeding dynamos at each. Dr. Werner Siemens favors the use of an insulated conductor supported beside the line, and giving current to the motor on the train by means of a running connection pulled by the train. Professors Ayrton and Perry have, as is well known, sought to overcome the leakage difficulty by making the line in short sections, each of which is put in circuit with the dynamo in turn as the train progresses, by an automatic action of the train itself. In this way, there is only one section electrified at a time, namely, that over which the train is running, and the leakage on the whole line is consequently very small.

The loads or cars on the telpherage line are connected together in trains, and the length of a train is nearly the length of a section of the cable or conductor. On passing either of the movable coupling pieces between two sections, the train throws it out of action, disconnecting the two sections at that point; but the circuit between these sections is maintained through the wheels of the train itself and a conductor on the train. In circuit with this conductor is a dynamo-electric motor, which is actuated by the current, and propels the train by driving the wheels. The power provided is more than sufficient to keep up a maximum speed, and the train is provided with a governor which, when the speed is sufficient, closes a shunt and allows the current to pass without traversing the coils of the electromotor. The governor acts directly to check the train if the speed becomes excessive, by short-circuiting the electro-motor, or otherwise bringing electric brakes into operation.

To further insure that one train shall not overtake another, Professor Jenkin provides an automatic telegraphic communication along the line, and the trains in passing close and open the telegraphic circuits. This automatic telegraph actuates circuit-closers between the different sections of the main cable or conductor so as to maintain connection between the sections for a certain distance behind the train quite independently, it may be, of the movable coupling-pieces. It is obvious that a following train entering upon a part of the line in which the sections are thus connected will have its speed checked, as the application of the power upon the train depends upon there being a break in the electrical coupling between the two sections on which the train is for the moment supported.

AN IMPROVED BELL TELEPHONE.—M. d'Arsonval, the well-known telephonist, has devised a new form of Bell receiver, which is, for its size, and weight, the most powerful yet constructed. The chief modification consists in inclosing the bobbin entirely between the poles of the magnet. This is done by making one pole of the magnet the core of the bobbin, and the other pole an inclosing ring of iron. The inductive plate vibrates over the poles and upper surfaces of the coil as before. The complete instrument only weighs a little over five ounces, and is stated to be as powerful as the heavy Gower-Bell receiver. Mr. Leczensky has applied magnets of steel tempered by compression after the manner introduced by M. Clemandot, and since this mode of tempering does not deform the magnets, a neater article is the result.

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MECHANICAL TESTS OF COMPRESSED STEEL SHAFTING.

In our report on the visits made by the American Institute of Mining Engineers to the various works in the vicinity of Boston, during the annual meeting held in that city, we referred briefly to a department in the Norway Iron and Steel-Works of Messrs. Naylor & Co., where steel was drawn cold in accordance with the patents of Mr. G. H. Billings, We then spoke of the simplicity of the plant for cold-drawing and compressing steel, and cold-straightening the compressed bars which are principally used for shafting, it being possible to produce regular and irregular sections within the range of ⅜ and 3-inch. As throwing much light upon the mechanical qualities of the metal thus treated, we have just received a series of tests made by Mr. J. E. Howard, with the great Emery machine at the Watertown Arsenal, which, with earlier experiments on torsional strength, conducted by Prof. J. E. Denton, at the Stevens Institute of Technology, clearly show the improvement due to the method of working.

Turning first to the Watertown tests, we find that three tests by tension and two by compression were made, the specimens being cut from the same original bar of hot-rolled steel, and beat out before and after being cold-drawn. Mr. Howard's record of tests is very complete, giving the elongation as every increment of load was applied. We have chosen from the detailed tables those figures which mark prominent points in the progressive alterations of the bars under stress. Beginning with the steel bar, as it came from the rolls, with its surface in the condition it left them, and therefore showing the mechanical properties of the metal before compression by cold-drawing, we have the following:

Original Bar.—Total length, 66·55 inches; diameter, 2·03 inches; sectional area, 3·24 square inches; distance between holder-jaws, 45 inches; gauged length, 30 inches; eight five-inch sections laid off in bar.

Loads Applied.		Elongation. Inches.	Permanent set. Inches.
Total pounds.	Pounds per square inch.		
3,240	1,000	.....	.....
16,200	5,000	0·0030	.....
32,400	10,000	0·0079	.....
.....	1,000	.....	0·0010
48,600	15,000	0·0130	.....
64,800	20,000	0·0191	.....
.....	1,000	.....	0·0001
66,000	.....	0·1990	.....
81,000	25,000	0·2560	.....
.....	1,000	.....	0·0012
86,000	**26,510**	0·2760	Elastic limit.
97,200	30,000	0 3200	.....
113,200	35,000	0·6400	.....
129,600	40,000	0·9900	.....
145,800	45,000	0·4700	.....
162,000	50,000	2·2400	.....
179,500	**55,400**	.....	Ultimate strength.
0	0	**7·16 (23·9 p.c.)**	.....

The elongation was therefore 23·9 per cent, and as the diameter at fracture was 1·54 inches, the area being 1·86 square inches, the contraction of area was 42·9 per cent. The elongation of the eight five-inch sections was respectively 0·87, 0·97, 1·03, 1·17, 1·73 (fractured section), 1·13, 1·13, and 1·06 inches. The fracture was oblique, its appearance being silky, with round spots from one sixteenth to one tenth of an inch in diameter each, about the center, presenting small bright facets.

Cold-Drawn Compressed Bar.—By one pass through the dies, the diameter of the above bar had been reduced 0·094 inch, leaving it 1·936 inches, with an area of 2·946 square inches. The total length of the bar was 59·30 inches; the distance between the holder-jaws 37 inches; and the gauged length, 20 inches. Six five-inch sections were laid off on the bar.

Loads Applied.		Elongation. Inches.	Permanent set. Inches.
Total. Pounds.	Pounds per square inch.		
2,946	1,000	.....	.....
14,730	5,000	0·0025	.....
29,460	10,000	0·0058	.....
.....	1,000	.....	0
44,190	15,000	0·0090	.....
58,920	20,000	0.0122	.....
.....	1,000	.....	0
73,650	25,000	0·0158	.....
.....	1,000	.....	0
88,380	30,000	0·0191	.....
.....	1,000	.....	0
103,110	35,000	0·0221	.....
.....	1,000	.....	0
117,840	40,000	0·0257	.....
132,570	45,000	0·0293	.....
.....	1,000	.....	0
147,300	50,000	0·0333	.....
.....	1,000	.....	0·0015
162,030	55,000	0·0381	.....
.....	1,000	.....	0·0015
167,000	.....	0·0412	.....
.....	1,000	.....	0·0027
176,760	60,000	0·0454	.....
.....	1,000	.....	0·0048
180,000	**61,100**	0·0473	Elastic limit.
191,490	65,000	0·0620	.....
.....	1,000	.....	0·0178
200,000	.....	0·134	.....
207,450	**70,420**	.....	Ultimate strength.
.....	.....	**0·54 (27 p. c.)**	.....

A glance at these figures, compared with those obtained in treating the rolled bar previous to compression, furnishes an eloquent proof of its effect upon the mechanical qualities of the metal. The diameter of the above bar at the fracture was 1·58 inches, the area being 1·96 inches, thus making the contraction of area 33·5 per cent. The fracture was oblique, the bar breaking 4½ inches from the face of the holder-jaws. In appearance, it was silky, round spots from one sixteenth to one eighth in diameter, with bright facets noticed near the center of the fracture. The elongation of the six five-inch sections was respectively, 0·10, 0·11, 0·12, 0·13, 0·18, and 0·78 inch (the latter the fractured section).

Cold-Drawn Compressed Bar.—The third bar tested was reduced in diameter by drawing through the compressing dies once, much more than the second, the reduction being 0·222 inch, leaving the diameter of the bar 1·808 inch, and its area 2·567 square inches. The total length of the bar was 61·04 inches, its gauged length 20 inches, and the distance between the holder-jars 39·50 inches. Six five-inch sections were laid off on the bar.

Loads Applied.		Elongation. Inches.	Permanent set. Inches.
Total. Pounds.	Pounds per square inch.		
2,567	1,000	0	.....
25,670	10,000	0·0150	.....
.....	1,000	.....	0·0005
38,505	15,000	0·0081	.....
51,340	20,000	0·0117	.....
.....	1,000	.....	0·0010
64,175	25,000	0·0151	.....
.....	1,000	.....	0·0011
77,010	30,000	0·0185	.....
.....	1,000	.....	0 0011
89,845	35,000	0·0218	.....
.....	1,000	.....	0·0011
102,680	40,000	0·0252	.....
.....	1,000	.....	0 0011
115,515	45,000	0·0288	.....
.....	1,000	.....	0·0011
128,350	50,000	0·0326	.....
.....	1,000	.....	0·0015
141,185	55,000	0.0371	.....
.....	1,000	.....	0·0018
154,020	60,000	0·0427	.....
.....	1,000	.....	0·0028
166,855	65,000	0·0495	.....
.....	1,000	.....	0·0049
168,690	70,000	0·0564	.....
.....	1,000	.....	0·0090
192,525	75,000	0·0700	.....
.....	1,000	.....	0·0185
205,360	80,000	0·1189	.....
.....	1,000	.....	0·0630
210,200	**81,890**	.....	Ultimate strength.
.....	.....	**0·15 (75 p. c)**	.....

The elastic limit was not well defined. The diameter of the bar at the fracture was 1·65 inches, and the area 2·138 square inches, making the contraction of area 16·7 per cent. The bar broke square across, one inch inside the face of the holder-jaws, the fracture being finely granular, with a silky spot in the center one quarter by one half an inch in size. The elongation of the different five-inch sections was 0·04, 0·4, 0·03, 0·05, and 0·06 inch respectively.

Compression Tests.—Two tests of the last bar were made with the following results, the diameter of the specimen being 1·808 inches; the sectional area, 2·567 square inches; and the length, 3·976 inches. The compression measurements were taken with a screw micrometer 12 inches between center punch marks:

Loads Applied.		No. 1.		No. 2.	
Total tons.	Pounds per square inch.	Compression. Inches.	Compression sets. Inches.	Compression. Inches.	Compression sets. Inches
2,567	1,000	0	.....	0	.....
12,835	5,000	0·0007	.....	0·0013	.....
51,340	20,000	0·0042	.....	0·0049	.....
.....	1,000	.....	0	.....	0·0006
64,175	25,000	0·0053	.....	0·0059	.....
102,680	40,000	0·0090	.....	0·0097	.....
.....	1,000	.....	0·0007	.....	0.0013
115,515	45,000	0·0106	.....	0·0115	.....
.....	1,000	.....	0·0010	.....	0·0019
128,350	51,000	0·0125	.....	0·0132	.....
.....	1,000	.....	0·0017	.....	.....
141,185	55,000	0·0146	.....	0·0154	.....
.....	1,000	.....	0·0028	.....	0·0040
154,120	60,000	0·0179	.....	0·0189	.....
.....	1,000	.....	0·0049	.....	0·0059
166,855	65,000	0·0242	.....	0·0195	.....
.....	1,000	.....	0·0103	.....	0 0165
178,690	70,000	0·0343	.....	0·0350	.....
.....	1,000	.....	0·0189	.....	0·0197
192,525	75,000	0·0562	.....	0·0578	.....
.....	1,000	.....	0·0395	.....	0·0400

The results of the torsional tests made by Professor Denton are as follows:

	Stresses in Torsion. Foot-pounds.	Actual Resilience. Foot-pounds.
	At elastic limit. M.	At elastic limit. W.
Compressed steel shafting	256·25	5·91
	245·25	5·88
	220·25	5·09
Common iron shafting	94·20	·86
	93·25	·72
	95·75	·70
Cold rolled iron shafting	161·25	3·25
	147·25	1·98
	152·25	2·59

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THE LINKENBACH BUDDLE.*

By Richard P. Rothwell.

Revolving slime-tables with stationary sprays and oscillating brushes have for many years been a favorite apparatus used for working slimes in German dressing-works, often displacing Rittinger tables and the many variations of Cornish buddles. The difficulty of building these tables larger than 5½ meters (17 feet) in diameter, increasing the cost and making them unwieldy, rendered it necessary also to concentrate the slimes in several operations, because the travel over so short a length of hearth would not suffice for close concentration.

A preliminary sizing is effected in a system of spitzkasten. Herr C. Linkenbach, general manager of the Ems Lead and Silver-Works, Germany, devised a buddle in 1878, which has since worked well and found much favor in Germany, and has in one instance been copied here, at Colorado Springs, without any credit having been given to the original inventor. Herr Linkenbach's plan has been to reverse the functions of the table and the washing apparatus of the old German revolving table. He makes the tables stationary and rotates the washing apparatus, thus enabling him to save in power, and, within certain limits, to increase the dimensions of the table, without in any way affecting its durability or materially increasing its cost.

In its earlier form, the buddle was single, and that type is still desirable when only small quantities of slime are to be worked. In order to secure economy in floor space and cheapen the first cost, by having a single foundation and only one set of rotating mechanisms, Mr. Linkenbach now builds the buddles in sets of three, one above the other, as shown in the accompanying drawing. The following figures, giving the cost of a single and a triple buddle at Ems, will fully illustrate this point. In order that these figures may be available under other conditions of cost of labor and materials, I may state that at Ems the cost of labor per shift was 2·80 marks (70 cents); the cost of 1000 kilogs. (1 ton) of wrought-iron, 180 marks ($45), and of cast-iron 170 marks ($42.50); of 1000 brick, 27 marks ($6.75); and 1000 kilograms cement, 50 marks ($12.50).

	Single.	Triple.
Foundation-work	238·18	296·56
Masonry and cement-work	1,075·86	2,279·48
Iron-work	2,010·07	6,451·10
Total	3,324·11	9,027·14
	$831	$2257

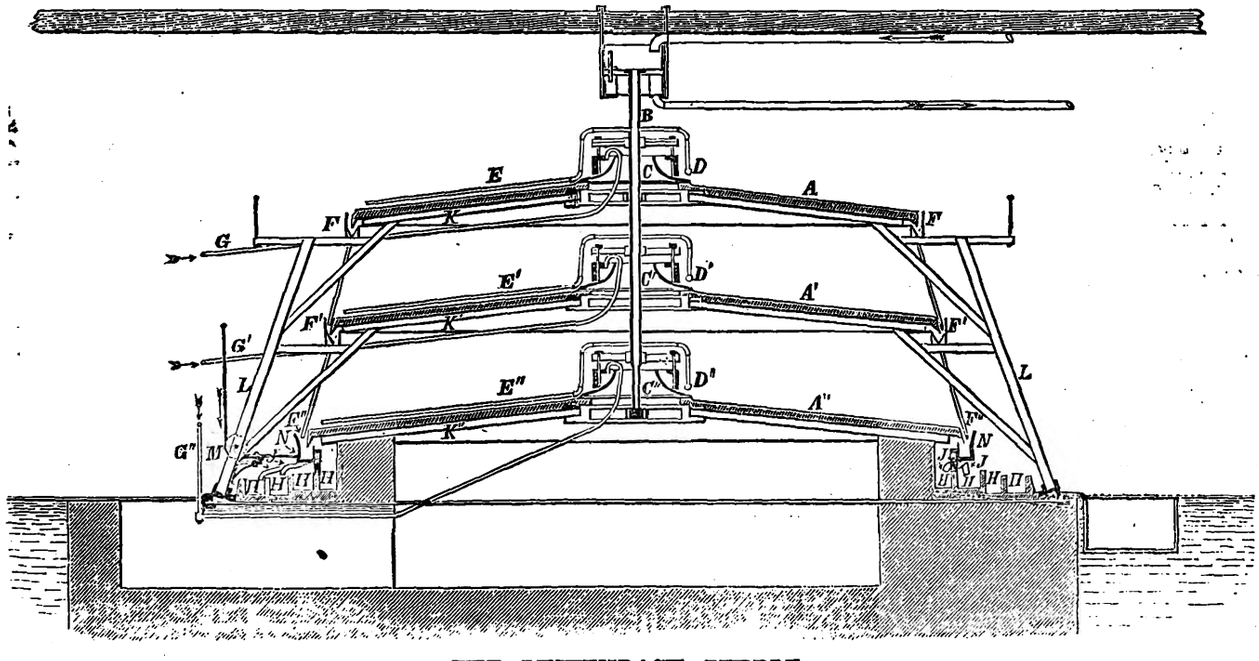
It will be noticed that there is very little difference in the cost of foundation; that the cost of masonry is only doubled; while the cost of the iron-work is more than trebled in the triple-hearth buddle. The cost of a single buddle is therefore 3324·11 marks = $831, against 9027 marks = $2257, for one of the triple buddles, not taking into account the saving in floor space and the consequent economy in construction of building, or the saving in driving gear.

I will therefore confine myself to a description of the latter form, the principle involved being the same and the connection requiring only a few necessary changes in detail skillfully carried out. As will be seen from the section, there are three stationary tables, the upper one *A* having a diameter of 6 meters (19·7 feet); the middle one *A'* of 6·5 meters (21·3 feet); and the lower table *A''* of 7 meters (23 feet). The first receives the coarsest grades of the slimes, while the lowest washes the finest sizes; the middle table taking intermediate grades. The tables themselves are made of a skeleton of wrought-iron, the upper surface being cement. The central hollow shaft *B* rotates, carrying with it the distributors *C*, *C'*, and *C''*, the washing-pipes *D*, *D'*, and *D''*, the cleaning-jets *E*, *E'*, and *E''*, and the rotating catch-gutter *F'''* of the lowest table, while the catch-gutters *F* and *F'* are stationary. The slimes, coming from a separate spitzkasten for each table, are delivered by the pipes *G*, *G'*, and *G''*.

The action of the buddle is simple. The slimes, flowing continuously over the tables, are first met by a current of water from the washing-pipes *D*, which carries off the middlings, the tailings having flowed off the table before the washing water reaches it. When the spray jets *E* reach the point of the table passed by the washing-pipes, the headings are flooded off the table. The various grades of concentrates are kept separate by the four gutters *H* and the rotating catch-gutter *F'''*, by means of pipes *J*, varying in length. The tailings, middlings, and headings from the lower table flow upon the rotating catch-board, which has adjustable compartments for their reception. Those from the other two tables go to stationary circular catch-gutters *F* and *F'*. The bottom of the latter consists of a series of funnels closely placed, the bottoms of which connect with pipes leading to the lower rotating catch-gutters. From the different compartments of the latter, the headings, middlings, and tailings are taken by the pipes to the gutters *H*.

With a single-table buddle, from 5200 to 6600 kilograms (from 5½ to 7 tons) of slimes, weighed dry, have been worked in a ten-hour shift, the percentage of material in the slimes being about 5½ per cent, the quantity of water used being from 90 to 100 liters (from 19 to 22 gallons) per minute, of which two thirds were used by the washing-troughs and one third by the spray. The lead headings produced assayed 40 per cent of lead, further enrichment not being considered desirable, because the foreign matter in the concentrates was hematite and spathic iron ore. The tailings yielded by wet assay from 0·75 to 1 per cent of lead.

On the triple buddle, slimes containing galena and blende were worked at Ems to the extent of from 6000 to 7000 kilograms (from 6½ to 7½ tons) per table per ten-hour shift. The consumption of water per minute was from 110 to 120 liters, the proportion of water from the troughs and the jets being 2·25 to 1. The galena headings run from 55 to 60 per cent, while the blende concentrates contain from 40 to 42 per cent of zinc, and the tailings hold by wet assay from 1 to 1·25 per cent of lead and from 2 to 2½ per cent of zinc.



THE LINKENBACH BUDDLE.

Among the great advantages this buddle possesses are, the possibility of making and maintaining the table perfectly true, great simplicity of construction, great durability, perfect control of the water and of the degree of concentration as well as of the number of classes into which the ore is to be made, and economy in space and in first cost.

* A paper read at the Boston Meeting of the American Institute of Mining Engineers.

THE BRITISH MANUFACTURED IRON TRADE IN 1882.

Mr. J. S. Jeans, the Secretary of the British Iron Trade Association, has just published the following detailed statistics of the manufactured iron trade in Great Britain for 1882, from which we extract the following:

The production of puddled bar in the United Kingdom during 1882 amounted to 2,841,534 tons, against 2,681,150 tons in the preceding year, the increase being thus 160,384 tons. It is noticeable that this would be a larger increase than that which has occurred in the production of pig-iron for the same period; but the figures given for 1881 in respect to the North of England are subject to the modification that they refer to manufactured iron only, while those for 1882 apply to puddled bar; and as the quantity of the latter produced in 1882 was more than 100,000 tons in excess of the make of finished iron, a nearly corresponding increase of puddled bar may be assumed for the former year.

The total number of puddling-furnaces in operation at the end of 1882 was 4369, being 814 less than in the preceding year. A statement of the number of furnaces in activity in each district at the end of 1882, and the average production per furnace, appears below.

In reference to this statement, it must be remembered, however, that the number of furnaces in activity throughout the year varies considerably in every district, and the number working on December 31st can not be accepted as a fair average of the whole year. This fact will explain the high averages returned for Lancashire and West Cumberland. It is also necessary to explain that in some cases large quanties of scrap, etc., are worked up, and the products of ball furnaces are included with

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"puddled bars." Even so, however, the Lancashire works have an exceptionally good record, and the results they have achieved seem to indicate a substantial improvement on the average yields of a few years ago.

AVERAGE ANNUAL PRODUCTION PER PUDDLING-FURNACE, RECKONED ON THE NUMBER OF FURNACES AT WORK IN DECEMBER, 1882.

District.	Production of puddled bar. Tons.	No. of puddling-furnaces active.	Average annual production per furnace. Tons.
Cleveland	852,199	1,236	689
South Staffordshire	660,326	1,115	592
Lancashire	277,476	313*	886
South Wales	213,179	270	789
Scotland	210,300	300	701
North Staffordshire	195,471	362	539
South Yorkshire	162,159	271	583
West Yorkshire	102,921	180	571
Shropshire	88,937	163	545
Derbyshire	40,226	88	457
Cumberland	23,040	28	823
Other districts	15,300	36	425
Total	2,841,534	4,369	650

The decline in the total number of puddling-furnaces during the last few years has been considerable. The figures issued by the Mining Record Office show that, in 1860, the total number of puddling-furnaces in the United Kingdom was 3462; in 1864, 6338; in 1868, 5903; and in 1872, 7311. The latter was the greatest number returned in any one year. In 1874, the number had declined to 6803, and in 1877 it rose again to 7159. The total number of furnaces returned for 1882—6296—is 101 less than that for the preceding year. The number of furnaces in actual operation at the end of 1882 was 814 less than that returned for the corresponding date in 1881; but of these, a good many had probably been working over a certain part of the year. This is, indeed, made tolerably evident by the greater production of 1882. Assuming that 10 per cent of the furnaces constructed are usually out of work for purposes of repair, etc.—which is the calculation generally accepted by the trade—it would appear that of the remainder 21 per cent of the furnaces were inoperative on account of the condition of trade, and of that proportion probably two thirds will not again be lighted up. Appended are the statistics of puddling-furnaces for 1882:

NUMBER OF PUDDLING-FURNACES, ACTIVE AND INOPERATIVE, IN THE UNITED KINGDOM AND IN EACH DISTRICT THEREOF IN 1882.

District.	No. of puddling-furnaces. Active.	Inoperative.	Total furnaces.	Percentage of total in activity.
Cleveland	1,236	555	1,791	69·01
South Staffordshire	1,115	605	1,720	64·82
Lancashire	313	49	362	86·46
South Wales	270	412	682	39·58
Scotland	300	80	380	78·94
North Staffordshire	362	48	410	88·29
South Yorkshire	278	59	337	82·49
West Yorkshire	180	22	202	89·10
Shropshire	163	35	198	82·32
Cumberland	28	12	40	70·00
Derbyshire	88	8	96	91·66
Other districts	36	42	78	46·15
Total	4,389	1,927	6,296	69·39

The following is a summary of the returns received by the Association of the different descriptions of manufactured iron produced in 1882. In reference to these figures, it has again to be remarked that they are far from being complete. Many firms, indeed, make up no record of the different descriptions of finished iron which they produce, but are content to divide their return into the two items of "puddled bar" and "finished iron." The figures that have been obtained, however, may be accepted as to some extent a guide to the proportions of the different leading productions from puddled bar.

PRODUCTION OF DIFFERENT DESCRIPTIONS OF MANUFACTURED IRON IN 1882.

Descriptions.	Production, tons.	Percentage total production.
Ship-plates	495,000	30·53
Angles	169,000	10·42
Bars	434,200	26·78
Rails	60,339	3·72
Sheets	114,200	7·04
Hoops	71,000	4·38
Wire rods	81,000	4·99
Coke bars (for tin plates)	35,000	2·15
Strips	42,600	2·62
Tee iron	21,720	1·33
Packing iron	3,500	·21
Fencing-wire	10,800	·66
Nail-rods	18,600	1·14
Boiler and other plates	64,000	3·94
Total	1,620,959	99·91

There are no reliable statistics of the production and consumption of coke in the United Kingdom; but the demand for this form of fuel is known to have very largely increased within the last few years. This has chiefly been due to the development of the iron trade; but the demands for locomotive and export purposes have also been extended in a material degree. The economies that have been introduced in blast-furnace practice have, however, so considerably reduced the consumption of fuel per ton of iron smelted that the effect of the greatly increased production of pig has not been so apparent in this industry as it otherwise would have been. The following figures show what the consumption of coke would be in the manufacture of pig-iron in 1882 compared with 1879, assuming for each year an average of 23 cwt. of coke per ton of pig:

Consumption of coke in 1879 ..... 5,822,834 tons.
Consumption of coke in 1882 ..... 8,472,378 "

These figures show an increase of 2,649,544 tons, or 45 per cent, within four years; but it should be noted that the average consumption per ton of pig is likely to have been higher in 1879 than in 1882, because of the extensive introduction of more economical blast-heating apparatus, and also because of the much larger make of hematite relatively to other qualities of iron in the latter year. The difference, therefore, against 1879 is likely to have been even greater than the foregoing figures indicate.

The consumption of coke in the manufacture of pig-iron in 1882 was as follows, both as coke and in the form of coal, Scotland being of course excluded, in consequence of the general use of raw coal in the blast-furnaces of that country:

	Tons.
Consumption of coke	8,472,378
Equivalent of coal, taking 60 per cent of coke as 100 per cent of coal	14,120,627
Add coal consumed in Scotland, say	2,300,000—16,420,627

It is probable that the average yield of the United Kingdom will be nearer 56 or 57 per cent of coke per 100 of coal, 60 per cent being, indeed, about the best average result that is obtained in the coke manufacture. It is probable, also, that the average consumption of coke per ton of pig made will, in the country generally, be nearer 25 than 23 cwt. The foregoing table is, therefore, subject to these two modifications.

* Includes some double reckoned as colliery furnaces.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Lode versus Placer Claims—The Shonbar, of Butte, Mont.—Secretary Teller has just rendered the following decision, in a letter directed to the Commissioner of the General Land-Office:

I have considered the appeal of Anthony H. Barret *et al.*, applicants for patent for the Shonbar lode, from your decision of March 28th and June 3d, 1882, the former holding their Helena, Montana, mineral entry, No. 611, of the premises for cancellation, and the latter declining to recall the former. You hold the entry for cancellation because the ground covered thereby had been previously patented as placer claims upon mineral entries numbered 375 and 553, per patents issued April 15th and May 16th, 1881, respectively. It appears that said applicants located their claims May 5th, 1879, filed application for patent November 2d, 1880, notice whereof was regularly published from November 5th to January 6th, 1881, whereupon they made mineral entry No. 611, January 14th, 1881. Their application calls for "1497 linear feet of the Shonbar vein, lode, or deposit, bearing silver and other metals, together with surface ground varying from 464 to 538 feet in width, . . . being situated in the Summit Valley Mining District, county of Deer Lodge, Territory of Montana." Such claim is designated as "Lot No. 175," containing an area of 17·19 acres, and is so delineated by the official survey thereof made by U. S. Deputy Mineral Surveyor Baker, June 26th, 1881, plot whereof was approved by U. S. Surveyor-General Mason, September 3d, ensuing. These applicants claim to have acquired title "by purchase from original locators." It further appears that, under date of May 29th, 1882, the applicants' attorney filed in their behalf the affidavits of certain persons resident in said district, alleging that the Shonbar lode is a well-defined vein, rich in minerals; that its existence was known at and long anterior to the date of said placer application. Wherefore said attorney requested that your former decision be recalled, that patent issue for the Shonbar lode claim; but by your decision of June 3d, 1882, you declined to recall your former decision, holding the matter to be beyond the jurisdiction of your office.

This case, so far as it relates to the existence of a known lode, is within the rule established by this department under date of the 19th proximo, in the matter of the Mammoth quartz mine, wherein it was ordered that the lode claimants be permitted to proceed, pursuant to statutory provisions, by application for patent upon the lode claim, by regular publication, subject to the filing of an adverse claim and the institution of suit in a court of competent jurisdiction. But the present claim exceeds twenty-five feet in width on each side of the vein. The application has been allowed, publication regularly had, and the entry made. In fact, said claimants had completed their proof, and the same were matter of record in your office for several months prior to the issuance of placer patents, and no adverse claim was filed. It would not be practicable, therefore, at this stage of the cause, to remit these claimants to the performance, *de novo*, of such preliminary requirements. In the absence of an adverse claim, they are entitled to take their lode and twenty-five feet on each side. The only question remaining is, whether or not the excess over that width of surface-ground can be allowed. I think this can not be done. The lode claimants, in order to protect their right to the full extent of their claims, should have filed adversely to the placer application within the statutory periods; but having failed so to do, they are expressly restricted by the statute to their lode, "and twenty-five feet of surface on each side thereof."

Your decision is accordingly reversed; and if, on examination, the proofs are found regular and sufficient, you will require a corrected plot, properly defining the restricted surface-ground, upon which patent will issue.

BASIC FURNACE LININGS.—Kutscha, Oehlwein, and Mertens recommend for furnace linings the use of the mineral agalmatolite, occurring at Dilln, near Schemnitz, in Hungary. Its composition is: Silicic acid, 30·40; alumina, 52·68; iron oxide, 0·80; manganese oxide, 0·30; lime, 0·89; magnesia, 0·39; sulphuric acid, 0·80; water, 11·88; alkalies, 1·50; total, 99·64. By mixing two parts of burnt agalmatolite with one of the raw mineral, and moistening the mass with water, the mixture may be pressed into briquettes, which, on burning at a white heat, become hard and adhesive, and do not shrink. For the preparation of basic linings, it is proposed to add to lime or dolomite a flux in such proportion that the mixture after twelve hours' burning at a white heat forms a slag which is pulverized and worked up with suitable binding agents. For the manufacture of such basic refractory masses, dolomite of the following composition is used: Silicic acid, 0·7; alumina, 0·5; iron oxide, 0·6; lime, 31·5; magnesia, 20·0; carbonic acid, 46·7; mixed with 12 per cent of talc of the composition: Silicic acid, 62·0; magnesia, 31·0; iron oxide, 2·0; water, 5·0. The mixture is formed into bricks, heated for twelve hours at a white heat, pulverized, treated with from 5 to 8 per cent of tar, from 3 to 5 per cent of pitch, or from 5 to 10 per cent of resin, pressed while hot in heated molds, and burnt at a high temperature. Bollinger recommends the use of a mixture of asbestos, chrysolite, and magnesium chloride for the preparation of refractory basic linings.

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OUR EXPORTS OF MANUFACTURES OF IRON AND STEEL.

The Bureau of Statistics has just issued a quarterly report, in which we find a series of interesting figures relating to our trade in manufactures of iron and steel with Mexico, the West Indies, and South America. We give below the exports to those countries for the past three calendar years:

To	1880.	1881.	1882.
Mexico	$1,257,574	$2,582,246	$4,239,712
Central American States	211,609	188,847	244,781
British Honduras	22,180	27,484	27,552
Danish West Indies	17,070	24,985	26,397
British West Indies	125,748	148,466	145,526
Hayti	74,593	73,355	58,496
San Domingo	221,151	106,261	138,889
Cuba	1,396,288	1,184,512	1,679,677
Porto Rico	128,031	110,289	84,038
Argentine Republic	168,418	272,175	440,201
Brazil	884,655	861,329	772,372
Chili	166,728	219,595	331,648
Peru	103,786	2,712	49,347
United States of Colombia	1,322,596	1,030,983	1,155,827
Uraguay	64,122	111,568	158,174
Venezuela	163,942	278,996	196,622

An idea of our share in the total trade of the countries mentioned in manufactures of iron and steel may be gathered from the following figures of the imports of these States from Great Britain and France during the calendar year 1881:

	Great Britain.	France.
Mexico	$2,653,078	$152,414
Central American States	404,304	14,019
Colombia	332,942	148,648
Venezuela	160,254	10,988
Brazil	6,657,839	492,648
Uruguay	244,834	518,856
Argentine Republic	3,754,836	557,891
Chili	1,956,839	124,446
Peru	366,404	.....

THAT coal mining is occasionally an exceedingly profitable undertaking, is shown by a few figures contained in a statement made recently by the receiver of the great Ohio iron firm, Brown, Bonnell & Co., of Youngstown. Among the assets figure the following items: "Mahoning Coal Company, incorporated 1862, block coal mine, Brookfield, Ohio, four sevenths of the stock owned by Brown, Bonnell & Co.; their share in the profits in 1881 was $80,000, and in 1882, $47,000; stands in ledger at cost of $275,000."

The same concern possessed full control of the Mahoning Coal Company at Dunbar, Pa., having a territory of 185 acres of coal and 100 coke-ovens, capable of producing 4000 tons of coke per month, the whole costing $80,000.

AN IMPORTANT PATENT DECISION.—The Secretary of the Interior has confirmed the decision of the Commissioner of Patents, holding that he has authority to institute proceedings like those in interference cases, to obtain testimony upon which to determine whether an invention has been in public use or on sale for two years, or more prior to the filing of an application for a patent therefor. Under this decision, a new practice will be established in the Patent-Office, substantially as follows: Where a petition is presented asking that an investigation be made to determine whether an invention which is the subject of an application for a patent has been in public use for two years, the Commissioner will direct the Examiner of Interferences to fix a time for taking testimony by the petitioner to show the facts alleged in the petition, giving thirty days for the production of such testimony. At the expiration of that time, the inventor or his assignee may produce testimony to show that the facts alleged are not true. The testimony will be returned to the Patent-Office and considered in the same manner as testimony taken in interference cases.

PIG-IRON AND IRON ORE IN LUXEMBURG.—Official statistics have been issued relative to the iron and mining production in the Grand Duchy of Luxemburg during the year 1882. The following is a table of the output of iron ore, its value, and the persons employed at the mines in 1882, as compared with 1880 and 1881:

	1882.	1881.	1880.
Production, tons	2,539,295	2,161,881	2,173,463
Value, francs	7,336,536	6,205,469	6,538,544
Persons employed	3,775	3,434	3,656

It is thus seen that the output, which showed a small decrease in 1881, has increased very largely. The statistics of the pig-iron trade are:

	1882.	1881.	1880.
Production of pigs, tons	376,587	293,616	263,666
Value, francs	21,345,700	14,136,667	14,445,282
Weeks of work	832	596	643
Persons employed	1,529	1,478	1,328
Blast-furnaces in operation	16	16	15

THE COST OF ELECTRIC LIGHTING.—The whole problem of electric lighting having been reduced to the question of cost, all reliable calculations based on actual results must be welcome. On the 1st of January, 1882, a large railroad station in California was lighted by a local branch of the Brush Electric Light Company. The dynamo was made to furnish forty lights, and worked by a fifty horse-power engine. Every thing was made of the best material and put up by experienced workmen. Allowing six months to pass, so as to permit the expenses to be cut down to a minimum, and the employés to be trained to the best efficiency, calculations were made for the months of June, July, August, and September, 1882, with the following result:

Average cost per month	$525.52
Average cost per night	17.06
Average number of lights nightly	30.09
Average hours of lighting nightly	5
Average cost of one light nightly	55 cts.
Average cost per light per hour	11 cts.

Mr. Samuel Purnell, who makes this report, comes to the following conclusion: He states that the local opinion was, that while the station was brilliantly illuminated by electricity, and better than gas could possibly do it, yet that sufficient light could have been obtained from gas for half the money.

FURNACE, MILL, AND FACTORY.

An additional set of sheet-iron rolls, a box-furnace for annealing iron, a scrap-furnace, and a set of new boilers will be erected in the mill of Summers Brothers & Co., at Youngstown, Ohio, this spring.

A factory for the manufacture of wire netting and screens, with a capacity of fifteen looms, is nearly completed at Milford, N. J.

The old puddle-mill of the Co-operative Iron and Steel-Works at Danville, Pa., is undergoing transformation into an open-hearth steel plant, and will probably be at work on the new product next month.

From the report made at the recent meeting of the Western Pig-Iron Association, at Pittsburg, it appears that the stock on hand at the close of 1882 was 420,694 tons, against 210,896 tons in 1881, and 456,658 tons in 1880. Of the whole supply on hand at the beginning of the present year, Pennsylvania held 150,858 tons and Ohio 187,253 tons.

The Clara Furnace, of Rayney & Berger, at Newcastle, Pa., has blown out for repairs, which will probably require two months.

Ground has been broken at Cranberry, Pa., for a new furnace. The ore mined at that place has been tested and found to produce a first-class Bessemer pig, said to be equal to that of any of the foreign ore imported into this country.

The Lancaster Rolling-Mill, located at Rohrerstown, Lancaster County, Pa., was sold at assignee's sale on Friday. It was purchased by George Youtz for $18,000. The property consists of two and three quarter acres of land, on which is a rolling-mill, 175 by 90 feet, containing seven puddling-furnaces, heating-furnaces, three steam-engines, and other necessary machinery. There are on the lot also two frame tenant-houses and other improvements.

The Southwark Foundry and Machine Company, of Philadelphia, has recently added to its machine-shops a large extension, and has filled it with the best machine tools obtainable in this country and in England. The manufacture of the Porter-Allen engine is vigorously prosecuted, and the company has adopted the specialties of hydraulic machines, including steam-pumps, passenger elevators, water-works, pumping engines, etc. The Southwark Company is now building a number of large Porter-Allen engines for the leading rolling-mills of the country. At the Cambria, Otis (Bethlehem), Albany & Rensselaer, Edgar Thomson, Indianapolis, Springfield, and Lackawanna works, these engines have made an excellent record. The great obstacle to the universal introduction of these engines hitherto has been the greater cost of the smaller sizes, compared with other engines of equal power of first-class makers. The Porter-Allen engines, above 250 horse-power, however, it is stated, cost less, power for power, than any other first-class engine. The old prejudices against high-speed engines are fast disappearing. The cost of construction, also, is now largely modified by new economic methods, and the rigid system rendered practicable, by the increase in the number of engines built. Where a single engine of a certain size was built alone, it was impossible to attain the same or as approximate an economy as when a number were ordered of exactly the same dimensions in all their parts. This point has now been reached, and we are informed that the Porter-Allen engines can be sold for about the same price as other first-class engines. The company has in process of construction several rolling-mill engines of large size, besides a number of smaller sizes for a variety of other duties. Three blowing-engines for blast-furnaces, several hydraulic passenger and freight-elevators, and pumps of various sizes are built with much other heavy work of varied character. The company also has the exclusive right of manufacture for the United States of the automatic ice-machine, an apparatus simple in construction and efficient for making ice and refrigerating apartments. It is the purpose of the company to carry on the manufacture of the Porter-Allen engines as its prime specialty; but to engage, in conjunction with it, in the construction of other heavy machinery.

The Pulsometer Steam Pump Company, on account of increased facilities for manufacturing, has lately reduced the price-list of the new pulsometer steam-pumps about one third. The company lately sent one of its hydraulic engineers to New Orleans, La., to superintend the running of one of its pumps on exhibition at the headquarters of its agents, Messrs. H. Dudley Coleman & Brother. Among the orders he obtained while there was a contract to supply a full plant of new pulsometers, boilers, etc., for irrigating a tract of land in Mexico, 40 by 25 miles square.

Two new blowing-engines are building for the furnaces of the Bethlehem Iron Company.

The Clemens Foundry and Machine Company, of Ansonia, Conn., has contracted with the Winchester Repeating Arms Company to furnish all the necessary machinery for the completion of its new brass rolling-mill.

The South Pueblo Machinery Company and the South Pueblo Manufacturing Company, both of South Pueblo, Colo., have consolidated their interests, and now carry on business in that place under the corporate name of the Colorado Machinery Company.

The Pensylvania Railroad Company has reduced the freight on coke 17 cents per ton.

The North Lebanon furnaces are to be remodeled by Messrs Witherow & Gordon, of Pittsburg, who will also put three Whitwell stoves into the Robesonia furnace, and two stoves for the furnace of Messrs. J. & R. Meily at Lebanon.

At Ansonia, Conn., the Farrel Foundry and Machine Company's orders for rolls are increasing to such an extent that a night force is soon to be added.

The Troy Bessemer Steel-Works recently produced in twelve hours 315 tons of steel in forty-one heats. This is considered the largest output on record with the number of vessels used.

The stockholders of the Union Iron and Steel Company, of Chicago, have decided to increase the capital stock from $1,600,000 to $3,000,000, the increase to be used for the purpose of effecting settlements with creditors.

President Potter, of the North Chicago Rolling-Mills, Chicago, states that the mills will again be in operation in three or six months, or not at all. They will not be started while the present prices continue. Four thousand men have been thrown out of work by the stoppage of these mills. Mr. Potter thinks that one third of the rails needed this year are already in market, and expresses the opinion that the outlook for the laborers now out of employment is a very dark one.

James Marshall & Co., iron pipe manufacturers, of Pittsburg, one of the largest firms in the business, have made an assignment to George J. Whitney for the benefit of creditors. The liabilities are $1,500,000, and the assets about $1,250,000. The failure was caused by too extensive speculation in pig-iron.

The Ferracute Machine Company of Brighton, N. Y., has issued a new catalogue of its power presses.

Messrs. E. P. Allis & Co., of the Reliance Works, Milwaukee, are building an engine for Carnegie Brothers, Pittsburg, Pa., for a pair of blowing-engines, with steam cylinder 36 inches diameter and 54-inch stroke, and air-cylinder 54 inches diameter and 54-inch stroke. They are to be put in for their new plant at the Edgar Thomson Steel-Works, these engines being similar in construction and design to those recently furnished the Joliet Steel Company, Joliet, Ill., by the Reliance Works.

The Chicago Smelting and Refining-Works are turning out large quantities of nickel-bronze castings for the Sperry Electric Motor and Car-Brake Company and the Hercules Iron-Works, of Chicago.

Fraser & Chalmers are building for the Golden Rule Mining Company, of Dragoon, Arizona, a complete twenty-stamp gold mill, including engine, boilers, and four Frue vanners. They are also making a thirty-stamp gold mill to go to Honduras. The above firm has just added to its boiler department a large boiler planer, which planes 14 feet 6 inches at each cut, and is 22 feet in length.

The Wharton Safety Railroad Switch Company, of Philadelphia, is gradually removing its works to Jenkintown, Pa., where the entire establishment is to be finally located. At the latter place, about 150 men are employed, while more

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than 400 are employed in Philadelphia. It is said that the removal will effect a saving of 90 cents a ton in freight for the delivery of all material, and from $15,000 to $20,000 annually in taxes.

R. H. Brown & Co., Westville, Conn., are filling an order for the Mexican government for fixtures and tools for the manufacture of fire-arms. They have recently added to their tools several drills, milling-machines, etc., of the Pratt & Whitney Company's make.

A recent circular issued by the Akron Iron Company announces that the company has disposed of its coal and iron interests in the Hocking Valley to the Columbus & Hocking Coal and Iron Company of Columbus. The new management proposes to continue the Akron Furnace on the same grade of iron as in the past. Mr. S. E. Bliss, of 89 Lake street, Chicago, Ill., who has so long acted as the Akron Iron Company's agent for the sale of pig-iron, has been appointed agent for the new company, for the sale of Akron foundry iron, in the Northwest. The Akron Iron Company retains control of its rolling-mills at Akron, and Mr. Bliss will continue to act as its Western agent for the sale of the company's bar iron and patent hot polished shafting.

Robert W. Gardner, of Quincy, Ill., issues the following circular under date of March 29th: "I beg leave to announce that the business owned by me and known as the Gardner Governor-Works, has this day been incorporated under the laws of the State of Illinois, by the name and style of the Gardner Governor Company. This will effect no change in the management, which remains the same. The Gardner Governor Company will largely increase the present facilities for the production of the perfected Gardner governor, and has already commenced the construction of entirely new works."

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE, APRIL 16, 1883.

ARIZONA.

PRESCOTT LAND DISTRICT.

William J. Simmons, Black lode.

CALIFORNIA.

SACRAMENTO LAND DISTRICT.

Philip Haskins *et al.*, Rose Hill gravel mine.

SAN FRANCISCO LAND DISTRICT.

Morris Goldtree, La Trinidad mine.

SHASTA LAND DISTRICT.

James A. Johnson *et al.*, Bullychoop and Occidental gold quartz mines. George Simmons, Burges Ranch placer.

COLORADO.

CENTRAL CITY LAND DISTRICT.

W. D. Cameron, Louis De Ball, Sheridan Hill, Sheridan Hill No. 2, and Robert E. Lee lodes. George W. Fox *et al.*, McLin lode. Albert H. Whitford, Mehaska lode. Theodore Michant *et al.*, New Enterprise lode. H. Montague *et al.*, placer. Ivers Phillips *et al.*, Providence lode. T. E. Shay *et al.*, Tishomingo lode.

DEL NORTE LAND DISTRICT.

Iowa & Colorado Consolidated Mining Company, Pay Streak lode.

DURANGO LAND DISTRICT.

J. T. Brewer *et al.*, Belle Conklin lode. Frank Walker, Sulphurets lode. William M. May *et al.*, Black Diamond lode. A. H. Steele *et al.*, Telegraph lode. Silverton Mining Company, North Star No. 2 lode. Patrick O'Brien, Katy lode and mill-site.

LAKE CITY LAND DISTRICT.

S. R. Beckwith, Warrick lode. Ouray Union Mining Company, Union lode. Galena Gulch Mining and Smelting Company, Muldoon and No. 3 lodes. C. E. Schoellkopf, Iron-Clad lode. Theodore Little, Jr., Emerald Isle lode. Allied Mines, Yellow Rose lode and mill-site. Edwin T. Rittenhouse, Katie lode. J. W. Mills, *et al.*, Flower of San Juan lode.

LEADVILLE LAND DISTRICT.

Frank L. Bellan, Louisiana lode. Oscar E. Lehon, *et al.*, Badger Boy lode. Michael Sullivan *et al.*, Silver Bell lode. P. J. Cunningham *et al.*, E. C. B. lode. Julius Hedge, Newton lode. Charles W. Ellis *et al.*, Curlew lode. Americus L. Pogue, Ajax, Nestor, and Cœsus lodes. J. T. Hillyer *et al.*, Hock Hocking lode. Relief Jackson, Klack Gulch lode. John J. Reithman *et al.*, Emile placer. Charles G. Arnold, placer. Albert Mead *et al.*, Surprise lode. S. W. Miller, Wilmot lode. Luther B. Smart *et al.*, Maxwell lode.

DAKOTA.

DEADWOOD LAND DISTRICT.

David M. Kelley *et al.*, placer.

MONTANA.

HELENA LAND DISTRICT.

Abraham Buol, IXL lode. Thomas Corrie *et al.*, Buffalo Spar lode. G. Henry Gayer *et al.*, Helvetia lode. William A. Clark *et al.*, Limitation lode. Marcus Daly, Grant extension lode. Elisha Pond *et al.*, placer.

NEVADA.

EUREKA LAND DISTRICT.

Frank Way *et al.*, Antelope (South) lode.

OREGON.

LE GRAND LAND DISTRICT.

J. P. Faull, placer. John O. Faull, John O. Faull quartz mine.

GENERAL MINING NEWS.

ARIZONA.

A correspondent of the Tucson *Citizen*, in speaking of the Welshman and Copperosity mines, says: On the Welshman, the greater portion of the work has been done, a forty-foot shaft having been sunk perpendicularly. At 20 feet, a cross-cut has been run, exposing 12 feet of red oxide, carbonate, and copper-glance ore, and again at the bottom, a thirty-five-foot cross-cut toward the hanging-wall, it shows 23 feet of this same ore solid, with ore still in the face of the cross-cut and no signs of the wall yet. Assay shows from 21 to 75 per cent in copper. The ore is of a good character for smelting, the lode carrying a large amount of iron for fluxing. This mine shows an outcrop the entire length of both these claims, carrying the same ore. On the Copperosity, a body of ore has been uncovered in the surface, near the Welshman line; and farther on, a twenty-foot shaft has been sunk on the ledge, showing a solid body of ore. The owners of these two mines are pushing the development of their property. There is sufficient ore uncovered to justify the erection of a smelter of good capacity, with the best of self-fluxing ore and a perfectly level wagon-road from Casa Grande right to the mine, over which to haul coke and necessary supplies.

COCHISE COUNTY.

It is stated that capitalists from Silver City have bought a group of gold mines near Dragoon Summit, and will erect a twenty-stamp mill at once. The mill is expected to be ready to run in ninety days.

TOMBSTONE DISTRICT.

The Tombstone *Epitaph*, in its review, says that the bullion output remains about the same as at the last reports. The smelter for the San Diego mine is rapidly approaching completion, and in a short time will add its quota to the bullion production.

GRAND CENTRAL.—The pumps are working successfully. Sinking the shaft has been resumed, and the 900 level is to be reached before cross-cutting or drifting begins.

MORNING STAR.—The shaft, which has obtained a depth of 94 feet, is sunk on a ledge showing up a true fissure-vein, which is three feet wide at the bottom. The assays run high in silver and gold.

SYDNEY.—This mine, which is an extension of the Grand Central and Naumkeag mines, has at last started working. The shaft is at present in shale and porphyry, and from an inspection of the west drift from the bottom of the shaft, the near prospects of an ore-body are most encouraging.

ALIFORNIA.

INYO COUNTY.

IBEX.—The company is building a five-stamp mill. The mines have a favorable prospect.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended April 7th shows: Ore crushed, 157½ tons; average assay value of pulp, $28.91 per ton; of tailings, $4.54. East cross-cut, 1000 level, is in 361 feet. North drift, 800 level, is 353 feet long. North drift, 672 level, 62 feet long. Uprise No. 52 is up 53 feet.

STANDARD CONSOLIDATED.—The official report for the week ended April 7th shows: Ore extracted and shipped to mills, 1172 tons. East cross-cut, 1000 level, is in 1304 feet. South drift from east cross-cut, 700 level, is in 645 feet, and shows 3 feet of vein. The uprise from this drift is up 12 feet, and also shows 3 feet of vein. West cross-cut from north drift is 155 feet long, and is still in hard blasting rock. North drift No. 1, 500 level, is 633 feet long, and the vein is about 9 feet wide. North drift from north uprise No. 1 is in 136 feet, and shows 6 feet of vein. South drift No. 2, 385 level, is in 414 feet, where the vein is about 4 feet wide. Uprise No. 4 is up 155 feet, showing 5 feet of vein. Uprise No. 5 is up 89 feet, and north uprise is up 75 feet. North drift No. 3 is 40 feet long. The stopes are yielding as usual, and show no change.

PLUMAS COUNTY—GREENVILLE DISTRICT.

The *Bulletin* reports:

GENESEE.—The mill has started up, and has been running successfully.

GREEN MOUNTAIN.—The mills have been kept running steadily during the past two weeks, and have been well supplied with ore of fair quality. The tunnel is advancing rapidly, and will reach the ledge toward the end of the month.

INDIAN VALLEY.—This mine is said to be the only one in the district provided with steam-power. When the supply of water fails, the engines can be started up and work continued as usual both in mine and mill.

TAYLOR-PLUMAS.—The mill has been busy night and day since a start was made over three weeks ago. Most of the ore crushed has been taken from the dump. A shaft has been started to tap the ledge close to the mill. Work was, however, stopped on account of the storm. Drifting eastward from the winze in the tunnel is continued, so that, when work in the shaft shall be resumed and the ledge reached, there will not be any great delay in opening from the shaft to the winze drift. The ledge is opening out in this drift fully up to what had been expected.

CANADA.

PROVINCE OF NOVA SCOTIA.

GALLIHAR GOLD MINING AND MILLING COMPANY.—The result of the crushing of fifty-one tons of ore was a bar of gold of about 200 ounces. The superintendent states that the mine is in splendid condition, and that the ore in the 140 and the 250-feet lodes can be depended upon to produce at least four ounces per ton on an average.

HALL-ANDERSON.—Active preparations are in progress for an early resumption of work at this mine. A large force of men has been set to work taking out ore from the Serpent and Orion lodes both of which are looking unusually rich. There are about one hundred tons of ore on the dumps, which will be crushed as soon as the new plates and water apparatus are placed in position. The government road is now completed to within four miles of the mine, and it is expected that it will be entirely completed within the next sixty days. The outlook is said to be most encouraging for a dividend in the near future.

OXFORD.—One hundred and forty-two tons of ore were milled in April—the mill running only fourteen days—which yielded $46 per ton. The mine is improving.

COLORADO.

ARAPAHOE COUNTY.

GRANT SMELTING-WORKS.—The Denver *Tribune* gives the bullion shipments from these works for the past month, as follows: Last month's bullion shipments amounted in value to $545,050; this is the largest shipment ever made in one month by any smelter, mill, or other reduction-works in Colorado. The amount of ore treated was 8350 tons. The amount of bullion shipped during the month represents very closely the month's product. It was produced in eight stacks. The new ninth stack has been running for about a week, but did not affect last month's product. The average daily work of a stack is therefore the reduction of 33⅔ tons of ore. It is not likely that a much higher average than this could be reached. The average amount treated daily is 270 tons. The highest amount treated in one day during the month was 307 tons, or 38⅜ tons to the stack. That is a fair test of the actual capacity of the stacks, with the charges then used, as they were running under a blast pressure which caused the slag to spout from the tap-hole in a stream which fell clear of the gutter which usually conducts it to the slag-pots. The new stack is similar to the others, and consequently, with similar ore and a smooth run, there will be probably over 9000 tons treated during the present month, and over $600,000 of bullion produced.

CHAFFEE COUNTY.

LONGFELLOW.—This claim, situated near Salida, has been opened in a new place, and the result is the securing of a large body of carbonates of a high grade.

MERRIMAC.—This company will put up concentrating-works just below Garfield, on the creek, where excellent, lasting, and abundant water-power can be had. Building will begin within the next ninety days.

CLEAR CREEK COUNTY.

GARFIELD.—This company, which was incorporated recently, will commence operations in May. The company owns four lodes, namely, the Excelsior, Aurora, Grand View, and Arequipa. The Excelsior lode will be cut at a depth of 250 feet; the Aurora, 690; and the Grand View 980.

FREMONT COUNTY.

The company that has been boring for oil at Cañon City struck it at a depth of 1200 feet. The oil is of a superior quality. The find is of course nothing more than a prospect at present, but experienced prospectors are sanguine in the belief that a few more days will develop an immense deposit.

ROYAL GEORGE SMELTING COMPANY.—A dispatch to the Denver *Tribune* states that one of the furnaces was blown in April 7th. The second one will be put in operation shortly. The capacity is fifty tons per day each.

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GILPIN COUNTY.

A dispatch from Central City says that there is considerable excitement over additional discoveries of surprisingly rich silver ore in Sulphuret Mountain, the new mining district.

DUTCHMAN.—The main shaft has attained a depth of 215 feet, from which point levels east and west will be driven. The outlook of the mine is favorable. At a point 160 feet below the surface, drifts east and west have been driven 40 feet in length.

GUNNELL.—The products of this mine for March were as follows: Smelting ore sold, $7780.75; gold retorts, $2323.75; tailings sold, $256.26; total, $10,330.76.

QUARTZ HILL MINING AND TUNNELING COMPANY.—It was decided at the annual meeting, held in Central City, to levy an assessment, so as to continue work in the heading of the tunnel, and a contract will soon be let to run the tunnel twenty-five feet beyond its present heading.

LEAVITT.—Work is to be resumed at this property. Men are engaged cleaning out the shaft.

TORONTO.—The mine produced and shipped about forty tons of ore during the month of March, which netted on an average about $18 per ton. The crevice is over two feet in width, all of which is sent to the sampling-works without sorting. It is soft and very easily worked. The ore now shipped is from a drift 25 feet from the surface.

LAKE COUNTY.

Late Leadville exchanges contain the following:

CLIMAX.—In the No. 3 shaft, which has reached a depth of two hundred and fourteen feet, a strike was made recently. The lessees have been pushing work vigorously, and after running a drift sixty feet from the one hundred and thirty-foot level, they came upon a three-foot breast of ore which carries one hundred and sixty ounces in silver and seventy-three per cent in lead. The ore is regarded as being of the most valuable character from the fact that it costs but a small amount to reduce it. About five tons per day are shipped, and this amount will be increased gradually as the work progresses.

COLONEL SELLERS.—The shaft has attained a depth of one hundred and six feet, and has passed through a small body of lime carbonates. After sinking twenty feet farther, the lessees will proceed to drift.

MATCHLESS.—The latest and what is considered the most important strike lately made is that in shaft No. 3. This shaft, after cutting a body of flint ninety-six feet in thickness has, at a depth of about two hundred feet, cut a large body of sand carbonate, assays from which return about thirty ounces in silver per ton. A short drift has been run on this body, and is entirely in ore,

MORNING STAR.—The McCord shaft is now down 300 feet, and is sinking to connect with the incline below the Waterloo shaft. A body of mineral was cut at 200 feet. A vein of water has been struck in the lower Waterloo shaft, but no great trouble is anticipated.

PITKIN COUNTY.

GENERAL SHIELDS.—Recently a vein has been struck, three feet in width, which carries ore that averages from thirty-five to forty ounces in silver, and fifty-five per cent lead. The owners have been working constantly, and there are about three thousand tons of ore upon the dump at the present writing.

SUMMIT COUNTY.

ADDIE.—The new incline is in forty-five feet, and is already showing some mineral. It is thought that the ore-body will be reached at a distance of seventy-five feet.

FELICIA GRACE.—The vein recently struck is about five feet thick, and contains wire silver and galena. The ore is in lime, and the appearances are, that the formation is regular. The vein is nearly perpendicular, and has the appearance of a fissure. No shipments have yet been made.

MAXIMUS AND BERNADOTTE.—The Leadville *Democrat* prints the following: There has been considerable gossip recently about a rich strike in one of the mines owned by the Colorado Land and Mining Company, located on Fletcher Mountain in Summit County, and about a true fissure-vein that had widened to five or six feet, and was already producing large quantities of high-grade ore. The reports being conflicting, the reporter called at the office of the company yesterday, and interviewed the manager, who was very evasive, and said in emphatic terms that the property of the company was not worked for the benefit of the public. The reporter learned from another source that the Maximus and Bernadotte veins were beyond question true fissures, and that they had produced more high-grade ore during the past month than at any previous month since the mines were opened. All persons not interested have been excluded from the mines, and it is difficult to get at their contents. A true-fissure producing vein is of vital importance to that district, and whatever tends to promote the welfare of the State is of interest to the public. This suggestion is for the benefit of the reluctant manager.

ROBINSON.—The new incline from winze No. 2 shows a vein of solid pay mineral five feet thick.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended April 1st: Ore produced, 1025 tons. Winze advanced 9½ feet; total, 66½ feet. We resumed work on the south header, which is now 59 feet from the chamber. There is a marked improvement in the yield of ore for the last ten days. For the week ended April 8th: Ore produced, 1050 tons. Shipped 827 ounces gold; value, about $14,000. Winze advanced 10 feet; total, 76½ feet; all in very fair ore. Work on the south header is advancing slowly, but all the ore taken out is of good quality.

FATHER DE SMET.—The superintendent's report from April 1st to April 8th shows ore extracted from first, second, and third levels, 1975 tons. Ore milled, 1975 tons. North end tunnel in 864 feet. Golden Gate north header in 60 feet. Cook's west cross cut in 39 feet. Tramway level rise in 51 feet. The superintendent writes, under date of the 5th inst., as follows: Herewith express company's receipt for bar No. 156, 1038·85 ounces gold, the result of run of mill for last half of March. The mill is running with the regularity of clock-work, and unless some accident occurs, it will require less repairs the coming year than for either of the last two past. At the mine, every thing is running well. The cross-cut running west from Cook's chamber is penetrating a good body of ore. We are into it with cross-cut for a distance of 15 feet; and if it continues to foot-wall, it ought to be, and I think it will, be 65 feet wide. I have reduced the force by discharging ten miners. If the dividend was about ten cents per share per month, I think I could tell you that we have twenty dividends in sight; and should also be able to do more necessary development-work, so that, at the end of the twenty months, we should have twenty more dividends in sight.

HOMESTAKE.—It is believed that this company will erect a 200-stamp mill on the Old Abe this season, although its location has not yet been determined. Whitewood, at the mouth of Gold Run, will probably be selected, as an abundance of water would there be assured, even in the dryest season.

RICHMOND.—A strike is reported in this mine, lying east of the Sitting Bull. The opinion prevails that the ledge, if there be one, is the Sitting Bull caught on the dip. Later reports say that litigation of an interesting character is promised between these companies.

SITTING BULL.—The mill continues in successful operation, turning out about 900 ounces every twenty-four hours. A large force is at work upon the addition, which will be completed in about two weeks, and which will treble the present milling capacity of 18 tons a day. Nearly all of the machinery has arrived. The dump now contains eighteen months' supply of milling ore, while a large reserve is in sight in the mine.

GEORGIA.

COLUMBIA.—The work is progressing rapidly; but on account of rain and lack of carpenters, the flume will not be completed as soon as expected. The tunnel through which the flume passes, in going through a divide so as to get to a great depth on the ore, is over 300 feet long.

FINDLEY.—Work is to be resumed at this mine, which has been shut down for a long time.

LOCKHART.—The twenty-stamp water-power mill is not at work. The ore is mined from the seven-foot vein on Findley Ridge. The vein is very uniform and turns out well.

PIGEON ROOST.—The mill has shut down. The owners will increase the present capacity to twenty stamps.

MEXICO.

Quimby, Appleton & Co., owners of the Zamelebuacan mines in Vera Cruz, have been joined by several capitalists from St. Louis, and will enlarge the operations at the mines. The Mexican *Financier* says that these mines are situated some ten miles from the Maqueta mines, and like the latter are conducted on the American system of mining. They are about 12 miles from Perote. The ores bear gold, silver, and copper. The silver ledges are generally narrow, but the supply of gold and copper-bearing ores is large, the gold ores running from $7.50 to $30 per ton. The mines have been worked for more than two hundred years by running tunnels into the mountain. One of these, on the Alto mine, is about 800 feet long. The ores are run through a Blake crusher, and are then worked in a Tasker pulverizer, and run over two Embrey concentrating-tables. The company will now erect a pulverizer of twice this capacity. The power is derived from an adjoining stream. The company will also erect a water-jacket furnace for smelting the copper ores which are now treated in a small Spanish smelter.

PACHUCA DISTRICT.

A correspondent sends us the following notes from the Pachuca and other districts in the State of Hidalgo:

Work on the "Pachuca River Concentration" advances slowly. The engine-house, with foundation for engine and boiler, is nearly completed. A part of the machinery has been received; the remainder, which is still at Irobo, is expected shortly.

At Real del Monte, work is to be resumed in the mines of Gen. John B. Frisbie, of California, who has some good property there. It is to be regretted that they have been left idle so long.

El Rosario mine, at El Chico, worked principally by American capital, is doing well. The old shaft, which is reported to be down several hundred feet, is now unwatering; in one of the old workings, a branch, one foot broad, of rich ore has been found. The mine promises well.

In the Capula and Santa Rosa districts, work has been stopped on nearly all the mines of the Schley Mining and Milling Company, until some arrangement can be made about putting up a mill for reducing the ore of the district.

The Miners and Inventors' Company, of Boston, has stopped work on all the mines for the present. Some of its property is reported to be good.

The Cueva Santa is looking well and is worked.

NEVADA.

COMSTOCK LODE.

From the report of the investigating committee of the San Francisco Stock and Exchange Board, we take the following:

We have found it impossible to obtain any reliable official information with reference to the condition of the mines on the Comstock lode, and the little we have been able to glean from that source is any thing but satisfactory. This is owing to the secrecy with which all exploratory work is carried on. While the State laws have made it imperative, on the part of the superintendents, to report to the companies' officers all discoveries made with the diamond drill, it is found that they have, in almost every instance, disregarded the law, contenting themselves with privately reporting such discoveries to operators who have obtained such control, while having little if any moneyed interest in the companies. This is a matter of grave import to the stockholders of the companies, who, while paying enormous sums for the purposes of exploration, are debarred all knowledge of or benefit from any discoveries which may be the result of such expenditures. It is true that reports are made to the secretaries of the different companies; but they are very meager and treat only of the most unimportant work going on in the mines; and where reference is made to interesting points on the lode, the information given is so vague as to be rather calculated to deceive than to give any proper understanding of the situation. From information obtained outside of official sources regarding the existence of "concealed bonanzas," we are inclined to the belief that valuable ore-bodies have been discovered, which, so far, have not been officially announced.

With reference to the middle and north-end mines, namely, all those mines situated between Potosi and Utah inclusive, we have to say that they appear to be in a splendid condition for rapid exploration. There has been an enormous amount of money expended upon these mines in preparatory work, such as sinking shafts and winzes, and making air-connections, running lateral drifts, etc., and we have every reason to suppose that the cost of future explorations in these properties will be much less than at any time in the past. In fact, it should be possible to run these mines for the next two years for one third of the expense which the work for the past two years has entailed on the stockholders. These mines are thoroughly ventilated, and, as a rule, much cooler than they have been for some time past. The danger from water is past, the water problem having been solved, and the work now going on is below the water-belt, and the mines are well drained. Nothing but the grossest carelessness could cause any damage from water. These mines are splendidly equipped with machinery of the finest and most substantial character, their pumping machinery being unequaled in the world. The mines are opened to great depth, the deepest workings being in the Mexican and Ophir, on the 3100-foot level. They have large and substantial shafts and winzes, and are opened laterally with large drifts for about two miles, and so well arranged and connected as to make danger from fire a very remote contingency.

For about a mile north of Savage, no explorations of any importance have been made on the lower levels until very recently, when several cross-cuts were started, one of which encountered ore on the line of the Union Consolidated and Sierra Nevada of great promise, and we have good reason to hope that when further explored it will prove a real bonanza. The other cross-cuts so far give good indications, and we expect to see paying ore developed by them.

The Savage, Hale & Norcross, Chollar, and Potosi are ready for cross-cutting on the lower levels, and the fact that in Hale & Norcross there has already been some good ore discovered in the 2600-foot level gives reason to expect the uncovering of a body of good ore in this section of the lode.

In the Mexican, Ophir, California, Consolidated Virginia, Best & Belcher, and Gould & Curry mines, there is a block of ground about 1000 feet in hight by over 1000 feet in width, and over 3500 feet in length, which has not, so far as has been learned, been cross-cut or explored in any way to any great extent.

All the lower levels of the Comstock mines are in an ore zone, as shown by the continual cutting of stringers, seams, and small bodies of rich ore, and there is no reason why there should not be large and rich bodies of ore discovered. In

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fact, the prospects for the lode were never brighter. So far as the southern group of mines is concerned, nothing can now be seen below the 1900 level, as the mines have been flooded up to that point for more than a year. Above this level, there has been a large amount of ore extracted. Within the past two years, over 120,000 tons of ore have been extracted and worked—principally from the Crown Point and Belcher. There is an abundance of ore in these mines, and it is not the fault of the mines that they have not been placed on a paying basis long ago. The prospects and condition of the mines on the Comstock lode has not been so good for years.

NEW MEXICO.

A correspondent of the New York *World* says that sixteen miles west of Las Cruces (an old Mexican town on the Atchison, Topeka & Santa Fé Railroad on the Rio Grande) is situated the Organ Mountain Mining District. About one and a half miles south of Organ, is the Stephenson mine, worked by Horace Stephenson before the war. All the mining was done by Mexicans on the "coyote" plan, the ore being packed on burros to the Rio Grande, and smelted in adobe furnaces. The Stephenson mine changed hands many times; finally a company which is at present known as the San Augustine Silver Mining Company was formed to work the mine. It is hoped that work may soon be commenced, as the mine shows a very large body of tractable ore. It is a lime and porphyry, and the ore runs about $35 to the ton in silver clear across the lead.

At the town of Organ, about one hundred yards north of the road, is the Memphis mine, situated on a low foot-hill about one and a half miles west of the main range. The main shaft is down 155 feet. At the 100-foot level, a drift has been opened 105 feet, showing a vein of ore 9 feet, red and black oxide of copper running from 27 to 60 per cent, and silver running from 5 to 100 ounces. At the same level, are also two winzes of 18 feet in depth each, down to water-level, and also showing 9 feet of ore. At 150 feet, a cross-cut was made, finding ore 17 feet from shaft, ore opening at five feet. Three assays gave the very satisfactory return of $40 per ton, the ore consisting of black oxide of copper, containing antimony. Machinery is daily expected. The mine is bonded for six months, and work will be pushed vigorously.

About two miles north, in the main range, are the Merrimac, Little Buck, and Silver Star mines. The Merrimac is the most fully developed, and has two lodes running through it, known as the Merrimac lode and the Little Buck lode. The first opened was the Merrimac, seventy feet, on an incline of forty-five degrees. The vein is from four to five feet in width; hanging-wall, porphyry; foot-wall, lime. The ore shows pyrites, green carbonate, and peacock copper, averaging 15 per cent; also galena, of which assays have been made running from 66 to 176 ounces.

About 100 feet to the east of the first shaft, the Little Buck lode has been opened twenty-five feet at an angle of forty-five degrees and dipping toward the Merrimac lead. One chamber has been opened and stoped and ore of the highest grade taken out, sacked and shipped to the St. Louis Smelting and Refining Works.

Adjoining the Merimac on the northeast is the Little Buck mine, a lime contact, native and horn-silver having been found two feet from the surface in June, 1882. Work is progressing slowly.

On the same lead, and adjoining the Little Buck on the northeast, is the Silver Star mine. The vein shows the same characteristics, but not so much native or horn-silver has been found. The lead is now decided, and shows galena principally; small quantities of native silver have also been found.

West of the Merrimac, on a foot-hill at the base of the mountains, is the Jay Gould, down 50 feet in a copper blow-out. Four fifths have been lately purchased by Philadelphia parties for $10,000. Work will soon be resumed.

Crossing the range at San Augustine Pass and going north two and a half miles, is the Black Prince group of mines, on the eastern slope of the mountains, which are very narrow for ten miles north of the pass, a rincon breaking back from the eastern face of the range. The Black Prince group consists of the Black Prince, Hidden Treasure, and the Fourth of July mines. The veins run from the southwest to the northeast. The formation is limestone, quartzite, and slate. The Black Prince is down 50 feet in lead carbonates, running from 13 to 51½ per cent lead, and from 34 to 54 ounces silver. From indications, the carbonate bed is from 10 to 25 feet wide. The Hidden Treasure is a tunnel excavation of 200 feet; hanging-wall, slate; ore, lead carbonates, same as Black Prince. The Fourth of July mine has a four-foot ledge showing silver and galena. The group is considered one of the best prospects in the Organs, but needs development.

Two and a half miles east of the Black Prince and four miles north of Shedd's Ranch, on Mineral Hill, a mountain detached from the main range and about in the middle of the rincon, is a group of mines, the most prominent of which is the Lady Hopkins, upon which work was commenced in January, 1882. The mine is now 105 feet in depth, with a good prospect, the ore running low in gold, silver, and copper. At 300 feet, work will be begun again on the shaft, so as to strike the tunnel. Two shifts are steadily at work.

Two miles northeasterly of the Hopkins is the Iron King group—the Iron King, Mary C., and Little Gem. The Iron King was opened to a depth of 79 feet in the summer of 1882; is an iron-stained quartz, the vein dipping at an angle of 45 degrees to a depth of 40 feet, then straightening to 20 degrees. The ore shows copper, silver, and gold in iron and quartz, and assays $30 per ton at a depth of 30 feet. The formation is granite and porphyry; width of vein unknown. Work was resumed February 1st by the owners. At 100 feet they will cross-cut for the walls. Southwest of the Iron King, and adjoining it, is the Mary C. mine. Assessment-work only has been done so far.

Four miles north is Black Mountain, on which are situated the Mountain Chief and Copper Duke mines. Work has progressed steadily, the formation changing very often, but the body of ore gradually growing larger. The ore runs principally in silver; at times the shaft runs in copper pockets. At present, at 115 feet, they are in an iron-stained quartz similar to that in which the strike was made.

Farther along the mountain, work is pushed by a Fort Worth company. Fifty-foot shafts are sinking in six claims, the most promising of which are the Dean Richmond and Home, Sweet Home.

North of Black Mountain, on the eastern face of the range, is one of the strongest leads of the camp. The course of the vein is from the southwest to the northeast. There are three adjoining claims—the Broad Gauge, the Alb, and the Fertile. Assessment-work only has been done on the first two. The Fertile is down 55 feet, the ore running from 15 to 55 per cent copper and 22 ounces silver. The vein was 2 feet wide in surface, but opened out to 7 feet at 35 feet.

All along the mountains, work is progressing steadily. The principal work is now going on on the east side. Good prospects are scattered all along from the pass to the San Andreas. The locations are on Mineral Hill, Antelope Hill, Black Mountain, Bear Cañon, and at Little San Nicholas, where the Organ Mountains and the San Andreas commence.

The survey of the El Paso and White Oaks Railroad has commenced, and has already progressed about twenty miles north of El Paso, finding a very easy grade and a country requiring the least amount of labor for the construction of a road-bed. The mining locality above described can not fail to attract wide attention as soon as transportation for ore is thus secured, which will be followed by the development of the fuel deposits and the erection of smelters along the line of the railroad in close proximity to the mines.

NEW YORK.

According to Mr. James M. Swank's report to the American Iron and Steel Association, the production of iron ore in 1882 of the Lake Champlain District of New York is estimated by a very well-informed correspondent at 675,000 gross tons, against 637,000 tons in 1881. Included in this district are the Chateaugay mines, from which 224,158 tons were shipped in 1882, according to the information received from Mr. A. L. Inman, general manager of the Chateaugay Ore and Iron Company.

PENNSYLVANIA.

Mr. J. Taylor Boyd, general superintendent of the mines of the Cornwall Ore Bank Company, in Lebanon County, states that the shipments of iron ore from these mines in 1882 amounted to 309,680 gross tons, against 249,040 tons in 1881.

UTAH.

CRESCENT.—The Salt Lake *Tribune* states that there are exposed in the workings of this company's claims 40,000 tons of ore of an average value of $38 per ton and which will net $20 per ton, the cost of mining, hauling, and reducing not being more than $18. It is further stated that the mine is in shape to send out from 75 to 100 tons per day as soon as it can be hauled away on the roads, which are at present in a very bad condition.

EMMA.—In order to be able to operate the mine at a much lower depth than the old workings, the present management has secured the right of way through the Bay City tunnel, which is in nearly half a mile. At the heading of this tunnel, a shaft is sinking, which has reached a depth of 155 feet. At a depth of 135 feet, a good station has been cut, from which drifting for the vein is done. This has now reached a length of twenty feet, and progress is made at the rate of three feet per day. It is expected to tap the Emma body of ore in 100 feet from the point now reached. The cuts making are in country-rock, which is barren of all mineral indications. The expenditures for machinery by the company during the past year aggregate about $20,000, and every improvement made is of the most substantial kind.

MAMMOTH.—The difficulties regarding this property have not yet been settled, according to the latest reports of the Salt Lake *Tribune*.

MILLARD COUNTY.

DESERET.—Mr. E. P. Hall, Secretary, reports the following: Recent test shipments made from the E. P. H. lode, one of the properties of this company, show most satisfactory results, extremely gratifying to the owners, and encouraging to all interested in this Detroit District. A shipment of ten tons average ore, taken out in sinking the shafts from a depth of 130 to 138 feet, sent to the sampling-works of Messrs. Scott & Anderson, Sandy, Utah, gave an average run of 15·4 per cent of copper and $15.27 in gold and silver. One car-load sent to the Chicago Copper Company yielded 25·3 per cent of copper. Eight tons being oxide ore, taken out of drift run from the 140-foot level, gave 19·7 per cent; and 3½ tons of green carbonate from the cross-cut tunnel at the 155-foot level ran 38·6 per cent of copper. The face of the drift from the 140-foot level is in ore, and is improving as greater depth is attained, pitching into the mountains. At the bottom of the shaft, the ore-body grows stronger. The cross-cut at the 155-foot level shows the largest ore-body yet discovered. Following this vein over the mountain for some 2000 feet, prospect shafts have been sunk various depths to 18 feet, all showing free gold quartz, assaying from $15 to $45, with picked samples showing from $215 to $490, in gold.

SILVER REEF.

STORMONT.—From a statement giving the present condition of the workings and developments of this property, we take the following: The Buckeye, Last Chance, and Half Savage, situated in one block of ground, are the only claims now worked by the company. The mines have been developed by five levels and a number of shafts. The present yield is about 1000 tons of ore per month, at a cost of $8 per ton for mining, $3.50 per ton for milling, and $2.08 for hauling. Prospecting costs about $1000 per month. At present, there are about 3000 tons of ore in sight, of from $20 to $25 per ton value. The company's mill is located on the Virgin River, six miles from the mines. The plant consists of ten stamps, 650 pounds weight, thirteen pans of 3000 pounds capacity, seventeen settlers, two boilers, twelve and fifteen feet long, pumps, retorts, etc. Power is furnished by a forty-eight inch turbine-wheel. The mill and the improvements cost over $70,000. After the failure of Clark & Bothwell, the most conservative course was forced on the present management of this property. Outside of the complications arising from the failure, other great difficulties were met. A series of freshets damaged the dam on the Rio Virgin, and swept away the mill-race, during the months of July and September, 1882, entailing great loss. During the months of November, December, 1882, and January and part of February, 1883, the ore ran very low grade, often as low as $15 per ton. To meet all these unexpected expenses and discouragements, required the strictest economy. With this end in view, the company has succeeded in reducing the monthly expenses from $22,000 to $15,000. Since the middle of February, the ore has steadily improved, until at present it averages about $23 per ton. As the ore on the upper levels has averaged as high as $35 per ton, it is expected that ore of that grade will be reached again. During February, rich ore was struck on the old Stormont vein just north of the boundary of the Stormont claim, on property not belonging to this company. This strike is believed to continue into the company's property, and to assure an additional ore-supply from a claim which has been worked for years. The present condition of the affairs of the company, in view of the difficulties which it has had to contend with, must be considered satisfactory. The gross bullion produced from May 16th, 1882, to March 1st, 1883, amounted to $188,718. Product of gross bullion for March, $19,770. None of the workings is as deep as some of those of other properties at the Reef, which to-day, on the same vein, are extracting much better grade ore. The two claims, the Thompson and the McNally, have never been developed. These claims are on the same reef as the Barbee & Walker mine, which at one time produced largely. The Stormont claim proper has not been worked for some years. Recent developments on adjoining property, above alluded to, indicate that valuable ore will again be found on it. At present, the mill and all its appurtenances, dam and race-way, are in the most stable condition, and there is no fear from further trouble by freshets.

WYOMING.

A correspondent of the Salt Lake *Tribune* writes from Atlantic City that mine-owners who have not worked the past winter are preparing to push work. The owners of the Soles & Perkins have been quietly at work all winter, and have a three-foot vein of ore that will run on an average $12 per ton. They own, in connection with the mine, a good ten-stamp mill and water-power. The Mary Ellen, which in days past attained considerable notoriety, having high-grade ore, is also owned by the owners of the above mine. The vein is small, but of extreme richness, and has yielded largely.

The Buckeye has been worked with good results. The ore averages about $8 per ton.

The Cariboo has also been worked the better part of the winter, and shows a small vein of good ore.

The Carrissa, in South Pass District, has had only assesment-work done.

The Bullion mine, in Miner's Delight District, has for some time past remained idle, owing to the vast amount of snow accumulated during the severe storms of February, and the absence of water for milling purposes.

A few prospects on Strawberry are worked, and it is said with flattering results.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, April 20.

There is nothing new or of special interest to note in the mining market this week. The dealings continue to be almost exclusively confined to Sonora and Robinson and a few low-priced stocks. Sonora and Robinson have been manipulated to suit the market, and have been strong one day and weak the next, while the others have generally showed weakness. Alta-Montana has come in for an active share of the business, and has been very weak, selling as low as 4c. Navajo, the chief Tuscarora stock, has also been very weak, but closed to-day a little stronger. Below will be found a complete summary of the market. The total number of mining shares sold at all the Exchanges aggregates 262,326, as against 344,094 last week.

The Comstock shares have been quiet and steady. California records but a small business at steady prices, selling from 22@20c. Consolidated Virginia was quiet and steady, selling from 48@45c. Sierra Nevada was dealt in to the extent of 465 shares at $2.10@$2.25@$2. Union Consolidated records but one transaction, and that at $3.25. Mexican was quiet and steady; it sold from $2.88@$2.75. Ophir sold at $2, and Savage at $2. Yellow Jacket was dealt in to-day at $2.88@$2.75. Best & Belcher sold to the extent of 300 shares at $3.50@$3.38. Sutro Tunnel was active and steady, selling from 21@20c.

The Leadville stocks were also quiet, and were steady. Amie was the exception, and was active at irregular prices, selling from 22@18@20c. Chrysolite records but a small business, and was steady at $1.20@$1.15. Dunkin sold at 26@25c., and Hibernia at 2c. Iron-Silver had a small business at irregular prices, selling from $2.90@$2.80@$2.85. Leadville was dealt in to the extent of 400 shares at 69@68c. Little Chief sold at 45@43c., with a small business. Little Pittsburg was steady at 60@66c., with a business of 600 shares. Big Pittsburg sold at 20c., and Climax at 6@5c. Miner Boy, with one small transaction, sold at 1c.

The Bodie stocks were quiet and steady. Bodie Consolidated was quiet and a little weak, selling from $1.50@1.25. Standard had a fair business, and was strong; it sold from $6.88@$7. Bulwer sold at 85c, and Goodshaw at 2@1c.

The Tuscarora stocks record a small business, and were generally, steady with the exception of Navajo. Grand Prize sold at 95c., Argenta at 85c., and Belle Isle at 50c., each recording but one transaction. Navajo had a fair business, and was quite weak; it sold from $3.20@$2.10@$2.40. North Belle Isle sold at 31c. Independence records a fair business at steady prices, selling from 65@60c. Elko Consolidated was active and irregular; it sold from 6@10@8c., with a business of 14,900 shares.

In the miscellaneous list, Alice continues strong, selling from $2.80@$3 with a small business. Bassick sold from $9.50@$9.63. The Green Mountain stocks have been quiet and steady. Gold Stripe sold at 7@10@9c. Green Mountain sold from 80@82c., and Cherokee at 2c. Hall-Anderson was active, and has grown quite weak; it sold from $2@$1.35, the transactions aggregating 10,800 shares. Homestake was quiet and steady at $15½@$15⅝. Horn-Silver had a small business and was a little weak; it sold from $8@$7.50. Ontario had a fair business at stronger prices, selling from $26½@$27¼. Robinson Consolidated continues to be actively dealt in at very irregular prices; it sold from 84@75c., then up to 84@79c., closing at 83c. to-day. Sierra Grande records but a small business, and has been steady; it sold from $1.65@$1.75. Vizina has been moderately dealt in, and has been a little weak, selling from 85@81c.

Alta-Montana, has been actively dealt in, and has become quite weak; it sold from 9@4@5c. Central Arizona was quiet at 29c. Dahlonega sold at 3@4c., with a small business. Decatur has been active and irregular, selling from 5@2@4c., the business aggregating 21,400 shares. Durango records but one transaction at 5c. Eastern Oregon sold at 40c. Harlem was moderately dealt in at irregular prices; it sold from $1.40@$1.55@$1.45. Hortense sold at 10@12c. and Lacrosse at 11@12c. Oriental & Miller has had a fair business at steady prices, selling from 17@15c. Rappahannock was quiet and steady at 9@8c. Red Elephant sold at 7c., the transactions being small. Silver Cliff sold at 34@33c., with a small business. Sonora Consolidated has been very active at very irregular prices; it sold from $1.30@$1@1.55@$1.05, closing at the latter figure to-day. South Pacific sold at 6@5c., with a small business. The State Line stocks were quiet and steady; Nos. 1 and 4 sold at 2@8c., and Nos. 2 and 3 at 6@5c. Taylor-Plumas has grown stronger, under a large business, and has sold from 14@19c.

The Reliance Mining Company has been dissolved by order of Judge Barrett, of the Supreme Court, and Mr. Charles H. Hamilton appointed receiver. The company was organized some years ago, and the petition for its dissolution states that it is possessed of no property.

MEETINGS.

The Atlanta Hill Mining Company. Mills Building, fifth floor, Room 4, New York City. Annual meeting and election of trustees May 2d, from two to three o'clock P.M.

The Evening Star Mining Company, No. 2 Wall street, New York City. Annual meeting of stockholders and election of trustees, May 7th, from two to three o'clock P.M.

The Little Pittsburg Consolidated Mining Company No. 45 William street, New York City. Annual meeting of stockholders and election of trustees, May 7th, from two to three o'clock P.M.

The Morning Star Mining Company, No. 2 Wall street, New York City. Annual meeting of stockholders and election of trustees, May 7th, from two to three o'clock P.M.

The Sterling Mining Company, No. 2 Wall street, New York City. Annual meeting of stockholders and election of trustees, May 7th, from two to three o'clock P.M.

DIVIDENDS.

The Carbonate Hill Mining Company, of Colorado, has declared dividend No. 4 of five cents per share, payable May 2d, making the total dividends to date $40,000.

The Contention Consolidated Mining Company, of Arizona, has declared its regular monthly dividend (No. 15) of twenty-five cents per share, payable April 28th, at the office of the Farmers' Loan and Trust Company on all stock registered in New York.

The Diamond Coal Land Company announces a quarterly dividend of three per cent, payable on demand.

The Father de Smet Consolidated Gold Mining Company, of Dakota, has declared dividend No. 27, of twenty cents per share, payable at the office of Laidlaw & Co., No. 14 Wall street, New York, April 30th. Transfer-books will close April 23d.

The Kentuck Mining Company, of Nevada, has declared a dividend of ten cents per share.

The Mohave Mining and Milling Company has declared a dividend (No. 4) of two per cent on the par value of the stock, payable at the office of the company, No. 78 La Salle street, Chicago, April 25th.

The Shoshone Gold Mining Company, of Idaho, has declared a dividend (No. 5) of one per cent on the capital stock, payable April 18th.

The Silver Cord Mining Company, of Colorado, has declared a dividend (No. 1) of fifteen cents per share, and an extra dividend of five cents per share, payable May 2d.

The True Fissure Mining Company has declared a quarterly dividend of twenty-five cents per share, payable on demand, at the office of the company, No. 167 La Salle street, Chicago.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, No. 49 Broadway, report as follows for the week:

Fluctuations during this week have been small and inconsequential, ranging from 92@96c. It is exceedingly dull in the oil market.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
April	14....	$0.94⅞	$0.95	$0.93¼	$0.93⅞	392,000
	16....	.92¾	.95⅛	.93	.95⅛	644,000
	17.....	.95¼	.95¾	.93⅛	.93¾	593,000
	18.....	.93⅞	.95⅛	.93⅝	.93⅝	578,000
	19....	.93⅝	.95	.93⅝	.93¾	439,000
	20.....	.94	.94⅛	.93⅞	.93⅞	251,000
	Total sales.					2,897,000

The Cooper tract, that was producing 5000 barrels a week ago, is now yielding 3300 barrels, and the Balltown District only 810 barrels, as against 1000 barrels two days ago. There are several wells expected in within the next few days, and better prices are looked for soon.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market continues dull. The Comstock shares show but little change in prices, and the business has been light. The outside stocks have also been dull. The only change of interest to note is in the Tuscaroras, which have been quite weak, the sharp decline in Navajo affecting the whole list.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. April 13.	April 14.	April 16.	April 17.	April 18.	April 19.
Albion						
Alpha	1¼	1¼				1¼
Alta	¼			3-16		
Bechtel						
Belcher	13-16	13-16		¾	13-16	27-32
Belle Isle	7-16				¼	11-32
Best & Belcher	3¾	3⅝		3¼	3¼	3⅝
Bodie	1¼	1⅜		1⅜	1⅜	1¼
Bullion						
California	3-16			3-16	3-16	¼
Challar						
Con. Virginia	7-16	7-16		7-16	13-32	13-32
Crown Point	1¼	1¼		1¼	1¼	1¼
Elko Cons	3-32					
Eureka Con	4⅛	4¾			5¼	5¼
Exchequer	¼	¼		3-16	3-16	¼
Gould & Curry		2¼		2	2⅛	2¼
Grand Prize	⅛	⅛		13-16	13-16	27-32
Hale & Norcross	3	3		3	3	3
Independence		9-16				9-16
Martin White				5-32	5-32	3-32
Mexican	2⅞	2¼		2¾	2¾	2¾
Mono						
Mount Diablo	3½			3½		
Navajo	3⅜	3		2¼	2⅜	2¼
Northern Belle	9¼	9		8	8	8⅛
North Belle Isle	¼	5-16				5-16
Ophir	2¼	2⅛		2	2	2
Overman						
Potosi	15-16	29-32		13-16	13-16	27-32
Savage	2			2	1⅞	2
Scorpion						
Sierra Nev	2⅜	2¼		2¼	2¼	2⅛
Silver King	10¼	10¾			11¼	11¼
Tip Top						
Union Con	3⅝	3¼		3⅝	3¾	3¾
Wales Con	3-16			3-16		3-16
Yellow Jacket	2⅞	2¾		2⅞	2⅞	2¾

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, April 19.

There is no improvement to note in the market for copper stocks the past week. The market is fairly steady as to prices, but business is extremely dull, and there is no disposition to buy any thing, except the dividend-paying stocks, which at the present rates for ingot copper will reduce the number of this class to probably two mines, namely, Calumet & Hecla and Quincy. The former will no doubt continue to pay its regular dividends, as it can make money at even a much lower price for copper, and the latter will be able to pay, although not so much as in the past two years. The Osceola, which has paid regular dividends for some years past, seems to be declining in price, which would indicate a fear on the part of holders that it may suspend dividends during the coming year, unless there should be an advance in ingot. Calumet & Hecla sold this week, ex dividend $5, at $234, and later at $234½, which is equal to $239½, the closing price of last week. Quincy has been fairly steady, at the decline of last week, selling at $45¾@$46. There have been no sales of Pewabic the past week; in fact, there is no demand for it; we hear that $3 is offered for it, assessment paid, which would not leave much for the holder. Franklin declined from $11@$10¼ on sales of 50 shares only. At the annual meeting this week, the old board of directors was re-elected, and the same management will continue the coming year. Osceola declined from $26½@$24 on free offering of the stock. Huron sold at 50c., assessment unpaid. National, no sales, but an assessment of $1 is announced, as indicated last week. Copper Falls sold at $1, as before.

In silver stocks, Catalpa declined from 72½@57½c.; but later rallied, and sold to-day at 65c., which is bid. Crescent sold at 25c. Harshaw, at 50c. San Pedro, at 62½c. Sullivan, at $1.

At the Boston Mining Exchange, the principal feature was the announcement of an assessment of 10c. per share on Bowman Silver Company, recently listed, and which was considered a good property and entitled to confidence. The price at once declined from 11 12@7c., and many of the members consider it a case of rather sharp practice. Empire was

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dull, but quite firm at 18@19c. Massachusetts & New Mexico, rather firmer at 8@9c. Brunswick Ship's Berth sold at 60@70c.

3 P.M.—There was but little doing at the afternoon Board. Calumet & Hecla sold at $233. Osceola declined from $24@$23. Sullivan sold at $1⅛.

Closing prices: Allouez, $1⅞ bid, $2 asked. Atlantic, $11. Bonanza, $2 bid. Calumet & Hecla, $233@$235. Catalpa, 65@70c. Crescent, 22½@25c. Franklin, $10¼ bid. Quincy, $46 asked. Sullivan, $1⅛ bid, $1¼ asked. San Pedro, 55@60c.

BULLION MARKET.

New York, Friday Evening, April 20.

The market abroad and here has been without any special feature since our last week's report.

Date.	London Pence.	N. Y. Cents.	Date.	London Pence.	N. Y Cents.
April 14...	50 9-19	109⅞	April 18....	50½	*
16...	50 9-16	109⅞	19....	50½	*
17...	50½	109¾	20....	50½	109⅞

* 109¾@109⅞.

BULLION PRODUCTION FOR 1883.

Mines.	States.	Month of March.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	....	$147,807
*Alta-Montana, G. L. S.	"	....	$10,625
*Belmont.	"	....	7,432
Bodie, G. S.	Cal....	21,459	66,257
Bodie Tunnel, G.	"	12,747	34,849
*Bonanza King, G.	"	64,000	177,132
*Boston & Montana, G.	Mont...	18,641	53,577
*Central Arizona, S.	Ariz...	20,218	35,845
*Christy, S.	Utah...	20,086	65,924
*Chrysolite, S. L.	Colo....	25,199	82,634
*Contention, S.	Ariz..	85,713	284,259
Crescent, G.	Cal....	....	13,000
*Custer, G. S.	Idaho..	....	43,572
*Deadwood-Terra, G.	Dak..	....	84,556
*Derbec Blue Gravel, G. S.	Cal....	5,201	21,803
*Father de Smet, G.	Dak....	32,200	101,389
*Frisco M. and S. Co., G. S. L...	Utah...	$16,795	60,718
*Hecla Cons., G. S.	Mont...	59,000	177,924
*Homestake, G.	Dak..	....	211,348
*Hope, S.	Mont...	....	20,574
Horn-Silver, S. L.	Utah...	285,000	764,000
*Independence, G. S.	Nev....	....	10,173
*Kentuck, G. S.	"	....	4,262
*Lexington, S.	Mont...	117,343	309,708
*Little Pittsburg, S. L.	Colo....	7,702	19,577
*Marguerite, G.	Cal....	7,300	33,200
*Martin White, G. S.	Nev....	35,166	121,453
*Moulton, G. S.	Mont...	34,700	123,288
Mount Diablo	Nev....	9,857	9,857
*Navajo, G. S.	"	68,833	211,980
Northern Belle, S.	"	46,225	207,315
*Ontario, S. L.	Utah...	....	364,067
*Oxford, G.	N. S....	6,620	15,143
*Pinal Cons., S. L.	Ariz ...	....	$49,810
*Satemo, G.	N. S...	....	2,500
*Silver Bow, G. S.	Mont...	....	34,246
Standard, G.	Cal....	74,727	269,006
Star, S.	Nev....	....	27,095
*Stormont, S.	Utah...	19,770	54,604
Syndicate, G.	Cal..	....	9,217
Tintic M. and M. Co.	Utah...	....	7,632
*Tip Top, S.	Ariz....	....	‡22,983
*Tombstone, G. S.	"	....	123,452
Yellow Jacket, S.	Nev....	69,797	98,753
Total amount of shipments to date			$4,648,545

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended April 20th, as compiled from various sources, amounted to $191,000, as against $254,505.45 reported for the previous week. The receipts from January 1st, 1883, to date are $4,263,713.53.

United States Assay-Office at New York.—Statement of business for the month ended March 31st, 1883:

Deposits of gold:		
Foreign coin	$343,000.00	
Foreign bullion	141,000.00	
United States bullion	661,000.00	
United States bullion (re-deposits)	100,000.00	
Jewelers' bars	117,000.00	
Refined gold	129,000.00	$1,491,000.00
Deposits of silver:		
Jewelers' bars	$16,500.00	
United States coin	500.00	
Foreign coin	7,000.00	
Foreign bullion	20,000.00	
United States bullion (contained in gold)	7,100.00	
(Re-deposits)	200.00	
Bullion, Arizona	2,300.00	
Colorado	10,100.00	
Dakota	7,200.00	
Lake Superior	500.00	
Montana	83,000.00	
Nevada	7,000.00	
New Mexico	21,500.00	
Utah	169,400.00	
Refined silver	71,700.00	$424,000.00
Total deposits		$1,915,000.00
Gold bars stamped	$1,613,855.52	
Silver "	451,909.25	$2,065,764.77

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended April 14th	$259,283
Corresponding week last year	503,000
Since January 1st, 1883	4,787,117
Corresponding period last year	14,490,253

Imports.

Week ended April 14th	$611,430
Corresponding week last year	6,356
Since January 1st, 1883	6,395,936
Corresponding period last year	1,116,957

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £240,000 bullion, but the proportion of its reserve to its liabilities was raised from 36 15-17 to 37 7-16 per cent, against 44 3-16 per cent at the same date last year. April 19th the bank gained £60,000 bullion on balance. The weekly statement of the Bank of France shows gains of 4,325,000 francs gold and 2,800,000 francs silver.

METALS.

New York, Friday Evening, April 20.

Copper.—So far as lake copper is concerned, there is a slightly better feeling; and though sales were made earlier in the week at 15¾c., it would be impossible at present to secure any copper of this description at less than 15⅞@16c. Brands other than Lake are still weak, selling within the range of 14⅝@15⅛c., and we hear of occasional lower figures. It must be remembered, however, that the lower figures are for grades below good standard quality, and for unknown brands; in fact, the struggle to introduce a variety of brands has much to do with the exceptional figures which are so freely used by buyers.

According to the Bureau of Statistics, the imports of copper ore for February were 45,747 cwts., valued at $5298. The imports of pig and old copper were only 24,181 pounds. The exports of copper ore in February were 7365 cwts., valued at $107,500, and of pig-copper, 90,798 pounds.

Under date of April 2d, Messrs. James & Shakspeare say:

It would seem that the total quantity of Lake copper bought does not exceed 4500 tons, and it is said that no further shipments from that source will be made.

Under date of April 5th, Messrs. French & Smith quote: Ores, 12@13 shillings per unit. Canadian Regulus commanded 13s.; Chilian, 13s. 3d.; and ores, from 12s. 6d. to 13s. Among the latter, we note a sale of 70 tons of Butte Mountain at 13s.

Messrs. James & Shakspeare have published the following statistics of copper in England and France, including metal afloat on March 31st:

		—March 1 to 31.— Imports. Tons.	Deliveries. Tons.	
Fine foreign, chiefly Australian		584	600	London.
Chili.	Bars and ingots	2,904	1,388	Liverpool
	In ores and regulus	10	160	and
Precipitate and sundries		1,730	1,447	Swansea.
Totals, England		5,228	3,604	
Fine foreign, chiefly American		65	70	France.
Chili bars, ingots, and Barilla		1,183	1,930	
		6,476	5,604	

	Stocks. Mar. 31. Tons.	Mar. 15. Tons.	Feb. 28. Tons.	
Fine foreign, chiefly Australian	4,546	4,345	4,571	London.
Chili. Bars and ingots	24,970	23,260	23,454	Liverpool and Swansea.
Chili. In ores and regulus	2,220	2,370	2,370	
Precipitate and sundries	3,606	4,174	3,323	
Totals, England	35,342	34,149	33,718	
Fine foreign, chiefly American	75	80	80	France.
Chili bars, ingots, and Barilla	2,695	2,358	3,442	
	38,112	36,887	37,240	
Advised by mail and telegram:				
Chili	8,024	8,440	8,493	
Australian	2,000	1,150	1,000	
	48,136	46,477	46,733	

		—Jan. 1 to March 31.— 1883. Tons.	1882. Tons.	1881. Tons.
Imports..	Chili	11,476	8,369	7,634
	Other foreign	9,305	10,079	8,208
		20,781	18,448	15,842
Deliveries..	Chili	9,073	10,437	10,824
	Other	8,723	6,691	6,660
		17,796	17,038	17,484

England is lower, cable quotations being £63@£63 5s., a drop of nearly a pound sterling.

Tin.—The arrival of 600 tons of tin in this port has had the effect of making the market dull and lifeless, buyers resuming an attitude of expectancy. We quote 21c. for straight spot, large lines. England cables £96 10s. @£96 15s.

Lead.—The available stock being concentrated in a few strong hands, successive bids upward from 4·40 @4·60c. have been declined, and the market closes strong though quiet, with a fair inquiry. We quote nominally, 4·62½@4·65c. for Common and Domestic. Two hundred tons of Germania lead have gone into store, and 500 arrived to-day have not as yet been disposed of in any way. We can not hear of a single wholesale transaction during the week.

Messrs. John Wahl & Co. of St. Louis wire as follows to-day: The market is strong and the demand good. It is very steady, with some advances on last week's quotations on Hard lead. Sales for the week sum up over 260 tons of Chemical lead at 4·17c. and 230 tons of Refined lead at 4·25c.

Spelter.—One of the large producers of the West yesterday raised his price 10 cents per hundred pounds, to 4·35c., which, with freight 43½ cents per hundred pounds, would bring it up to 4·80c. here. There is, however, little trouble in securing a trifle lower figures here, from the stocks in the hands of the trade. We quote 4·75@4·80c. for Common Domestic, and 5·12@5·37c. for Silesian.

The February imports of spelter were light, being only 324,447 pounds of spelter and 256,094 pounds of sheet-zinc.

Antimony.—This metal is quiet at 10·85@11c. for Cookson's, and 9⅛@10c. for Hallett's.

IRON MARKET REVIEW.

New York, Friday Evening, April 20.

Our February imports of iron and steel were as follows:

February.	1883.	1882.
Pig-iron, net tons	21,547	30,320
Bar-iron, "	2,676	6,672
Band, hoop, and scroll, net tons	278	40
Iron rails, net tons	23	8,211
Sheet-iron, "	344	469
Old and scrap, "	5,960	17,222
Steel rails, "	11,565	13,512
Steel ingots, bars, sheets, and wire	$957,772	$1,029,058

A temporary organization of the two Iron and Metal Exchanges, under the consolidation plan, has been formed by the election of John C. Cook, of Messrs. Bruce & Cook, President; George P. Thompkins, of Messrs. O. E. Schmidt & Co., Vice-President; E. J. Shriver, Secretary; and James E. Pope, Treasurer.

American Pig.—The event of the week has been the announcement to-day, by the Thomas Iron Company, that it had decided to reduce its quotations for Nos. 1 and 2 Foundry Pig from $24 and $22, respectively, to $22 and $20, a drop of $2 per ton. In view of the fact that for many weeks past the demand for Foundry Pig has been on a very limited scale, and that the little business for urgent needs has been picked up by the makers of outside brands, who, as our quotations showed, were cutting under considerably, this move was a wise one. Consumers have not, as in former years, contracted far ahead for season delivery; and as we intimated in our last, the accumulation of stocks was encouraging them to look for lower figures. It is, of course, too early to form any estimate of the effect of the reduction now made; but consumers will certainly have no reason to complain that it is not sweeping enough. It is reported that two of the Thomas furnaces are to be blown out, which seems to indicate that the management, which is known in the trade to be averse to any accumulation of stocks, does not look forward to a heavy demand in the near future. Thus far, we do not learn that the Crane or Allentown companies have followed suit in reducing quotations. We quote No. 1 Foundry, nominally $22@$24, which the makers of less well-known brands will have to shade; No. 2, $20@$21.50; and Gray Forge, $18.50@$19.50. Bessemer Pig is quiet at $22 asked for American. Spiegeleisen, at least so far as the higher grade is concerned, has improved upon more inquiry. We quote for 20 per cent, $32.50 @$33, while 12 to 15 per cent, for which there is less demand, is still nominally $26.

Scotch Pig.—Sales aggregating 600 or 700 tons have been made in small lots. The arrivals are small, but partially go into store. The spot stocks are light, and in the case of some brands are exhausted. On the

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 14.		April 16.		April 17.		April 18.		April 19.		April 20.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.					2.80		2 95		3.00		3.00		2,100
Amie Con., Co.	.22		.21	.20	.21	.20	.20	.18	.20	.19	.20		12,600
Argenta, Ne.											.85		200
Bar. & Walker, Ut.													
Bassick, Co.							9.50		9.63				60
Belle Isle, Ne.	.50												100
Bodie Cons., Ca.	1.50										1.25		600
Breece, Co.													
Bulwer, Ca.							85		.85				200
California, Ne.			.22		.21		.20		.20				2,700
Cal. & Hecla, Mich.													
Carbonate Hill.	1.10	1.05											200
Caribou Con., Co.							.15						200
Chrysolite, Co.			1.20		1.20		1.20	1.15	1.15				1,300
Cons. Va., Ne.	.46		.47		.48	.45	.45		.45				3,500
Crown Point.													
Deadwood-Terra, Dk.													
Dunkin, Co.			.26	.25							.25		300
Eureka Cons., Ne.			5.75						5.38		5.63		140
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.			.05										200
Gold Stripe, Ca.					.07		.10				.09	.08	4,300
Gould & Curry, Ne.													
Grand Prize, Ne.	.95										.80		675
Great Eastern, Dk.	.02		.03	.02					.03	.02	.02		3,400
Green Mountain, Ca.	.81	.80			.82								2,000
Hale & Norcross, Ne.													
Hall-Anderson, N. S.	2.00		1.8	1.60			1 65	1.50	1 55	1.40	1 50	1.35	10,800
Hibernia, Co.											.02		200
Homestake, Dk.	15.50	15.13											115
Horn-Silver, Ut.	8.00	7.50	7.88				8.00		7.63		7.75	7.50	1,250
Hukill, Co.			.14	.13									600
Independence, Ne.	.65		.65		.60								6,200
Iron Silver, Co.	2.90	2.80	2.85		2.85								1,136
La Plata, Co.													
Leadville C., Co.			.69	.68									400
Little Chief, Co.	.45	.44	.44				.43		.43				1,600
Little Pittsburg, Co.									.65	.64	.66	.60	600
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	3.20	3.10	3.20	3.15	3.15	2.75	2.50	2.10	2 50	2.25	2.40	2 35	3,125
Northern Belle, Ne.							8.50						10
North Belle Isle, Ne.					.31								100
Ontario, Ut.	28.75				26.50		26 50		27.75	27.00	27.75		1,005
Ophir, Ne.											2.00		100
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.84	.77	.77	.75	.84	.76	.82	.81	.82	.79	.83	.79	21,400
Savage, Ne.											2.00		100
Sierra Grande, N. M.	1.75		1.70	1.65	1.75		1.75		1.75				2,500
Sierra Nevada, Ne.	2.25	2.10	2.10		2.10						2.25	2.00	455
Silver King, Ar.	10.63										11.25		20
Spring Valley, Ca.													
Standard, Ca.			7.00	6.88					7.00				1,200
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.			.85		.84		.83		.82		.81		900
Yellow Jacket											2.88	2.75	400

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 14.		April 16.		April 17.		April 18.		April 19.		April 20.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.	.19	.18	.19	.18			.19	.18					1,700
Albion, s.													
Alta-Montana, G.	.09		.08		.08	.07	.07	.04	.04		.05	.04	25,825
Am. Flag, s.													
Barcelona, G.			.13		15								2,000
Bear Creek													
Bechtel Con., G.					.10								200
Best & B'licher, G. S.			3 50									3.88	300
Big Pittsburg, S. L.										.20			50
Bradshaw, s.													
Buckeye	.02		02									.02	700
" pref.													
Bull-Domingo, S. L.													
Bye and Bye												.02	200
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., S. H., G.	.80												200
Central Ariz'na, s.										.29		.29	200
Chapparal													
Cherokee, G.										.02		.02	
Climax, Co.			.06		.05							.02	1,200
Cons. Imp'r'l, G. S.												.05	300
Con. Pacific, G.													500
Crowell, G.			.05										
Dahlonega, G.			03		.03					.06	.04		3,300
Decatur.	.05		05		.05		.05	.04	.04	.02	.04	.04	4,100
Durango, G.			03									.03	21,400
Eastern Oregon	.40												100
Elko Cons.	.07	.06	.08	.06	.10	.09							100
Enterprise			.29	.26						.08	.06	.09	14,900
Fannie Barret			2.20									.06	6,900
Gold Placer, G										25	.24		600
Goodshaw, G.			.02							2.20			
Granville, G												2.20	600
Harlem M. & M. Co.	1.45		1.40		1 50	1.45	1.55		1.50	1.45	1.50	1.45	700
Hortense, s			.10										4,400
Lacrosse, G.					11							12	700
Lucerne.					.01							.12	800
Mariposa Pref., G.													100
" Com., G													
Mexican, G. S.													
Miner Boy	.01											2.88	2.75	150
Mono.												.01		200
North Standard, G.													
N. Horn-Silv'r, S. L.													
Pi'rat'l & Miller, S.	.16		.17	.16	.16		.16		.16	.15	.15		7,000
Quartz Creek.	.03	.02	.04	.03	.03	.02					.03	.02	13,000
Rappahannock, G.	.08						.09	.08	.08		.08		3,700
Red Elephant, s.			.07		.07								1,700
Ruby, of Arizona													
Silver Cliff, s.			.34	.33									400
Sonora Con.	1.30	1.15	1.10		1.35	1.00	1.55	1.30	1.50	1.10	1.20	1.05	21,700
South Bodie, G.													
South Bulwer, G.													
South Hite.												.20	.19	1,400
South Pacific.	.05		.06		.06							.05		2,300
State Line, 1 & 4, s.			02		03									200
" Nos. 2 & 3, s.	.06		05		05							.05		600
Sutro Tunnel.	.21	.20	20		21	.20	.20		.20			.20		17,000
Taylor-Plumas	.14		.18	.15	18		.19	.18	.19	.18				10,900
Unadilla, s.					.04	.02								1,100
Union Cons., G. S.	3.25													200
Vandewater.														
Washington			.03							.08				300

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 89,001. Non-dividend shares sold, 173,825.

BOSTON MINING STOCKS.

	April 13.		April 14.		April 16.		April 17.		April 18.		April 19.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.					2.00				2.00				250
Amie.									.20				500
Atlantic													
Aztec.													
Bodie Con.													
Bonanza D.	2.13				2.13				2.00	1.75			710
Bowman Sil	.12	.11	.11		.07				.07		.08	.07	9,200
Bruns. Ant.													
Bulwer.											.85		100
California.													
Cal. & Hec.	230				235		234	234½			233		45
Catalpa.	.72½	.70	.72½	.67½	.67½		.60	.57½	.63	.62½	.65	.62½	6,600
Central Ariz											.28		100
Cherryfield.													
Co. Virginia													
Copper F'lls					1.00								150
Copperop.									.09				400
Crescent.			.25								.26	.23	500
Cumberl'd.													
Decatur.													
Deer Isle.													
Denver City													
Douglas.													
Duncan.													
Dunkin.					.27								100
Empire	.18	.16									.20	.19	2,900
Eureka Con.					5.75								50
Franklin.	11.00		11.00		10.25				10.25				105
Hancock G.					9.13								100
Harshaw.							.50						200
Huron.	.50				.50								45
Independ'ce					.63								300
Indian Q'n.													
Mammoth													
Mass. & N. M.	.08		.09		.11	.09			.09		.09		15,700
Milton.													
Napa.													
National.					.50								25
North Belle	9.63												10
Ontario.													
Osceola.			26.50		26.00		25.00		24.50		24.00	23.00	220
Penn-Breck.													
Pewabic.													
Pine Tree													
Plymouth					.19				.18				500
Quincy.	46.00	45.50					46.00		46.00				183
Ridge.													
Robinson													
San Pedro.					.62½								400
S'ra Nevada					2.15				2.20				200
S'ra Grande			1.80										100
Silver Islet.	2.50												15
Silver King.													
Simpson Gd													
So. Pacific.	.05												500
Standard.													
State Line, Nos. 2 & 3.													
Sullivan.									1.00		1.13	1.00	669
Sutro Tun.	.21				.21						.21		800
Sycamore.													
Twin Lead.			.15						.13	.10	.10		5,400
Vizina.													

PHILADELPHIA MINING STOCKS.

	April 13.		April 14.		April 16.		April 17.		April 18.		April 19.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American.					.20	.19	.19	.18	.19	.18	.19	.18	22,600
Argent.	.18	.17											
Arizona So.													
Aztec													
Battle Mt.													
Black Sul.													
Bodie.													
Buena.	.03						.03		.03		.04		4,000
California.													
Calista.													
Cincinnati.	.10				.10		.11						46,700
Comprom'e.	.30		.30		.30		.30	.27½					6,100
Contention.													6,200
Dauntless.													
Del Monte.													
Denver City	.14		.14		.15	.14	.14					.15	5,500
Fairview.							.01						6,000
Eureka.					.10		.09						
Girard.											.11	.10	3,000
Golconda.													
Golden Age.													
Governor.	.08		.08	.07	.08							.09	11,100
Grand Uni'n	.22		.22				.23	.22	.25	.24			9,300
Gunnison.	.55				.55		.52½		.55		.55		2,700
Hancock.													
Iowa Gulch.	.08		.09	.08	.10	.08	.10	.08	.11	.08	.08		212,89
King Bul'on												.02	
Ledger Con.													5,000
Little Dia'd.													
Little Maud	.05		.05				.05					.05	1,900
Ltg & D'y Hl													
McCullough													
Magnolia.							.01						1,000
Montana													
Mt. Lincoln.							.01						6,000
Mt. Sheridan	.06										.05	.06	3,000
National.												.02	5,000
Orion.	.04		.05								.05		1,800
Orion Pref.											10		100
Palmetto E.													
Pembina.			.15		.16		.15					.15	1,700
Penn-Breck.	.11		.13	.12	.14		.13	.12	.13	.12	.13	.14	28,500
Permanent.													
Pizarro.													
Pizarro Ex.													
Potosi.													
Rara Avis.			.09		.09		.09		.09		.09		18,500
Rara Avis E.													
Record													
Rico Pion'r.													
San Pedro.													
Sierra G'nde	1.85	1.75	1.75		1.75		1.77½	1.75	1.77½	1.75	1.77½	1.75	29,100
Silver Cord.	1.67½		1.60						1.80		1.80	1.77½	4,000
Silv'r Plume									.01				1,000
Silver Rock													
Sovereign.													
Standard.													
Sultana.	.04				.04		.04				.04		3,000
Sutro Tun'l.													
Tombstone.	.80		.80		.82½				.82½		.82½		3,700
Tranquilli'y													
Victor.	.01		.02		.01		.02		.02		.02		30,000
Yale Mt.	.08		.07		.07								1,800

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whole, quotations for immediate delivery are materially higher than futures. We quote spot, $24.50@24.75 on dock, and $24@24.25 June delivery; Dallmellington, $21.50@$22; Glengarnock, $22@22.50; and Eglinton, $21.50 in yard. At the Wall Street Exchange, the following cables were received to-day, showing a decline in the better brands: Carnbroe, 54s. 6d.; Gartsherrie, 60s.; Summerlee, 60s. 9d.; Coltness, 62s. 9d.; Langloan, 63s. 6d.; Glengarnock, 54s. 3d.; and Eglinton, 48s. 6d. Warrants were 47s. 3d. Freights are unchanged, 5s.

Rails.—During the week, there have been sales aggregating 25,000 tons, partly at mill, at $38@$39, and partly at tidewater, at $39.75@$40, which figures we quote. The feeling is a little better. England is low, cabling £4 15s.@£5 at shipping port. British exports to this country in March were only 4957 tons.

Old Rails.—Old rails are fairly steady at quotations ranging from $24@$24.50 for spot, and $23.50@$24 for future delivery. A sale is reported to us of 500 tons of D. Hs. at private terms.

Scrap-Iron.—The market is dull, nominally at $25.

Philadelphia. April 20.

Pig-Iron.—The sales of pig-iron in Eastern Pennsylvania since Monday have been smaller than usual, and buyers are purchasing for current requirements. A few negotiations in hand for large lots have been bruptly terminated. The outlook is less encouraging an a week ago for inferior irons; though for some of the finer brands, prices are firmly maintained and concessions have been refused for future deliveries. Gray forge iron is the weakest on the list. Makers of finished iron see no inducement to cover requirements for from sixty to ninety days. Quotations run from $18, at furnace, to $20.50. Average brands are selling at $19@$19.50. No additional restriction has been heard of, though several companies contemplate blowing out unless there is an improvement. Stocks are sufficient to sustain the hope of consumers that prices may yet decline still further, notwithstanding the fact that there is no room for any legitimate decline. Inferior Foundry irons are selling at $23.50@$24 and good foundry brands from $24@$25. No. 2 lots were disposed of at $22.50. Prices have taken a wider range than usual this week. English and Scotch are unusually dull. Sellers have endeavored to dispose of a few hundred tons, but founders buy only for actual requirements. Consumers desire to run close until after July. Bessemer iron would sell at $21.50, but at $22.50, the price asked, nothing of any account is done.

Muck Bar.—A few hundred tons of Muck Bar have been sold for May delivery at $35@$35.50. Offers are in hand at $34.50, and will probably be accepted. Four or five transactions in Charcoal Blooms were made at prices varying from $60@$66, according to quality of bloom and location; for good quality, $63.50 $64 is a fair average, and for Anthracite, $54@$56 are the limits.

The bar mills of Eastern Pennsylvania have good cause for complaint at the condition of business. The card rates are not maintained; but within two or three days, sufficient new business came to hand to afford encouragement that the worst had been reached, the bottom touched, and an improvement probable. There is more capacity for making iron than under ordinary conditions there is demand for, and manufacturers are anxious to secure orders at 2·20c., but buyers hold back and purchase for immediate requirements. Small lots are selling at 2·20@2·25c. Large orders have been placed at as low as 2c, but 2·10@2·20c. will now cover all the business done. The possibility of a general suspension in the West is contemplated, and would be beneficial to the trade.

Nails.—A large amount of business has been done recently in nails, and for small lots prices have improved, though large buyers can still secure valuable concessions, especially in the West. Prices run from $3.10@$3.30, according to amount of order. Factories will continue the maximum output indefinitely. The requirements of the trade are large.

Shapes.—A few orders for bridge iron and boiler plate have been secured this week, and specifications are expected next week for larger lots for structural iron. Concessions are extended and prices are weak, though mills are not all suffering for want of business, and bridge works in all parts of the country are well supplied with orders. Manufacturers of structural iron and plate and tank express themselves as pleased with the present and future prospects of the trade, and believe that remunerative prices can be maintained, notwithstanding the complaints made in several quarters of declining activity.

Steel Rail transactions foot up 30,000 tons for the week, and there are inquiries on hand for 40,000 more in Eastern and Western mills, which will be placed if offers are accepted. Quotations for smaller lots are held with more firmness in the neighborhood of $40.

Old material is not selling. There are no stocks on hand, and the offers made are not acceptable to buyers. American rails are selling from $23.50@$25, according to size of order and place of delivery. Scrap transactions are insignificant, and prices run from $24.50@$28, according to quality, the extremes being exceptional.

Cleveland. April 18.

The trade for the past week in volume has been quite satisfactory, and there has been no cutting or falling off in prices.

The buying seems to be principally for immediate wants, although some few contracts have been made for several months' delivery. The prospects are for a large volume of trade for the present year, at low values; but this may be upset by labor troubles.

There has been considerable ore contracted for, principally the lower grades; but furnaces, as a rule, are disposed to buy only for short wants.

We quote:

No. 1 Bessemer	$23.00@$24.00
" Foundry, all ore	22.00@ 23.50
" Foundry, cinder mixture	21.00@ 22.50
" Soft Foundry	20.00@ 21.00
" Open silvery	19.00@ 20.00
Mill Irons	19.00@ 20.00
Four months, f. o. b. cars furnaces:	
Nos. 1 and 2 Charcoal	26.00@ 27.00
Nos. 3, 4, 5, and 6 Charcoal	26.50@ 28.00
Hanging Rock Charcoal	25.00@ 28.00
Strictly Cold-Blast Charcoal	30.00@ 32.00
Four months, f. o. b. cars Cleveland:	
Bessemer ores	7.00@ 8.50
Hematite "	5.00@ 6.00

COAL TRADE REVIEW.

Anthracite.

NEW YORK, Friday Evening, April 20.

The trade has fallen into a state of absolute quietude, and accordingly the prices at which coal is selling are extremely irregular. Buyers, who were taken aback by the high spring rates, seem confident that they will have no difficulty in securing their supplies at low figures. The fact that until the close of the month there will be full work at the mines is not calculated to discourage their hope, and coal is accumulating on the hands of those who are not forced to market it. The manufacturing demand is slack, and the latest news from the anthracite furnaces is not hopeful. Broken and egg are particularly weak.

Mr. John H. Jones, official accountant, has just published the following statement of the anthracite coal tonnage for March:

	March, 1883.	For year 1883.	For year 1882.	Differ'ce.
Phila. & Reading RR.	536,488	1,477,142	1,264,587	I. 212,555
Lehigh Valley RR.	*509,061	1,342,026	1,142,295	I. 199,732
Central RR. of N. J.	366,061	950,874	806,889	I. 143,984
Del., Lack. & W. RR.	371,132	1,018,019	900,741	I. 117,278
Del. & Hud. Canal Co.	†267,799	710,386	663,156	I. 47,230
Pennsylvania RR.	188,577	515,896	446,517	I. 69,379
Penna. Coal Co.	105,592	298,897	260,309	I. 38,588
N. Y., L. E. & W. RR	30,801	76,010	46,417	I. 29,593
Total.	2,375,512	6,389,251	5,530,913	I. 558,338

* This amount includes the production of the mines of the State Line and Sullivan RR. Co., amounting to 6643 tons.

† In addition there were 39,914 tons transported from mines by D. & H. C. Co. during March, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, March 31st, 1883, was 598,192 tons; on February 28th, 1883, 575,695 tons; increase, 22,497 tons.

A meeting of the Western Association was held in this city this week. It is understood that prices have been fixed which are slightly higher than the opening figures of last year. They have, however, been arranged on a different basis. As yet the circular has not been officially issued.

The latest news from the East is, that a war has broken out between the retail dealers and the peddlers, and that the former have put down prices considerably.

Bituminous.

There is little that is new in the bituminous trade, except that the feeling of uncertainty is greater than ever, as having an important bearing upon the possible relations of the two railroads, the Baltimore & Ohio and the Pennsylvania. The trade is discussing with much earnestness the fact that the former company has executed a mortgage upon its proposed Philadelphia branch, to secure a proposed issue of £2,400,000 sterling 4½ per cent bonds. It is argued that the Pennsylvania Company is not likely to look at any move to get into Philadelphia with placid good feeling, and that it is possible it will retaliate by cutting into the Cumberland, in giving the Clearfield operators low rates.

Business here is exceedingly dull, and we hear of all sorts of low prices. We are unable to verify a statement that a Cumberland company received the New York & New England Railroad's contract. In fact, we have every reason to believe that it is still open. The aim especially of the Clearfield operators appears to have been to prevent the closing of any contracts, and so far they have certainly been very successful. We quote, alongside, nominally, Clearfield, $4.25@$4.40, and Cumberland, $4.35@$4.60, according to quality.

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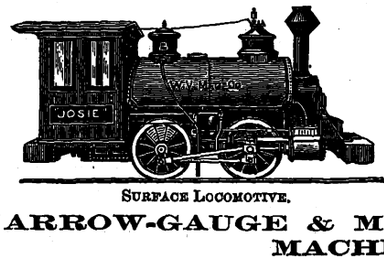
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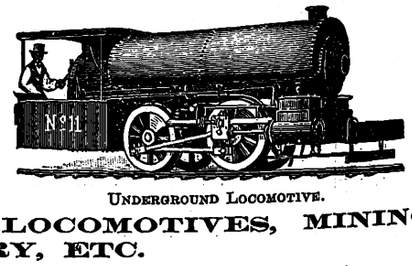


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RICHARD P. ROTHWELL, C.E., M.E.,
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CHARLES KIRCHHOFF Jr. M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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IT is reported that extensive deposits of phosphates have been discovered in Poland. English capitalists, it is said, are investing heavily.

IT is reported that a deposit of zinc ore has been discovered a few miles from the famous Friedensville mines, Pennsylvania. The latter are suffering from an increased influx of water. Should the new discovery prove all that is hoped for it, Eastern spelter production would receive a new impetus.

IN the editorial, "The New York Water Supply," in our issue of April 21st, page 218, last line but one of the article, please read, "a masonry dam **230** feet high." Those were the figures in the Editor's copy ; and they actually got into type as he wrote them ; but afterward, the cipher, not realizing its importance, dropped out.

THE Ohio Institute of Mining Engineers, an association formed within the past year, is exhibiting every sign of vigorous growth, under the progressive management of such officers as ANDREW ROY, President, and R. S. PAUL, Secretary. The next meeting, we are informed, is to be held on the 9th of May at Youngstown. A number of interesting topics are to be discussed.

MR. JAMES PARK, Jr., the great Pittsburg steel manufacturer, died suddenly of apoplexy on the 21st inst. He was born in Pittsburg on January 11th, 1820. He was first in his father's grocery and metal business ; but in 1843 built a copper rolling-mill. In 1862, the Black Diamond Steel-Works was erected, and Mr. PARK became one of the pioneers of the crucible tool steel trade. He was one of the most prominent and active of the members of the Tariff Commission, the work connected with it being the crowning effort of a busy life.

THE best indications of the capacity of the Spanish lead mines to work along under the prevailing low prices of the metal in the markets of the world is furnished by the reports of the English companies working there. According to the financial statement of the directors of the Linares, Fortuna, and Allamillos companies for the half-year ended December 31st, 1882, these companies did well, although the prices of lead ranged within the extremely low limit of £13 and £13 10s. The Linares made a profit of £2283, against £730 during the previous half-year ; the Fortuna ran its net returns up from £2454 to £3609 ; while the Alamillos declined from £4387 to £3666. In all cases, the cost of production was notably decreased, so that, if we should ever be forced to become exporters of lead, as some pessimists believe we must be in the early future, we should have to meet very low figures.

IT is announced that the Western iron manufacturers have decided to reconsider their recent ultimatum to reduce wages 10 per cent, and to afford the men an opportunity, on Thursday next, at a conference to be held at Pittsburg, to come to an understanding as to the scale to rule after June 1st. Any one who has followed developments in the finished iron trade during the first quarter of the present year will recognize that its position is, if any thing, worse than last year. There can be little doubt that we are, in the present condition of consumptive interests, suffering from over production, and a restriction, voluntary or enforced by a strike, is necessary, unless business is stimulated by low prices. It can not be expected that the manufacturers will bear the brunt of poor trade alone, and the sooner the men recognize this fact, the better. Their employers have much to gain and little to lose, while the men will be called upon to endure all the sufferings which idleness entails.

SLICKENS.

This word, probably brought into Cornwall by German miners, and signifying slimes (as its derivative, *slickensides*, signifies the smooth faces caused by the movements of rock-masses, and often covered with slippery clay), is now acquiring a portentous importance in the affairs of California. The great struggle between the hydraulic miners and the farmers of that State turns on *slickens*, which in this case is the *débris* of the hydraulic mines, minus the pebbles and boulders, or, in other words, the material carried in suspension by the rivers and re-deposited at lower points.

The following analyses of *slickens*, made for purposes of the pending litigation, are worth preserving :

	I.	II.	III.	IV.	V.	VI.
Silica	80·500	68·90	90·05	70·00	59·88	58·26
Oxide of iron	7·200	9·00	4·16	10·80	5·14	10·00
Oxide of aluminium	3·800	12·30	3·00	9·20	25·20	15·40
Lime	1·270	None.	0·90	1·52	0·87	1·83
Oxide of manganese	0·300	0·50	0·40	0·50	....	....
Magnesia	0·180	Traces.	Traces.	0·32	0·77	1·30
Potash	1·900	1·69	Traces.	1·71	1·44	1·14
Soda	Traces.	0·17	Traces.	0·90	4·96	0·10
Moisture at 100° C.	1·480	6·02	0·76	2·24	....	....
Water chemically combined	3·300	3·33	0·56	2·80	....	....
Phosphoric acid	Traces.	Traces.	Traces.	None.	....	0·18
Sulphuric acid	Traces.	None.	Traces.	Traces.	....	0·79
Specific gravity	2·580	2·31	2·66	2·60	....	....
Specific gravity (after washing)	2·584	2·46	....	....	....	....
Chlorine	....	....	....	...	0·06	....
Phosphorus	....	....	....	....	0·51	....
Sulphur	....	....	....	....	0·24	....
Water, organic matter and loss	....	....	....	....	0·93	11·00
	99·93	99·90	99·83	99·99	100·00	100·00

I. Sand from Gold Run mine, on bed-rock, sample taken October 19th, 1881, by P. M. RANDALL and W. A. SKIDMORE. Analysis by FALKENAU and RUSE, State Assayers.
II. Sand from Gold Run mine, 180 feet above bed-rock. Sample taken and analyzed as above.
III. Sand taken 300 feet above junction of North and Middle Forks of American River, October 20th, 1881. Analysts, etc., as above.
IV. Sand from American River, 200 feet above junction with Sacramento, taken October 21st, 1881. Analysts as above.
V. Slickens from the banks of the Sacramento. Analyzed by THOMAS PRICE.
VI. Slickens from Butte Co. Analyzed by H. G. HANKS.

These analyses are less valuable for the purpose in view than a thorough microscopic mechanical analysis would have been. Their principal sig-

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nificance in the pending case is the proof they offer that the sands of the Gold Run mine contain little or no mica, while the sands taken near Sacramento contain a good deal. Mr. SKIDMORE writes: "In the course of the examinations which devolved upon me, I could not find any mining alluvium in San Francisco Bay or San Pablo Bay. We did not strike sand until we had passed the Straits of Carquinez. Near the old steamboat landing of Collinsville, on the Sacramento River, we first struck the invading sands; and here mica was predominant, showing it must have come from at least 100 miles distant, since there is no granite country nearer than Folsom and Auburn."

These observations show that the common talk of the injury done to San Francisco Bay by the mining *débris* is unfounded. The simple fact is, that the cultivation of the Sacramento and San Joaquin valleys, increasing as it does the amount of alluvium annually washed into those rivers, is largely responsible for the effects appearing below. But there is no doubt that, farther up the streams, lands have been injured or destroyed by the *débris* of the mines, though we think the extent of the damage has been overrated, and the spirit in which the mining companies are now pursued indicates on the part of the farmers the desire rather for plunder than for justice. Their demands have constantly grown with their successes; and nothing will now satisfy them but the entire suppression of the hydraulic mining industry.

The following summary of the history and present condition of this litigation will interest our readers:

The first case of importance was that of KEYES *vs.* Little York Company and thirty-eight other defendants, begun July 29th, 1876. After a long trial, wherein the best legal and engineering talent in the State was employed, a judgment was rendered against the mines. The case was appealed to the Supreme Court of California, where it was reversed on a point raised by demurrer, on the ground of misjoinder of parties defendant.

The city of Marysville then brought suit (September 15th, 1879) against the North Bloomfield Gravel Mining Company and thirty-two other companies. They included about 200 persons as defendants. The defendants appealed to the Supreme Court from the injunction issued in that suit and also demurred, and applied for change of the place of trial on the ground that the presiding judge was prejudiced. The motion was refused, and an appeal was taken to the Supreme Court, where it is now pending.

Then the State of California, by its attorney-general, brought an action against the Miocene Mining Company, of Butte County. This being a foreign corporation, the case was transferred to the U. S. Circuit Court for the District of California. Defendants demurred, the principal ground being the want of authority of the attorney-general to use the name of the State. The question was argued orally, and in addition briefs were filed and the matter submitted. Up to this time, Judge SAWYER has not rendered a decision.

Simultaneously with the above action, the attorney-general commenced suit (June 28th, 1881) against the Gold Run Mining Company of Placer County. Defendants, through the counsel of the Miners' Association, demurred and answered. The trial came on in October, 1881, and occupied the court sixty days. The presiding judge (TEMPLE) rendered a decision June 12th, 1881, sustaining the injunction, with a qualification that, on a proper showing of the construction of dams to restrain the coarse material, he would entertain a motion to dissolve the injunction. The point raised on demurrer as to want of authority of the attorney-general to use the name of the State was not decided, but referred to the Appellate Court. Neither party fully acquiesced in the decision. Defendants appealed to the Supreme Court, and plaintiff took a cross-appeal.

Then the county of Yuba sued the Excelsior Water and Mining Company, the Eureka Lake and Yuba Canal Company Consolidated, the Blue Tent Consolidated Hydraulic Gold Mines of California, Limited, and the Yuba River Gold Washing Company. Injunctions were issued in all these cases *ex parte* and without notice to the defendants.

Then came the suit of the county of Sutter *vs.* J. T. HICKEY *et al.*, commenced April 4th, 1882, in the county of Colusa. The defendants' mine is in Nevada County. Also, at about the same time, a suit was begun against the Birdseye Creek Company, of Placer County.

The last action brought is that of EDWARDS WOODRUFF *vs.* North Bloomfield Gravel Mining Company, Milton Mining and Water Company, and some eight other companies. It is substantially of the same nature as the others, praying for a perpetual injunction. WOODRUFF being a citizen of another State, the suit was brought in the Circuit Court of the United States, Judge SAWYER presiding. Defendants demurred on the ground of misjoinder of parties defendant. The demurrer was argued by the ablest counsel in the State, occupying the court two weeks. Judge SAWYER held that the demurrer was not tenable, and required defendant to answer on May 9th.

The decision of Judge TEMPLE, in June, 1881, indicated the solution which the miners must make up their minds to accept. They declare that they are ready and willing to build dams; but their opponents are not so willing to have this remedy applied. It is claimed that, sooner or later, such dams will give way, and let loose vast accumulations of *débris* to desolate the plains. In the present attitude of the courts, however, we presume that the construction of dams by the mining companies will be accepted, and injunctions will not be continued thereafter.

An effort has been made to get aid from the Federal government in the building of such dams. But it has failed—and, though we sympathize with the troubles of our hydraulic mining friends, we must frankly say that we do not think it a fair case for national expenditure. The best that could be said for it would be that it was less improper than many of the items in the River and Harbor bill. However, that need not be argued now. The miners generally expect to build their own dams. These dams will restrain the coarser material, but not the finest *slickens*.

The various companies operating on the Yuba are reported to be doing better than at any time in their history. That is, the ground is paying more per cubic yard and per inch of water. But the effect of the litigation has been disastrous in many ways. Capital has been driven from the State. Real estate has depreciated in the mining counties; and great works in contemplation have been suspended or abandoned. The alliance of Kearneyism and Grangerism, which has given vigor to various crusades against capital in California, is probably responsible for the loud complaint of "dull times" in the State. Nobody appears to be happy there except the Chinese, who, having been protected by law against the competition of their countrymen, naturally feel that they have the best of the bargain. Altogether, it is a pretty picture of the boomerang in politics.

GUNS AND ARMOR.

The comparative inactivity of our government in matters of coast and maritime defense for years past has had one compensation. Other nations have spent many millions in costly experiments, gradually perfecting both heavy guns and armor; and we now get the benefit of their discoveries. The armaments, afloat or ashore, with which we ended the war in 1865 are out of fashion long ago. Apart from our ingenious, but almost untried, stationary and moving torpedoes, there would be nothing to-day to prevent first-class iron-clads, such as are owned by more than one second or third-rate power, from getting near enough to bombard any of our great coast cities. It will not be safe to trust our luck forever. The defense of our harbors should be seriously prepared. And while it may be that the art of war will be yet farther advanced, there are signs that the limit of progress, on the lines hitherto pursued, has been nearly reached, both as to size of guns and as to thickness of floating armor.

The U. S. Board of Engineers for Fortifications has recently submitted (*Professional Papers of the Corps of Engineers, U. S. Army*, No. 25) a valuable report upon the practice in Europe with the heavy Armstrong, Woolwich, and Krupp rifled guns. The conclusions of this report are as follows:

"Experimental firings for penetration during the past twenty years have determined:

"1st. That wrought-iron and cast-iron, unless chilled, are unsuitable for projectiles to be used against iron armor; that the best material for that purpose is hammered steel or Whitworth's compressed steel.

"2d. That cast-iron and cast-steel armor-plates will break up under the impact of the heaviest projectiles now in service unless made so thick as to exclude their use in ship protection.

"3d. That wrought-iron plates have been so perfected that they do not break up, but are penetrated by displacement or crowding aside of the material in the path of the shot, the rate of penetration bearing an approximately determined ratio to the striking energy of the projectile, measured per inch of shot's circumference, as expressed by the following formula:

$$\text{Penetration} = 2{\cdot}035 \sqrt{\frac{V^2 P}{2g \times 2r\pi \times 2240 \times 0{\cdot}86}} \text{ in inches.}$$

V = velocity in feet per second; P = weight of shot in pounds; r = radius of shot in inches.

"That such plates can, therefore, be safely used in ship construction, their thickness being determined by the limit of flotation and the protection needed.

"4th. That though experiments with wrought-iron plates faced with steel have not been sufficiently extended to determine the best combination of these two materials, we may nevertheless assume that they give a resistance about one fourth greater than those of homogeneous iron.

"5th. That hammered steel in the late Spezzia trials proved superior to any other material hitherto tested for armor-plates. The 19-inch plate resisted penetration and was only partially broken up by four shots, three of which had a striking energy of between 33,000 and 34,000 foot-tons each. Not one shot penetrated the plate. Those of chilled iron were broken up, and the steel projectile, though of excellent quality, was set up to about two thirds of its length. This experiment seems to promise the solution of the problem to determine a material for armor-plates which, though limited in thickness to the carrying capacity of the ship to be protected, will still have sufficient resistance to break up the projectiles of the largest guns now in the naval service, without being penetrated or broken by the projectile.

"It seems probable that a hammered-steel plate, like that tried at Spezzia, if equal in thickness to the belt armor of the Inflexible (22 inches), would stop the shot of the 100-ton gun (Armstrong), fired with its greatest practicable velocity.

"Finally, these later experiments confirm this Board in its opinion, enunciated some years since, that, while the 12-inch rifled gun may prove a sufficient armament for the barbette batteries of our sea-coast defenses, as against the lighter iron-clads of foreign navies, iron turrets, armed with guns of 100 tons weight at least, will be needed to meet the attack of armored ships of the latest construction."

The 100-ton chambered Armstrong gun, throwing a projectile of a ton weight, and fired with a charge of over 700 pounds of powder, may be taken as a sample of the monstrous requirements of modern war. Such guns must be both made and operated by machinery. A larger steam-hammer

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than any now in this country is required to make them. These are pre-eminently the things which can not be improvised in a sudden emergency, and which should therefore be prudently prepared in time of peace. We are strong in the particulars in which we are least exposed to danger. The patriotism and valor of our citizens may be relied upon to repel invasion—but nobody is likely to invade us; and all our martial ardor would not prevent a single modern armored ship from levying a forced contribution upon the city of New York, in defiance of the puny cannon of the last generation which grin harmlessly from the forts of the harbor. *

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Metal Exchange Reorganization.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reply to an article in yesterday's *Iron Age* on "The Metal Exchange Reorganization," I would like to record my hearty concurrence in one sentiment expressed therein—that there has been "too much of calling names and making faces," and am only sorry that the editor has lost his temper in a professional and, I trust, Pickwickian sort of way, instead of quietly taking for his paper a fair share of punishment in a discussion he himself provoked. Yours truly,

NEW YORK, April 27. EDWARD J. SHRIVER.

ANALYSIS OF THE FRANKLINITE ORES OF NEW JERSEY.*

By Dr. Pierre De P. Ricketts.

Some time since, my attention was called to the question of determining a method for estimating the amount of red oxide of zinc contained in certain deposits of these Franklinite ores. Some of the results obtained have not been published, other than in the testimony taken in lawsuits about these deposits.

The methods employed were briefly as follows: The first was a mechanical separation, made by Mr. A. F. Wendt and myself, for the purpose of obtaining the mineral constituents of the samples treated, as nearly as possible. The ore was crushed down to below 40 meshes to the inch, and sieved. The Franklinite was then extracted by the magnet from an average portion of the sample, and the red oxide separated by hand, under a powerful magnifying-glass, from the residue, by using a fine wire with a small hook at the end. The result of the separation of the 1700-ton sample was:

	A.	B.
Franklinite	48·2 per cent.	44·7 per cent.
Red oxide	2·7 "	7·4 "
Silicates and carbonates	49·1 "	47·9 "
	100·0	100·0

The next method adopted was to take average samples of the Franklinite ore, carefully separate from a portion of the sample the mineral constituents contained in the same, and analyze the separated minerals. Several analyses of average samples were then made, and from these, and the analysis of the separated minerals, the mineralogical constitution of the ores was calculated.

The complete analyses of the average samples were as follows:

	A.	B.	C.	D.
Silica	11·85	11·59	8·64	10·70
Oxide of zinc	34·13	40·33	34·70	33·09
Proto-sesqui-oxide of iron	28·48	29·94	28·34	31·05
Alumina	0·58	trace.	trace.	trace.
Protoxide of manganese	14·13	8·35	15·50	15·51
Lime	5·51	4·16	5·70	4·59
Magnesia	0·13	0·79	1·44	0·27
Carbonic acid	4·96	4·12	6·26	4·38
Copper	0·07	undetermined.	trace.	trace.
	99·84	99·78	100·58	99·59

The analysis of the constituent minerals gave the following figures, as representative of their constitution, after separating and cleaning them from adhering gangue, etc., under a magnifying-glass:

	A. Franklinite.	B. Zincite.	C. Willemite residue.
Silica and insoluble matter	2·62	0·81	24·36
Oxide of zinc	21·60	95·23	48·06
Proto-sesqui-oxide of iron	55·80	trace.	1·97
Alumina	trace.	trace.	.....
Protoxide of magnesia	17·06	3·51	12·25
Lime	1·28	0·32	6·29
Magnesia	0·30	0·10	0·99
Carbonic acid	1·35	0·37	6·28
Copper	none.	undetermined.	trace.
	100·04	100·34	100·20

The Franklinite, after deducting foreign constituents, such as silica, magnesia, lime, etc., would have the following composition: Oxide of zinc, 22·90; protoxide of manganese, 18·08; and proto-sesqui-oxide of iron, 59·15. The zincite, allowing for the impurities which even careful picking could not separate, would have the following constitution: Oxide of zinc, 96·44; protoxide of manganese, 3·55; proto-sesqui-oxide of iron, a trace. The Willemite analyzed evidently contained considerable limestone and impurities, and although the analysis is stated, it was thought safer to take the composition of Willemite as given by Dana, in calculating the mineralogical constituents of the ore. Taking the analysis of sample marked "A," considering the constitution of the Franklinite and zinc as determined, and using the mechanical separation marked "A," we should have the following as the mineralogical composition of the sample:

Zincite.		Franklinite.		Willemite (Dana).	
ZnO	96·44		22·90		72·90 per cent.
MnO	3·55		18·08	SiO_2	27·10 " "
Fe_3O_4			59·15		

Mechanical separation of 1700-ton sample gave: Franklinite 48·2; Zincite 2·7; Silicates and carbonates 49·1

By computing the quantity of oxide of zinc in the Franklinite and zincite, 20·49 per cent of oxide of zinc remain in sample "A" for Willemite, which, requiring 7·617 per cent of silica, would correspond to 28·107 of Willemite.

Deducting the silica for the Willemite from the total silica, and the amount for the alumina present, a balance of 3·893 of silica remains, which would require 4·589 per cent of protoxide of manganese, equal to 8·482 of rhodonite. By analyses, the carbonates of lime and magnesia were 10·110 per cent, leaving a difference of 1·481, of which 1·270 per cent would be carbonate of manganese, calculated from the excess of carbonic acid, leaving 0·211 for copper, etc.

The following is a statement of the mineralogical composition of the ore, as calculated from the analysis:

	SiO_2.	ZnO.	Fe_3O_4.	MnO.	Al_2O_3.	CO_2.	CaO and MgO.	Calculated.
Franklinite	.....	11·04	28·51	8·710	.....	.....	.....	48·200
Willemite	7·617	20·49	.....	.....	.....	.....	.....	28·107
Silicate of alumina, etc.	0·340	.....	.....	.....	0·58	.....	.....	0·920
Red oxide	.....	2·60	.....	0·100	.....	.....	.....	2·700
Rhodonite	3·893	.....	.....	4·589	.....	.....	.....	8·482
Carbonate of manganese	.....	.....	.....	0·780	.....	0·49	.....	1·270
Limestone	.....	.....	.....	.....	.....	4·47	5·64	10·110
Copper, etc	.....	.....	.....	.....	.....	.....	.....	0·211
Totals	11·850	34·13	28·51	14·179	0·58	4·96	5·64	100·000
Found by analysis	11·850	34·13	28·48	14·130	0·58	4·96	5·64	99·770

To check this calculation, the average composition of Franklinite, Willemite, and zincite, as given by Dana, were used in connection with the mechanical separation already referred to, and the calculation made as to the composition of Sample "A," with the results given below:

Zincite.		Franklinite.		Willemite.	
ZnO	95·20	ZnO	20·72	ZnO	69·97
MnO	3·19	MnO	12·72	MnO	1·14
		Fe_3O_4	63·90	Fe_3O_4	trace
				SiO_2	16·81

Franklinite	48·2	
Zincite	2·7	
Willemite	38·84	= 38·64 silicates.
Rhodonite	7·80	
Limestone	10·11	= 11·38 carbonates.
Carb. manganese	1·27	
	100·92	50·02 per cent silicates and carbonates.

Other methods of calculation were employed, such as applying the various standard analyses of Franklinite to the complete analysis given, considering that all the iron found came from the Franklinite, and using that as a starting-point. For instance, taking an analysis of Franklinite as given by Cook, and applying it to complete analysis marked "D," we should obtain the following calculation and results:

The analysis of Franklinite gives sesqui-oxide of iron, 62·36—equivalent to proto-sesqui-oxide, 60·28; oxide of zinc, 22·95; protoxide of manganese, 17·20. Taking the proto-sesqui-oxide of iron in the sample at 31·05, and comparing with the proto-sesqui-oxide of iron in 100 parts as found in the Franklinite, the amount of Franklinite corresponding to 31·05 is easily obtained. Calculating the silicate of manganese as rhodonite, taking all the oxide of zinc necessary for silica, etc., and calling what remains red oxide, we should have the approximate mineralogical composition of Sample "D":

Franklinite	51·51
Red oxide of zinc	6·40
Rhodonite	11·13
Willemite	20·23
Carbonate of manganese	1·24
Limestone	8·76
	99·27

The next trial made was to determine some solvent which would dissolve the red oxide of zinc, and practically leave the other mineral constituents, with the exception of the limestone, unacted on.

THE Massachusetts Institute of Technology, of Boston, which begins its next school year on September 24th, has set aside the following dates for entrance examinations: May 31st, June 1st, and September 18th and 19th.

* Abstract of a paper read before the New York Academy of Sciences.

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NEW PUBLICATIONS.

MANUAL OF ASSAYING GOLD, SILVER, COPPER, AND LEAD ORES. By WALTER LEE BROWN, B.Sc. With Illustrations. Chicago: Jansen, McClurg & Co. 1888. 12mo, 318 pages. (*Index.*) Price, $1.75.

Mr. Walter Lee Brown, who has had much experience as a chemist and assayer, has endeavored, we may add with marked success, to prepare a work on assaying which will aid those who have had no previous scientific or technical training. Those who have had occasion to train youths fresh from school, to make them competent assistants, have, we believe, generally felt that the standard works of Mitchell, Ricketts, and Kerl are, on the whole, not available as guides to this class of beginners, however high they stand as text-books for those who have gone through a course of chemistry and assaying. Mr. Brown probably will agree with us that in many cases it may be deplored that our assayers, or those who would enter that branch of the profession, have not obtained that preliminary training. Still, the fact remains that there is a large class of such men; and in filling the large demand for a work suitable as a guide to them, Mr. Brown has done them a service, and has, at the same time, we believe, lightened the labor of those who are forced by circumstances to train assistants.

Mr. Brown's work is, of course, essentially elementary. He devotes a long chapter to a description of the apparatus used in assaying, to the reagents, and to testing them. His second part, treating of the assays of gold, silver, copper, and lead ores, is full and, we believe, within the grasp of any beginner. We note some little points where perhaps he is not quite elementary enough. Thus, for instance, in speaking of preliminary roasting of silver ores in the scorification assay, he says, "Whenever an ore contains a large amount of antimony, arsenic, sulphur, or zinc, it can first be roasted," without, however, giving his reader any idea how to detect such obnoxious elements. In the description of the crucible assay, we note a neat hint by Mr. A. H. Low, of Argo, Colo., when working sulphuret ores. Mr. Brown treats the dry copper assays rather too briefly; but in an appendix gives a good description of the Luckow electrolytic assay, which, after all, with proper precautions, is destined to become the standard method. The chapter on lead ores is good.

In the appendix, Mr. Brown has gathered a number of papers, among them the late Mr. F. A. Lowe's article on metallic scales, a paper by Mr. M. G. Nixon, M.E., on the laboratory mill run, the pan test for gold, the chlorination assay for gold, the assay of gold bullion, base bullion, determination of moisture, etc.

EXTRACTS FROM CHORDAL'S LETTERS. *New and Enlarged Edition, with Additional Plates.* [By JAMES W. SEE, Hamilton, O.] New York: John Wiley & Sons. 1888. 12mo, 396 pages. (*No Index.*)

A new edition of the inimitable letters which "Chordal," Mr. James W. See, has contributed to our vigorous young contemporary, the *American Machinist*, has been issued. We have already dwelt upon the characteristics which have made this work as well one of the most entertaining as one of the most useful works in the library of an engineer or mechanic. Mr. See has watched men and methods with the eyes of a keen observer, and in a humorous garb he has clad a sharp and discriminating criticism of much that needs reform. A man of clear common sense, he has the knack of hitting upon a point of view that is original, and throws a flood of suggestive light on the subject of which he is treating.

CONVERSION TABLES OF METRIC AND BRITISH OR UNITED STATES WEIGHTS AND MEASURES. By ROBERT H. THURSTON. New York: John Wiley & Sons. 8vo, 83 pages.

The title of this little book sufficiently indicates its aims and its scope. It is, so far as we are able to judge, in substance a reprint of an appendix to Professor Thurston's recent work on the Materials of Engineering. The figures are plainly printed, and the arrangement suitable to the purpose.

THE REMOVAL OF AMMONIA FROM CRUDE GAS.

In connection with the many plans now brought forward to utilize the ammonia in the gases escaping from coke-ovens and blast-furnaces, it may be of interest to refer to a process brought out some years ago in connection with illuminating gas manufacture by Messrs. Bolton & Wanklyn, and adapted by them, we understand, to the metallurgical branches also. When bone-ash or any other substance containing phosphate of lime is treated with sulphuric acid, the products formed are superphosphate of lime and hydrated sulphate of lime, this mixture is known as superphosphate of lime in commerce, and is the substance used in this process. This substance is capable of absorbing carbonic acid and ammonia from foul gas. The complete action can only take place in the presence of a certain proportion of carbonic acid, so that the process is not so successful with "well-scrubbed illuminating gas." The superphosphate is converted into carbonate of lime, while the ammonia combines with the phosphoric acid to form phosphate of ammonia; the hydrated sulphate of lime is also acted upon, and forms carbonate of lime and sulphate of ammonia; so that, presuming the action to be complete, and the material to be thoroughly saturated with carbonic acid and ammonia from the foul gas, the result is a mixture of carbonate of lime and phosphate and sulphate of ammonia. Under these circumstances, the mixture absorbs one equivalent of carbonic acid for every four equivalents of ammonia; therefore, if the superphosphate process be substituted for the ordinary washers and scrubbers, a large proportion of the carbonic acid and also the whole of the sulphureted hydrogen is left in the gas, and must be dealt with in other ways. This superphosphate process has been at work at the South Metropolitan Gas-Works, Old Kent Road, for nearly two years. In practice it is usual to water the superphosphate before use with ammoniacal liquor, and it is used in dry purifiers, in layers about eight inches thick. This process has been thoroughly investigated at the Munich Gas-Works, by Drs. Bünte and Schilling, and the report made by these gentlemen proves its practical efficiency, and therefore the question of its advantage, as compared with washing and scrubbing, is based chiefly upon financial considerations. It is evident that in foreign parts, or in any place where there is a difficulty in disposing of the ammonia, the obtaining of the same in a dry form offers several advantages as compared with having it as a weak solution.

THE EARLY HISTORY OF THE STEAM-HAMMER.

An autobiography of James Nasmyth, the great British engineer, has just been published, in which he gives the following account of the manner in which he was led to invent the steam-hammer, with which his name will always be associated, and how it was introduced into practice:

"My connection with the Great Western Railroad Company shortly led to a most important event in connection with my own personal history. It appears that the Great Western steamship had been very successful in her voyages between Bristol and New York; so much so, indeed, that the directors of the company ordered the construction of another vessel of much greater magnitude—the Great Britain. Mr. Francis Humphries, their engineer, came to Patricroft to consult with me as to the machine tools, of unusual size and power, which were required for the construction of the immense engines of the proposed ship, which were to be made on the vertical trunk principle. Very complete works were erected at Bristol for the accommodation of the requisite machinery. The tools were made according to Mr. Humphries's order; they were delivered and fitted to his entire approval, and the construction of the gigantic engines was soon in full progress.

"An unexpected difficulty, however, was encountered with respect to the enormous wrought-iron intermediate paddle-shaft. It was required to be of a size and diameter the like of which had never been forged. Mr. Humphries applied to the largest firms throughout the country for tenders of the price at which they would execute this important part of the work; but to his surprise and dismay, he found that not one of them would undertake so large a forging. In this dilemma, he wrote a letter to me, which I received on November 24th, 1839, informing me of the unlooked-for difficulty. 'I find,' he said, 'that there is not a forge-hammer in England or Scotland powerful enough to forge the intermediate paddle-shaft of the engines for the Great Britain! What am I to do? Do you think I might dare to use cast-iron?'

"This letter immediately set me a-thinking. How was it that the existing hammers were incapable of forging a wrought-iron shaft of thirty inches diameter? Simply because of their want of compass, of range and fall, as well as of their want of power of blow. A few moments' rapid thought satisfied me that it was by our rigidly adhering to the old, traditional form of a smith's hand-hammer—of which the forge and tilt-hammer, although driven by water or steam power, were mere enlarged modifications—that the difficulty had arisen; as, whenever the largest forge-hammer was tilted up to its full hight, its range was so small that, when a piece of work of considerable size was placed on the anvil, the hammer became 'gagged;' so that when the forging required the most powerful blow, it received next to no blow at all, as the clear space for the fall of the hammer was almost entirely occupied by the work on the anvil.

"The obvious remedy was to contrive some method by which a ponderous block of iron should be lifted to a sufficient hight above the object on which it was desired to strike a blow, and then to let the block fall down upon the forging, guiding it in its descent by such simple means as should give the required precision in the percussive action of the falling mass. Following out this idea, I got out my 'scheme-book,' on the pages of which I generally *thought out*, with the aid of pen and pencil, such mechanical adaptations as I had conceived in my mind, and was thereby enabled to render them visible. I then rapidly sketched out my steam-hammer, having it all clearly before me in my mind's eye. In little more than half an hour after receiving Mr. Humphries's letter, narrating his unlooked-for difficulty, I had the whole contrivance, in all its executant details, before me in a page of my scheme-book. The date of this first drawing was November 24th, 1839.

"My steam-hammer, as thus first sketched, consisted of, first, a massive anvil, on which to rest the work; second, a block of iron, constituting the hammer or blow-giving portion; and third, an inverted steam-cylinder, to whose piston-rod the hammer-block was attached. All that was then required to produce a most effective hammer was simply to admit steam of sufficient pressure into the cylinder, so as to act on the under side of the piston, and thus to raise the hammer-block attached to the end of the piston-rod. By a very simple arrangement of a slide-valve, under the control of an attendant, the steam was allowed to escape, and thus permit the massive block of iron rapidly to descend by its own gravity upon the work then upon the anvil.

"Thus, by the more or less rapid manner in which the attendant allowed the steam to enter or escape from the cylinder, any required number or any intensity of blows could be delivered. Their succession might be modified in an instant; the hammer might be arrested and suspended according to the requirements of the work. The workman might thus, as it were, *think in blows*. He might deal them out on to the ponderous glowing mass, and mold or knead it into the desired form as if it were a lump of clay; or pat it with gentle taps, according to his will, or at the desire of the forge-man.

"Rude and rapidly sketched out as it was, this, my first delineation of the steam-hammer, will be found to comprise all the essential elements of the invention. Every detail of the drawing retains to this day the form and arrangement which I gave to it forty-three years ago. I believed that the steam-hammer would prove practically successful; and I looked forward to its general employment in the forging of heavy masses of iron. It is no small gratification to me now, when I look over my rude and hasty first sketch, to find that I hit the mark so exactly, not only in general structure but in the details; and that the invention, as I then conceived it and put it into shape, still retains its form and arrangements intact in the thousands of steam-hammers that are now doing good service in the mechanical arts throughout the civilized world.

"But to return to my correspondence with the Great Western Company. I wrote at once to Mr. Humphries, and sent him a sketch of my proposed steam-hammer. I told him that I felt assured he would now be able to overcome his difficulty, and that the paddle-shaft of the Great Britain might now be forged. Mr. Humphries was delighted with my design. He submitted it to Mr. Brunel, engineer-in-chief of the steamship; to Mr. Guppy, the managing director; and to other persons interested in the undertaking—by all of whom it was heartily approved. I accordingly gave the company permission to communicate my design to such forge proprietors as might feel disposed to erect the steam-hammer, the only condition that I made being that, in the event of its being adopted, I was to be allowed to supply it in accordance with my design.

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"But the paddle-shaft of the Great Britain was never forged. About that time, the substitution of the screw for the paddle-wheel as a means of propulsion was attracting much attention. The performances of the Archimedes, contrived by Mr. Francis P. Smith, were so satisfactory that Mr. Brunel, after he had made an excursion in that vessel, recommended the directors to adopt the new propelling power. After much discussion, they yielded to his strongly-urged advice. The consequence was, that the great engines which Mr. Humphries had so elaborately designed, and which were far advanced in construction, were given up, to his inexpressible regret and mortification, as he had pinned his highest hopes as a practical engineer on the results of their performance; and, to crown his distress, he was ordered to produce fresh designs of engines specially suited for screw propulsion. Mr. Humphries was a man of the most sensitive and sanguine constitution of mind. The labor and the anxiety which he had already undergone, and perhaps the disappointment of his hopes, proved too much for him, and a brain-fever carried him off after a few days' illness. There was thus, for a time, an end of the steam-hammer required for forging the paddle-shaft of the Great Britain.

"Very bad times for the iron trade and for all mechanical undertakings set in about this time. A wide-spread depression affected all conditions of industry. Although I wrote to the heads of all the great firms, urging the importance of my invention, and forwarding designs of my steam-hammer, I was unable to obtain a single order. It is true they cordially approved of my plan, and were greatly struck by its simplicity, unity, and apparent power; but the substance of their replies was, that they had not sufficient orders to keep the forge-hammers they already possessed in work. They promised, however, that, in the event of trade recovering from its depression, they would probably adopt the new power.

"In the mean time, my invention was taken up in an entirely new and unexpected quarter. I had for some years been supplying foreign customers with self-acting machine tools. The principals of continental manufacturing establishments were accustomed to make frequent visits to England, for the purpose of purchasing various machine tools required for the production of the ponderous as well as the lighter parts of their machinery. We gave our foreign visitors every facility and opportunity for seeing our own tools at work; and they were often so much pleased that, when they came to order one special tool, they ended by ordering many—the machine tools in full activity, thus acting as their most effective advertisements.

"In like manner I freely opened my scheme-book to any foreign visitors. There I let them see the mechanical thoughts that were passing through my mind, reduced to pen-and-ink drawings. I did not hesitate to advocate the advantage of my steam-hammer over every other method of forging heavy masses of iron; and I pointed out the drawing in my scheme-book in confirmation of my views. The book was kept in the office, to be handy for such occasions; and in many cases it was the means of suggesting ideas of machine tools to our customers, and thus led to orders which might not have been obtained without this effective method of prompting them. Among our foreign visitors was M. Schneider, proprietor of the great iron-works at Creusot, in France. We had supplied him with various machine tools; and he was so pleased with their action that, the next time he came to England, he called at our office at Patricroft. M. Bourdon, his mechanical manager, accompanied him.

"I happened to be absent on a journey at the time; but my partner, Mr. Gaskell, was present. After showing them over the works, as an act of courtesy he brought them my scheme-book and allowed them to examine it. He pointed out the drawing of my steam-hammer, and told the purpose for which it was intended. They were impressed with its simplicity and apparent practical utility—so much so that M. Bourdon took careful notes and sketches of the constructive details of the hammer.

"I was informed, on my return, of the visit of MM. Schneider and Bourdon; but the circumstance of their having inspected the designs in my scheme-book, and especially my original design of the steam-hammer, was regarded by my partner as too ordinary and trivial an incident of their visit to be mentioned to me. The exhibition of my mechanical designs to visitors at the foundry was a matter of almost daily occurrence. I was, therefore, in entire ignorance of the fact that these foreign visitors had taken with them to France a copy of the plan and details of my steam-hammer.

"It was not until my visit to France in April, 1842, that the upshot of their visit was brought under my notice in an extraordinary manner. I was requested by M. Bouchier, Minister of Marine, to visit the French dock-yards and arsenals, for the purpose of conferring with the director of each with reference to the supply of various machine tools for the proper equipment of the marine engine factories in connection with the royal dock-yards. In order to render this journey more effective and instructive, I visited most of the French engineering establishments which had been supplied with machine tools by our firm. Among these was, of course, the famous firm of Schneider, whose works at Creusot lay not far out of the way of my return journey. I accordingly made my way thither, and found M. Bourdon at his post, although M. Schneider was absent.

"M. Bourdon received me with much cordiality. As he spoke English with fluency, I was fortunate in finding him present, in order to show me over the works; on entering which, one of the things that particularly struck me was the excellence of a large wrought-iron marine engine single crank, forged with a remarkable degree of exactness in its general form. I observed also that the large eye of the crank had been punched and drifted with extraordinary smoothness and truth. I inquired of M. Bourdon 'how that crank had been forged.' His immediate reply was, '*It was forged by your steam-hammer!*'

"Great was my surprise and pleasure at hearing this statement. I asked him how he had come to be acquainted with my steam-hammer. He then narrated the circumstance of his visit to the Bridgewater Foundry during my absence. He told me of my partner having exhibited to him the original design, and how much he was struck by its simplicity and probable efficiency; that he had taken careful notes and sketches on the spot; that among the first things he did after his return to Creusot was to put in hand the necessary work for the erection of a steam-hammer; and that the results had in all respects realized the high expectations he had formed of it.

"M. Bourdon conducted me to the forge department of the works, that I might, as he said, '*see my own child;*' and there it was, in truth—a thumping child of my brain! Until then it had only existed in my scheme-book; and yet it had often and often been before my mind's eye in full action. On inspecting the steam-hammer, I found that Bourdon had omitted some important details, which had led to a few mishaps, especially with respect to the frequent breaking of the piston-rod at its junction with the hammer-block. He had effected this, in the usual way, by means of a cutter-wedge through the rod; but he told me that it often broke, through the severe jar during the action of the hammer. I sketched for him, then and there, in full size, on a board, the elastic packing under the end of the piston-rod, which acted, as I told him, like the cartilage between the bones of the vertebræ, preventing the destructive effects of violent jars. I also communicated to him a few other important details, which he had missed in his hasty inspection of my design. Indeed, I felt great pleasure in doing so, as I found Bourdon to be a most intelligent mechanic, and thoroughly able to appreciate the practical value of the information I communicated to him. He expressed his obligation to me in the warmest terms, and the alterations which he shortly afterward effected in the steam-hammer, in accordance with my plans, enabled it to accomplish every thing that he could desire.

"I had not yet taken out a patent for the steam-hammer. The reason was this: The cost of the patent, at the time I invented it, was little short of £500, all expenses included. My partner was unwilling to lay out so large a sum upon an invention for which there seemed to be so little demand at that time, and I myself had the whole of my capital embarked in the concern. Besides, the general depression still continued in the iron trade, and we had use for every farthing of money we possessed. I had been warned of the risk I ran by freely exhibiting my original design, as well as by sending drawings of it to those who I thought were most likely to bring the invention into use. But nothing had as yet been done in England. It was left for France, as I have described, to embody my invention in an actual steam-hammer.

"I now became alarmed, and feared lest I should lose the benefits of my invention. As my partner declined to help me, I applied to my brother-in-law, William Bennett. He was a practical engineer, and had expressed himself as highly satisfied with its value. He had also many times cautioned me against 'publishing' its advantages so widely, without having first protected it by a patent. He was, therefore, quite ready to come to my assistance. He helped me with the necessary money, and the invention was placed in a position of safety so far as my interests were concerned. In return for his kindness, I stipulated that the reimbursement of his loan should be a first charge upon any profits arising from the manufacture of the steam-hammer, and also that he should have a share in the profits during the period of the patent rights. Mr. Bennett lived for many years, rejoicing in the results of his kindness to me in the time of my difficulty. I may add that the patent was secured in June, 1842, or less than two months after my return from France.

"Soon after this, the iron trade recovered from its depression. The tide of financial prosperity of the Bridgewater Foundry soon set in, and my partner's sanguine confidence in my ability to raise it to the condition of a thriving and prosperous concern was justified in a most substantial manner. In order to make the most effective demonstration of the powers and capabilities of my steam-hammer, I constructed one of 30 cwt. of hammer-block, with a clear four-foot range of fall. I soon had it set to work, and its energetic services helped us greatly in our smith and forge work. It was admired by all observers. People came from a distance to see it. Mechanics and iron-founders wondered at the new power which had been born. The precision and beauty of its action seemed marvelous. The attendant could, by means of the steam slide-valve level in his hand, transmit his will to the action of the hammer, and thus *think* in blows. The machine combined great power with gentleness. The hammer could be made to give so gentle a blow as to crack the end of an egg placed in a wine-glass on the anvil, while the next blow would shake the parish, or be instantly arrested in its descent midway.

"Hand-gear was the original system introduced in working the hammer. A method of self-acting was afterward added. In 1843, I admitted steam above the piston, to aid gravitation. This was an important improvement. The self-acting arrangement was eventually done away with, and hand-gear again became all but universal. Sir John Anderson, in his admirable 'Report on the Vienna Exhibition of 1873,' says: 'The most remarkable features of the Nasmyth hammers were the almost entire abandonment of the old self-acting motion of the early hammers, and the substitution of new devices, and in the use of hand-gear only in all attempts to show off the working. There is no real saving, as a general rule, by the self-acting arrangement, because one attendant is required in either case; and, on the other hand, there is frequently a positive loss in the effect of the blow. By hand-working, with steam on top of piston, the full force can be more readily maintained until the blow is fully delivered. It is thus more of a 'dead blow' than was formerly the case with the other system.'

"There was no want of orders when the valuable qualities of the steam-hammer came to be seen and experienced. The first order came from Rushton & Eccersley, of Bolton, who, by the way, had seen the first copy of my original design a few years before. The steam-hammer I made for them was more powerful than my own. The hammer-block was of five tons weight, and had a clear fall of five feet. It gave every satisfaction, and the fame of its performances went abroad among the iron-workers. The Low Moor Iron-Works Company followed suit with an order for one of the same size and power; and another came from Hawkes & Co., of Newcastle-upon-Tyne.

"One of the most important uses of the steam-hammer was in forging anchors. Under the old system, anchors—upon the soundness of which the safety of ships so often depends—were forged upon the 'bit by bit' system. The various pieces of an anchor were welded together, but at the parts where the different pieces of iron were welded together flaws often occurred; the parts would break off—blades from the stock, or flukes from the blades—and leave the vessel, which relied upon the security of its anchor, to the risk of the winds and waves. By means of the steam-hammer, these risks were averted. The slag was driven out during the hammering process. The anchor was sound throughout, because it was welded as a whole.

"Those who are technically acquainted with smith-work as it used to be

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practiced, by what I term the 'bit by bit' system, that is, of building up from many separate parts of iron, afterward welded together into the required form, can appreciate the vast practical value of the 'die' method brought into general use by the controllable but immense power of the steam-hammer. At a very early period of my employment of the steam-hammer, I introduced the system of stamping masses of welded hot iron as if it had been clay, and forcing it into suitable molds or dies placed upon the anvil. This practice had been in use on a small scale in the Birmingham gun-trade. The iron-work of fire-arms was thus stamped into exact form. But until we possessed the wide range and perfectly controllable powers of the steam-hammer, the stamping system was confined to comparatively small portions of forge work. The new power enabled the die and stamp system to be applied to the largest class of forge work; and another era in the working of ponderous masses of smith and forge work commenced, and has rapidly extended until the present time. Without entering into further details, the steam-hammer has advanced the mechanical arts, especially with relation to machinery of the larger class, to an extent that is of incalculable importance.

"Soon after my steam-hammer had exhibited its merits as a powerful and docile agent in percussive force, and shown its applicability to some of the most important branches of iron manufacture, I had the opportunity of securing a patent for it in the United States. This was through the kind agency of my excellent friend and solicitor, the late George Humphreys, of Manchester. Mr. Humphreys was a native of Philadelphia, and the intimate friend of Samuel Vaughan Merrick, founder of the eminent engineering firm of that city. Through his instrumentality, I forwarded to Mr. Merrick all the requisite documents to enable a patent to be secured at the United States Patent-Office, at Washington. I transferred the patent to Mr. Merrick, in order that it might be worked to our mutual advantage. My invention was thus introduced into America under the most favorable auspices. The steam-hammer soon found its way into the principal iron-works of the country. The admirable, straightforward manner in which our American agent conducted the business from first to last will ever command my grateful remembrance."

THE SILVER KING MINE.

By William P. Blake.

History of the Discovery and Location.—The importance of the Silver King mine in the history of mining in the United States, and particularly in the territory of Arizona, lends more than the usual interest to the details of the discovery and location to the vein. The efforts to find the locality and to open up the mine date back into the period when the southwestern and central parts of Arizona were still in possession of the savages, and the history of the mine is closely connected with the development of the region and its settlement by the white man. In fact, the Silver King has been an important if not the leading factor in the reclamation of the Pinal region from the murderous Apaches. These hereditary, marauding savages dominated the whole region, and made it almost inaccessible to the hardy and daring prospectors who began to press outward from the frontier settlements on the Gila River toward its sources in the mountains.

The Pinal Mountains, rising to the eastward of the broad plains of the Gila and Salt rivers, stretch northwestward from the Gila to the higher ranges of the White Mountains, and to the plains of the Great Colorado. This range has many spurs and irregular outlying masses cut by cañons leading down to the Gila Valley, which, by reason of their extreme ruggedness and impassable nature, afforded an excellent refuge and secure hiding-place for the Apaches after marauding expeditions to the plains or the destruction of helpless trains of immigrants. One of the trails most traveled by the Apaches led up the valley of the little creek now known as Queen Creek, and over the nearly vertical face of the mountain, within a stone's throw, almost, of the point where the Silver King mine was afterward discovered. That the vicinity was the favorite resort and hiding-place of the savages is shown, also, by the fact that there are caves in the face of the cliffs overlooking the trail, containing piles of ashes and fragments of Indian pottery.

In the year 1873 (?), when General Stoneman, the accomplished cavalry officer, now Governor of California, was commander of the military department of Arizona, it became necessary to adopt more vigorous measures than had been made for the repression of Apache raids. To this end, General Stoneman moved with his command to the base of the mountains, near to the Apache trail, and established a camp. He then constructed a road or mule-trail diagonally up the face of the mountains leading over into the higher table-lands and valleys of the Pinal Range. This pack-trail, since known as "Stoneman's Grade," is the main traveled route to the mining districts of Globe and Pioneer.

One of the soldiers, named Sullivan, employed in cutting the trail, when returning from his work one evening, sat down to rest on a projecting rock, near the camp, and began picking up loose fragments of rock about him, among which there were some small but heavy, black, metallic-looking lumps. These, instead of breaking up when pounded on the stones, became flattened out, and were evidently metallic, somewhat resembling lead. This attracted his attention, but he did not fully realize the importance of his find. He, however, gathered a few of the lumps and went on to camp without saying any thing about his discovery to his comrades. His term of service expiring soon afterward, he was discharged from the service and made his way to the rancho of Charles G. Mason, on Salt River, near to the place where the town of Phœnix was afterward located. Mr. Mason was one of the very few frontiersmen who braved the terrors of the Apaches and staked out a farm on the fertile bottom-lands of the river. Sullivan remained at the place some time, and frequently showed the black ore (since familiarly known among the miners and prospectors of the region as "nugget silver") to Mr. Mason, but without telling exactly where he had found it. Mr. Mason supposed that he would go back to the place, and he no doubt expected to go with him and participate in the benefits of the discovery; but one day Sullivan suddenly disappeared, and was not heard of for years after. He was supposed to have been killed by the Apaches, or to have perished on the desert, in the attempt, perhaps, to return to the place where he had found the rich silver ore.

The desire to find the place where Sullivan had discovered the "pure stuff," as the rancheros called the black nuggets of silver sulphide, led them to make several attempts to get there. Prospecting parties were formed at intervals for several years to prospect the Pinal Mountains, and these parties were often close upon the spot without knowing it. They even made a location only a mile and a half distant from the place, and called it the Silver Queen. This was the first location made in the region; but no district was then defined by boundaries or organized by the appointment of a recorder. Later, the party extended their searches over the Pinal Mountains into the region now known as Globe District. They made a location there known to this time as the Globe mine, and they gave the name to the district. The next year, 1875, Mr. Mason and one of his neighbors, Benjamin W. Regan, formed a party of five, consisting of themselves, William H. Long, Isaac Copeland, and one man whose name can not now be recalled, to go again to the Globe mine, taking a train of animals to fetch out some of the ore. On their way back, March 21st, 1875, they were attacked by Apaches, and one of their party was killed. His body was taken to Camp Supply, at the summit of the Stoneman Grade, and was buried by his comrades in one of the old stone baking-ovens used for baking bread by Stoneman's soldiers. When the survivors reached the foot of the grade, near to the water and camp-ground, Copeland was sent to break off some of the croppings from projecting rocks at one side of the trail, and fetch them into camp two miles below. He went to the place indicated, and soon after came hurrying into camp shouting, "I have struck it," and "it is good enough for me." The excited and hopeful prospectors gathered around him, and as the pieces of croppings holding the long-sought black silver ore passed from hand to hand, they all said, "It is good enough for us," and concluded that at last they had discovered the place where Sullivan had found the "black stuff," the nugget silver. But they were in no condition to remain at that time to explore the locality or to make their prize more certain and secure. Travel-worn, weary, and saddened by the loss of their comrade, and without provisions, they hastened on to the settlement on the Gila, at Florence, crossing the dreaded desert at night. The next day, jealously guarding their secret, they gathered supplies together and hastened back to the discovery-point. There, sure enough, they found the little black nuggets strewing the surface, and mineral stains, of many colors, including green and blue, in the substance of the rock. The long-sought treasure was found at last. Sullivan's discovery was no longer his alone. Standing upon the highest point of the mineral-stained rock, they made the Silver King location, fifteen hundred feet long in an easterly and westerly direction, and six hundred feet wide in a northerly and southerly direction. This was on the 22d day of March, 1875. It was the initial location of the mining district now known as the Pioneer Mining District. This district was immediately laid out, or designated, as twenty miles square, extending ten miles each way from the initial point of the Silver King location, with the bounding lines running north and south, east and west. This location, and the location of the claim, were properly made in accordance with the laws, and they were duly recorded in the county records at Florence, the county-seat.

The ownership of the location of the Silver King claim was then equally divided between the four survivors of the party of five, each holding one fourth. On the 30th of June, 1876, Isaac Copeland sold his one quarter to Charles G. Mason, and William H. Long sold his one quarter to Benjamin W. Reagan. On the 9th of January, 1877, Charles G. Mason sold his one half to Col. James M. Barney, and on the 5th day of May, 1877, the Silver King Mining Company was incorporated under the laws of the State of California. On the 9th of May, 1877, James M. Barney and Benjamin W. Reagan deeded their entire interests in the mine to the incorporation.

The title to the mine is thus continuous and perfect, and is in accordance with the laws of the United States governing the occupation and working of mineral lands. The mine has been worked continuously, and since the incorporation to the present time, and it promises to be prominent as the leading silver mine of the country for years to come.

One day, two years ago, an aged man came slowly into the thriving settlement at Picket Post, and with great interest wandered about the Silver King mill, where twenty stamps were day and night merrily pounding out silver from the rock. The man was evidently in need of help, and soon went to the office of the company and announced himself as Sullivan, the old soldier, the original discoverer of the vein, and humbly asked for work. Although long before he had been given up as dead, and very few of his old acquaintances survived, he was identified beyond a doubt, and was immediately taken into the company's service by the day. His story, was briefly told, as follows: On leaving Mason's rancho, he crossed the wide deserts to the westward as far as the Great Colorado River, and beyond it into California. Being penniless, he had sustained himself by working as a farm hand in California. Always hoping to obtain sufficient means to return to Arizona and secure the benefits of his discovery, he had labored on year after year, looking vaguely forward, and keeping the secret of the locality to himself, until one day he heard of the discovery of the rich deposit of silver by Mason and others. He was convinced that the place had been found, and that he had lost his chance of making the location for himself. Although without any ownership or right in the location, as made by Mason and his friends, and disappointed in his long-cherished hope, he could not resist a desire to return and see the result of the opening of the mine.

Situation, Accessibility, Climate.—The Silver King mine is situated near the base of the southwestern slope of the Pinal Mountain range in Pinal County, Arizona territory, at an elevation of 3700 feet above the sea. The location overlooks the country to the southward as far as the Mexican line, and westward, the vast plain of the Gila and Salt rivers to Phœnix, and beyond. This plain, now comparatively treeless, sterile, and desert-like, was once the seat of ancient civilization, as shown by the numerous ruins of buildings, and the profusion of fragments of pottery strewing the surface; but there is no evidence that the dwellers of the plain had ever discovered the wealth that lay hidden in the King Mountain.

The road from the mine leads for a few miles down the foot-hills and then over the nearly level plain for about thirty-five miles to Florence, on the Gila River, the county-seat of Pinal County. Beyond this town, the

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road continues over the plain to Casa Grande station, on the Southern Pacific Railroad of Arizona, nine hundred and thirteen miles from San Francisco. The natural road, now also the county-road, is excellent at all seasons, and the drive from the railroad station can be easily made in eight or nine hours. The mine may be reached from San Francisco in fifty-three hours, or five and a half days from New York, and at all seasons without embarrassment by snow, which renders so many of the important mines of the country comparatively inaccessible in the winter season.

The mill of the company is at the town called Pinal, on Queen Creek, five miles from the mine. Pinal is at an elevation of 2400 feet above tide. It is connected with the mine by a good road, and by telephone. At Pinal, the offices of the Silver King & Florence Telegraph Company give direct telegraphic communication with the Western Union lines.

The climate of the region is salubrious, and is particularly delightful in winter, as severe frosts are unknown. The air is remarkably clear, the days are warm, and the nights are cool and refreshing. In summer, the great heat of the day is tempered by the dryness of the air, which promotes rapid evaporation from the skin, and keeps down the temperature of the body. There is no interference with mining or milling operations, or loss of time due to the climate.

A project for a railroad leading northward from the Southern Pacific Railroad to the Silver King mine, and beyond it, is now under consideration, and in all probability a road will be built in the near future. Such a road would not only make the mine accessible in a shorter time than is now required, but would reduce the cost of freight on machinery and supplies, and afford a cheaper outlet for the ores and bullion. The configuration of the country is especially favorable for railroad construction, particularly as far as the foot-hills ;] for it is nearly all a continuous, level, gravelly plain, without streams or cañons, and requiring little or no grading. (TO BE CONTINUED.)

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

RECENT RULINGS OF THE COMMISSIONER.

By a recent ruling, the claimants of mill-sites are permitted to cut and remove timber thereon for the purpose of constructing mills, reduction-works, tramways, or other accessory required in developing their mining interests. In permitting the removal of timber from a mill-site or tract of non-mineral land, prior to the issuance of a patent therefor, it is strictly forbidden to make such timber an article of sale for private gain or speculation.

The law recognizes two ways by which title to a placer claim may be shown: one by a duly certified abstract; and the other, under the statute of limitations.

A final certificate received at the General Land-Office is made out to John Doe *et al.* The commissioner advises the local offices that *et al.* is altogether too loose and indefinite a basis upon which to issue a mineral patent.

A local attorney asked the commissioner to dismiss an application for patent because no appearance had been entered here on behalf of the party. The commissioner says: Should the motion come properly before me for consideration, I shall require advice as to the rule which makes a failure to employ resident counsel sufficient ground for dismissing an appeal without considering the merits of a case.

Concerning the right to order a hearing, the commissioner considers it proper in the exercise of his discretion to order a hearing upon whatever question of fact arising in a case and at whatever stage of the proceedings he pleases. When entry is made of a mining claim and the money paid for the land, the receiver of the local land-office in which the claim is entered fills out two receipts for the amount paid: one of these is transmitted with the final certificate of entry and the papers and the application for patent to the General Land-Office. The other receipt is given to the purchaser. When patent is issued, it is delivered to the party holding the duplicate receipt, who surrenders the same. An attorney for the owner or any one else holding the duplicate receipt can obtain possession of the patent. Usually this receipt is held by the attorney attending to the business of the claimant.

Application for patent and publication of notice thereof, as required by law, do not exempt a lode claimant from making the annual expenditures thereafter upon his claim. That requirement ceases only after payment of the purchase-money and entry in the local land-office.

"A" filed an application, and due publication was made. He failed to prosecute his claim, and the case rested, when "B" appeared at the local office and made a motion to dismiss the proceedings, in order to make application for patent, basing such motion upon a certificate of subsequent relocation and a decree of court in an action commenced by "B" against "A" to quiet title, which decree was rendered through the default in appearance of "A." The Commissioner of the General Land-Office refused to dismiss "A's" application upon such a showing, holding that the courts had no jurisdiction at that stage of the proceedings; that the question of abandonment after the period of publication prescribed by law is one which must be determined by the Executive Department after an investigation. "B" appealed from this ruling to the secretary, who ordered a hearing to determine the question of abandonment before relocation.

The question of a disputed mining title is always one for judicial investigation, and can in no instance be determined by the General Land-Office.

Application for patent can not be received at a local land-office for a lode claim embracing a portion of the surface ground of a claim for which an application has been previously filed and is still pending; but when an application has been properly refused a filing, the subsequent application for a patent for another lode should be received, although including part of the surface claimed adversely by others.

Where non-mineral lands have been fraudulently entered under the mining laws, disinterested parties may, at any time before patent issue, lay the facts before the General Land-Office, supported by affidavits of reliable persons; and, if sufficient to establish a *prima-facie* case of fraud or illegality, a hearing will be directed to be held by the local land-offices for the purpose of determining the truth of the charges made, and, if substantiated the entry will be canceled.

The rule which forbids the reception of an application for patent to a mining claim which conflicts with a claim embracing a prior pending application is derived from that provision of the statute which prescribes the method of filing adverse claims. Where the statute prescribes one way in which a thing shall be done, it precludes every other. It is easy to see that this rule is a salutary one; for were it otherwise, application after application might be accumulated in the local office all relating to the same land, thus nullifying the law which requires adverse claims to be filed and prosecuted. A suit upon an adverse claim, commenced after the period prescribed by law has expired, does not justify the suspension of proceedings for patent.

Coal lands were never subject to location with Sioux or California University scrip.

FOREST FIRES.

Professor C. S. Sargent, who has charge of the forestry statistics of the census, has presented a paper on forest fires at a meeting of the Massachusetts State Board of Agriculture, from which the following parts have been chosen as particularly interesting by the editor of the *Journal* of the Charcoal Iron-Workers:

The division of the tenth census which has been specially engaged studying the forests of the country has endeavored to gather statistics of the extent and value of the forests burned during the year 1880, and, though the results obtained have not yet been published, there is every reason to believe that the extent of forest fires through the country is infinitely greater than has ever been seriously supposed. In Massachusetts, the amount of property destroyed in this way is naturally shown to be comparatively small; and yet, in the year 1880, some 13,899 acres of land were burned over, the loss being given at over $100,000. In Pennsylvania, where the value of forest property is more appreciated than in Massachusetts, and the lumbering interests are only second to those of Michigan, 685,738 acres are reported burned over during the year, with a loss of over $3,000,000. It is not probable that these statements are exaggerated, and in the case of Pennsylvania they undoubtedly do not represent the actual loss from this cause.

An important fact, which probably very rarely receives due attention, is, that forest fires destroy not only growing wood, but the fertility of the soil itself. In treating of forest fires, we generally consider only the immediate damage and pay little if any attention to the greater loss which the land itself suffers from being burnt over. If only a portion of the trees growing on a tract of land are cut, and a sufficient number is left to protect the soil and produce a supply of seed, the same species will continue to grow almost indefinitely. If, on the other hand, a forest is destroyed by a fire which kills the trees and undergrowth of shrubs and herbs, the same species, except in the case of some of our least valuable trees, rarely spring up again. If a forest of white pine is destroyed by fire, this tree does not spring up again, as it would under proper care, and the land is not covered again with any growth of trees for a considerable period. The fire-weed first makes its appearance. The light seed of this plant is often blown for a long distance, and, falling upon the bare ground, germinates quickly, and finally covers the burnt surface with vegetation. Birds drop the seeds of raspberries and blackberries, which find sufficient nourishment and light for germination. These, as they grow, cover the ground and afford protection to the stones of the little Moreton cherry, dropped by birds also, or to the light seeds of the gray birch, or some of the willows or poplars, which are constantly blowing about, and will germinate anywhere upon any unshaded ground. These are generally the first trees which succeed a fire-swept pine wood. Years, however, elapse before the ground is covered again even with such trees.

The cherries and the birches and poplars are short-lived, and are succeeded by more valuable broad-leaved trees. Squirrels and other animals deposit acorns in the ground, and the wind brings the seeds of maples, ashes, and the valuable birches. Such seeds find protection among the poplars and willows which had sprung up, and, as these die, the more valuable trees get a chance to grow, and gradually occupy the ground. This new forest of hardwood trees, if protected from fire, will occupy the ground for a long time, and the original pine will not appear again until the land, long enriched by an annual deposit of leaves, has been once more stripped of its tree-covering and mellowed by years of cultivation. Such land, nearly all over New England, if freed from the plow or the scythe, and guarded from fire and pasturage, grows up again with pine.

The forest fire, then, which destroyed the pine destroyed as well the capacity of the land to produce a similar crop for a period of from fifty to one hundred years. The damage inflicted upon the land is, of course, not irreparable in a climate like that of New England, where the annual rain-fall is sufficient always to insure a growth of trees of some sort upon undisturbed ground, and sooner or later, in the ordinary workings of nature's laws, forests will succeed each other here; but in some parts of the country, where the rain-fall is so slight that there is a constant and severe struggle between the forest and the plain, and where trees under the most favorable conditions barely exist, a fire not only kills the forest, but it makes any future growth of trees impossible.

There is little inducement to plant or protect and encourage the growth of natural woodlands so long as the condition of public sentiment is such that the authors of forest fires are not held responsible for their acts. It is safer to cut it off for cordwood at the earliest possible moment, and thus reduce the risk of probable loss. Under these circumstances, it is useless to adopt any of the methods of thinning or pruning by which the value of young forest-trees for timber may be vastly improved, or to guard the woods from roaming and destructive cattle. Even in a State like Massachusetts, where the value of all forest products is enormously high, capital will not take the risk of forest culture, although it might be made most profitable under a wiser management.

Not a small part of central and southern New England, no longer profitable for agriculture, is now growing up with white pine, and this, if it can only be protected, will, it is thought, soon exceed in value the net profit upon all the New England farms. In some parts of New England, this second growth of pine has been growing for a considerable time, and has already given rise to large and profitable industries. The value of logs cut in Massachusetts during the census year reached nearly $2,000,000. At least one half of these logs were of second-growth pine. More than

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100,000,000 feet of second-growth pine were sawed during the same year in Vermont and New Hampshire, and nearly, if not quite, as much more in Maine.

The census investigation showed that in Massachusetts, during the year 1880, 52 forest fires were set by sparks from locomotives; that 40 spread from carelessly burned brush-heaps; that hunters caused 37; that nineteen careless smokers dropped their lighted cigars or burning ashes from their pipes, and so caused disastrous conflagrations. In three instances, the origin of forest fires is ascribed to the burning of charcoal, and in only eight cases to malice. It appears, then, that the railroads are responsible for the greatest number of these fires, and that the remainder may be generally traced to sheer carelessness. As a first step toward checking this evil, railroad corporations should be compelled to provide their locomotives with spark-consumers. Another act is needed to compel the collection and burning during the winter in which the trees are cut of every part of them not carried away. A criminal act is also demanded for the punishment of any who shall maliciously or carelessly set fire to growing wood. On these points, however, it is more important to educate public opinion than to frame or pass laws which will only be enforced when people feel the need of them. A full understanding of the forest question is the best guarantee that woods will be protected and receive the care which, in their economic aspect, if in no other, they deserve.

THE IRON TRADE IN THE NORTHWEST OF GERMANY IN 1882.

German iron-masters possess an association whose aims and methods are very similar to those of kindred bodies in Great Britain and in this country. Germany is the third in the rank of producing countries, and and in some specialties sends important quantities of iron and steel to the United States. Indirectly, the growth of the German iron trade has affected our own, as robbing Great Britain of a valued customer and, in some instances, creating a competition in other markets.

The year 1882 was a dull one in the German iron trade, consumers holding off, and a serious decline in prices was averted only by combination of producers. The latter were assisted in their endeavors by the large contracts for railroad material entered into. An exceptionally good crop also created a demand for merchant shapes and bars, particularly in the eastern section of the country, stocks in speculators' and dealers' hands having run down during the preceding period of inactivity. Another feature of the year was the fact that the pending exceptional increase in the Russian duties on wire and wire-rods led the works interested in that specialty to drive at their utmost capacity, in order to make heavy deliveries previous to the enforcement of the new tariff. This summer activity was lost in the winter, and at the close of the year dullness set in. The production in the northwest of Germany, including the Rhenish Provinces, the Siegen District, Westphalia, and Nassau, but excluding the works on the Moselle and Saar rivers, was as follows:

	1881.	1882.	Increase (+) or Decrease (−)
High-Grade Forge Pig.			
Stock, Jan. 1, tons	24,157	7,545	− 16,612
Production, "	545,620	637,612	+ 91,992
Consumption and sales, tons	562,232	621,900	+ 59,668
Stock, Dec. 31, "	7,545	23,257	+ 15,712
Ordinary Forge Pig.			
Stock, Jan. 1, tons	2,595	522	− 2,073
Production, "	81,622	159,127	+ 77,505
Consumption and sales, tons	83,695	151,504	+ 67,809
Stock, Dec. 31, "	522	8,145	+ 7,623
Spiegeleisen.			
Stock, Jan. 1, tons	7,774	2,846	− 4,928
Production, "	97,055	109,787	+ 12,732
Consumption and sales, tons	101,983	102,698	+ 715
Stock, Dec. 31, "	2,846	9,935	+ 7,089
Bessemer Pig.			
Stock, Jan. 1, tons	6,613	10,971	+ 4,358
Production, "	224,718	414,948	+190,230
Consumption and sales, tons	220,360	413,035	+192,675
Stock, Dec. 31, "	10,971	12,884	+ 1,913
Foundry Pig.			
Stock, Jan. 1, tons	14,735	8,901	− 5,834
Production, "	120,133	113,608	− 6,525
Consumption and sales, tons	125,967	119,598	− 5,969
Stock, Dec. 31, "	8,901	2,911	− 5,990

The total output of Germany in 1882 and 1881 was 3,170,957 and 2,914,009 metric tons, of which this district made 1,435,082 and 1,069,148 tons respectively. The imports and exports of pig-iron in Germany were:

	1882.	1881.	1882.
Imports	282,958	244,601	Inc. 38,357
Exports	186,938	245,496	Dec. 58,558

This decrease in the exports is looked upon as a good sign for the activity in the home markets, while the increase in the imports is considered a proof of the heavy disadvantages which high rates of freight cause the German pig-iron industry to labor under. It is generally assumed that two sevenths of the imports are Bessemer pig, while five sevenths are foundry iron.

In regard to other branches of the German iron and steel trade, the following figures of imports and exports will be of interest:

		1882.	1881.
Old and Scrap	Import	8,048	5,644
	Export	59,315	67,073
Billets and Ingots	Import	683	330
	Export	32,957	40,677
Bars	Import	15,779	14,258
	Export	144,397	152,804
Tires and Plow-shares	Import	38	47
	Export	14,052	15,567
Angles and Tees	Import	199	71
	Export	3,695	4,554
Rails	Import	663	1,495
	Export	186,053	250,708
Track Material	Import	173	297
	Export	11,596	11,981
Axles, Wheels, etc.	Import	239	171
	Export	11,822	17,083
Plates and Sheet	Import	3,156	3,053
	Export	44,204	40,932
Wire Rods	Import	3,480	3,276
	Export	227,415	159,416
Wire Nails	Import	23	32
	Export	23,877	21,710

The most interesting figures to Americans are those relating to wire, of which the Germans are the leading producers in the world. On the first of July, the Russian government raised the duty on wire-rods from 35 kopecks to 1 ruble 10 kopecks per poud, or an increase of 185·77 per cent, and as the Russian wire-mills produce only a portion of the quantity required by wire-drawers and nail-makers, they endeavored to obtain as heavy an amount of the supplies of raw material as possible. The German mills were therefore taxed to their utmost capacity, and the number of trains added to their plant was extraordinary, carrying the total number in the Northwest District, which is the chief producing section, to 51, so that fears are expressed of a danger of overproduction. The Germans are making great efforts to produce barbed wire. Hitherto this class of goods has been made almost exclusively from imported Swedish iron, but now it is made of soft steel hardened. The German makers complain that the duty, which is only one half of one per cent *ad valorem*, is too low to protect them against English competition, and they are clamoring for more. Some of the wire-makers complained that the duty on pig was checking them, and the manufacturers have accordingly, under certain circumstances, put down the price of the raw material for wire made for export. The German wire-makers are besides urging the railroad managers to give them special drawbacks on freights on exported material, and the fact that such concessions have been made on exported rails seems to give them grounds for hoping that they will succeed.

It may be noted that the Siegen spiegeleisen producers are also dissatisfied with the railroad rates, notably on coke and on metal for export.

PROGRESS IN SCIENCE AND THE ARTS.

Electric Torpedo-Boat.—A torpedo-boat has just been satisfactorily tried at Constantinople, in which a Siemens electro-motor drives two screw propellers in the rear of the boat. The vessel is cigar-shaped, and moves under water at the rate of eight knots an hour. Its path is traced in the daytime by a wire which projects above the surface, and is followed by a telescope; in the night, by a lantern having an opening only toward the shore, and a light too feeble to betray itself to the enemy by reflection. The place in which the torpedo-boat was tried furnished a severe test on account of the strong currents, which vary in direction in different parts of the channel, and in strength from one part of the day to another. The wires conveying the explosive discharge are, of course, distinct from those carrying the motive current.

Preventing the Corrosion of Steam-Boilers.—In concluding a valuable paper on steam-raising waters, published in the Journal of the Society of Chemical Industry, Mr. W. Ivison Macadam, F.I.C., says: "Clarke's process, the addition of milk of lime, is suitable; but the space required for settling is against the general adoption of the method. The addition to the feed-water of caustic soda, or, still better, of soda-ash, and at the same time raising the temperature by utilizing waste steam or heat, would be beneficial in most cases, care being taken to afterward settle or filter the water. Soda-ash was first recommended in the columns of the *Times* of March 17th, 1864, by Mr. Peter Spence, of the Manchester Alum-Works, who says: 'For every boiler 2 pounds of soda-ash—an article easily procured at 1½d. per pound—is every day given to the stoker. This he dissolves in a bucketful of cold water, and puts the solution into the water supply for the boilers. This he does as part of his imperative daily duties, and the consequence is, that now not the slightest corrosive action takes place, an additional advantage being that no crust is ever formed in my boiler, all the lime-salt that forms these crusts being also destroyed by the alkaline solution.'"

Paper Doors.—In the use of wood for constructing doors, great difficulty is experienced from the shrinkage, swelling and warping to which the material is subject, while the general use of metal for such purposes is rendered impracticable by its weight. To obviate these objections, a door composed of two or more sheets of paper-board, secured together and rendered homogeneous, has been devised. The following description is furnished by the *Manufacturer and Industrial Gazette:* Boards of properly prepared paper are taken, each having the requisite dimensions for a door, and a thickness of one third or one half the proposed thickness of such door, and within the outer board or boards, openings are cut that correspond in size, shape, and location to the ordinary panel-openings. The edges of these opening are preferably molded, but, if desired, may be left plain and separate moldings may be secured thereon after the door is completed. The outer boards thus constructed are then coated upon their inner faces with a suitable adhesive mixture, preferably composed of forty-nine parts of glue and one and one eighth part of bichromate of potash dissolved in water, and placed upon opposite sides of a central panel board, after which they are passed between rollers and subjected to a heavy pressure, which cause the boards to firmly adhere to and become practically homogeneous. The door may now be covered with any desired fire or water-proof coating, and then painted in the ordinary way, after which it may be hung and trimmed in the usual manner, and from the nature of the material employed is free from all changes which are produced by atmospheric causes upon wood, costs much less than metal, and has less weight even than a door constructed from pine.

Discharging Torpedoes.—It is well known that the problem how best to discharge Whitehead torpedoes presents considerable difficulty, and many attempts have been made to devise a satisfactory mechanism. It appears that Messrs. Yarrow have settled the question so far as torpedo-boats are concerned. Some interesting trials took place at Westminster on the afternoon of the 9th, in the presence of Admiral Sir Cooper Key, First Sea Lord, Rear-Admiral Brandreth, Controller of the Navy, Mr. George Rendel, and Mr. Nathaniel Barnaby, with a second-class torpedo-boat recently built for the English government by Messrs. Yarrow & Co., in order to illustrate the new system of steam impulse introduced by them. The gear is similar to that recently tested at Portsmouth with great success, it being found very superior to the plan previously adopted. The arrangement consists in building two troughs inclined at an angle of 5 degrees in the bow of the boat, which are provided with suitable guides for carrying the Whitehead torpedo. Aft of these

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troughs or guides are two long steel steam cylinders, 6 inches diameter and 7-foot stroke, the piston-rods of which press against the ends of the torpedoes, and upon steam being suddenly admitted into these cylinders, the torpedoes are instantly forced out with considerable velocity, the speed being estimated at about fifteen miles an hour. If, therefore, the impulse is given when the boat is going twenty miles an hour, the collective speed of the torpedo upon entering the water is clearly thirty-five miles an hour. The arrangement is exceedingly simple, and under the entire control of the steersman.

The Estimation of Sulphureted Hydrogen and Carbonic Acid in Coal-Gas.—Mr. L. T. Wright recommends the following method in a paper read before the British Chemical Society:

The crude coal-gas, dried and freed from ammonia by passing through phosphoric acid, is passed through two weighed U tubes, the first charged with roughly powdered cupric phosphate in one leg and calcium chloride in the other, the second containing soda lime—slightly moistened by exposure to the air for about eighteen hours—and calcium chloride. The increase of weight in the first gives the sulphureted hydrogen in the second the carbonic acid. The copper phosphate is prepared thus: Two pounds of ordinary phosphate of soda are dissolved in one gallon of water, and two and a half pounds of cupric sulphate in one and a half gallons of water. The two solutions are vigorously stirred together, the precipitate washed by decantation, and dried at 100 degrees C. Phosphate thus prepared absorbs hydrogen sulphide very perfectly. Before using the absorption-tubes, three cubic feet of clean dry coal-gas are passed through to "saturate" the reagents. The gas during the absorption should be passed at the rate of ½ to ¼ a cubic foot per hour. The total quantity must vary with the impurity in the gas. The sum of the hydrogen sulphide and carbonic anhydride, thus estimated, is always greater than the number obtained by absorbing these gases simultaneously in one U tube charged with soda lime. A 6-inch U tube charged with cupric phosphate will absorb twenty grains of hydrogen sulphide. A similar sized U tube, charged with soda lime, will absorb perfectly eighteen grains of carbonic anhydride. Dr. Armstrong suggested that some acetylene might be absorbed by the cupric phosphate.

Storage Batteries.—Prof. Henry Morton recently read a paper on the storage of electricity to the members of the New York Electrical Society, at the Stevens Institute of Technology, in Hoboken. Edison incandescent lamps lighted the room, a two horse-power Weston electric motor stood on the lecture-table, and the lamps and motor were furnished with electricity from the Sellon-Volckmar accumulators. Professor Morton briefly described the principles involved in the present methods of electrical storage. He then explained the structure of the Sellon-Volckmar battery, which consists of plates, each made of a fine lattice-work of metallic lead, filled in with a porous mass, which was in each alternate plate either metallic lead or the black peroxide of lead. The experiments made by the lecturer showed that each cell in the battery would yield a continuous current or about thirty-two ampères for nine hours, with an electro-motive force of about two and two tenths volts, a quantity of current sufficient to supply forty-four of the Edison incandescent lamps of 16 candle-power, without employing more than 50 of the cells to secure sufficient electro-motive force to overcome the resistance of the lamps. Each cell weighed only 80 pounds when ready for work, so that for each light of 16 candles, burning one hour, 10 pounds of battery should be provided, if it were used solely as a reservoir to contain the current required. Experiments with the lights in the room were made to show that the battery in many cases would only be required to act as a regulator, simply taking up a temporary excess of the entire amount of electricity used, and providing for a temporary deficiency. By connecting the lights directly with a dynamo, its current was made to fluctuate so that the lights flashed up or faded according as the current was strong or weak. By connecting the dynamo with the battery, so that any excess of current could flow into it, or any deficiency be supplied by it, the lights burned perfectly steady. Touching on the question of using the storage batteries as a means of driving street cars, Professor Morton said that his measurements showed that each battery of 80 pounds weight contained energy equal to about 1,800,000 foot-pounds, or sufficient to take a one-horse car full of passengers across town, or from one end of the city to the other.

The Proportion of Carbon Wasted as Soot.—Prof. W. Chandler Roberts, in his elaborate chemical report for the committee of the Exhibition of Appliances for the Abatement of Smoke, held in London some time since, gives the following evidence on the proportion of carbon wasted as soot. Professor Roberts says: Earlier experiments have indicated the limits within which this proportion of soot will probably be comprised. M. Delezenne estimated in 1855 that the proportion of carbon that escaped combustion in this form might be taken at five per cent of the total weight of fuel burnt in the grate, and that 6320 kilograms of soot fell in twelve hours on the town of Lille. But, as Emile Burnat, quoting Payen, pointed out in a valuable paper on the combustion of smoke in boiler-furnaces, the amount of finely-divided carbon produced in a certain *lamp-black* factory is only 3 per cent of the coal burnt, and therefore the amount of carbon in ordinary smoke must be much lower. In 1858, Mr. John Graham estimated that very black smoke does not contain more than $\frac{1}{10}$ per cent of the carbon of the coal burnt, and the accurate experiments of M. Scheurer-Kestner showed that in boiler-furnaces the loss of carbon in the form of soot never exceeds 1 per cent of the fuel burnt, while the mean loss is probably between ½ and ¾ per cent. A case, however, is recorded, in which a coal containing 69 per cent of carbon (burnt with an inadequate supply of air) thus lost an amount of carbon as soot equal to 2·03 per cent of the fuel burnt. As might be anticipated, the amount of soot is greater in the case of an open fire-place than in a boiler-furnace; but the evidence afforded by the results of the tests made at the exhibition, while possessing much interest, does not, unfortunately, render it possible to give a precise answer to the question, for the following reasons: Some of the soot must have been deposited in the flue before it reached the point at which the withdrawing tube was inserted; and there is reason to fear that in the withdrawal of flue-gas laden with soot through any form of slit or orifice in a tube, the gaseous and solid portions may not enter in exactly the ratio in which they exist in the chimney. In many cases, the flues were carefully swept before and after the trial, and the soot was collected and weighed. In an extreme case, in an open fire-place, no less than 2¼ per cent of soot, compared with the fuel burnt, was found in the flue at the end of the trial. In the case of three close stoves of careful construction, rather less than ¼ per cent was found, while in some cases it fell to ¼ per cent, and in one case to $\frac{1}{10}$ per cent. Of course, these numbers do not include the amount escaping into the air. I may perhaps add that in a preliminary experiment, made with an ordinary open fire-place connected with a chimney by means of a sheet-iron pipe 6 feet long and 9 inches diameter, 17 pounds of bituminous coal were burnt in three hours, and no less than 0·61 per cent of the fuel burnt was collected in the pipe in the form of soot, while the soot that passed into the chimney was not collected. This 0·61 per cent of soot, after drying at 100 degrees C., yielded, on distillation at 300 degrees C., 12 per cent of an oily, strong-smelling mixture of hydrocarbons.

Lubrication.—A subject which does not generally receive the attention it deserves was brought before the members of the Manchester Association of Employers, Foremen, and Draftsmen, at a recent Saturday meeting, in an interesting paper read by Mr. J. Veitch Wilson, on the lubrication of ordinary bearings and of bearings and faces subject to the action of steam. Mr. Wilson dealt with the question in an exhaustive manner. With regard to ordinary bearings under normal atmospheric conditions, he laid down that the lubricants to be employed should possess the following essential properties: They must not give off inflammable vapor under 350 degrees Fahr.; they must not act upon the metals with which they come in contact, nor oxidize, which tended to spontaneous combustion and clogged the machinery; they must have body adapted to the work to be done; their boiling-point must be sufficiently high to prevent evaporation and secure durability, and their freezing-point must be low enough to insure regularity of feed from the oil-cups and convenience in handling. As the result of numerous experiments, he had become convinced that mineral oils were, if used alone, unsatisfactory lubricants; but bearing in mind the fact that mineral oils could now be obtained in every respect as safe as the finest animal oils, and that the admixture of mineral oil with animal or vegetable oils neutralized the acidity in the one case and the acidity and oxidizing tendency in the other, he was of opinion that the safest, most efficient, and most economical lubricants for all manner of bearings were to be found in a judicious mixture of animal or vegetable with good mineral oils. With regard to cylinder lubricants, the peculiar conditions were the liberation of natural acids from vegetable and animal fats by the action of steam and heat, the action of these acids on the cylinders, and the evidence that in these acids were constituent parts of all animal and vegetable fats and oils: they could not be removed by any process of refining. One of the lubricants largely in use was tallow, but that this was the cause of considerable injury to the engine cylinders he had abundant evidence to prove. From the mass of evidence he had collected upon the subject, he was convinced that, if care were exercised in the selection of the oil, and equal care in its preparation and application, hydrocarbon oil would be found thoroughly efficient as a cylinder lubricant, absolutely harmless and much more economical than tallow. Sometimes a small percentage of vegetable or animal matter was added, in order to increase the lubricating properties, and in his experience this had always been attended with favorable results. Hot-air engines might be lubricated on the same principle as steam-cylinders, but gas-engines presented a new and special feature, as in their case the lubricant was not only subjected temporarily to the intense heat of the explosion, but also came in direct contact with the flame, and was liable to be carbonized thereby. If, therefore, vegetable or animal oils and fats were objectionable in steam-cylinders, they were much more so in the cylinders of gas-engines.

THE SLIPPING OF MINE LOCOMOTIVE-WHEELS.—There has been complaint occasionally that mine locomotives give trouble underground, because the wheels are apt to slip, the weight of the engines not being great enough in comparison with the duty they are called upon to perform, because their dimensions are restricted by the size of the drifts and galleries. Besides, escaping steam and smoke make the rails slippery, so that a grade of two per cent is considered a maximum by many. The frequent use of sand-boxes is objectionable, because it tends to destroy the rails more rapidly. In the Mazenay iron mines, the observation was made accidentally that throwing a jet of water upon the rails considerably increases the friction. A condensation water-cock broke accidentally, and a mixture of water and steam flowed on the rails at a point where the grade was 1¼ per cent, and where usually the wheels slipped. No trouble at all was experienced that time, and since then, special cocks have been provided, which are opened when the steep grade is reached, throwing water from the boiler upon the rails. Since the introduction of this simple experiment, there has been no difficulty whatever.

DUST-CHAMBERS FOR BLAST-FURNACES.—In order to avoid the inconvenience attending the cleaning of brick stoves for heating the blast by the waste gases from their iron blast-furnaces, the managers of the new St. Nazaire works, France, have put up dust-chambers. The furnaces, of which there are two, are 19 meters (62·34 feet) high, have a 5-meter (16·4-foot) bosh, and are designed to smelt Spanish and Segré (Anjou) ores with Welsh coke. The velocity of the gases carried from the furnaces to the Whitwell stoves was computed at about 21 feet, so that no chance would be afforded the dust carried along to settle in the flues, and for this purpose large sheet-iron boxes were built, with the object of forcing the gases to travel in thin sheets over long stretches of sheet-iron and settle the dust previous to its entering the stoves. Herr J. H. C. Steffen, in a recent issue of *Stahl und Eisen*, gives the details of the construction of these dust-settlers. In running on Spanish ores to the extent of 80 per cent of the charge, the average quantity of dust gathered per week was 45 cubic feet. On the second furnace, which had not yet been at work at the time when the St. Nazaire establishment was visited by Herr Steffen, a different plan, based upon the idea of diminishing the velocity of the current as much as possible, was to be tried, and accordingly, dust-chambers of a different design were built. As yet, no data as to the merits of the two plans are available.

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PROFITS IN THE MANUFACTURE OF DYNAMITE.—The report of the directors of the Nobel Explosive Company, Glasgow, showed a net profit for the year of £58,087 14s., in addition to £9737 1s. 3d. brought forward. The output of the various articles manufactured by the company, and their ultimate conversion into dynamite, blasting gelatine, detonators, and electric fuses, has considerably increased during the year, with the exception of the sulphuric acid, which was slightly decreased, owing to the necessary repairs of chambers. The cost of manufacturing nitro-glycerine was considerably greater than during 1881, owing to a further advance in the price of crude and refined gelatine. But for this, the balance of profit for the year would have been greater. The cost of nitro-cotton, fulminate of mercury, detonators, and electric fuses compares favorably with that of 1881. The demand for the company's manufactures, both at home and abroad, has continued to increase, and has taxed the producing powers of the factories to such an extent that the dynamite and blasting gelatine had to be dispatched from the Ardeer factory more frequently, and in smaller shipments than usual. In order to assist in the more rapid delivery of the explosives, the directors were compelled to charter an extra steamer during the whole of the past year, the expense of which has enhanced the cost of production. For a length of time, it has been evident to the directors that the steadily increasing demand for dynamite and blasting gelatine would soon overtake the company's powers of production, and after obtaining government sanction for the necessary extension of the works, they decided about a year ago to erect a duplicate factory. With this view, it became necessary to acquire more land, and they have now the pleasure of reporting that they have purchased, at a cost of £10,000 sterling, 240 acres of ground from Mr. Patrick Warner, which will give them ample scope for their future operations. This additional factory is now approaching completion.

A CURIOUS CASE OF CORROSION OF STEEL.—Professor Munroe, of the United States Naval Academy, has contributed the following to the *Journal of the Franklin Institute:* Through the kindness of Chief-Engineer Farmer, my attention has recently been called to the appearance of two cold-chisels found in the United States steamship Triana in 1874, and which have since been preserved in the Department of Steam Engineering at the Naval Academy. These chisels were taken from the channel-way leading from the jet-condenser, and were located between the foot-valve and the air-pump. Both chisels were of steel throughout, as was proved by tempering the head. For use, of course, only the points had been tempered. During the time of exposure to the action of the salt water in the channel-way, the chisels were deeply corroded; but the corrosion was confined entirely to the soft metal, the tempered points not being attacked in the least. The corrosion was deepest at the line of contact between the tempered points and the untempered metal of the haft. The line of immersion, on tempering, is as distinctly marked as if drawn with a shading-pen. Since meeting with these chisels, I have heard of a similar case of corrosion, although the object has been lost. It was a hammer which had been taken from the boiler of a merchant vessel, the tempered faces of which were intact, while the soft metal was corroded. Remembering the heated discussion going on in metallurgical circles on the question, What is Steel? I shall not attempt to decide whether the change which takes place in the tempering of steel is a chemical or a physical one; but it is evident that this change produces a body which is not so readily acted upon by salt water as untempered steel is. It is also probable that, when the untempered and tempered steels are brought in contact in the presence of salt water, we have an electro-chemical couple, and that this hastens the destruction of the untempered metal. I beg to suggest that this observation may have a practical bearing upon the construction of steel ships.

ESTIMATING THE CONTENTS OF HIGHLY PLICATED ANTHRACITE COAL-BEDS.—At a meeting of the Engineers' Club of Philadelphia, Mr. Charles A. Ashburner read a paper on a New Method of Estimating the Contents of Highly Plicated Coal-Beds as applied to the Anthracite Coal-Fields of Pennsylvania. The questions of the future production and ultimate exhaustion of these fields are of the greatest importance. In 1860, the population of the United States was 31,443,321, and 8,513,123 tons of coal were produced, that is, actually shipped to market; in 1870, the population had increased 22 per cent (38,558,371) and the production of anthracite was nearly doubled, being 16,182,191 tons. For the year 1880, with a population of over 50 millions, the product was 28,437,242+ tons. In 1882, the actual production was over 30,000,000 tons. It has been variously estimated that the 470 square miles containing this coal in Pennsylvania will be entirely exhausted in from 140 to 204 years. While Mr. Ashburner does not estimate the ultimate exhaustion, he has devised a method for estimating the contents of these fields from data which the careful and practical geological and mining examinations of the State Survey are now affording. The exact position and detailed structural shape of the coal-beds are first mapped by 50-foot contour-lines along the floor of the beds, giving, completely and satisfactorily, their geometrical construction and shape. These surfaces are then developed into planes, by the development into straight lines of the line of the bed as cut by paralleled section planes 1600 feet apart. This graphical method is attended with errors which are mathematically discussed, and which have been formulated by Mr. Arthur Winslow, member of the Club. This method does not give the true area of the surface of a sphere, cone, or triangular trough. In the case of a sphere, it gives $\frac{\pi}{4}$ of the true area; in a cone, the error increases directly as the secant of the angle which the pitch of the cone makes with its axis; and in a triangular trough, which more nearly represents the shape of the anthracite basins, the error is very much less. A practical test has been made of this method in the Panther Creek basin, between Mauch Chunk and Tamaqua, and the maximum possible error in estimating the surface area of the coal-beds was found to be ·905 of 1 per cent. After the areas are thus found, the contents are obtained by careful measurements made in the mines, to ascertain the actual number of tons of coal which are contained in a unit (1 acre) of bed area. In this way, it has been estimated that the above basin originally contained 1,032,000,000± tons; that the area under development originally contained 92,000,000± tons, out of which latter area 54,000,000± tons have been taken.

FURNACE, MILL, AND FACTORY.

The Colorado Smelting Company has broken ground and begun the construction of large smelting-works at Pueblo. The iron work, including furnaces and two large engines, is manufactured at the extensive shops of Hendey & Meyer in Denver. The furnaces are to be of a size larger than has heretofore been used in Western smelting, having twelve tuyeres instead of eight or ten. Mr. Anton Eilers, widely and favorably known among smelting men, is to be metallurgist of the new works.

On the 13th inst., fire caught in the charcoal sheds of the Midland Blast-Furnace Company, at Midland, Mo., from a spark from the furnace, destroying about 100,000 bushels of charcoal and two large sheds. The loss, about $12,000, was covered by insurance, but the incidental loss by enforced stoppage will amount to considerably more. It was only by the most faithful efforts of the employés that the entire furnace property was saved from destruction. President Lee writes to the *Age of Steel* that several men covered themselves with wet blankets, and stood in the face of the fire and worked to save the company's property, while their own household goods, which wives had carried out of houses, were suffering destruction. He distributed $250 among four of the most faithful men, besides paying them enough to cover their own losses. The furnace will be idle for several weeks, until a fresh stock of charcoal can be made.

The employés of the pipe-mill of the Reading Iron Company on April 20th appointed a committee to wait upon the proprietors, to demand the restoration of wages paid previous to last August. The company denied their request. Superintendent Wolf stated that there was not work enough on hand to keep the men employed. The sheet and iron rolling-mills are also idle. The nail factory of the company has been out of operation for two years. The furnaces, foundry, and forge are running full blast.

Contracts for the construction of eight vessels have been secured by the American Ship-Builders of Philadelphia. Four hundred Edison electric lights will enable work to be carried on at night as well as day. Four hundred men are at present employed. A 140 horse-power engine is 22-inch cylinder and 48-inch stroke. The keel of ship No. 1 will be begun on Monday, and there is yard room for ten in all. The machinery was started up on Thursday of this week.

G. S. Wormer & Sons, of Chicago, are building for the Marinette Iron-Works Company, of Florence, Wis., one 30 and one 25 horse-power portable boiler and a double 6¼ by 8 friction-drum hoisting-engine; for the Lumberman's Mining Company, Iron Mountain, Mich., a 54 by 16 tubular boiler and fixtures complete; for James A. Allen, Fort Howard, Wis., one friction-drum hoisting-engine and boiler; for the Metropolitan Iron and Land Company, Metropolitan, Mich., double-cylinder 10 by 12 friction-drum mining-engine.

The Webster, Camp & Lane Company, of Akron, O., has recently shipped to the Cleveland Iron Mining Company, at Ishpeming, Mich., a hoisting-plant consisting of four drums 8 feet in diameter with face surface sufficient to coil 1300 feet of rope. The drums are to be operated by a pair of engines 22 by 42 inches, and will have a hoisting capacity of 140 tons. This company has also recently furnished the Iron Mountain Mining Company, of Iron Mountain, Mo., a hoisting-plant consisting of two 5-foot drums and one 8 by 32-inch engine, and is now constructing a plant of four 8-foot drums for the Lake Superior Iron Mining Company, and also several different hoisting apparatus, some to go Colorado and some to Montana.

The Buckeye Bridge and Boiler-Works, in Cleveland, O., have several heavy contracts for boilers, and are making 1¾ miles of boiler-iron tubing for compressed air, for a mining company in the Lake Superior region.

The Lake Shore Tube-Works Company, of Pittsburg, was chartered recently, with a capital stock of $25,000, divided into 250 shares of $100 each, and held by the following persons: William L. Hurd, McKeesport, 25; Peter Patterson, McKeesport, 10; James B. Murray, McKeesport, 10; J. M. Converse, Pittsburg, 50; James B. Converse, Pittsburg, 50; James H. Flager, trustee, New York City, 105.

Robert Hogsett is now sole owner of the Lemont Furnace, in Fayette County, Pa., having purchased the half-interest of his partners. The consideration is not known.

The mechanical puddler which recently gave the Phœnix Iron Company so trouble made four heats last week, and did the work admirably, so far as the puddler is concerned; but it is now found that the engine for drawing it is too light for the work, and that the furnace will not melt the iron fast enough to supply the molten iron to keep one of the puddlers in operation. It was thought it would be ample for two of them. These defects will be remedied, another furnace will be built, and a new and larger engine substituted for the one now in use.

The Monongahela Manufacturing Company, Monongahela City, Pa., was reorganized January 1st, 1883, and the capacity of the works was largely increased by putting in new machinery. It is also still adding to its extensive works. It manufactures steam-engines, hoisting machinery, and general supplies for coal mines; pit-cars, pit car-wheels, frogs, and turn-outs; sheaves, drums, etc.; and complete outfits for tipples. Mr. Kelly, the president of the company, was for a long time with the Pittsburg Locomotive-Works, and with A. Garrison & Co. Mr. T. H. Pollock has had charge of these works for over seven years. Previous to this time, Mr. Kelly was superintendent of Witherow & Gordon's works, at New Castle, Pa.

Stack No. 2 of the Franklin Iron Manufacturing Company, Oneida County, N. Y., was blown out for repairs March 23d, after a successful blast of three years and three months. The repairs in progress include raising the stack from 54 to 70 feet, the erection of regenerative stoves, 18 by 60 feet, under the supervision of John M. Hartman, and erecting two blowing-engines, 84 and 40 inches by 4½-foot stroke, made by the Cuyahoga Works, Cleveland, Ohio. No. 1 furnace is in operation, making 300 tons foundry iron per week.

Recently, a large spur-wheel for an engine was cast at the steel-works of the Cambria Iron Company, in Johnstown, Pa. The mammoth ladle contained upward of 20 tons of molten steel, 15 tons of which were poured without the slightest trouble.

The Lehigh Car Manufacturing Company, at Stemton, Pa., whose shops have been idle several weeks for want of orders, has contracted with the Lehigh Coal and Navigation Company for building 500 coal-cars.

The Lochiel rolling-mill property, at Harrisburg, has been sold to Senator Don Cameron for $100,000. It is said that the purchase was made for the Harrisburg & Western Railroad, on which to establish the shops of the company. The furnace was not included in the sale.

GENERAL MINING NEWS.

CALIFORNIA.

INYO COUNTY—BEVERIDGE DISTRICT.

The Inyo *Independent* gives the following items:

A large number of the men are at work on the different mines getting out ore. Two mills are running constantly, and it is said that there is enough ore in sight to keep them running all summer.

SWANSEA DISTRICT.

A number of men are busy in this district, prospecting and developing claims for smelting ores. The large number of fine prospects already located and partly opened, and the probability that first-class smelting-works will soon be erected on the lake, have given an impetus to mining in that section.

BROWN MONSTER AND HERSCH MINES.—These mines are situated in the Inyos,

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nine miles from Independence. The ore carries gold and silver. The mill has 30 stamps, in six batteries, and the cost of running them by water-power is very small. The Brown Monster is opened by an incline shaft to a depth of nearly 500 feet, and shows a large blue and regular vein of quartz its entire length. The Hersch mine has not been prospected to the extent of the former mine, there being about 100 feet of shaft and tunnel openings; but as far as can be seen, it shows a vein of great strength, with a width of four feet, and all pay-ore. The Hersch ore is of the same general character as the Brown Monster. The situation of these two mines in relation to each other is such that they should be worked and operated by one company.

MONO COUNTY—BODIE DISTRICT.

Work at the different mines continues as usual, and there is no change to report.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—The mill is running regularly.

TAYLOR-PLUMAS.—A very marked and most favorable change has lately occurred in the face of the main tunnel; all the way in, the ground had been exceedingly hard and difficult to work, but lately the character suddenly changed; the ground has become soft, and most of it can be worked with the pick. As was to be expected, when softer ground was entered, the ledge-matter widened out; in the hardest ground there were places where the ledge was not much over one foot wide; now it is about five feet wide; this is not all solid ore, but consists partly of stringers, with soft dirt between.

CANADA.

PHOSPHATE MINES.—According to the Montreal *Herald*, the operations in phosphate mines in Ottawa County promise to be carried on extensively during the coming summer. One of the new companies which is preparing to operate is the Union Phosphate Mining and Land Company. This company has purchased the Preston property.

Mr. J. H. Dwyer has sold his phosphate mine in Templeton to an American company for $60,000.

About 8000 tons of high-grade phosphate are at present at the Buckingham station of the Canadian Pacific Railroad, Ottawa; also at the Windsor wharf, awaiting shipment. This quantity was drawn by sleigh from the mine on the Du Lievre during the past winter. Two thousand two hundred tons have been taken within the past six months from Mr. B. W. Murray's mine, and deposited at the station.

MANITOBA.

The Manitoba *Mining Index* says:

ARGYLE.—The machinery is working well; about twelve tons per day are put through. The run, so far, has shown a result of about $40 per ton.

LAKE WINNIPEG.—The shaft is driven as rapidly as it is possible for day and night shifts to push the work. No difficulty is experienced from the flow of water, there being just enough coming in to answer for drilling purposes. About sixty tons of ore have already been taken out.

NOVA SCOTIA—SHERBROKE DISTRICT.

The Pactolus Gold Mining Company, of Nova Scotia, which has recently been working on a belt of low-grade ore yielding about $4 per ton at the 95-foot level, started a cross-cut north, and, at a distance of ten feet from the belt, struck a twenty-inch lode hitherto entirely unknown, and made a rich strike therein. Two tons of the ore gave $1248 gold; $80 was taken out of one pound of ore; $600 was taken out of six pounds; $540 was taken out of nine pounds, besides specimens valued at $200 being retained; making in all $2668 from two tons of ore. This strike has created the greatest excitement not only in this district, but is attracting general attention to Nova Scotia mines. It may be added that on this same property the deepest workings have been attained of any mine in Nova Scotia, a single vein having been worked down to a depth of 800 feet.

COLORADO.

HOOSAC.—The annual meeting of the Hoosac Mining and Milling Company was held at Boston recently, the following directors being elected: George S. Merrill, of Lawrence; Cyrus S. Haldeman, of Boston; Cyrus N. Pratt, of New York; Henry B. Pierce, of Boston; Thomas B. Bryam, of Colorado; V. V. Vanderburg, of Colorado; Alfred S. Potter, of Providence; and George E. Curtis, of New York. The statement of General Manager Vanderburgh for the year ended February 28th showed the following:

DISBURSEMENTS.

Labor	$26,880.84
Expenses	4,508.51
Property	5,094.35
Total	$36,483.70

RECEIPTS.

Drafts	$15,804.86
Sales of ore	18,034.27
Balance on hand last annual report	80.79
Balance due managing director	$2,563.78

The above balance was canceled during the early part of the present month through the sale of ore on hand, amounting to $3080.70. The Little Mattie mine has paid expenses since last July, four men on mineral paying the expenses and labor of 24 men on development. One hundred and thirty-two tons of mineral of all grades, sold to date, have netted $136.63 per ton. In the Little Mattie, there have been completed and substantially timbered 456 feet of levels 6½ by 5 feet, 275 feet of shaft 12 by 8 feet, and 104 feet of stopes—in all, 835 lineal feet. There was expended upon the Hoosac mine the past year $6777.07. The March sales of ore amounted to $4011.37. The output in March averaged over one ton of assorted ore per day.

ARAPAHOE COUNTY.

BOSTON & COLORADO SMELTING-WORKS.—It is reported that the capital of this company is to be increased from $1,000,000 to $2,000,000.

BOULDER COUNTY.

The news from the different mines around Jamestown continues to be favorable. The Nil Desperandum is giving good indications. Work on the White Rock is pushed and good ore is produced. The Buckhorn and the Golden King mines are both shipping ore from which the returns are very satisfactory. The Invincible holds its own, and is visited daily by curious investigators.

CHAFFEE COUNTY.

BRISTOL.—This mine has lately been leased. The vein is a large and well-defined fissure, and shows an eight-foot breast of mineral which mill-runs sixty-three ounces in silver and ten per cent lead. The lessees have begun operations, and are putting the mine in order, and shipping will be commenced next week. It is not settled as yet where the ore will be shipped, but it will probably go to Cañon City.

NILES-AUGUSTA.—Later developments and returns from assays show the strike of iron ore to be of considerable importance. The first specimens, which are inferior to the mineral now in the breast of the workings, returned thirteen and a half ounces in silver and 35·4 per cent iron. Assays were not made for lead, although the iron carries a small percentage of it. This same body has been tapped from the other side, and shows a continuous body over seventy feet in extent. The maximum thickness of the ore is not known, but the entire face of the present drift is in mineral. There is a body of mineral overlying this iron, the extent of which is not known, which carries thirty-four ounces in silver and forty-one per cent in lead.

ONLY CHANCE.—This mine has been shipping on an average from twelve to sixteen tons per day of mineral which averages about thirty ounces in silver and fifty-five per cent lead per ton. A large body of ore has just been opened in the workings, and the connection has been completed to the shaft, which will admit of larger shipments from this time on.

MASCOT.—The mine consists of two tunnels and the discovery-shaft. The tunnels are about 80 or 90 feet in depth. The owners have been confining themselves to development-work, and a great portion of the rich ore still remains untouched.

GILPIN COUNTY.

The new discoveries of silver mines in this county, says a dispatch to the Denver *Tribune*, are proving a surprise to the oldest and best miners. Sears & Morris are getting out some fine-looking silver glance from their new mine just opened up in Silver Gulch, east of Black Hawk. They have an eighteen-inch crevice. The Specie Payment, in Virginia Cañon, has been leased and bonded for $75,000, with a paid-up working capital of $10,000, and will begin operations at once. The Champion lode, in the same cañon, now in the hands of an English company, is shipping two and a half cords per day.

JEFFERSON COUNTY.

MINERS' SMELTING AND REDUCTION COMPANY.—The company is running its works at Golden at their fullest capacity night and day, and will probably have to build a large addition to the already extensive works, in order to treat the large quantity of ore. The company is at present working a force of sixty men.

LAKE COUNTY.

Late Leadville exchanges contain the following:

BRADSHAW TUNNEL.—One of the most extensive pieces of prospecting upon Printer Boy Hill is this tunnel upon the north side in California Gulch. The tunnel has been run in a distance of 720 feet, and the intention is to push it about 200 feet farther, with the object of catching the contact disclosed in the Nellie S. In the Lincoln drift of the tunnel, small streaks of mineral have been discovered which were worked and reduced at the Oro stamp-mill It carried about four ounces in gold and a small amount of silver.

CLIMAX.—The Montana shaft is showing some rich mineral. About thirty-five tons of ore are shipped daily, carrying on an average over 100 ounces of silver per ton.

CLONTARF.—This property has now got its water under control and about 300 gallons are taken out per minute. A drift has been run at the bottom of the shaft which is 24 feet lower than the ore-body which was cut recently. The ore-body varies between eight and ten feet thick, and runs about seventy per cent in lead and from twelve to eighteen ounces in silver. Shipping ore will commence shortly.

LITTLE SLIVER.—The suit of Bradford *et al. against* H. S. Kearney, representing the lessees of the Little Sliver mine, being an application for an injunction to restrain the lessees from taking out any more ore from the mine, has been dismissed by Judge Hallett, on the ground that no valid reasons were shown why such an injunction should be granted. The petition alleged that the lessees had extracted more ore from the mine than had been accounted for, but failed to show even presumptive evidence that such was the case. The applicants for the injunction represent a one-ninth interest in the property.

POCAHONTAS.—Among the properties which are started up by lessees, this mine, adjoining the Weldon, on Carbonate Hill, is not the least promising. An engine is now in place over the shaft, and work has been actively commenced. The shaft is 270 feet deep, and there is about fifty feet of water in it. The lessees will first endeavor to handle the water by the present facilities, and if not successful will run a drift above it. There is now a fine body of iron contact exposed in the bottom of the shaft.

WELDON.—This property is situated between the Pendery and Pocahontas, and the location is regarded as most desirable. For some weeks past, it has been working in an eight-foot breast of iron ore, which ran from thirty to fifty dollars per ton. A strike of rich ore was made recently. The force of miners will be increased at once, and work will be pushed vigorously.

SUMMIT COUNTY.

CHAMPION.—The property is now worked under a lease. The principal workings at present lie about two hundred feet above the Robinson, and the ore which is hoisted will average about 100 ounces of silver and 40 per cent in lead. On the dump may be seen over 75 tons of mineral, which will be shipped for reduction.

ROBINSON.—About thirty tons of ore are shipped daily, which is extracted from the various levels running from the sixth to the twelfth, which, it is said, carries about forty ounces in silver and a small percentage of lead, and which is treated at the Argo works.

DAKOTA.

CHEYENNE.—A dispatch to the New York *Tribune* says that the affairs of this company, which have been in a wretched muddle for years, have been adjusted, and a mill is to be erected as soon as one can be shipped. It is understood that the mill is to be one of eighty stamps. Much development-work should be performed on this property before great expense is incurred in procuring reduction-works.

FATHER DE SMET.—The superintendent's report from April 8th to April 15th shows ore extracted from first, second, and third levels, 2090 tons. Ore milled, 2040 tons. North end tunnel in 869 feet. Golden Gate north header in 76 feet. Cook's west cross-cut in 50 feet. In Cook's west cross-cut, have struck a good body of ore. Will cut out a chamber.

ORO FINO.—A contract has been awarded for the erection of hoisting-works at this mine and putting in many improvements, including a Gates crusher, feeders, pumps, etc., the whole to cost $12,000. It is the intention to have the work completed by July 1st, when the mill will resume operations. In the mean time, no work will be done by the company at the mine.

PHANTOM.—It is reported that negotiations have been concluded with an English syndicate whereby the latter will erect two 120-stamp mills upon this group of mines on Box Elder. This group consists of eight contiguous locations in a district (Greenwood) of which little is known even at this near-by point. The property has been quietly and thoroughly developed by a system of open cuts, shafts, and tunnels, and discloses a large body of crystallized ore showing much free gold and milling far above the average Black Hills production. The success of the Phantom scheme will insure the opening of a large and comparatively unexplored district.

SITTING BULL.—Work is advancing satisfactorily on the enlargement of the mill, and will no doubt be ended by the 1st of May.

GEORGIA.

BARLOW.—The open cut at this mine, says the Dahlonega *Signal*, is the largest one in the district, and, in fact, in the State. It is from 400 to 600 feet wide, and nearly one fifth of a mile long.

CONSOLIDATED GOLD MINING COMPANY OF GEORGIA.—The Ivey mill is running regularly on ore from the Ivey cut. The yield is uniform. The ditch that has been so very troublesome now affords a considerable head, and is expected soon to come up to expectations. The 60-stamp mill will be ready for operation some time during the summer.

SINGLETON.—Twenty-five stamps are now running on ore taken from the large stope on Findley Ridge. The company's water-power twenty-stamp mill is one of the most complete in the district. The canal that conveys the water from Yahoola River to the mill is about 700 feet long.

MAINE.

DOUGLASS.—At a meeting held recently, it was decided to purchase immediately two calcining furnaces similar to those in use at the Orford Nickel and

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Copper Company's work at Bergen Point, N. J. The information from the mine is of a cheering nature; the furnaces are working well, the mine is showing up large quantities of ore of an excellent grade, and preparations are making to conduct operations on a large scale with the intention of turning out thirty tons of ingot copper per month.

FANEUIL HALL.—The Hancock *Bulletin* states that the order for the removal of this company's machinery from Sullivan has been countermanded, and a full crew is at work putting things in shape again.

MANHATTAN.—Work has been resumed.

MEXICO.

A dispatch to the New York *Tribune* says that one of the largest sales of Mexican lands ever made has just been made to a London syndicate. The estate sold is known as the Bustamente tract, and comprises a million acres in Zacatecas. The price paid was $2,500,000.

PACHUCA DISTRICT.

A correspondent of the Mexican *Financier* says that the San Ignacio mine continues in rich ore, and really is the only important mining work now doing by the Real del Monte Company. A large amount of paving stone, etc., has been ordered for the Sanchez reduction-works, as a bed for the patio process. The ores will be ground by arrastras, run by animal power, and the poor people of the vicinity are rejoiced at even this additional prospect of work. They earnestly hope that the opening of these new works by the company will not cause them to close some of their other reduction-works; but unless work be soon resumed in the mines, the supply of ore will not be enough to keep all the works running, especially as the company will lose the Santa Gertrudis ores as soon as the latter company completes its reduction-works of Gaudalupe and Progreso. These ores have always paid large profits to the old company which has until now worked them.

The prospects of the Santa Gertrudis continue good, and twice the present amount of ore could be extracted easily. There have been lively times at the recent meetings of the stockholders. A committee has lately been appointed to examine the books, inspect all parts of the mine, make its own assays, and visit the reduction-works regularly.

The Pachuca River Company has erected part of its machinery and buildings, and has begun to transport the tailings for concentration. Much of the machinery has not arrived. The lawsuit between the claimants of the Rosario Viejo mine and some of the chiefs of this company, for the possession of the mine claimed to have been forcibly taken from the above claimants, continues, and promises to be a bitter struggle.

The engine at the Acosta mine of Real del Monte will be removed to the San Pedro mine of Pachuca. La Estrella and Alta Gracia mines have struck a good body of ore. At the Rosario, the water has been lowered 25 feet, and a lode of rich ore has been uncovered.

The work on the reduction-works of San Antonio Huasca is nearly completed, and ores will be treated there very shortly. Work has been resumed on various other mines in the district.

MICHIGAN.

The plumbago deposit developing near Humboldt is improving steadily, and gives much encouragement to the owner. The deposit has been cross-cut a distance of 60 feet, and sunk upon 25 feet. It is at yet slightly siliceous, but shows less of this detrimental mineral as greater depth is attained. The shaft will be continued to a depth of 60 feet.

ROPES.—The work of sinking the Curry shaft has been interfered with during the past week by an abundance of water. A pump will be put in at once. The management is desirous that sinking shall progress as rapidly as possible, so that a large stoping face may be had by the time the mill is ready to treat the rock. About 70 tons of fine quartz are now on the dump. The treatment of several tons of the rock of this mine, made in New York recently, proved that 60 per cent of the gold was saved on the plates alone. Concentrator, riffles, and arrastra will be added to the mill. The location is most advantageous for cheap treatment of the rock; a brook of sufficient size to furnish water flows within a few yards of the mine; there is an abundance of timber growing on the lands of the company; the fall from the site of the mill is fitted by nature; and labor can be procured at one half the cost that Western companies have to pay for it.

MONTANA.

MARYSVILLE DISTRICT.

DRUM LUMMON.—It has been decided to erect a sixty-stamp mill. The old mill, which has been running several years with good results, will be refitted and used to make test runs on the several qualities of ore which may be discovered in the mine, in order to demonstrate the grade of its milling character.

SUMMIT VALLEY DISTRICT.

ALICE.—The latest strike was on the surface of the south vein between the Magna Charta and the Valdemere, about midway between the two shafts. Developments already made across the vein show it to be seven feet wide, and an average assay yields 80 ounces of silver per ton; it has not been assayed for gold. The ore from this important development is extracted and hauled to the mills on wagons. In the Alice proper, the strike recently reported in the 100 has now been developed a distance of 270 feet horizontally, the entire distance being in pay-ore. The same vein has been struck in the 200, running east, south of the shaft, where the face of the drift is in pay-ore of the same grade and quality as the pay-chute developed in the 100.

BELL.—The smelter started up April 14th. There is ore on hand for a sixty-day run; and by the time the ore now at the smelter is exhausted, it is expected the mine will be in shape to furnish a future supply. Until that time, but one stack will be run. At the mine, work is progressing favorably in the new three-compartment shaft, which has reached a depth of 188 feet. Softer ground has been struck, and progress will be more rapid in the future. A north drift will be run from the 300 as soon as that depth is reached, which will be connected with the old workings in the 240 west drift, by an uprise. This plan will enable the company to begin hoisting the high-grade copper-silver ore from the old workings, before the supply on the smelter dump is exhausted.

SHONBAR.—The last mill-run averaged $160 net to the ton.

NEVADA.

BERRYMAN TUNNEL AND MINING COMPANY.—Work upon the tunnel was commenced some time ago. An open cut was run a short distance, beginning at a point in the quartzite about 75 feet down the hill below the contact of it and the ore-bearing lime-rock. There is a good wagon-road to within a few feet of the tunnel, and no difficulty will be experienced in getting supplies to it. As was anticipated of the formation, it is peculiarly easy to work.

NYE COUNTY.

A correspondent of the Eureka *Sentinel* says: At Hot Creek, the Philadelphia Company is doing but little beyond assessment-work. The Mountain View Company possessed but little perception, as was proved by its management. It erected the old Lemon mill, formerly of Eureka, near the mine, regardless of the necessity of a bountiful supply of water for milling purposes. The diminutive spring near which it located proved inadequate to the requirements, and, as a result, the works were closed and the men discharged unpaid. It is difficult to determine whether the Mountain View mine is valuable or not. Reports about it conflict greatly. Some contend that it has plenty of good ore in sight, while others assert the contrary.

The Rattlesnake has a promising future before it. It appears to be situated on the same mineral belt as Morey, Hot Creek, and Tybo. The chief mines are the Sedan, Louisa, and Oliver Twist. The Sedan is down over 100 feet, with levels showing a well-defined ledge of good average ore.

If it were not for the fact that eight or ten men are working in the 2 G mine, the Tybo camp would be absolutely and completely defunct. The men above mentioned are taking out considerable fair ore on contracts, and will have sufficient on the dumps to start up the mill before long.

In a mining sense, Belmont is dull, though hopes are entertained of its soon becoming otherwise. The Belmont Company is speaking of starting up the works on an extensive scale shortly. Rich ore was recently encountered in one of the mines, making the prospects brighter than they have been for a long time past. Work is still prosecuted in Spanish belt, 11 miles distant from Belmont, by the Barcelona Company. A long tunnel is driven ahead without delay.

NEW MEXICO.

The Southwest *Sentinel* states that an English syndicate has bought the entire property of the Queen City Company and of the Valverde Mining and Smelting Company and sixty other mines, covering in all nine square miles of mineral land. This sale is one of the most important that has occurred in New Mexico for many months, the actual price paid being $1,500,000 in cash. The English company has reserved $1,000,000 for a working capital to open and develop the mines and to extend and enlarge the reduction-works already erected. The properties transferred are extensive and of great value.

ILLINOIS.—The grading for the company's smelter at Copper City is nearly completed. According to the manager's statements, the company can take out one hundred tons of ore per day from the Eureka mine, and if this smelter which is now erecting works successfully, it will put up four more. The machinery for the smelter has arrived, and it will be in working order in thirty days. Hauling ore to the bins constructed for that purpose will be commenced at once, and by the time the smelter is completed four or five hundred tons will be on the ground.

SAN JOSE.—One furnace of a capacity of thirty tons has been erected by this company, which will be in running order very shortly. The purchase of ore and supplies has already begun.

OREGON.

EASTERN OREGON.—We have the following letter concerning this property, dated April 6th:

The Monumental Gold and Silver Mining Company, now known as the Eastern Oregon, was incorporated in this State, and commenced operating on the Monumental mine in 1876. After developing the mine to the depth of 250 feet, the company erected in 1879 a first-class ten-stamp dry-crushing silver mill, which began reducing ore in December of that year. The mill continued to run at intervals during 1880 and part of the spring of 1881, when it fully closed down, the company having utterly exhausted every available pound of ore in the mine, contracted an indebtedness of sixty-five thousand dollars, which still hangs over it in the shape of a mortgage, and victimized every one who was foolish enough to invest in any of its 500,000 shares. An examination of the mine and of the records of the clerk's office of Grant County will verify the above statements.

F. E. C.

PENNSYLVANIA.

A dispatch says that great excitement prevails at Myerstown, Lebanon County, owing to a supposed discovery of a gold vein. Farmers have given up their business and begun digging on their premises. Kreitzer & Co., of Philadelphia, have equipped a mine with a sixty horse-power engine and a furnace for smelting ore, and are making daily shipments of quartz to Philadelphia. Over $6000 have already been spent in experimenting.

SPAIN.

THARSIS-SULPHUR AND COPPER COMPANY.—This company owns mineral properties in Spain, and in 1878 effected a fusion with the Huelva (French) Copper Company, by which the mines, property, and assets of that company were acquired by the purchase of the capital shares, and the exchange of the Jouissance shares for shares of the Tharsis Company. Of the capital shares, 401 (representing £4185) remained unredeemed on December 31st, 1881, and of the Jouissance shares there were 1116 outstanding. In 1881, a scheme was prepared by the directors by which the capital of the company was to be reduced from £1,236,660, divided into 123,666 shares of £10 each (91,896 fully paid up, 31,100 with £7 paid up, and 670 unissued), to £1,174,460, divided into 117,446 shares of £10 each, such reduction being effected by reducing the liability on each of the 31,100 shares after £1 has been called and paid up thereon to the extent of £2 per share, and exchanging four paid-up shares of £10 each for five shares £8 paid of these 31,100 shares. The capital of the company is then to be increased to £1,250,000, divided into 125,000 shares of £10 each, by the creation of 7554 new shares. These, along with the 670 shares hitherto unissued, are to be sold at the discretion of the directors. The funds realized from the call on the 31,100 shares and from the issue and disposal of the 8224 shares are to be applied in paying of the debenture debt of the company. This scheme was adopted by the shareholders by resolutions passed on November 24th, 1881, and confirmed on December 9th, 1881, but it has not yet been effected. The call of £1 per share on the £7 paid shares has, however, been made for January 2d, 1883, and it is believed that the exchange of these £8 paid shares for fully paid-up £10 shares will take place shortly after. Accounts are now made up annually to December 31st and submitted at Glasgow in April. According to the report and accounts for the 10 months to December 31st, 1881, after the payment of the dividends, writing £20,000 off the mines in Spain, and adding £20,000 to the reserve fund, £32,724 were carried forward. Railroad and pier sinking fund, £100,000; reserve fund, £90,124; reserve for alteration of railroad, £10,000. Dividends for last five years—1877-8, 17½ per cent; 1878-9, 16½ per cent; 1879-80, 20 per cent; 1880-1, 25 per cent; 1881 (10 months), 30 per cent. Of the existing debentures, £66,000 are repayable in one year, £214,000 in two years, £10,000 in three years, and £60,000 in five years.

UTAH.

CACTUS.—The company is working a force of men in drifting and sinking. Two drifts are running on the vein in opposite directions in good ore for concentrating. Concentrating works are building, which will be capable of handling a vast quantity of ore. The company expects soon to begin shipping the concentrates.

CLYDE.—The mine is developing to a greater extent than any in the Marysvale District, and is showing well. One tunnel has been driven 675 feet, to tap the vein at a depth of 450 feet. This tunnel will soon reach the vein. Another tunnel on the ledge has been driven 175 feet, which tapped an ore-chamber thirty feet long and twenty feet wide. From the inner end of this tunnel, a shaft has been sunk 7 by 7 feet and fifty feet deep, from which between 600 and 700 tons of ore have been taken. This ore assays 75 ounces silver, 25 per cent copper, and about $3 in gold. It carries some iron and silver, and is an easy ore to smelt.

MAMMOTH.—Matters at the Mammoth works, Tintic, says the Salt Lake *Tribune*, remain quiet, and yet preparations are going on for active operations as soon as the management meets its engagements with the men. The smelters are lying idle, so are the mines, but machinery for the reduction-works is getting into place. Twenty-six dynamo machines have been put in position for the purpose of separating copper from the matte and leaving the silver, gold, and other substances to be afterward disposed of by refining. It is understood that Mr. Goodhart, the gentleman coming from England to provide funds, will arrive here early in May, after which all matters will be adjusted and the works put in full operation again.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, April 27.

The mining market has been dull and featureless. Most of the business done at the Mining Exchange has been in Pipe Line Certificates, and mining stocks have been almost neglected. There is nothing new to note, the dealings being confined to the same fancy and low-priced stocks that have monopolized the market for the past month. Below will be found a complete summary. The total number of mining shares sold at all the Exchanges aggregates 326,892, as against 262,326 last week.

The Comstock shares have been strong under small dealings. California was quiet and steady, selling from 20@23@22c. Consolidated Virginia had a small business at firm prices, selling from 44@50@47c. Sierra Nevada was but moderately dealt in, and sold from $1.88, assessment unpaid, to $3.40, assessment paid.

Union Consolidated had a small business and showed a little strength; it sold from $3.25@$3.60. Mexican records a small business and was firm, selling from $2.55@$2.88. Hale & Norcross sold at $4.50@$3, with a small business. Savage was quiet and steady, selling from $1.88@$2.13. Yellow Jacket was dealt in to the extent of 300 shares at $2.75@$3.25. Sutro Tunnel had a small business at steady prices, selling from 20@21c.

The Leadville stocks were quiet and steady. Amie Consolidated sold from $19@$20, with a business of 7300 shares. Chrysolite was quiet and weak; it sold from $1.20@$1. Dunkin sold from 26@20c. under a small business. Hibernia sold at 3c. Iron Silver was quiet and steady, selling from $2.80@$2.90. Leadville sold from 68@69c., the transactions aggregating 600 shares. Little Chief was quiet and steady at 43@47c. Little Pittsburg was moderately dealt in at weak prices; it sold from 70@50c. Big Pittsburg has also been weak, under a fair business, and has sold from 16@10c. Climax was quiet and steady at 5@7c.

The Bodie stocks were quiet and steady. Bodie Consolidated sold from $1.25@$1.30, with a business of 350 shares. Standard was very quiet at steady prices, selling at $6.75@$7. Bulwer had a small business and was steady, selling from 80@85c. Goodshaw sold at 2c.

The Tuscarora stocks were quiet and very irregular. Grand Prize showed considerable strength at one time, but lost some of it toward the close; it sold from 80c.@$1.15@95c. Argenta sold at $1.40 to-day. Belle Isle was quiet and steady, selling from 56@50c. Navajo had a small business, and was very irregular; it sold from $2.50@$3.50 and then down to $2.25, closing at $2.30 to-day. North Belle Isle was quiet and steady at 38@35c. Independence records a fair business at irregular prices; it sold from 55@68@62c. Elk Consolidated was active and irregular, selling from 8@5@6c., the business aggregating 16,200 shares.

In the miscellaneous list, Alice sold from $3.25@3 under a fair business. The Green Mountain stocks have been very quiet at steady prices. Gold Stripe sold from 9@8c. Green Mountain sold from 85@80c. Rising Sun was quoted at 3c., and Cherokee at 2c. Hall-Anderson records a fair business, and was very irregular during the week, but developed some strength to-day; it sold from $1.40@$1.20@1.45. Horn-Silver was quiet and irregular, selling from $7.25@$8.@$7.50. Hukill sold from 12@10c., the dealings being small. Northern Belle was quiet and firm, selling from $8.38@$9.@$8.75. Robinson Consolidated continues to be actively dealt in at very irregular prices; it sold this week from 86@79c., closing to-day at the latter figure. Sierra Grande was quiet and strong, selling from $1.65@$1.85. Silver King sold at $10.38@$10.50.

Alta-Montana records an active business at irregular prices, selling from 5@3@4c. Bradshaw was quiet and steady at 28@29c. Central Arizona, with one transaction, sold at 31c. Dahlonega was quiet and steady, selling from 4@3c. Decatur was very active and very irregular; it sold from 5@2@3c. Durango was also irregular under a small business, and sold from 8@4@8c. Eastern Oregon sold from 25@19c., with small dealings. Harlem had a small business and was steady, selling from $1.40@$1.50. Hortense sold at 12c., and Lacrose from 13@11c. Oriental & Miller was quiet and steady at 14@16@15c. Rappahannock sold from 8@7c., with a business of 6800 shares. Silver Cliff was fairly dealt in at weak prices; it sold from 23@16@19c. Sonora Consolidated records a very large business, and has gradually declined from its strong prices of last week; it sold from $1.05@84@86c. South Hite sold at 18c. under a small business. South Pacific was quiet and steady at 6@5c. The State Line stocks were active at steady prices; Nos. 1 & 4 sold at 2c., and Nos. 2 & 3 from 5@4c. Taylor-Plumas sold from 17@16c., with a business of 5600 shares.

Judge Barrett has granted an order requiring all persons interested in the Battle Creek Gravel Mining Company to show cause, July 30th, why the company should not be dissolved. The company owns property in Custer County, Dakota, has a debt of nearly $15,000, and can not work the mines with profit.

DIVIDENDS.

The Calumet & Hecla Mining Company, of Michigan, has declared its quarterly dividend of $500,000.

The Jackson Mining Company has declared a dividend (No. 1) of ten cents per share.

The Total Wreck Mining Company, of Arizona, has declared a dividend (No. 1) of twenty-five cents per share, or $50,000, payable May 15th.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF MARCH, AND FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of April.	Since January 1, 1883.
Atlantic, c	Mich		$80,000
Bassick, s	Colo.	$100,000	100,000
Boston & Montana, g	Mont		10,000
Bulwer Consolidated, g	Cal	5,000	20,000
Calumet & Hecla, c	Mich		500,000
Carbonate Hill, s	Colo.	10,000	30,000
Castle Creek, g	Idaho	3,000	12,000
Central, c	Mich		60,000
Christy, s. L	Utah		6,000
Contention, s	Ariz.	62,500	250,000
Con. Gold M. Co. of Ga	Ga.	4,000	16,000
Copper Queen, c	Ariz.	125,000	250,000
Cosmopolitan	Utah		50,000
Deadwood-Terra, g	Dak		20,000
Father de Smet, g	"	20,000	60,000
Gem, s	Colo.		5,000
Glen, s	"		2,000
Granite, s	"		2,500
Hecla, s	Mont	15,000	60,000
Holyoke, g	Idaho	4,000	16,000
Homestake, g	Dak	50,000	200,000
Hope, s. c. L	Mont		12,000
Horn-Silver, s. L	Utah		300,000
Idaho, g	Cal	7,750	31,000
Indian Spring Drift	"		1,000
Iron-Silver, s. L	Colo.		100,000
Jocuistita, s	Mexico		50,000
Kentuck, s	Nev.	3,000	12,000
Leadville Consolidated, s	Colo		20,000
Navajo, g. s	Nev.	25,000	100,000
Northern Belle, s	"	25,000	100,000
Ontario, s. L	Utah		75,000
Osceola Consolidated, c	Mich		50,000
Oxford, g	N. S	5,000	10,000
Prussian, s. L	Colo		15,000
Quincy, c	Mich		240,000
Richmond, s. L	Nev		135,000
San Francisco, c	Cal		2,500
Shoshone, g	Idaho	1,500	6,000
Sierra Grande, s	New Mex.	100,000	400,000
Silver King, s	Ariz	25,000	100,000
Smuggler, s	Colo		9,000
Standard Cons., g	Cal	25,000	100,000
True Fissure, g. s. L	Utah	37,500	37,500
		$653,250	$3,655,000

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

MEETINGS.

Chase Gold and Silver Mining Company, No. 206 Broadway, Room 22, New York City. A deferred meeting of the stockholders, May 5th, at four o'clock P.M.

Conglomerate Mining Company, No. 205 Walnut place, Philadelphia, Pa. A special meeting of stockholders for the purpose of confirming the sale of certain lands to the Mendota Mining Company, May 3d, at twelve o'clock M.

Hanover Mining Company, No. 70 Devonshire street, Boston, Mass. Annual meeting of stockholders and election of trustees, May 8th, at three o'clock P.M.

Harshaw Mining Company, No. 62 Cedar street, New York City. A special meeting of stockholders for the purpose of deciding whether the company shall be wound up or not, May 15th, at twelve o'clock M.

Hibernia Silver Mining Company, No. 61 Broadway, Room 29, New York City. Annual meeting of stockholders and election of trustees, May 7th, at twelve o'clock M.

Hukill Gold and Silver Mining Company, No. 35 Broadway, Room 88, New York City. Special stockholders' meeting for the purpose of taking final action on a plan to save the company's valuable property from creditors, May 10th, at one o'clock P.M.

Silver Cord Combination Mining Company, company's office, on Iron Hill, near Leadville, Colorado. Annual meeting of stockholders and election of trustees, May 15th, at eleven o'clock A.M.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
April	21	$0.94⅝	$0.94¾	$0.94⅛	$0.94⅛	210,000
	23	.94⅛	.94¾	.92½	.92¾	2,291,000
	24	.93⅛	.93⅛	.92½	.93⅛	1,546,000
	25	.93¼	.93⅞	.90	.90¼	4,550,000
	26	.89⅛	.90¼	.86	.86	2,585,000
	27	.86	.89⅝	.85	.88¼	3,966,000
Total sales						15,148,000

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been more active than usual this week, and prices have been firm. Most of the business done was in the Comstock shares, Hale & Norcross being the most prominently dealt in at strong prices. The middle Comstocks were also quite active and were steady. The Tuscarora stocks were generally quiet and steady, with the exception of Grand Prize, which was quite active and very strong.

The following are the financial balances of the various mining companies on April 1st, so far as reported:

CASH ON HAND.

Alta	$18,764.08
Albion Consolidated	801.99
Benton Consolidated	5,478.75
Best & Belcher	12,691.09
Bodie Consolidated	11,193.84
Bechtel	2,820.24
Bulwer	11,269.04
Belcher	10,560.28
Crown Point	20,561.63
Choliar	3,535.40
Consolidated Virginia	61,424.34
California	2,066.46
Consolidated Imperial	344.76
Challenge Consolidated	234.23
Gould & Curry	32,484.39
Hale & Norcross	43,371.39
Jackson	794.75
Mexican	55,768.10
Manhattan	
Northern Belle	83,560.64
Ophir	31,715.13
Occidental	6,731.09
Mono	4,310.35
Silver Hill	3,500.44
Standard	121,444.98
Sierra Nevada	304.10
Savage	40,486.42
Union	29,953.44
Utah	7,082.81

INDEBTEDNESS.

Lady Washington	$852.49
Martin White	4,029.46
Potosi	7,121.57

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, April 26.

There is but little to be said about the market for mining stocks the past week. The tendency continues to lower prices, and even the dividend-paying copper mines continue to decline, with no immediate prospect of being better. Calumet & Hecla shows a falling off of $2, with sales at $231, and the stock is offered at that price, with but few takers. Franklin is a fraction higher; sales of small lots at $10¼@$10⅛, against $10¼ last week. Pewabic sold at $4, assessment ($1) paid. Quincy declined from $46@$44, which is, however, bid for it. Osceola dull at $24@$23½ for small lots. Huron sold at $1⅛, assessment ($1) paid. Nothing doing in the rest of the list.

In silver stocks, Bonanza declined to $1⅝. Catalpa and Crescent dull at 67½@62½c. for the former and 25c. for the latter. Silver Islet advanced on sale of 50 shares from $2½@$3. San Pedro declined to 60c. Sullivan advanced from $1⅛@1$^{5}/_{16}$, with later sales at $1, closing at $1⅛.

At the Boston Mining Exchange, there is but little business doing, and what business there is, is mostly confined to a few stocks at low prices. Empire is firmer, and has advanced from 18@22c., which was bid for it to-day without calling out the stock. Bowman Silver Company declined to 3c. per share, or 13c., with 10c. assessment paid. This is undoubtedly a good property, and, if well managed, might be made valuable. The course which has been pursued since putting it on the Board has not tended to inspire confidence in its management. Massachusetts & New Mexico is firm at 9@10c., but little doing in it.

3 P.M.—At the afternoon Board, there was no im-

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provement. Calumet & Hecla sold at $231. Catalpa at 62½c. Bonanza, $1¾. Pewabic, $4. Silver Islet, $3. Sullivan, $1⅛. San Pedro, 57½c. Franklin, $10 bid, $10⅝ asked. Quincy, $44 bid, $45 asked. Calumet & Hecla, $230 bid. Allouez, $1⅛ bid. Catalpa, 62½c. bid. Huron, $1⅛ bid. National, $1¼ bid. Osceola, $23 bid, $23½ asked.

BULLION MARKET.

NEW YORK, Friday Evening, April 27.

The market abroad and here continues about the same as last week, with a probability of lower prices.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
April 21...	50⅛	109⅞	April 25....	50 7-16	*
23...	50⅛	109⅞	26....	50 7-16	109¾
24...	50 7-16	109⅝	27....	50 7-16	109¾

* 109⅝@109¾.

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of March.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	86,386	$234,193
*Alta-Montana, G. L. S.	"	....	$10,625
*Belmont.	"	....	12,604
Bodie, G. S.	Cal....	21,459	66,257
Bodie Tunnel, G.	"	12,747	34,849
*Bonanza King, G.	"	28,945	142,077
*Boston & Montana, G.	Mont...	18,641	53,577
*Central Arizona, S.	Ariz..	20,218	35,845
*Christy, S.	Utah...	22,567	68,405
*Chrysolite, S. L.	Colo....	36,284	118,092
*Contention, S.	Ariz..	85,713	284,259
Crescent, G.	Cal....	....	13,000
*Custer, G. S.	Idaho..	....	43,572
*Deadwood-Terra, G.	Dak..	....	84,556
*Derbec Blue Gravel, G. S.	Cal....	5,201	21,803
*Father de Smet, G.	Dak....	32,200	101,389
*Frisco M. and S. Co., G. S. L.	Utah...	§16,795	60,718
*Head Center and Tranquillity	Ariz.	4,593	4,593
*Hecla Cons., G. S.	Mont...	59,000	177,924
*Homestake, G.	Dak.	....	211,348
*Hope, S.	Mont...	....	20,574
Horn-Silver, S. L.	Utah...	285,000	764,000
*Independence, G. S.	Nev....	18,971	26,943
*Kentuck, G. S.	"	1,875	6,137
*Lexington, S.	Mont...	117,343	309,708
*Little Pittsburg, S. L.	Colo....	7,702	19,577
*Marguerite, G.	Cal....	7,300	33,200
*Martin White, G. S.	Nev....	50,030	116,317
*Moulton, G. S.	Mont...	34,700	123,288
Mount Diablo	Nev....	9,857	9,857
*Navajo, G. S.	"	68,833	211,980
Northern Belle, S.	"	46,225	207,315
*Ontario, S. L.	Utah...	....	364,067
*Oxford, G.	N. S....	6,620	15,143
*Pinal Cons., S. L.	Ariz	....	§49,810
*Satemo, G.	N. S.	....	2,500
*Silver Bow, G. S.	Mont...	....	34,246
Standard, G.	Cal....	74,727	263,006
Star, S.	Nev.	....	27,095
*Stormont, S.	Utah...	19,770	54,604
Syndicate, G.	Cal.	....	9,217
Tintic M. and M. Co.	Utah...	....	7,032
*Tip Top, S.	Ariz....	....	‡22,983
*Tombstone, G. S.	"	....	123,452
Yellow Jacket, S.	Nev....	69,797	98,753
Total amount of shipments to date			$4,781,039

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended April 27th, as compiled from various sources, amounted to $286,000, as against $191,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,549,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended April 21st	$186,970
Corresponding week last year	169,100
Since January 1st, 1883	4,974,087
Corresponding period last year	14,669,353

Imports.

Week ended April 21st	$49,186
Corresponding week last year	32,000
Since January 1st, 1883	6,445,122
Corresponding period last year	1,148,957

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £73,000 bullion, and the proportion of its reserve to its liabilities was raised from 37 7-16 to 38 3-16 per cent, against 44 3-16 per cent at the same date last year. April 26th, the bank lost £28,000 bullion on balance. The weekly statement of the Bank of France shows gains of 3,020,000 francs gold and 425,000 francs silver. The Imperial Bank of Germany reports a specie gain for the week of 8,580,000 marks.

METALS.

NEW YORK, Friday Evening, April 27.

Copper.—The disappearance of cheap lots has somewhat strengthened the copper market. Sales of Lake are limited to small lots, at the range of 15⅞@16c. We have been unable to verify a rumor that manufacturers had contracted for any considerable lots. We hear, however, that a round lot of Arizona black copper, reported to be 500 tons, has been sold for export, thus showing that producers are in earnest about preventing any serious over-supply. On the other hand, we hear that another concern in Globe, A. T., has stopped, it is said for good. Other brands of copper than Lake are held at 14⅞@15⅝c. England has shown a further decline, having reached to £62 5s. at one time. It has, however, reacted to £62 15s., Chili Bars.

Under date of April 12th, Messrs. French & Smith, of London and Liverpool, quote ores 12@18s. per unit.

British copper statistics have a renewed interest to producers in this country. The following are the Board of Trade returns for the first quarter:

	Jan. 1 to March 31. 1883. Tons.	1882. Tons.	1881. Tons.
Imports.			
Pure in pyrites	4,348	4,319	3,423
Precipitate	5,414	4,686	5,905
Ore	2,750	2,968	2,234
Regulus	2,012	1,819	674
Bars, cakes, etc.	9,097	8,566	7,170
	23,621	22,358	19,406
Exports.			
Pure in English raw, sheets, yellow metal, and brass	12,296	8,980	10,703
Foreign	2,209	3,235	2,048
	14,505	12,215	12,751

Tin.—This market has been steady, foreign advices, notably from Scotland, showing a firm feeling. There has, however, been no activity here, and the market closes with Straits, spot 21¼c. London closes at £96 10@£96 15s.

Lead.—The market has been exceptionally quiet, the only transaction worth recording being the sale of 250 out of the 500 tons of Germania on the dock here, at 4·60c., the bulk to a holder of lead. In this market, no lead can be bought under 4·60c.; but on the other hand, it would be difficult to place any large quantity at that figure. The rest of the Germania load has gone into store. Only a few hundred tons more are now on their way. Refined is entirely nominal.

The rate of freight on pig-lead from East St. Louis to New York is reduced from 40½ cents to 35 cents per 100 pounds.

Messrs. John Wahl & Co. write to us as follows to-day:

Our market is unchanged. Sales for the week sum up to over 450 tons of Refined at 4·25c. Hard lead is nominally 4·20c. The receipts are 550 tons, against 750 tons last week.

Spelter.—Business is quiet. Sales have been made at 4·80c., which we quote.

Antimony.—We quote 9⅞@10c. for Hallett's, and 10⅞@11c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 27.

American Pig.—It can not be said that buying has been stimulated much by the reduction in quotations in Foundry irons, which has now been generally accepted by the leading producers, though neither Coalbrookdale nor any other is reported as refusing to meet the market, or rather to go sufficiently below it to move red-short iron. We hear of transactions footing up from 2000 to 3000 tons. The situation is now more clearly defined, though it remains to be seen to what extent some of the producers will yield to the pressure and blow out. The first movement will probably be that those furnace-men who are not fortunate enough to draw their supplies of ores from their own mines will try to obtain concessions on iron ore and fuel. It is probable that they will at least partially succeed. This is the element which must decide whether the hopes of buyers who look for still lower prices will be disappointed or not. Forge irons have been somewhat affected, although it must be noted that this grade has been largely sold ahead. We quote $21.50@$22.50 for ordinary to choice No. 1 Foundry; $19.50@$20.50 for No. 2; and $18.50@$19.50 for Gray Forge. Bessemer pig is quiet, with $21@$21.50 the quotation for American at furnace. Foreign is nominal, but it should be noted that English quotations are weakening. Spiegeleisen is steady for the higher grade, $32 being asked, but dull for 12 to 15 per cent metal.

Scotch Pig.—The drop in American foundry iron has placed Scotch pig at a disadvantage. While it previously ranged below the equivalent grades, it is now higher. We quote Coltness at $24.25@$24.50 for early delivery; Glengarnock, $22 asked; Eglinton, $21@$21.50; and Summerlee, $24.25@$24.50. At the Wall Street Exchange, the following cables were received to-day, showing a further slight decline in the patent brands, which were relatively too high. Carnbroe, 54s. 6d.; Gartsherrie, 60s.; Summerlee 60s. 6d.; Coltness, 62s. 6d.; Langloan, 63s. 6d.; Glengarnock, 54s. 3d., and Eglinton, 48s. 3d. Warrants are 47s., and freights unchanged at 5s.

Rails.—During the week, there have been sales, aggregating 9000 to 10,000 tons, in small lots, which are at present the only quantities that can be placed for summer delivery, at about $38 at mill, which we quote, $39@$39.50 being asked for tidewater delivery. England is unchanged at £4 15s.@£5, ordinary sections.

Old Rails.—Business is quiet, the last sales of T's having been made at $23.50, which we quote. Double-Heads are scarce, and are quoted nominally $27.50@$28, at tide-water.

Scrap.—Scrap is lifeless. We quote ex ship nominally $25.

Philadelphia. April 26.

Pig-Iron.—The heavy drop in Foundry iron has not brought out buyers in the force that was looked for. Several of the strong companies have recognized the wisdom of the action of the Thomas Iron Company, and have promptly reduced quotations to $22 for No. 1 and $20 for No. 2. The purpose of this action is to restrict production to the market requirements. There are more furnaces in blast than demand requires, and the strong companies recognize that, sooner or later, restriction will be forced upon them, and they have concluded that it is better to arrest production now, when stocks are comparatively light, and when prices with a little wisdom can be maintained, rather than to wait until stocks have accumulated, and when a recovery by restriction would be impossible, or at least a very slow process. Some of the special brands are selling above $22 and as low as have been heard of are $23. But there is a general downward tendency, and it is said on the street that seven or eight furnaces will blow out in two weeks. A blowing-out will become necessary sooner or later, as, at current rates, a good many furnaces can not make iron. The founders are purchasing from hand to mouth, and look for still lower prices. A few large sales of No. 1 Foundry have been made at $21.75, and like concessions have been made on No. 2. Gray Forge iron has suffered correspondingly, and transactions have been heard of under $18 at furnace, for a fair iron; but the standard brands are still held at $18@$19. A few special brands are held above this figure. Bessemer iron can be sold at $21@$21.50, but quotations are kept at $22@$23, and in consequence only a moderate business is reported, although negotiations are still hanging fire for large lots. The movements in foreign iron are of very little importance. Small sales are made daily for current requirements. A few inquiries are in hand for Middlesborough, but, with a downward tendency in American irons, there is very little chance for it.

Muck Bars.—Our best Muck Bars are selling at $36 at mill, but the ordinary stuff is selling at $34.50@$35. Three or four lots of Charcoal Blooms were closed out at $64. Inquiries have been made for Anthracite Blooms, and sales are reported at $54@$56.

Merchant Iron.—Business in merchant iron is of an unsatisfactory character, and consumers are waiting for further downward tendency in crude material before placing large orders. Another occasion for delay is the uncertainty attending the settlement of the labor question in the West. The trade recognizes that restriction in some shape or other will soon be forced upon it, and it desires to see what action the manufacturers in the West will take. Small retail lots are moving from store at 2·25@2·30c. Large lots have been sold at 2·15@2·20c. It has been said that iron has sold as low as 2·10c., but not for first-class. Orders for Car iron have been placed at 1·90c., and when not cut to lengths, at a tenth less. Skelp iron is weak, and negotiations are in hand, but inside figures can not be given yet.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 21.		April 23.		April 24.		April 25.		April 26.		April 27.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	3.20	3.00	3.25	.....	3.25	.....	3.25	3.20	3.25	.....	3.20	3.00	3,300
Amie Con., Co.	.20	.19	.19	.....	.....	.....	.20	.19	.20	.19	.20	.....	7,300
Argenta, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.40	.....	600
Bar. & Walker, Ut.	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Bassick, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belle Isle, Ne.	.....	.....	.....	.....	.56	.54	.....	.....	.50	.....	.....	.....	300
Bodie Cons., Ca.	1.25	.....	.....	.....	1.25	.....	.....	.....	1.30	.....	.....	.....	350
Breece, Co.	.25	.....	.....	.....	.20	.....	.20	.....	.....	.....	.....	.....	500
Bulwer, Ca.	.85	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
California, Ne.	.21	.20	.....	.....	.23	.....	.....	.....	.22	.20	.23	.22	2,285
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill	1.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Caribou Con., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Co.	1.20	.....	.....	.....	1.10	.....	.....	.....	1.10	.....	1.15	1.00	1,300
Cons. Va., Ne.	.45	.44	.....	.....	.45	.....	.....	.....	.50	.47	.47	.....	5,100
Crown Point.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deadwood-Terra, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.22	.....	.....	.....	.26	.....	.20	.....	.....	.....	.....	.....	267
Eureka Cons., Ne.	5.63	.....	.....	.....	.....	.....	5.63	.....	5.75	.....	5.25	.....	65
Excelsior, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dk.	.....	.....	.....	.....	.....	.....	4.20	.....	4.50	.....	.....	.....	200
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.09	.08	.09	.08	.09	.08	.....	.....	.....	.....	.08	.....	3,300
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.....	.....	.85	.80	1.10	1.00	1.15	1.05	.95	.....	.....	.....	1,000
Great Eastern, Dk.	.02	.....	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Green Mountain, Ca.	.82	.81	.....	.....	.....	.....	.85	.82	.85	.80	.....	.....	2,400
Hale & Norcross, Ne.	.....	.....	.....	.....	4.50	.....	.....	.....	.....	.....	3.00	.....	400
Hall-Anderson, N. S.	1.40	1.25	1.25	1.20	.....	.....	1.35	1.30	1.40	1.35	1.45	1.35	9,100
Hibernia, Co.	.98	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Homestake, Dk.	14.88	.....	.....	.....	15.50	.....	.....	.....	.....	.....	.....	.....	115
Horn-Silver, Ut.	7.50	7.25	8.00	7.75	7.63	.....	7.50	.....	7.50	.....	.....	.....	715
Hukill, Co.	.12	.....	.....	.....	.....	.....	.....	.....	.10	.....	.10	.....	1,300
Independence, Ne.	.55	.....	.55	.....	.68	.....	.65	.....	.60	.....	.62	.60	7,150
Iron Silver, Co.	2.90	2.80	.....	.....	2.90	.....	2.90	2.85	.....	.....	.....	.....	875
La Plata, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co.	.63	.....	.....	.....	.....	.....	.....	.....	.69	.....	.....	.....	600
Little Chief, Co.	.45	.44	.44	.....	.....	.....	.43	.....	.45	.....	.47	.....	1,000
Little Pittsburg, Co.	.61	.60	.70	.....	.....	.....	.58	.50	.....	.....	.....	.....	1,045
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.45	.....	.....	.....	100
Moose, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	2.50	.....	2.65	.....	3.25	.....	3.50	3.35	2.75	.....	2.50	2.25	2,095
Northern Belle, Ne.	8.88	.....	8.50	.....	.....	.....	9.00	.....	.....	.....	8.75	.....	210
North Belle Isle, Ne.	.....	.....	.....	.....	.38	.35	.....	.....	.....	.....	.....	.....	400
Ontario, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ophir, Ne.	2.00	1.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Plumas, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rising Sun, Ca.	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Robinson Cons., Co.	.85	.82	.86	.83	.86	.85	.85	.84	.82	.80	.80	.79	22,900
Savage, Ne.	1.88	.....	.....	.....	.....	.....	.....	.....	2.13	.....	.....	.....	200
Sierra Grande, N. M.	1.75	1.70	1.85	.....	1.75	.....	1.75	.....	.....	.....	1.85	1.75	2,500
Sierra Nevada, Ne.	2.00	1.88	2.50	.....	.....	.....	3.25	.....	3.40	.....	.....	.....	1,005
Silver King, Ar.	.....	.....	.....	.....	10.88	.....	.....	.....	.....	.....	10.50	.....	250
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	.....	.....	.....	.....	7.00	6.75	.....	.....	7.00	.....	.....	.....	80
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina, Ar.	.80	.....	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 0
Yellow Jacket	2.75	.....	.....	.....	.....	.....	.....	.....	3.25	3.13	.....	.....	300
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 21.		April 23.		April 24.		April 25.		April 26.		April 27.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.	.....	.....	.....	.....	.19	.18	.20	.18	.20	.19	.20	.....	1,300
Alta-Montana, G.	.05	.03	.04	.....	.03	.....	.....	.....	.....	.....	.04	.....	18,000
Am. Flag, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Barcelona, G.	.15	.....	.24	.....	.25	.....	.25	.....	.....	.....	.....	.....	1,100
Bear Creek.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.25	.....	20
Best & Bicher, G. s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	.10	4,400
Big Pittsburg, s. l.	.16	.15	.....	.....	.14	.13	.12	.....	.12	.....	.....	.....	100
Bondholder.	.05	.....	.28	.....	.28	.....	.....	.....	.....	.....	.29	.....	1,800
Bradshaw, s.	.28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
Buckeye	.02	.....	.....	.....	.....	.....	.02	.....	.....	.....	.....	.....	.....
" pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Bull-Domingo, s. l.	.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,100
Bye and Bye.	.02	.....	.....	.....	.....	.....	.....	.....	.....	.02	.01	.....	100
Calaveras, G.	.01	.....	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.....
C'lav'r's W. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., G.	.....	.....	.....	.....	.....	.....	.....	.....	.60	.....	.60	.....	400
Central Ariz'na, s.	.31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Cherokee, G.	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Climax, Co.	.07	.06	.06	.....	.07	.....	.07	.05	.07	.....	.....	.....	2,750
Cons. Imp'ri'l, G. s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,500
Crowell, G.	.06	.....	.....	.....	.....	.....	.04	.....	.....	.....	.....	.....	7,800
Dahlonega, G.	.....	.....	.04	.....	.04	.....	.....	.....	.03	.....	.....	.....	40,200
Decatur.	.05	.04	.04	.03	.03	.02	.03	.02	.04	.02	.04	.03	100
Dunderberg.	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.08	.....	1,800
Durango, G.	.08	.....	.....	.....	.....	.....	.06	.04	.06	.....	.....	.....	200
Eastern Oregon.	.....	.....	.25	.....	.....	.....	.19	.....	.....	.....	.....	.....	16,200
Elko Cons.	.08	.07	.08	.07	.....	.....	.06	.....	.05	.....	.07	.05	13,100
Enterprise.	.29	.20	.....	.....	.28	.26	.27	.26	.27	.23	.25	.....	600
Fannie Barret.	2.25	2.20	2.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
Globe Copper.	.....	.....	.....	.....	.07	.....	.08	.07	.....	.....	.....	.....	.....
Gold Placer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Goodshaw, G.	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granville, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	1.45	1.40	1.45	.....	1.50	1.45	1.45	.....	.....	.....	1.50	1.45	5,100
Hortense, s.	.12	.....	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Lacrosse, G.	.13	.12	.13	.....	.12	.....	.11	.....	.....	.....	.....	.....	2,400
Lucerne.	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	.....	.....	2.50	.....	.....	.....	.....	.....	2.88	2.63	2.88	.....	700
Miner Boy.	.01	.....	.....	.....	.01	.....	.01	.....	.....	.....	.....	.....	500
Mono.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, s. l.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, s.	.16	.14	.15	.....	.15	.14	.16	.....	.15	.....	.....	.....	2,000
Quartz Creek.	.03	.02	.02	.....	.02	.....	.03	.02	.....	.....	.....	.....	5,500
Rappahannock, G.	.03	.....	.08	.....	.08	.07	.08	.....	.07	.....	.....	.....	6 800
Red Elephant, s.	.08	.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,800
Ruby, of Arizona.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, s.	.23	.....	.18	.16	.....	.....	.23	.18	.22	.18	.19	.....	7,600
Sonora Con.	1.05	.99	1.00	.99	.97	.95	.91	.89	.89	.85	.86	.84	30,300
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite.	.....	.....	.....	.....	.18	.....	.....	.....	.18	.....	.....	.....	1,200
South Pacific.	.06	.....	.....	.....	.06	.05	.05	.....	.06	.05	.05	.....	3,600
State Line, 1 & 4, s.	.02	.....	.02	.....	.02	.....	.02	.....	.....	.....	.....	.....	900
" Nos. 2 & 3, s.	.05	.04	.04	.....	.04	.....	.....	.....	.04	.....	.....	.....	35,800
Sutro Tunnel.	.20	.....	.20	.....	.21	.....	.21	.20	.21	.20	.21	.20	7,900
Taylor Plumas	.....	.....	.....	.....	.....	.....	.17	.16	.17	.16	.17	.16	5,600
Unadilla, s.	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Union Cons., G. s.	3.25	.....	3.25	.....	.....	.....	.....	.....	.....	.....	3.60	.....	405
Vandewater.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington.	.08	.....	.....	.....	.....	.....	.07	.....	.....	.....	.07	.06	2,000
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 83,957. Non-dividend shares sold, 242,935.

BOSTON MINING STOCKS.

	April 20.		April 21.		April 23.		April 24.		April 25.		April 26.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amie.	.....	.....	.....	.....	.....	.....	.19	.....	.....	.....	.....	.....	500
Atlantic.	.....	.....	10.50	.....	10.50	.....	.....	.....	.....	.....	.....	.....	35
Aztec.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza D.	.....	.....	2.13	2.00	1.88	.....	1.87½	1.75	1.63	.....	1.75	.....	975
Bowman Sil	.09	.08	.09	.08	.08	.07	.07	.05	.15	.14	.14	.....	9,840
Bruna. Ant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer.	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	.....	.....	100
California.	.....	.....	.....	.....	.....	.....	.....	.....	.23	.....	.....	.....	300
Cal. & Hec.	.238	.....	.....	.....	.233	.....	.....	.....	.232	.....	.231	.....	79
Catalpa.	.67½	.....	.....	.....	.65	.62½	.65	.62½	.62½	.....	.65	.62½	2,100
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherryfield.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Co. Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copper F'lls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copperop.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent.	.....	.....	.....	.....	.28	.....	.....	.....	.25	.....	.....	.....	900
Cumberl'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deer Isle.	.....	.....	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	1,500
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas.	.80	.....	.....	.....	.....	.....	.80	.....	.....	.....	.....	.....	200
Duncan.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin.	.....	.....	.....	.....	.27	.25	.....	.....	.25	.....	.....	.....	1,800
Empire.	.19	.....	.19	.....	.19	.18	.20	.....	.22	.21	.....	.....	2,800
Eureka Con.	5.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.50	.....	35
Franklin.	10.75	10.50	.....	.....	10.75	.....	10.63	.....	.....	.....	.....	.....	155
Hancock G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.13	.....	100
Harshaw.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron.	.....	.....	.62½	.....	.....	.....	1.50	.....	.....	.....	.....	.....	125
Independ'ce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Q'n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mass. & N.M.	.09	.....	.09	.....	.....	.....	.09	.....	.09	.....	.10	.....	11,100
Milton.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Belle	.....	.....	.....	.....	.....	.....	8.63	.....	.....	.....	9.13	.....	60
Ontario.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola.	.....	.....	.....	.....	.....	.....	.....	.....	24.00	.....	23.50	.....	42
Penn-Breck.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewablic.	.....	.....	.....	.....	.....	.....	.....	.....	4.00	.....	4.00	.....	255
Pine Tree.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth.	.....	.....	.....	.....	.....	.....	.16	.....	.....	.....	.....	.....	500
Quincy.	.....	.....	45.25	.....	45.00	.....	45.38	.....	45.25	45.00	44.00	.....	212
Ridge.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.81	.....	100
San Pedro.	.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.57½	.....	700
S'ra Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.00	.....	100
S'ra Grande	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Islet.	.....	.....	.....	.....	.....	.....	3.00	.....	2.88	.....	3.00	.....	230
Silver King.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simpson Gd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
So. Pacific.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	500
Standard.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, Nos. 2 & 3.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan.	1.38	1.25	1.31¼	1.25	1.25	.....	1.25	.....	1.13	1.00	1.13	.....	1,410
Sutro Tun.	.....	.....	.....	.....	.21	.....	.....	.....	.....	.....	.....	.....	300
Sycamore.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead.	.11	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,600
Vizina.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	April 20.		April 21.		April 23.		April 24.		April 25.		April 26.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Argent.	.19	.18	.19	.18	.18	.....	.18	.....	.19	.18	.....	.....	7,600
Arizona So.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aztec.	.....	.....	.04	.....	.04	.....	.04	.....	.04	.....	.....	.....	8,400
Battle Mt.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Black Sul.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie.	.03	.....	.03	.....	.....	.....	.03	.....	.....	.....	.03	.....	12,800
Buena.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calista.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati.	.10	.....	.12	.10	.12	.....	.12	.11	.....	.....	.....	.....	32,700
Comprom'e.	.....	.....	.....	.....	.....	.....	.27½	.....	.26	.....	.....	.....	4,300
Contention.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dauntless.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del Monte.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.16	.....	.....	.....	100
Fairview.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Girard.	.....	.....	.10	.....	.10	.....	.10	.09	.10	.....	.10	.....	24,000
Golconda.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Golden Age.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Governor.	.09	.08	.09	.08	.09	.....	.09	.....	.....	.....	.07	.....	18,800
Grand Uni'n	.24	.....	.....	.....	.25	.20	.24	.....	.24	.....	.....	.....	11,650
Gunnison.	.62½	.57½	.60	.....	.60	.57½	.62½	.60	.65	.62½	.67½	.65	17,500
Hancock.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch.	.09	.08	.08	.....	.08	.....	.08	.07	.08	.07	.08	.....	50,000
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Maud	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	5,500
Lg & D'y Hl	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McCullough	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Magnolia.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Lincoln.	.01	.....	.01	.....	.....	.....	.01	.....	.....	.....	.....	.....	10,200
Mt. Sheridan	.....	.....	.....	.....	.04	.....	.....	.....	.05	.....	.....	.....	5,300
National.	.....	.....	.02	.....	.....	.....	.....	.....	.02	.....	.....	.....	10,000
Orion.	.....	.....	.06	.....	.06	.....	.06	.....	.....	.....	.05	.....	3,500
Orion Pref.	.....	.....	.....	.....	.....	.....	.09	.....	.09	.....	.....	.....	700
Palmetto E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina.	.15	.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,100
Penn-Breck.	.13	.12	.14	.13	.13	.....	.14	.13	.13	.....	.....	.....	15,500
Permanent.	.02	.....	.....	.....	.....	.....

Wrought Pipes and Tubes.—A further decline has taken place in prices, and discounts are given at 70 off for steam pipes, and boiler tubes at 57½c.

Sheet-Iron.—Sheet-iron is selling in retail lots at 4@4½c., and buyers of large lots are waiting for lower prices. Stocks at mill are not permitted to accumulate, and the production is kept within bounds. Galvanized is from 35 to 40 per cent off. A large amount of business is looked for.

Structural Iron.—Sales of 3000 tons of structural iron were made this week for bridges, and additional work is under negotiation which will be placed probably next week. Steel for structural purposes is firmer than usual, and orders for angle-iron were secured at 2·50c. Tees, 3·20c. The combination price for Channels and Beams is 3½c.

Plate and Tank Iron.—An improving activity has been developed in plate and tank, though some manufacturers complain of very dull trade. Competition is active, but, as the volume of business is not sufficient to keep all mills active, there is necessarily some complaint upon the part of unsuccessful bidders.

Steel.—Steel rails are active at $39@$40 in small lots.

Old rails have scarcely any activity, and are quoted nominally at $24. Tees $27.50 for Double-Heads, and occasional sales of American are made at $23.50@$24.

Scrap-Iron.—Transactions at yard this week were at about $26 for No. 2 and $27 for No. 1.

Pittsburg. April 26.

The Western Pennsylvania iron market has been unsettled by the recent failure, and by the reduction of $2 per ton on Foundry iron in the East. If 60,000 tons of iron are thrown upon the market, even with the greatest care, it can not help to depress prices. Nothing has been decided yet. Consumers are fighting, and will not purchase except for immediate requirements. Small sales have been made at $21.50 for No. 1 Foundry, $19 for Gray Forge, and $22.50 for Bessemer. Concessions have been made on these prices for spot cash; but in view of the downward tendency, holders of crude iron report great difficulty in disposing of it. Another obstacle in the way of business is the uncertainty as to the action of the iron-workers. The manufacturers have submitted their ultimatum, which is, that, unless the workmen accept a reduction of wages of one dollar per ton, when the selling price of iron is 2 cents per pound, they will close their mills. This policy was agreed upon several weeks ago, but it is hinted that the workmen will be given another chance. Several lodges have taken action and decided to strike, but there is plenty of time between this and the 2d of June for a sober second thought. A suspension is desired by the manufacturers, especially as, under the organization made a year ago, suspension can be maintained without injury to the trade. The Western manufacturers are in excellent shape to stand any suspension, voluntary or forced upon them. The demand for finished iron is only moderate, and selling prices have declined to 1.90c.; even lower rates have been heard of, and if maximum production is kept up, still lower prices will be inevitable. Gray Forge is declining, and mill requirements are filled from week to week. The lake ore companies are still holding back, and furnace companies purchase season requirements at present figures. Steel rails are selling at $39@$40. Merchant steel is in moderate demand in small lots. Old rails are fluctuating, and offers are made at tide-water, but not accepted. Nails are selling at $3 in car load lots, and the demand for building purposes is active.

Cleveland. April 25.

The situation of last week remains unchanged in the main, more strength being developed in some sections and weakness in others. Good brands command fair prices, and off grades are not much in demand by the trade, and consequently in this grade some cutting is being done.

No. 1 Bessemer	$23.00@$24.00
" Foundry, all ore	22.00@ 23.50
" Foundry, cinder mixture	21.00@ 22.50
" Soft Foundry	20.00@ 21.00
" Open silvery	19.00@ 20.00
Mill Irons	19 00@ 20.00
Four months, f. o. b. cars Cleveland:	
Nos. 1 and 2 Charcoal	26 00@ 27.00
Nos. 3, 4, 5, and 6 Charcoal	26.50@ 28.00
Hanging Rock Charcoal	25.00@ 28.00
Strictly Cold-Blast Charcoal	30.00@ 32.00
Four months, f. o. b. cars Cleveland:	
Bessemer ores	7.00@ 8.50
Hematite "	5.00@ 6.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 27.

Anthracite.

We can not note any change for the better in the anthracite coal trade. Individual operators and middlemen are selling practically for what they can get, and there is quite a good deal of buying on the part of cautious consumers. The companies are maintaining an attitude of firmness, so far as appears on the surface. The only piece of more important news which we hear is, that one of the companies has taken the contract with the Pacific Mills, 35,000 tons, broken, delivered, screened, on cars, during any time of the year at Salem or Newburyport, for $5 a ton, a very low figure.

A reliable correspondent sends us the following from Philadelphia, under date of April 26th:

The local trade is dull. It is generally so at this time of the year, but not to the same extent, and the present dullness is greatly due to the effort to maintain the winter prices, which give no inducement to dealers or consumers to anticipate their wants. It is to be hoped that this mistake will be corrected to-morrow, when the city and line prices are to be fixed for May month.

Orders for shipments are also coming slower than they should at this season, and after a long winter, leaving no over-stock in the yards or cellars.

Nothing has yet been decided about curtailment for the early part of May. It is believed that some restriction must take place until coal sets moving West, which will be as soon as lake navigation opens.

Vessels are scarce, and the rates of freights the same—$1.25@$1.30 to Boston and Portland.

The following prices were fixed upon at the meeting of the Western Anthracite Joint Association:

	Buffalo, Pittsburg, Salamanca, and Bridges on cars.	Buffalo. f. o. b.	Rochester.	Syracuse.
Grate	$4.80	$5.10	$4.45	$4.20
Egg	4.90	5.20	4.55	4.30
Stove	5.15	5.45	4.80	4.55
Chestnut	5.15	5.45	4.80	4.55
Pea	3.65	...	3.30	3.05
No. 4	5.40	5.70	5.05	4.80

Bituminous.

It now appears that a number of railroad contracts have been closed, generally we hear at unprecedentedly low figures. Among those of which we have heard are the New York Central, 120,000 tons, to two Cumberland companies; the New York & New England, 100,000 tons, to Clearfield parties; the Boston & Lowell, 40,000 tons, to Cumberland and Clearfield operators; and the Boston & Providence, 20,000 tons, to a Cumberland firm. There are others pending, but so far as we can learn, not closed.

The statement has been made that bituminous coal had sold as low as $4 per ton. In explanation of this, it may be stated that this has been done to frustrate any heavy purchases abroad for the steamer trade, and covers this year's delivery. We quote Clearfield alongside $4.20@$4.50 and Cumberland $4.30@$4.60, according to quality.

STATISTICS OF COAL PRODUCTION.

The Transportation of Coke over the Pennsylvania Railroad for the week ended April 21st and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Allegheny Region)	2,293	38,014
West Penn. RR	2,071	31,959
Southwest Penn. RR	42,660	594,141
Penn. & Westmoreland Region, Pa. RR	5,878	74,657
Pittsburg, Penn. RR	....	274
Snow Shoe (Clearfield Region)	760	5,372
Total	53,662	744,417

Horsford's Acid Phosphate

In Despondency, etc.

DR. W. S. POWELL, Defiance, O., says: "I have used it with satisfactory results in dyspeptic ailments associated with great mental depression or despondency."

DIVIDENDS.

SAN FRANCISCO, April 14, 1883.

THE FATHER DE SMET CONSOLIDATED Gold Mining Company has declared dividend No. 27 of TWENTY CENTS per share, payable at the office of Laidlaw & Co., 14 Wall Street, New York, on the 30th inst. Transfer books will close on the 23d.

H. DEAS, Secretary.

NEW YORK, April 13, 1883.

THE CONTENTION CONSOLIDATED MINING COMPANY has declared its regular monthly dividend, No. 15, of

TWENTY-FIVE CENTS PER SHARE,

payable April 28th, 1883, at the office of the Farmers' Loan and Trust Company, No. 26 Exchange Place, on all stock registered in New York.

Transfer-books close on April 18th.

W. HART SMITH, Vice-President.

A. H. McNEAL,

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF Jr. M.E., } Editors.

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MR. H. B. HERR leaves Chicago on a professional trip to the West on May 15th.

A PETITION is circulating to ask the next Congress to place the duty on tin plates at 2¼ cents per pound, instead of 1 cent, as provided in the new tariff, and 1·1 cent as fixed by treasury rulings and now in force.

MR. KNIGHT NEFTEL, of Messrs. NEFTEL, CHURCHILL & PARKS, mining and civil engineers, will leave for Colorado on professional business, on the 7th inst. All communications addressed to the office of the firm, No. 39 Broadway, New York City, will be immediately forwarded to him.

MR. F. R. HUTTON, Secretary of the American Society of Mechanical Engineers, announces that the summer meeting of the society will be held at Cleveland, O., beginning Tuesday, June 12th. It is reported that an opportunity may be afforded to visit the Exposition of Railroad Appliances at Chicago.

THE International Electric Exhibition to be held in Vienna this year promises to become truly representative of recent progress. From the bulletins issued in rapid succession, we notice that almost all the leading inventions and the principal manufacturers of machinery and supplies will be represented.

WE print this week a second installment of Prof. W. P. BLAKE'S monograph, *Description of the Silver King Mine*, which has been published, handsomely printed in pamphlet form, by private parties. We are indebted to Professor BLAKE for our illustrations. The original report contains a number of maps and views for which we can not make room, and those who desire to study them in detail are referred to it. Our extracts are too eloquent a proof of the scope and character of the work to call for any words of commendation on our part.

THE basic process is making headway much more slowly in the open-hearth than in the Bessemer converter, though it is for good reasons particularly well adapted to the manufacture of high grades of steel from impure raw materials, which open-hearth makers have always been threatened with. Scrap is proverbially a tricky raw material, coming as it does from all sorts of sources. To open-hearth steel melters, emancipation from pure pig and anxiously selected scrap is a very important point, especially as it is accompanied with the peculiar advantage due to the open-hearth that the quality of the final product is completely in the control of the melter. We know now, from the experience of the past few years in basic Bessemer practice, that for the converter the pig must have a composition varying within certain pretty narrowly drawn limits. This is not the case for the open-hearth, and there are no close restrictions, notably in respect to sulphur, of which only 60 per cent is eliminated in the converter. Almost the only consideration which need govern those using the basic open-hearth process is the one of price of the raw materials, almost irrespective of their quality. Where scrap is not available, blowing of air through immersed tuyeres, as is done at the Phœnix works, in Germany, may be substituted. The trouble of making a suitable junction between the acid brick of the roof and the basic material constituting the hearth has been solved by M. POURCEL, of Terrenoire, by a joint of chrome iron ore ; and by WALRAND, of Creusot, by the use of bauxite. As to the quality of the product of the basic process, whether carried out in the converter or the open-hearth, there can be no doubt. Numerous analyses and mechanical and working tests prove its superiority to ordinary, and its equality with best grades of wrought-iron.

IN the very intelligent and interesting annual report of Mr. HEBER S. THOMPSON, Engineer of the Girard Estate, made December 31st, 1882, we find an account of the system of mining coal pursued by the Lehigh Valley Coal Company, at the Lehigh colliery, which is leased by that company. Mr. THOMPSON says :

"The working out of the coal has not here followed closely the extension of the gangways, as is the usual method. On the contrary, pillars of solid coal, fifty yards in width, have been left unmined between every two breasts, which will be mined in succession from the ends of the gangways toward the slope. In the six thousand yards of gangway now opened on these four levels, only one hundred breasts have been opened, between which solid pillars of coal have been left, sufficient for the opening of two hundred breasts more. This method of mining, always the most economical and productive, but rarely adopted, was specially wise at this colliery, because of the heavy weight of rock bearing upon the coal, produced by the inversion of the north-dipping rock and consequent crushed and loose condition of the coal of the synclinal axis. If breasts had been opened here in the ordinary way, a large proportion of the coal which will now be taken out would have been lost."

We understand that this system is practiced also at the Potts colliery of the Reading Company, near Ashland. In Vol. V., p. 421, of the Transactions of the American Institute of Mining Engineers, a similar case (though not in anthracite) is cited from Longdale, West Virginia. The discussion of Mr. WETHERILL'S paper on anthracite mining found in that volume is full of interest ; and the advocacy of wider pillars then expressed by Messrs. COXE, RAYMOND, and others, was not only very generally approved, but seems to have received the indorsement of success in practice since. We are glad to see this system making progress, and we shall be pleased to chronicle any further instances of its application.

MATTERS in the Western coal and iron trades are beginning to assume a gloomy aspect. The conference between the representatives of the Western Iron Association and of the Amalgamated Association has been held, and the conclusion promptly reached that neither party would yield to the arguments of the other. We hardly believe that this ends all efforts at a compromise, because it will not be until the first of June that

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any changes will go into effect. At present, there is probably nothing but preliminary maneuvering, and neither the employers nor the employés are probably willing to forego the faint chances that the situation in the trade may afford developments during the next two or three weeks which will be favorable to them. As matters now stand, the position is partly clearly defined. The trade is suffering from overproduction, partly real and partly apparent, through the usual tactics of buyers of keeping out of a falling market. Prices have reached a very low figure, merchant in Pittsburg having sold as low as 1·80@1·90c., while a year ago, when the same wages were prevailing, it ranged between 2·30@2·40c. It is true that pig-iron and scrap are lower, and that fuel is cheaper; but these items do not compensate for more than a part of the falling off in the selling price, and manufacturers demand a scaling down in wages of from 10 to 20 per cent. Last year, the men asked for an increase and did not get it, even after a long struggle; this year, they resist a reduction, and as is usual in such cases, may be even more willing to stand off for a long period. As we have already noted, a forced restriction would do the trade much good, and might ultimately lead to a revival of the demand.

In the coal trade, the labor troubles are assuming a serious aspect. A scaling down of wages is attempted in the Pittsburg District, in Ohio, Iowa, Illinois, and other Western States, and has been partially successful. It is the natural result of an enormous expansion in the production, and a partial decline in the consumption, leading to a serious decline of values. The railroad pits of the Pittsburg District are out against a reduction from 3½ to 3 cents per bushel for mining, and the men profess to be determined to use all efforts to keep the mines idle.

IT is of interest to call attention to the fact that the Wallace Voluntary Trade Tribunal bill has passed the two houses of Pennsylvania, and, we understand, has received the sanction of the executive. High hopes are pinned to this measure; but while we heartily indorse honest efforts to avoid the constantly recurring struggles between employers and employed, we are not sanguine as to the good that will come of it. A brief summary of its principal features will show its scope and its shortcomings. The bill provides that, upon petition by a specified number of the employers and men in a trade in a district, the presiding judges of the courts of common pleas have the power to issue a license for the establishment of a tribunal to settle disputes between employers and employed. The petition shall be signed by at least twenty-five workmen and five employers. The tribunal shall consist of at least two employers, or their representatives, and two workmen, and no pleading by attorneys shall be allowed before them. The chairman or umpire shall have authority to examine books, call witnesses, etc., but he shall only be called upon to act after disagreement is manifested in the tribunal by failure during three meetings held and a full discussion. The umpire's award, when entered on record in due form, shall be final and conclusive, and the proper court may on motion thereon enter judgment and issue final process to enforce the same, but—and this is the most important clause—upon questions affecting the price of labor it shall in no case be binding upon either employer or workman, save as they may acquiesce therein after such award. The bill, therefore, aims first at affording the means of bringing about a free interchange of data with a view to conciliation, and after that has failed, gives the chairman the power to act as arbitrator. The trouble which we fear will make the bill valueless is, that the vital question, that of wages, will remain unsettled.

Experience in the coal and iron trades of Great Britain and in this country has proved that while boards of conciliation and arbitration are often necessary, and have undoubtedly done good, they have disastrously failed in a number of instances through lack of faith on the part of the men, or because their representatives were not empowered to act. Last year, after over ten years of experience, the men in the North of England iron trade calmly repudiated their representatives and struck against the award.

The Wallace bill may do much to clear away obstacles that lie in the way of a free interchange of opinion; but it does not yet strike at the root of the evil. It will, we hope, receive the benefit of a thorough test, and we hope it may pave the road to a more incisive measure. The objection has been raised against it that it establishes a close connection between the proposed boards and the courts, that the good sense and honor of both parties should be trusted to enforce its decisions. We know, however, from the history of the movement, that these can not be relied upon, and the features of the Wallace bill looking to compulsory settlement are among those most to be commended.

A CORPS of Vanderbilt engineers are at work extending a line from Deeter's Gap, in Somerset County, Pa., to Garrett, on the Baltimore & Ohio Railroad. It is believed that it is intended to run a branch from the main line in this way into the coal-fields of Brothers Valley, Summit, and Elk Lick townships.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Bessemerizing Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reply to Mr. Howe, in your issue of April 21st, allow me to mention only the following: The first attempts to Bessemerize copper matte were made in Russia in 1867 by Jossa and Laletin, by forcing either air or steam, or a mixture of both, through molten copper matte in a converter described in the *Oesterreichische Zeitschrift für Berg- und Hüttenwesen*, 1868, No. 50; in *Berggeist*, 1868, No. 50; and *Jernkontorets Annaler*, 1882, Vol. II. Experiments were made in 1868 at Vestanfors, in Sweden, by Stridsberg and Kollberg, to Bessemerize iron pyrites rich in copper, in a converter, mentioned in *Jernkontorets Annaler*, 1882, Vol. II. Rittinger proposed in the *Oesterreichische Zeitschrift*, 1871, No. 35, to blow compressed air in copper matte in a reverberatory furnace, and to put in silica to take care of the oxidized iron.

I did not mention any thing about Mr. Howe's experiments, for the natural reason that I did not know any thing about the nature and quality of his experiments. When I read Dr. Tamm's description of the process in France to the superintendent at Bergen Point, I was told that the company had made experiments in a similar way before; but these experiments had not been successful. When I told my ideas of Bessemerizing copper matte to Mr. J. L. Thomson and Mr. W. C. E. Eustis, just before I left Bergen Point, these gentlemen did not mention any thing about their having made such experiments before. PAUL JOHNSSON.

ISHPEMING, MICH., April 27.

Bessemerizing Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have followed with much interest the controversy about Bessemerizing copper matte between Messrs. H. M. Howe and Paul Johnsson in your valuable paper. I have just now received the copy of April 21st, in which Mr. Howe ascribes the priority of the Bessemerizing to Mr. Hollway, and the use of tuyeres in reverberatories for the same purpose to himself. Permit me space enough to correct this. I patented the Bessemerizing of matte in 1866; and a few years ago, when Mr. Hollway's process was much talked about, I sent you a copy of my patent, which you were kind enough to publish. I began the use of tuyeres in reverberatories for oxidizing matte in 1867, at the Ducktown copper-mines, and continued it with much success until 1875, when I left that place. Mr. Howe, no doubt, was not aware of these facts; nor do I consider them great inventions, and I think that any rational copper-smelter would invent them if placed in my position. A. RAHT.

FRANCKLYN FURNACES,
NEAR SALT LAKE CITY, UTAH, April 28.

THE ENGLISH GUNPOWDER TRADE.

The *Ironmonger* prints the following wail: The gunpowder trade has within the past two months shown a slight improvement, so far as the colonial demand is concerned. Some good lines have been received from Australia, and several rather large contracts are in immediate prospect. The home trade, however, has remained very quiet, the effect of the mild and wet winter being still felt by manufacturers. As we pointed out a few months ago, the gunpowder industry of this country is slowly undermined by the disadvantages under which manufacturers labor as compared with their rivals on the continent, in consequence of the many vexatious restrictions to which they are subjected. The explosives act of 1875, which was intended to prevent abuses and to insure every reasonable precaution against accidents, unfortunately contains superfluous clauses, such, for instance, as those relating to "incorporation" and other processes of manufacture. Thus the legislature has so heavily handicapped our manufacturers that every opportunity has presented itself to the German makers to develop their foreign connection, and so weaken our position, and they have not been slow to avail themselves of the advantage. It is, moderately stated, very hard that makers, especially the older firms, who in the past have not hesitated to make great sacrifices when the country needed their help, should now find their foreign trade destroyed by the operation of an arbitrary law. But the law being as it is, it is only reasonable to expect that the government officials should adhere strictly to the spirit as well as the letter of the act. But whether the act is good or bad, it is held to be very hard for the authorities in this country to accept tenders from continental makers because they quote a cheaper rate than English firms; and yet this is what has just been done. Four fifths of a very large contract for prismatic powder for heavy ordnance has been intrusted to German makers, which means a loss in value of about £50,000 to English producers. That such an incident should have occurred in face of the known fact that it is the existing law, and nothing else, which prevents our makers quoting equally low prices, is almost past belief, especially when it is remembered that the commodity is gunpowder, and for national use.

WATER-GAS FUEL FOR STEAMSHIPS.—A test is about to be made in England of the use of water-gas as fuel for steamships. The Mauritius Steamship Line has built a steamship called the Heron of 1000 tons burden, and provided it with the apparatus invented by Dr. C. Holland for making water-gas. Dr. Holland's process has been tested on the Long Island and Erie railroads; but this is the first time that it, or any similar process, has been applied to a steamship. The Heron is to ply between London and the islands of Mauritius and Madagascar, and it is expected that she will start on her trial trip on May 10th. She has been fitted out with six furnaces precisely like those placed by Dr. Holland in the experimental locomotive named after him on the Erie road.

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COMPARATIVE MERITS OF BRIMSTONE AND PYRITES FOR THE MANUFACTURE OF SULPHURIC ACID.

(WITH SUPPLEMENT.)

The recent rapid rise in the price of brimstone has stimulated so energetically the substitution for it of pyrites that several of the largest of our acid manufacturers have replaced their brimstone-burners by pyrites-kilns. But the great majority still hesitates or refuses to see the advantage of the change; regarding the high price of brimstone as but temporary, and denying that, with brimstone at from $20 to $25, there can be any economy in the use of pyrites. Yet in England and Scotland, where the price of Sicilian brimstone is as low as here, and where the same methods of manufacture are employed, acid is made so cheaply that phosphates are imported into England from this side the Atlantic, made into manure, and exported for sale here at figures with which our manufacturers find it difficult to compete, if we may judge from the fact that they were desirous to tax the acid in imported superphosphates. This is not a case in which the convenient excuse of high labor here and cheap labor there explains the anomaly; for the item of labor cost in the manufacture of both acid and manure is fractionally small as compared with that of material. The real reason is, that the sulphur out of which English and Scotch acid is made is derived from pyrites, and is so much cheaper than the brimstone which acid-makers here persist in preferring that chamber acid there costs about one half what it does here, and therefore all the articles into whose production acid enters are correspondingly cheaper. At present, pyrites is offered here almost at English prices; but were a large market to be opened for it, competition would be found to enter, with the inevitable result of low prices. But even at present prices of pyrites, acid can be made from it more cheaply than from brimstone at its lowest possible price; as is shown by the following comparative estimates, based upon English practice and our prices, calculating brimstone of 98 per cent at $25 per ton, and the sulphur saved from a 48 per cent pyrites, say 45 per cent, at 15 cents per unit.

ESTIMATE OF COST OF MAKING BRIMSTONE AND PYRITES, AND THE COST OF BRIMSTONE ACID.

Six tons of brimstone producing 18 tons of oil of vitriol at $25 per ton	$150.00
Niter—8 per cent of the brimstone used, at $2.75	28.60
Coal—5 tons, at $4	20.00
Labor—2 men burn 6 tons weekly, feeding 40 pounds hourly to each of two burners. The same men keep up steam, fire the lead evaporators, and do all the general work. Fourteen days' labor, at $1.50	21.00
Distillation and general labor, fourteen days, at $1.50	21.00
Repairs	4.00
	$244.60
Equal per ton of oil of vitriol to	13.58

COST OF PYRITES ACID.

13·06 tons of pyrites, if 45 per cent be saved, will yield 588 units of sulphur, and, at 15 cents per unit	$88.20
4½ per cent of niter on the sulphur contents, equal to 5·02 cwts., at $2.75	14.30
4 tons coal, at $4	16.00
Labor—Each battery of 27 kilns is in England worked by one man per shift of eight hours. Each man charges, shakes down, and removes the cinder from nine kilns, and pots the niter as required. Thus the 27 kilns are fed and discharged once each twenty-four hours with 5 cwts. of pyrites, equal to 6¾ tons, which yield 303 units of sulphur and are handled by 3 men, at $1.50 each. Therefore 588 units are handled for	8.73
In England, the usual contract price for breaking the pyrites by hand into lumps two inches square is 25 cents per ton; allow 50 cents here; therefore, breaking 13·06 tons, at 50 cents, costs	6.53
Concentrating to 44 degrees in Glover tower, and to 66 degrees in platinum stills	10.00
Repairs	6.00
	$148.76
Equal per ton of oil of vitriol to	8.22

In the preceding estimates, the difference in the consumption of niter is noteworthy, due to the fact that there is not in brimstone gas, except when in large volume in very large works, enough heat to enable the Glover tower to be used, whereas, it is a necessary part of the pyrites plant. The concentration to 44 degrees is, therefore, in the brimstone plant, usually effected in lead pans at the expense of more fuel than is consumed in pumping acid to the top of the tower in the pyrites plant. Hence, I have allowed five tons of coal in the one case, as against four tons in the other.

Although the cost of actually handling pyrites exceeds that of an equal weight of brimstone, nevertheless the item of labor in the pyrites account is less than in the brimstone account; and this difference grows greater the richer in sulphur the pyrites. The proportionate loss of sulphur in burning a rich pyrites is also much less than when burning a poor, independently of the fact that, in a siliceous pyrites, a certain amount of sulphide of iron is likely to be so enveloped in incombustible gangue as to be protected from all action. If 5 per cent of a 35 per cent pyrites is lost, one seventh of all the sulphur remains behind; if 5 per cent of a 45 per cent is lost, one ninth remains. But what is recovered in the former case stands to what is recovered in the latter in a much lower ratio, namely, as 30 per cent to 40 per cent, or as only 3 to 4. Although, however, the cost of burning pyrites is less than that of oxidizing an equivalent quantity of sulphur from brimstone, there are disadvantages attending the use of the mineral. The pyrites-kiln is more costly to build than a sulphur-burner. Again, under the most favorable circumstances, a kiln of the ordinary size will deliver 300 pounds of sulphur as sulphurous acid; while a sulphur-burner will consume 960 pounds; consequently, the space occupied by a nest of kilns is at least four times greater than that covered by sulphur-burners of the same capacity. Owing to the somewhat greater heat of the gases as they enter the chamber, as works are usually constructed, even when a Glover tower is interposed, the wear of the first chamber is greater when pyrites than when brimstone is used; and this is much more the case if the pyrites contains arsenic. But admitting to their fullest extent the cogency of these objections, the latter of which are allowed for in the above estimates by nearly doubling the item for repairs in the pyrites account over a similar item in the brimstone account, there remains so large a balance to the credit of pyrites that it should require but little argument to decide the wavering in its favor.

Properties of Pyrites.—But much of the advantage depends on the character of the pyrites. If we take the experience of English acid-makers, we find that up to 1860 they drew their supply largely from Wicklow, Ireland, where there are large beds of a hard slaty pyrites, the richest portions of which alone were exported, and of which richest portions the following average of four assays by Clapham shows the composition:

Sulphur	38·79	Lead	1·80
Iron	36·06	Arsenic	·39
Copper	2·57	Insoluble	19·71

Not a ton of Wicklow pyrites now enters the market. It burns, owing to its compact structure, with difficulty. The proportion of insoluble matter being high, the cost of burning off the sulphur is proportionately so. The iron in the residuum is too low to fit it for fettling, and the percentage of copper below that of Spanish pyrites.

Another pyrites which at one time was largely used, but has gradually fallen into disuse, is from Norway. The following average of assays, by Pattinson & McCulloch, explains some of the reasons why:

Sulphur	47·55	Zinc	1·26
Iron	41·92	Carbonate of lime and magnesia	3·38
Copper	·90	Insoluble	.615

Here the percentage of sulphur and iron is high and that of silica low; but the copper is present in unremunerative quantities, and the ore is so hard that it burns slowly. Nevertheless, it would have displaced the Irish and English pyrites and occupied the market, had not Spain supplied it with an ore that meets so perfectly all requirements that it has excluded from the English market all competitors, and may be accepted as the standard by which to estimate the merits of all pyrites for acid-making. An average of four assays of Spanish by Pattinson gives:

Sulphur	47·87	Zinc	·10
Iron	40·93	Lime and magnesia	·19
Copper	3·82	Arsenic	·26
Lead	·62	Insoluble	5·42

Looking at the chemical composition of the pyrites from Spain and Portugal, we find the sulphur contents to be high; the iron and silica to bear such relationship to one another that, after roasting and extracting the copper, the iron oxide is high and pure enough and the silica low enough to make a suitable material for lining puddling-furnaces; while its entire freedom from phosphorus gives this "blue billy" exceptional value when pressed into bricks for the making of Bessemer pig. The percentage of copper in the above analyses is slightly higher than the general run. It is always extracted in the wet way, and so extensively are these low-grade ores worked that their copper forms one of the most important items in the world's present supply, amounting to nearly 40,000 tons. The next ingredients, lead, zinc, calcium, and magnesium, must exist in very small quantities in a good pyrites, one reason being that in roasting they are converted into sulphates, and therefore occasion a proportionate loss of sulphur; another, that when in large quantities, they reduce or destroy the value of the iron as a by-product. The presence of the next element, arsenic, in any proportion, no matter how minute, is prejudicial. It tends to corrode the chambers, it consumes niter, and it vitiates the acid, rendering it unfit for the manufacture of any article that enters directly into human food. Were it entirely absent from Spanish and Norwegian pyrites, no brimstone would be used in England; but as it is, all acid for pharmaceutical purposes and for the manufacture of food must be made from brimstone. And arsenical acid is objectionable in cleaning iron for galvanizing and in finishing copper sheets and wire. Any pyrites, therefore, which is absolutely free from this poison would bear on that account an extra price. And there is reason to believe that this advantage is possessed by some of our native ores. There is, however, a difference between one Spanish and Portuguese ore and another. The Mason ore generally commands 1½d. per unit more than any other, on account of its hardness and very slight liability to clinker. Between Tharsis and Rio Tinto, there is but little to choose.

Ores in the American Market.—At present, there are bidding for purchasers in our market both home and foreign pyrites. *Rio Tinto pyrites*, whose character is so well known and whose reputation is so thoroughly established that its agents have but to point to the fact that it and its related ores have replaced all others in the European market, and that probably three fourths of the acid of the world is made from them, is regularly imported. Though not the favorite among the pyrites of the Peninsula, it yet is neither so hard as to burn reluctantly, nor so soft as to make in breaking an undue proportion of fines. Its percentage of sulphur is so high as to make the cost of burning the lowest possible, and both its iron and copper are in proportions sufficient to give them value. Were there less arsenic, it would be a point very much in its favor.

The acid trade owes to the *Orford Nickel and Copper Company* no small thanks for having first induced more than one of our largest acid-makers to use pyrites properly and extensively. Its pyrites from Capelton, in the Province of Quebec, Canada, though not free from arsenic, is probably purer than the Spanish; but it is lower in iron, and therefore the wet treatment applied to Spanish pyrites, and which depends in a measure for its profit on the iron residues, has not been adopted for recovering the copper from its cinder.

From Maine and New Hampshire, comes some pyrites; but it is so contaminated with blende and galena, the zinc and lead of which, as already pointed out, lose in roasting almost none of their sulphur, but are converted from sulphides into sulphates, that its value for acid-making is seriously impaired.

The Davis mine, in Massachusetts, however, has, within the past half-year, been sending to the market a pyrites of remarkable excellence. The returns of the Merrimac Chemical Company, which has used 3000 tons since March, show that it has actually recovered as acid 47 per cent of sulphur. It is claimed to be absolutely free from arsenic; and zinc, lead, and other objectionable elements are in very small quantities; while it possesses copper in remunerative quantities. The company publishes as its average contents:

Sulphur	50·30	Silica	3·19
Iron	42·83	Zinc, lime, etc	0·61
Copper	3·07		
			100·00

It is granular in structure, and therefore in breaking makes a larger quantity of smalls than a more compact ore; but as a compensation for this disadvantage, it burns so freely and so perfectly that kilns of a given area will roast more of it per diem than of a more compact ore; and in a

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shallow layer, the disintegration within the kilns is not sufficient to impede the burning. As depth is attained in the mine, this single defect is rapidly disappearing. The objection to smalls is, however, less than it was. A good deal of ingenuity is expended in devising a mechanical furnace in which to burn granular pyrites and pyrites smalls; and with such results that it is not unlikely that ere long fines will be preferred to lumps, both on account of less cost of burning in mechanical furnaces and on account of more perfect elimination of the sulphur.

A still more granular ore is in the market from Virginia. The Virginia pyrites possesses the same valuable property which characterizes the Davis, complete freedom from arsenic, a property to which none of the European ores can lay claim; but it is barren of copper, and when copper is absent, the cost of preparing the iron for ore exceeds in most localities its value.

Alterations of Plant.—The only essential alteration in the existing plants erected for the burning of brimstone to fit them for roasting pyrites is in the kilns. Most brimstone plants, by reason of the paucity of heat in the gases, do not use the Glover tower, while no pyrites plant can well be without it, and therefore this economical adjunct to the kilns is virtually a necessity. Chambers of a given capacity for brimstone will yield only about two thirds as much acid when supplied by kilns, and consequently increased chamber-space is necessary in a pyrites plant. But the cost of the alterations is trifling compared with the advantages.

The construction of the kilns will be understood from the accompanying illustrations, Figures 1 to 12, copied from Lunge. The kilns are cased in iron plates, and the touching surface of the doors and openings planed. The uppermost door gives access to the space between the double roofs which serves as a dust-chamber and as a flue to lead off the gases from the kilns to the Glover tower. Below is the charging-door. The door next below should seldom be opened. It is intended to reach large scars and clinkers which may have been produced by excessive heat. The next, the long, narrow door, opens on the grate-bars, whose shape and arrangement and mode of working the illustration sufficiently explains. The last, the ash-pit door, is necessarily large. The dimensions of the kilns' superficial area vary much with the fancy of the builders, although 4 feet 6 inches by from 5 feet to 5 feet 8 inches of grate surface may be accepted as a standard size. The depth is determined by the character of the ore. Hard and infusible pyrites like the Norwegian may require a greater depth than a free-burning ore, from which a strong gas and good roasting may be obtained from a depth of from one foot to eighteen inches. This is the case in roasting the ore of the Davis mine. In any case, the large proportion of the sulphur should be burnt off and all vivid combustion occur on the surface between each charging; otherwise, a heat sufficient to produce sintering or even fusion would be engendered in the center of the mass. The usual practice in England is to charge the kilns once in twenty-four hours with from five cwts. to seven cwts. of ore, as already explained in the estimate of cost. All clinkers which reach the ash-pits are returned to the kilns and worked over as part of the regular charge; for not only do they occasion loss of sulphur, but the copper companies refuse to receive them.

In the contracts between the sulphur companies and the English manufacturers, it is stipulated that not more than 10 per cent of fines shall be delivered. In breaking the ore, even by hand, 10 per cent more is produced. In Great Britain, the smalls are consolidated by grinding them in a pug-mill with enough water to make a paste, and spreading this in a layer half an inch thick on the roofs of the kilns. Enough of the sulphuret of iron is thereby oxidized to bind the grains so firmly together that, on drying, the cake becomes as hard as lump ore, and burns even more freely. The cost of making these cakes in England is fifty cents per ton.

In France and Germany, shelf-burners are preferred to caking the ore as in England. One of the best is that proposed by Schaffner and illustrated, from Lunge—Figures 13 to 17—with such detail that minute description is needless. Seven shelves, on which doors open, stretch from side to side of the kilns, but, as shown in Fig. 16, leave alternately an open space between either front or back walls and their free edges. Ore is introduced through a hopper in charges of 250 pounds every four hours on to the upper shelf, after the lower shelves have been successively emptied. The capacity of such a burner is, therefore, over three quarters of a ton per day, or about thrice that of a kiln for lumps, which compensates for a greater cost of construction and greater expenditure of labor in working. The sulphur can be very thoroughly eliminated, but the gas is liable to be weaker than kiln-gas, due to the more frequent opening of the doors. This burner is the product of earlier inventions by McCulloch, Perret, and Olivier, who supported shelves in the upper part of the lump-kilns. Other classes of dust and smalls-burners have for their types the Gerstenhöfer, where the ore falls from the roof toward the floor, being arrested in its fall by tiers of fire-clay bars stretching from wall to wall; the Malétra furnaces, where the ore slides down automatically a series of inclined shelves supported in a tower attached to a lump-kiln; and the Spence furnace, where a rake is drawn mechanically from end to end of a long muffle, stirring the ore and discharging at each motion a given quantity. All these various forms of burners yield a roast so low in sulphur at a cost so reasonable per unit of sulphur burned as to make the objections to pyrites smalls less forcible than they used to be.

J. D., JR.

FREIGHT RATES TO THE BLACK HILLS.—At a meeting of the railroads and stage lines, the following rates to the Black Hills points were decided upon for freight from Chicago and Milwaukee or adjacent points: To Rapid City, $3.25 per 100 pounds; to Fort Meade, $3.35; to Deadwood, $3.50; to Crook City, $3.40; to Sturgis City, $3.35; to Central City, $3.60; to Spearfish, $3.50; to Lead City, $3.65.

THE NEW YORK IRON AND METAL EXCHANGE.—At a meeting of the New York Iron and Metal Exchange, the treasurer submitted a statement. The expenditures were $819.85 property account; $4720.84 for miscellaneous expenditures, including printing of market reports, telegraph service, etc.; $2387.90 for salaries; $2838.87 for rent; and $14,529.95 balance on hand. For the purpose of keeping up the organization until the new organization has been effected, the officers of the company were re-elected. President Edward P. White delivered an address to the members in which he summarized the work done by the Exchange during the past year.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

TOWN-SITE VERSUS MINERAL CLAIMANTS.

The following two decisions affect the vexed question of town-site *versus* mineral claimants:

The United States Supreme Court in a case before it settled the following points: That land embraced in a town-site on the public domain, when unoccupied, is not exempt from location and sale for mining purposes, even after the establishment of a regular municipal government, but only from settlement and sale under the pre-emption laws; the act of issuing a patent by the General Land-Office, in cases within its jurisdiction, is conclusive of the legal title and of all the facts on which it has to pass before the issuing of patent, and can not be attacked collaterally; hence in an action of ejectment brought by a patentee, it can not be set up as a defense that the land was not of a character required for the issue of such a patent, or that the patentee was not a citizen, or that he had used fraud and perjury in obtaining the patent, such being matters which the commission had to act upon, or which only could be raised by direct proceeding attacking the patent. The issue of a patent is conclusive proof that the requisite notices were given; the point that an owner is estopped from claiming land when he has lain by and seen another make improvements on it can be raised only by one who is ignorant of his defective title.

Secretary Teller has rendered the following decision:

SIR: I have considered the case of Batista Papina *vs.* Thomas Alderson, Stephen Cocking, and Charles Weiner, applicants for patent to the Enterprise mining claim, situated in Sec. 7, 10 N., 11 E., Sacramento District, California, within the limits of the Placerville town-site, entered July, 1871, patented September 10th, 1872.

The patent to the city authorities contained this reservation: "No title shall be hereby acquired to any mine of gold, silver, cinnabar, or copper, or to any valid mining claim or possession held under existing laws of Congress;" following the language of the act of March 2d, 1867 (14 Stat., 541), and the cumulative provision of the amendatory act of June 8th, 1868 (15 Stat., 57).

The lands embraced in said town-site had been declared non-mineral, after regular hearing, by the decision of your office rendered November 17th, 1871, from which no appeal had been taken; but after said decision, mineral affidavits were received, resulting in delay in issuing the patent, and in the filing of certain communications on behalf of the mayor and corporate authorities, conceding the fact of the existence of several known mines and claims, and consenting to the insertion of the reservation in the patent, as defined by law. Since that date, several of these old claims have been applied for and patented, with regularly defined surface ground, shown by accompanying evidence to have been necessary to the use and actually used for the working and operating of the mines. In all the cases examined by me, I find that the continuity of the claims, as respects possession and transfer, has been shown from a period anterior to the town-site entry, and in two or three instances surface ground has been applied for, and its use proved, 250 feet in width on each side of the vein, which was the limit allowed by the rules of the mining district. The present application was filed October 7th, 1878, and publication was made October 17th following. It calls for "1500 linear feet of the Enterprise or Pacific lode, . . . together with surface ground as herein applied for," referring to the accompanying plat and field-notes (Sur. No. 56, executed in August, 1878) for particular description, and setting up an alleged location of the claim on the 19th of March, 1878. The survey shows the vein and surface ground about 1409 feet in length, and 200 feet in width at one end, diminishing, after running a few chains, by offsets exhibiting other claims on either side so as to extend but about 150 feet in width at the other end; the whole embracing 4·33 acres.

The record of location describes the same as "the second northerly extension of the Pacific lode or ledge, . . . commencing at a stake and pile of stones standing 600 feet north of Spring street on line of Pacific lode, running thence north 1500 feet on line of said lode or ledge to a stake and pile of stones standing on Quartz Hill, together with 300 feet on each side of the center of said lode or ledge." No out-boundaries are alleged to have been staked or marked by which to trace the lines of the claim. On the plat of survey filed for patent, no lines are placed showing the crossing of municipal lots, blocks, or streets, nor are any buildings or other objects, except tunnels, shafts, ditches, and two or three fences, noted.

On the 14th of December, 1878, within the period of publication, Batista Papina filed notice of conflict of surface ground to the extent of 1·82 acres, with his improvements, situated on Lot No. 19, Block No. 37, city of Placerville, held by deed from the proper authorities under the town-site patent, and denied the right of Alderson *et al.* to obtain patent to such surface ground or to any claim for mines therein; accompanying his notice with a plat exhibiting the alleged conflict, and copies of his deed dated April 11th, 1874, and of the record of said patent. He further alleged residence and improvement upon the land for upward of nine years, and that, prior to the location in 1878, no mining had within that time been done thereon. The register did not stay the proceedings and refer him to the courts, but seems to have treated the notice as a protest, and on the 30th of December, 1878, forwarded the application for entry to your office without any opinion or recommendation. April 26th, 1880, your office decided that Papina had no standing as an adverse claimant, because the land was subject to no claim, except a mineral claim if in fact mineral, and to entitle him to such recognition he must be actually claiming a vein, lode, or mining claim in opposition to another. You further held that "the town patent conveyed title only to such land as is non-mineral, and an express exception is made of mineral claims. Hence the proper proceeding for Mr. Papina would be to show, if possible, that the land in question is not valuable for minerals." You thereupon dismissed his protest, at the same time offering to permit him to file allegations of the distinctively agricultural character of the land, and to have a hearing upon that point. From this decision he appeals, and the record is now before me. In the mean time, however, it appears that a paper described "as containing evidence in behalf of the mineral applicants," transmitted by the register January 25th, 1879, has been mislaid, and there is no record of what it may have purported to show, upon which to base a judgment, and after being called upon to supply it, the applicants

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have failed to do so, sending up merely argumentative statements in its stead.

There is also a material discrepancy in the *locus* of the ground as exhibited by the plat filed by the applicants and that filed by Papina to illustrate the conflict alleged, although the latter was made by the same deputy, one J. M. Anderson, who surveyed the claim, and is certified by him as correctly showing the true relative position of the claim with respect to the town lot and adjoining claims. The only questions sharply defined are: 1st. Had the owner of the town lot a right under the law to demand a stay for the purpose of a judicial determination of the right of possession? 2d. To what extent within a patented town-site a lode claimant may be permitted by this department to take surface ground; it being conceded as established by the decisions of this department and of the courts that town-sites may exist upon and embrace mineral lands, subject only to the particular exceptions of law and to vested prior rights. (Rico Case, July 6th, 1882, 9 Copp, 90; Vizina Case, July 11th, 1882, ibid. 92; Mining Company *vs.* Consolidated Mining Company, 102 U. S., 168; Steel *et al. vs.* Smelting Company, October term, 1882.) These questions may be considered together. The deed of Papina from the city contained in the same words as the town-site patent the reservation of mines and valid mining claims. He took, therefore, with express notice of the particular things carved out of the patent in the exact language of the law. This reservation, like the patent itself, had necessary relation to the inception of acquisition of title by the town-site, and its extent must be measured as of that date. All passed to him by his deed not expressly excepted. For Congress, in enlarging the methods of acquisition of title to public lands, provided for towns on the public domain prior to the acquisition of mineral rights. See Stat. of July 1st, 1864 (13 Stat. 343), and March 3d, 1865 (ibid. 529), authorizing the platting of such towns either by "parties" or the Secretary of the Interior, and sale of the lots under certain provisions. The former of these acts made no exception of "mines" or "mining claims;" but the act of 1865, while not excepting "mines," as such, did provide "that where mineral veins are possessed, which possession is recognized by local authority, and to the extent so possessed and recognized, the title to town lots to be acquired shall be subject to such recognized possession and the necessary use thereof." Here was no withholding of title, but only a subjection of the same to a recognized possession and use; and there can be no question that a town lot so conveyed would have passed in fee, with absolute ownership of the vein, upon the cessation or abandonment of the miner's recognized possession. There is nothing incompatible with the grant of the fee, burdened only by the use of an actual occupant by prior possession. And the statute was especially guarded against the idea of any thing beyond a possession and necessary use, by further providing "that nothing contained herein shall be so construed as to recognize any color of title in possessors for mining purposes as against the government of the United States."

The great change which introduced an entirely new system of mining law, differing from that of any existing government, had not then been adopted by Congress. But in the following year, the act of July 26th, 1866 (14 Stat. 251), gave, with certain restrictions, legislative sanction to the laws and customs of "local authority" affecting possessory rights, and the added privilege of acquiring title to the mine itself, under the authority and forms of law. This change gave such rights, even against the government, as required some modification of the town-site provisions, and resulted in the enactments of 1867 and 1868, previously cited, with the express reservations against the acquisition of mines or valid mining claims. And it is to be observed that the exception of such claims by the act of June 8th, 1868, was made with direct reference to towns whose inhabitants, having acquired rights under the act of 1865, should elect to proceed under the act of 1867 instead; although it also enlarged the general exception already expressed in the amended act as to all titles acquired under the town-site entry and patent. But it still left individual lot-owners free to proceed and take title to their own lots, burdened only by the use and possession described in the act of 1865. And it may be further remarked, that the Revised Statutes now contain these several provisions, together with the subsequent amendments of the mining laws. Having now found the order of the law which has first granted the town right, and afterward abridged it only in so far as to admit the new relations presented by the enactment of the mining statutes, the reason of the whole seems to result in this: That, by the acquisition of title to a town-site, no right remains to proceed for patent for mining ground under the reservations of the law, except, 1st. For the mines, with only such incidents of surface ground and the like as are actually necessary to the use and operating of the same; and 2d, For such mine and possessory rights, including surface ground not in excess of that recognized by law at the date of location, as were required by the applicant or his grantors, privies in interest, before the legal inception of the patented town right. But, as with the grant of mines the power to dig them is impliedly given (Shep. Touchet, 89) so by the reservation of mines the power necessary to their enjoyment must be also reserved. And this reservation to and by the government must come under the mining laws to citizens of the United States authorized to explore and possess them, and acquire the government title thereto (Maxwell on Interpretation, 319). If, then, an applicant, as in this case, seeks to acquire patent for a mine (lode or vein) within a patented town-site, based upon a location subsequent to such patent, he must be required to show affirmatively the existence of such mine and its true location, and prove his possessory right and value of work performed, as in other applications. He will not, however, be permitted to proceed as for a claim with surface ground limited only by the usual statutory restrictions as to width along the vein, but will only be allowed to claim the necessary surface ground for the convenient working of his mine; in no case in excess of the legal width at date of the town-site appropriation. His plat must distinctly show the ground so claimed with relation to all other claims, and the occupation and improvement of others, whether municipal or otherwise, and proof of such necessary possession and use must be furnished sufficient to make a clear *prima-facie* showing of his right (Steele *vs.* Smelting Company, *supra*). If such showing be made, he may proceed to publication, and, if no adverse claim is filed, may obtain his patent, containing the usual town-site reservations, for the protection of any interests previously acquired. Should a lot-owner elect to come forward denying the applicant's right to the possession, while it may not yet be incumbent upon him to do so in order to preserve his own previously acquired rights of priority under his patent, I see no objection to permitting him to set up his own title and allegations of possession as an adverse claim, and have a stay of proceedings for the statutory period, to enable him to go into court for the settlement of the matter before the issuing of the mining patent. This is a question of the right of possession which may properly, in harmony with my decision in the Rico case, determine all the issues involved, and if the town-lot owner sees fit to assume the burden of suit, he should have that right. The applicant can not complain. He is only placed upon the same footing with other applicants on the public lands, and it may result that the finding of the court will conclude the matter in favor of the town-site title, in which case the confusion resulting from a wrongful issue of patent will be prevented. That town-site occupants may be adverse claimants within the meaning of the mining statute was decided by this department upon reasons stated in the case of Becker *vs.* Citizens of Central City, August 7th, 1871. Should the mining claimant, in addition to the mine, claim surface ground, based upon possession and location prior to entry of the town-site, he must show affirmatively the facts relating to such location and possession, and his own priority with the possessory title, and upon such showing he may proceed. His plat must show, as in the preceding case, every thing necessary to exhibit the true character and location of all improvements, and he must be restricted to the limit as to width established by the local laws at date of town-site entry. The application of Alderson *et al.* for the Enterprise mine being notoriously lacking in the preliminary requirements, must be dismissed, without prejudice to his right to proceed *de novo* on compliance with these conditions, and your decision dismissing the protest of Papina is accordingly reversed.

THE SIEMENS DIRECT PROCESS.

Mr. James Davis, manager of the New Steel-Works, London, has communicated the following particulars of the working in the Siemens direct rotatory furnace of the separated magnetic iron-sand from Moisic, Canada, that was sent to these works to be experimented upon, to ascertain the best mixture and most suitable temperature for working this material in the rotator. After various trial charges, it was found that a charge of 25 cwt. of magnetic iron-sand, mixed with 6 cwt. of coal or charcoal, gave the best results. The average time required in the rotator was 3 hours 45 minutes, and the yield of solid metallic balls was 15 cwt. 3 qrs. The reduction of the magnetic iron to the metallic state took place very easily; in fact, he reports that it is the best material for working in the rotator that he has seen so far. One of the balls made with coal was roughly hammered out into a billet, which on analysis gave:

Metallic iron	96·950	Sulphur	0·030
Slag and silicon	3·040	Manganese	Trace.
Carbonaceous matter	0·170		
Phosphorus	0·002		100·19

One of the billets made from a charge reduced with charcoal was afterward reheated and simply rolled into a finished bar without piling and reheating (as is usually done), and gave an analysis as follows:

Metallic iron	95·77	Manganese	Trace.
Slag	3·91	Carbon	0·11
Sulphur	0·02		
Phosphorus	0·02		99·83

The tensile strain of this bar was 21·5 tons per square inch, with 23 per cent elongation. Most of the balls made were taken straight from the rotator, and used in the Siemens furnace for the production of mild steel; they were found to be very suitable for this purpose, and gave excellent results. There would be no difficulty in getting six charges, or about five tons per day of balls out of such a rotator when working with this magnetic iron-sand, which would be a weekly make of at least 30 tons per rotator. Working the rotator in pairs, the wages would come to about 5s. per ton on the rough balls. The fuel required for the Siemens gas-producer to heat the rotator is as nearly as possible one ton per ton of balls produced. Generally speaking, the magnetic iron-sand appears to me peculiarly well adapted for the production directly of a very fine quality of steel or iron in the Siemens rotatory furnace, and if it can be cheaply obtained, should yield a very handsome profit in working.

UNDERGROUND ELECTRIC WIRES.—At the meeting of representatives of telegraph and electrical companies to consider the subject of underground electrical communication, it was resolved to appoint a general committee to take charge of and push the matter. This committee has organized by the election of J. P. Davis, Chairman; R. W. Blackwell, Treasurer; and W. C. Behrens, Secretary. A committee consisting of Mr. Davis, Col. R. R. Hazard, and F. H. May was appointed to nominate permanent sub-committees on electrical and mechanical devices, law and franchises, and business organization.

THE EDISON LIGHTS IN EUROPE.—According to a report read at a meeting of the stockholders of the Edison Electric Light Company of Europe, Limited, there are in France 32 plants of the company with 2680 lights; in Italy, 11 plants with 5777 lights; in Germany, 28 plants with 3667 lights; in Holland, 4 plants with 1648 lights; in Austria, 7 plants with 1724 lights; in Russia, 14 plants with 2772 lights; and in Belgium, 12 plants, with 1268 lights. A subordinate company has been formed in Germany, and the interests of the Edison and Siemens lights have been consolidated under the name of the Edison Electric Light Company of Germany. The capital of the company is 5,000,000 marks. The capital of the General European Company is $2,000,000. The subordinate company recently formed in Italy has a capital of 3,000,000 francs. It was stated that an Edison factory, similar to those in this country, had been established in Italy, for manufacturing dynamo lamps, underground conductors, meters, and other apparatus for use by the European Company, exclusive of Germany, where the Siemens and Edison companies manufacture apparatus under separate licenses. A company has just been formed to introduce central station lighting in Paris on a large scale, and a central station similar to the one in Pearl street will be built. A central station is also starting in Milan, Italy, where La Scala Opera-House is lighted by Edison lamps.

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THE SILVER KING MINE.*

By Prof. William P. Blake.

(*Continued from page* 239.)

Geology.—The geological structure of the Pinal region is somewhat complex, but is very interesting. The whole country appears to have been covered, in comparatively recent geological time, with volcanic rocks, partly in a sedimentary form, as volcanic sandstones and conglomerates, and partly and lastly, in a molten or lava-form. Considerable areas of these rocks have been swept away by denudation and erosion, leaving the older and foundation rocks exposed to view, particularly in the valleys and cañons, while remnants of the lava-flow cap the summits and in places remain as flat-topped mountains; as, for example, the mountain known as Tordilla, at Pinal, back of the mill.

The Pinal range, above the Silver King mine, is formed chiefly of Paleozoic strata, with heavy beds of quartzite at the base, overlain by massive limestones dipping eastwardly. These strata show along the Stoneman Grade as it ascends the mountain, and can be seen in greater thickness, probably not less than 3000 feet, by ascending Queen Creek farther to the southwest. Several miles farther southwest, toward the Gila, the same series of limestones crops out in mountain masses, pitching at a higher angle eastward, and in some of the upper beds spirifers have been found, which I refer to the Coal Measure series of the Carboniferous formation. In some places, there is a large development of a coarse conglomerate of a red color.

Above the limestones at the King Mountain, as I denominate the highest summit above the mine, the volcanic outflows which form the capping consist largely of pitchstone porphyry carrying obsidian, geodes of quartz crystals, masses of chalcedony and of semi-opal.

Below the limestone and quartzite series, gneissic and hornblendic grained mica slate formation. This formation is very ancient, and is lithologically and to all appearance the equivalent of the Taconic slates of Berkshire, Massachusetts, and the Vermont extensions. It is extensively developed in Arizona, and being one of the primal series of formations and fundamental bed-rocks of the territory, in and upon which such a variety of later formations are grouped, it deserves the distinguishing name of Arizonian slate, which I shall apply to it. It is extensively exposed to view along the sides of the Queen Creek Valley, west of the town of Pinal, where it may be seen in a highly contorted, twisted condition, traversed by innumerable veins of white quartz, also contorted, and often doubled back and forth upon themselves. This slate extends to the southwest, flanking the granitic masses of the Pinal range, and is there much traversed and broken up by granitic intrusions. This rock finally disappears, westward, under the post-tertiary formations of the Gila plains.

The sequence of the formations thus briefly noticed is shown on the appended sketch-section representing the summit of King Peak westward to the Gila plain. The central portion of the Arizonian slate is concealed from view by the horizontal sediments of Tordilla Mountain, opposite Pinal, but it crops out along the valley below it. About seven miles below Pinal, the slate is penetrated by granitic intrusions, and is gradually replaced by granite.

The lower portion of Tordilla Mountain is formed of regular layers of compact white sandstone. It is suitable for building-stone, and is quarried for that purpose. The same formation is developed along the Gila, but is there, in some places, tilted up at considerable angles.

The Vein Formation.—The observer, standing upon the highest point of the Silver King location, the initial point of the mine and of Pioneer District, looks below to the westward into the large open pit or excavation, the result of the first working of the mine from the surface downward. This pit measures, approximately, 115 feet long by 92 feet wide

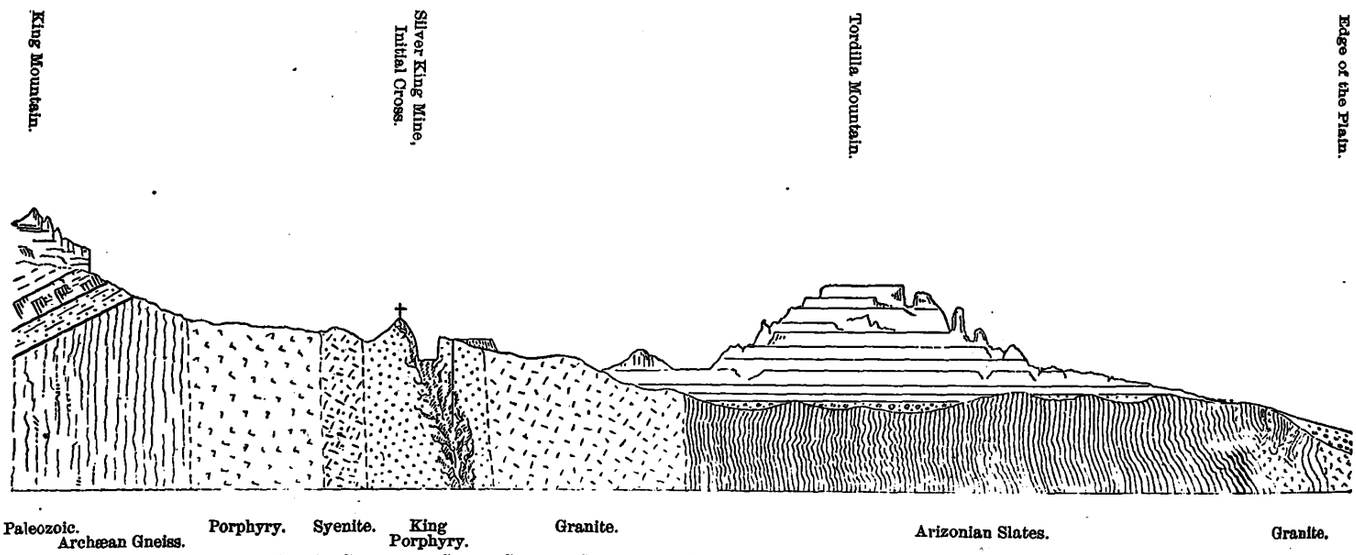


FIG. 1.—GEOLOGICAL SKETCH-SECTION, SILVER KING PEAK TO THE PLAIN, OVER THE SILVER KING MINE.

rocks of the Archæan age crop out and appear to be the foundation rocks on which the sediments rest unconformably. Still lower down the slope, the rocks become syenitic, and are then replaced by a distinctly-formed feldspar porphyry, with small white feldspar crystals, and an abundance of iron pyrites finely disseminated. The formation appears to have the position of a dike, cutting the other rocks, but it is extensive, and continues to and beyond the Silver King mine. It may be regarded as the inclosing rock of the Silver King, although in one place, some 200 feet above the mine, there is a strongly-defined outcrop of a dense, hard porphyry with hornblende crystals and brilliant glassy feldspar forming a syenitic porphyry.

At the mine, and in it, the porphyritic structure generally becomes obliterated and the rock has more the appearance of a granular quartzite with a large amount of earthy admixture, and obscure fragmentary crystals of silvery mica. Examined alone, it would pass as a quartzite containing much clay and iron protoxide. In some places, it is almost colorless, white and earthy, soft, easily cut or crushed, but shows distinct grains of quartz as large as peas. The larger portion of the rock below the open cut has a dark, greenish color, and is known by the miners as "dark porphyry." In some places, it appears to be chloritic. This, with the light porphyry, is the ore-bearing rock of the mine. It is penetrated, as will be shown in detail in the following pages, by veinlets of quartz and by ore.

After carefully studying the rock in place and its environment by the unaltered crystalline porphyry, I am led to the conclusion that the rock of the mine is an altered porphyry, changed in its place contiguous to the solfataric outflow, the principal portion of the silica of the feldspar having been removed, going, perhaps, to form the veinstone of the ore. If, as seems probable, the rocks originally were charged with disseminated pyrites, as seen at some distance from the mine, it is now largely removed, and the pyrites may have exerted an important function in the precipitation of the ore as we now find it concentrated in veinlets and bunches. The altered porphyry appears to contain more iron protoxide than the unchanged rock. The feldspar porphyry below the mine is succeeded by a fine-grained gray granite, in places syenitic, and this again lower down the slope, toward the plain, by an extensively developed fine-

and 120 feet in depth. It marks very nearly the limits of the ore-bearing ground, so far as it is yet known or developed at the surface and near it. The portions removed consisted largely of rock, the porphyry, so-called, penetrated and seamed with interlacing veinlets of quartz, reticulating and crossing in every direction. These veinlets varied from the thickness of a sheet of paper to one quarter of an inch or an inch in thickness, and were generally accompanied with ore in a medial position, having quartz on each side of it next to the rock. The same conditions may be seen in the lower levels at the present time. In addition to these veinlets, there are masses and bunches of ore, and apparently (at least in the upper levels) a central mass of quartz, a large and compact body, toward which the system of veinlets converged, or from which they may be said to radiate. This mass of quartz, of irregular dimensions, still exists in the region opened by the lowest levels of the mine, but it has not yet been thoroughly explored. This quartz appears to hold some direct relation to the deposition of the ore; the heavier bodies of ore, so far, having been cut below, or on the foot-wall side of the quartz body. It may be regarded as holding the relation of the chief veinstone to the ore, and as presenting within itself, and together with the branching veinlets, the characters of a true fissure-filling, although it has not the usual sheet-like or tabular form. It is, instead, a columnar or chimney-like mass, some eighty feet in diameter in places, but irregular and without longitudinal extension. In other words, this quartz-vein, instead of forming a sheet-like mass or filling between parallel walls, with a length much greater than its breadth, is approximately *cylindrical* or columnar in its form, filling a nearly vertical, spirally-formed cavity, as if it had risen as smoke rises in a chimney, but circling about through the riven rocks until it reached the surface by many outlets.

Without here discussing the various theories which might be advanced to account for this peculiar impregnation of the rocks with rich ores of silver; whether the flow was from above downward, or the reverse, whether the quartz with the associated metals was extruded from the surrounding rock and found lodgment by replacement, or whether it was diffused by the penetration of fissures by solutions or gases, I prefer to adopt the explanation that there was an upward flow of heated water and steam which carried the metals into the fissures and left them there. The conditions as we find them are most clearly explained upon this hypothesis, and I believe are most vividly and truthfully repre-

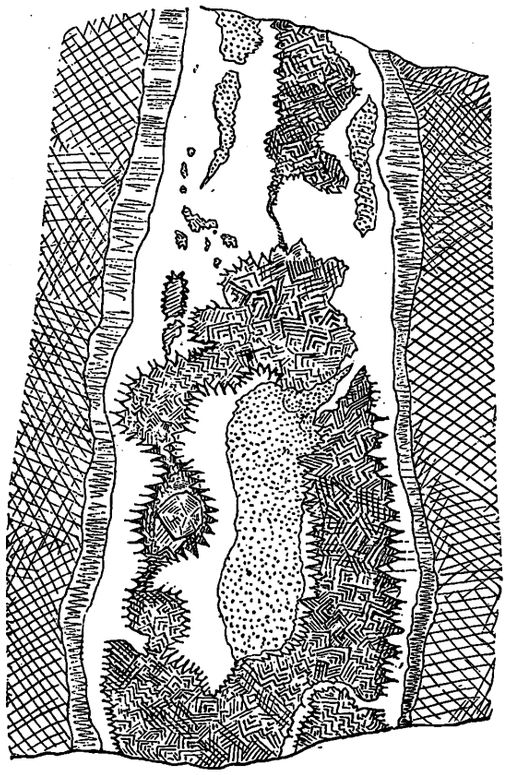
* Abstracts from a work entitled *Description of the Silver King Mine of Arizona.* New Haven, March, 1883. 48 pages.

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sented to the mind by this conception, of an upward flow of thermal water along a main central channel, like that of a deep-seated spring or geyser, now an extinct argentiferous solfatara.

If we examine the structure of the veinlets in detail, we find them presenting the characteristics of fissure-veins. They extend for long distances through the rocks and with parallel walls. They have regular veinstone and vein structure. The quartz forms on the opposite walls of the fissures in regular sheets, with "combs" or quartz crystals pointing inward and holding the ore in bunches and sheets. Such inclusions of ore are still to be seen in the small veins at the summit of the croppings and in the levels below.

Some of the various forms under which the ores present themselves in the mine, and the sequence or order of deposition of the minerals, may be shown to best advantage by a few illustrative sketches and sections of the veins.



1 2 3 4 3a 2a 1a

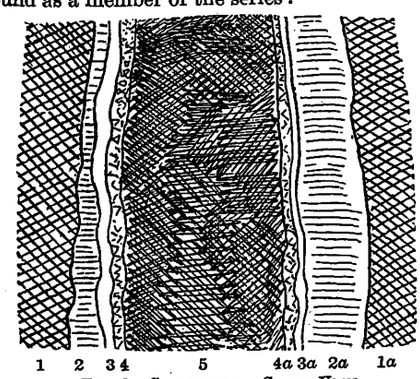
FIG. 2.—SECTION OF A VEIN, SHOWING THE STRUCTURE.

1. Porphyry.
2. Compact quartz.
3. White crystalline quartz.
4. Ore filling, consisting of sphalerite, galenite, and native silver, with some vuggs or cavities containing crystals of light-colored blende. Some irregular fragments of altered porphyry are inclosed in the midst of the vein.

3a. White crystalline quartz.
2a. Compact quartz.
1a. Porphyry.

Figure 2, of one half the natural size of the specimen, shows a veinlet about four inches wide in the light-colored porphyry. We find first, next to the rock, a lining on each side of compact quartz, succeeded by white crystalline quartz and the ore, in the succession indicated.

Fig. 3. Section of a veinlet in dark porphyry carrying about two inches of dark-colored sphalerite (blende), confusedly crystallized. The paragenesis is as follows, and is chiefly remarkable for the brown-spar, which is not often found as a member of the series:



1 2 3 4 5 4a 3a 2a 1a

FIG. 3.—SECTION OF A SMALL VEIN.

1. Porphyry.
2. Compact quartz.
3. White quartz.
4. Brown-spar or iron-spar with disseminated pyrites.
5. Central filling of compact ore. Blende chiefly.

4a. Brown-spar and pyrites.
3a. White quartz.
2a. Compact quartz.
1a. Porphyry.

Another fragment of a veinlet shows quartz more distinctly crystalline, with some copper pyrites between it and the porphyry, and a central ore-filling of massive blende and galena mingled together.

The ore occurs also in bunches in the rock with but little veinstone. A tendency to triangular forms is observable, and in several places I have noted veins joining together nearly at right angles, somewhat as shown by the figure annexed.

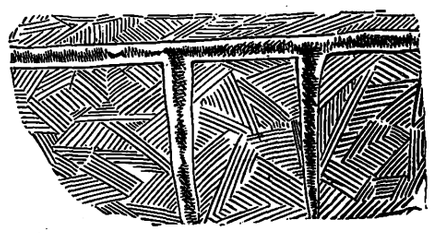


FIG. 4.—EXAMPLE OF RETICULATION OF SMALL VEINS, BRANCHING FROM ONE SIDE IN THE GREEN "PORPHYRY."

This is an example of reticulation but not of crossing. The latter form is, however, common, and may frequently be found in the masses of ore as sent out from the stopes, or better in the freshly broken faces of the stopes. But irregularity of branching is the rule rather than any geometrical or symmetrical arrangement. The various appearances presented justify liberal illustrations, and I would be glad to add a few photographs of some blocks of the ore-bearing porphyry as taken from the dump.

The reticulation of the veins is seen to the best advantage at the surface, and particularly at the summit. There is at that point a very interesting example within the space of a few square feet, showing apparently two systems of veins of different ages, one system with a true north and south strike, and the other system having an east and west strike. They intersect at right angles, as shown on the appended sketch, from a drawing made upon the spot, and curiously at this initial point they form a true

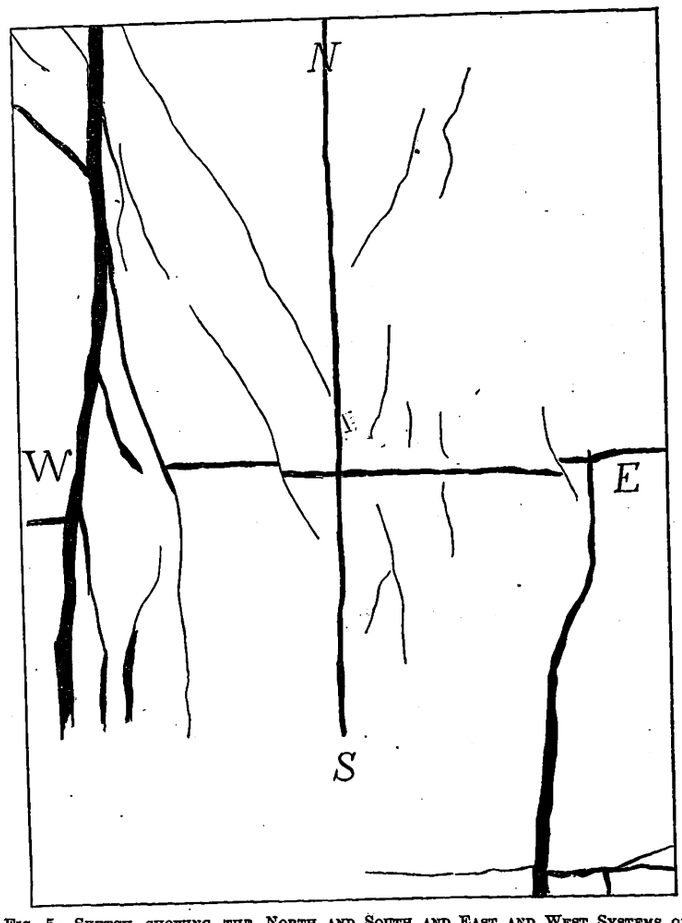


FIG. 5.—SKETCH SHOWING THE NORTH AND SOUTH AND EAST AND WEST SYSTEMS OF VEINLETS, FORMING A CROSS AT THE SUMMIT OF SILVER KING MINE.

right-angled *cross*, the arms of which point north and south, east and west, marking in a very appropriate manner the center of the district. I have deemed it worthy of a diagram or plat, illustrating, as it does, the reticulation of the veins and the complete mineralization of the mass of the rock. The east and west fissuring appears to be the older of the two, for the veinlets of that direction are cut through and are faulted for a short distance by the north and south veinlets.

It will be inferred from the preceding descriptions that the richest and most important accumulations of ore are not found in the main body of the quartz veinstone. Although the massive quartz does hold bunches of rich ore, it is not, as a rule, so rich and profitable to work as the rock adjoining it. The ore is more abundant in connection with the small branching veins in the outside rock than in the mass of the quartz itself. It must, however, be stated that the quartz body has not yet been fully explored, being merely cross-cut in the upper levels. It is my opinion, however, based upon what has already been shown, that, contrary to the usual conditions in mines, the chief body of quartz veinstone does not carry the best part of the ore. It appears rather to have been the main channel of the mineralization; the main artery or feeder to the thousands of veinlets branching from it into the wall-rock, following the clefts and

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penetrating the substance of the rock, depositing and diffusing native silver and the sulphides throughout the whole mass of rock for an indeterminate distance on each side.

So far as explorations have extended, no distinct boundary line or wall to the ore has been found. The silver solutions appear to have found a congenial resting-place in the midst of the rock. We have, as the result, a form of mineral impregnation which may be classed as "*stockwork*," this name having been given to masses of rock so mineralized by small veins ramifying through them that they require to be mined *en masse*, and give broad excavations known as "*floors*." These are precisely the conditions found in the Silver King. The whole of the impregnated rock is blasted out and sent to the surface with but little selection or sorting. The "porphyry" and the veinlets go together and are crushed together, it being impossible to separate all the ore from the rock by sorting.

This extensive and varied mineralization, connected, as it appears to be, with a central solfataric mass of quartz, gives good evidence of being deep-seated. It is evidently not superficial, but has the appearance of a lasting ore-channel of great depth. There is no evidence of any weakening of the mineralization at the lowest level reached; on the contrary, the lowest level is the largest yet opened except the Open Pit at the surface. The veinlets can not be traced far on the surface, and it is difficult to show that they extend more in one direction than another. The formation seems to have a general dip to the westward, and this is the direction of the underlie of the ore-ground, as is shown in the chapter upon development.

The solid white quartz of the upper levels has not yet been fully explored. It contains rich bunches of gray copper ore, generally in a very friable condition, almost in black powder, but rich in silver.

(TO BE CONTINUED.)

THE ESTIMATION OF ARSENIC.

Written for the Engineering and Mining Journal by O. J. Frost, Argo, Colo.

Mr. Richard Pearce, of the Boston & Colorado Smelting Company, Argo, Colo., has long felt the need of a rapid and reliable method for the estimation of arsenic in ores and metallurgical products, and more particularly in copper ores and copper smelting products. After a great many experiments in different directions, the following scheme, depending on the insolubility, under certain conditions, of silver arseniate in neutral solutions, has been found to work well. It was described by him in a paper read before the Colorado Scientific Society.

The finely-powdered substance for analysis is mixed in a large porcelain crucible with from six to ten times its weight of a mixture of equal parts of carbonate of sodium and nitrate of potassium. The mass is then heated with a gradually increasing temperature to fusion, and kept for a few minutes in that state. It is then allowed to cool, and the soluble portion is extracted by warming with water in the crucible, and filtering from the insoluble residue when disintegration is complete. The arsenic is in the filtrate as alkaline arseniate. The solution is acidified with nitric acid and boiled to expel carbonic acid and nitrous fumes. It is then cooled to the ordinary temperature, and almost exactly neutralized as follows: Place a small piece of litmus paper in the liquid: it should show an acid reaction. Now gradually add strong ammonia till the litmus turns blue, avoiding a great excess. Again make slightly acid with a drop or two of strong nitric acid; and then, by means of very dilute ammonia and nitric acid, added drop by drop, bring the solution to such a condition that the litmus paper, after having previously been reddened, will, in the course of half a minute, begin to show signs of alkalinity. The litmus paper may now be removed and washed, and the solution, if tolerably clear, is ready for the addition of nitrate of silver. If the neutralization has caused much of a precipitate (alumina, etc.), it is best to filter it off at once, to render the subsequent filtration and washing of the arseniate of silver easier.

A solution of nitrate of silver (of neutral reaction) is now added in slight excess; and after stirring a moment, to partially coagulate the precipitated arseniate, which is of a brick-red color, the liquid is filtered, and the precipitate is washed with cold water. The filtrate is then tested with nitrate of silver and dilute nitric acid and ammonia, to see that the precipitation is complete.

The object is now to determine the amount of silver in the precipitated arseniate of silver, and from this to calculate the arsenic. Two methods may be employed, the conveniences of a laboratory determining which is preferable: (1) The arseniate of silver may be subjected to scorification (or fusion) and subsequent cupellation. This necessitates the removal, earlier in the process, of any soluble chloride present. (2) The arseniate of silver may be dissolved on the filter with dilute nitric acid (which leaves undissolved any chloride of silver) and the filtrate titrated, after the addition of ferric nitrate or sulphate, with sulphocyanate of ammonium. About five cubic centimeters of a saturated solution of ferric-ammonio-sulphate are added, and the standardized sulphocyanate solution (about five grams to the liter) run in until a faint red tinge is obtained, which remains after considerable shaking. The shaking breaks up the clots of sulphocyanate of silver and frees any solution held mechanically.

From the formula $3Ag_2O.As_2O_5$, we deduce 648 parts Ag = 150 parts As, or Ag : As = 108 : 25:

	As. Per cent.
1-10 of a gram of a sample enargite tested by this method gave	19·036
A second trial showed	19·090
To try the effect of antimony, 1-10 of a gram of the enargite was mixed with an equal weight of stibnite and tested; the result was	19·130
The arsenic in the enargite determined by the arseniate of magnesia and ammonia method showed	19·440
A sample of copper glance was tested, and found free from arsenic. This was then added in sufficient quantity to the enargite to produce a mixture calculated to contain	0·370
0·55 gram was taken for analysis and showed	0·380
A test on 1-20 of a gram of pure proustite gave	15·080
Theoretical	15·150
A sample of copper matte gave first trial	0·470
Second trial	0·460
Another sample of copper matte gave, on first trial	0·280
Second trial	0·284
A sample "pimple" metal gave	0.458
Repeated	0.459

Additional experiments have been equally satisfactory.

This method for the estimation of arsenic is not only accurate, it is short also. By process (2) an estimation can easily be made in half an hour; and an estimation has been made by Mr. A. H. Low in the laboratory of the Boston & Colorado Smelting Company at Argo, where the details of the process were worked out in twenty-two minutes.

Owing to the large amount of arseniate of silver formed from a small quantity of arsenic (nearly six times by weight), it is not at all necessary or even desirable to work with large amounts of substance. Half a gram is usually sufficient for the determination of the smallest quantity of arsenic; and where the percentage is high, as little as one tenth or one twentieth of a gram may be taken with advantage. The method has been used with very satisfactory results on the sulphide of arsenic obtained in the ordinary course of analysis.

Substances such as molybdic and phosphoric acids, which may behave similarly to arsenic under this treatment, interfere, of course, with the method. Antimony, by forming antimoniate of sodium, remains practically insoluble and without effect.

It is quite probable that the method could be adapted for the rapid estimation of phosphorus in commercial products and in iron and steel; but beyond a few preliminary experiments, nothing has been attempted in this direction.

THE POWER OF EXPLOSIVES.

The dynamite scare in England has led to the publication in the English journals of a number of letters on the power of explosives, from which we choose the following written by Mr. George M. Roberts, the technical manager of Nobel's Explosive Company, Limited, who writes:

Nitro-glycerine and dynamite do not, when exploded, exert such a force as is popularly believed. To speak precisely, the power developed by the explosion of a ton of dynamite is equal to 45,675 tons raised 1 foot, or 45,675 foot-tons. One ton of nitro-glycerine similarly exploded will exert a power of 64,452 foot-tons, and 1 ton of blasting gelatine similarly exploded, 71,050 foot-tons. These figures, although large, are not enormous, and need not excite terror. Seventy-one thousand tons of ordinary building-stone, if arranged in the form of a cube, would measure only 96 feet on the side, and if it were possible to concentrate the whole force of a ton of blasting gelatine at the moment of explosion on such a mass, the only effect would be to lift it to the hight of a foot. The foregoing figures are derived from experiments made at Ardeer with an instrument which gives accurate results in measuring the force of explosives. The power exerted by an explosion on surrounding objects is in the inverse ratio of the cube of the distance from the point of explosion. Thus, at 100 feet from the exact point of an explosion, the power is only the cube of 1-100, or 1-1,000,000th part of what it is at a distance of only 1 foot from that point; or, in other words, if the power at 1 foot from the spot be represented by 1,000,000, at the distance of 100 feet it will be but 1. It is thus seen that the effects are intense locally, but comparatively trifling at even short distances. If a ton of dynamite or nitro-glycerine were exploded in a London street, the effects would be felt severely in the immediate neighborhood only of the explosion, and beyond that they would be confined to the mere breakage of windows. Indeed, it would be impossible by a single explosion, however large, to do damage to any considerable extent beyond the immediate neighborhood in which the explosion took place. On one occasion, I happened to witness the explosion of over a ton of nitro-glycerine from a distance of only 60 yards. The nitro-glycerine was about 10 feet beneath the level of the ground, which was of sand and covered with water. Beyond the breakage of windows and the bursting of a few doors in the surrounding buildings, there was no damage done. A little sand was thrown over me, but I received no personal injury. Vague statements have been made from time to time, promulgated to induce the belief that there are stronger explosives than nitro-glycerine and nitro-glycerine preparations, and that the wretched men who have been guilty of the late attempts on public buildings, etc., are in possession of more powerful explosives than any known to chemists. The public may rest assured that such is not the case. Nitro-glycerine and its preparations form the strongest explosives yet known. The strongest of these is the material known as blasting gelatine. It consists of nitro-glycerine combined with a certain proportion of nitrated cotton. It is much more difficult to prepare than either nitro-glycerine or dynamite, and can not be made by unskilled persons. If the power of dynamite be represented by 1000, that of nitro-glycerine will be 1411, and of blasting gelatine 1555. The 1¼ cwt. of nitro-glycerine seized by the police the other day would, if exploded, exert a force of only 4833 foot-tons, and if converted into dynamite it would represent a force of only 4567 foot-tons. The conversion of nitro-glycerine into dynamite reduces the power of the former, but renders it more easy and safe to handle and use. The power given above is comparatively insignificant, and as it is the maximum effect that could be produced under the most favorable circumstances on the very spot of explosion, it never could be obtained in practice. It is therefore absurd to say, as was said the other day in a London paper, that the explosion of such a quantity of nitro-glycerine would blow up the whole of London. In fact, the explosion could scarcely be heard over London, and the damage done by it would be strictly local. I have often, by way of experiment, exploded one pound of dynamite suspended from the end of a fishing-rod by a string about six feet long, holding the rod in my hand the while. As there was no solid matter to project, I received no injury, and the end of the fishing-rod was not even scratched. About three feet of the string at the end of the rod was always left uninjured.

THE CONSOLIDATION OF THE ELECTRIC RAILROAD PATENTS.—Negotiations with a view of consolidating the electric motor patents of Edison and Stephen D. Field have been going on for the last month, and resulted in the signing of contracts by both parties, which put an end to the fight and give the patents into the control of a new company. On the basis of the use of both sets of patents, a company is to be formed, with a capital of $2,000,000, for the purpose of operating electric railroads in the United States. This basis was decided upon after the value of the patents had been placed at the sum named by a committee of estimate appointed for the purpose, whose chairman was Prof. George F. Barker, of the University of Pennsylvania.

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THE PRODUCTION OF COAL, ORES, AND METALS IN GERMANY IN 1882.

A preliminary statement has been published, giving the production in Germany of coal, ores, iron, and metals. The reports are not quite complete; but as our third column, giving the production in 1882 of works from which no returns were as yet received for 1881 will show, the missing figures are insignificant. The unit is the metric ton, except when elsewhere specified:

	1882.	1881.	Not reported.
Coal	52,094,895	48,677,140	11,021
Lignite	13,238,030	12,818,210	34,114
Asphaltum	37,120	42,330	.....
Petroleum	8,158	4,099	9
Graphite	2,161	1,511	.....
Rock-salt	322,442	311,967	.....
Kainite	141,272	160,538	.....
Other potash salts	1,063,592	745,353	.....
Iron ore, Germany	5,650,017	5,311,442	127,476
" Luxemburg	2,500,145	2,161,882	.....
Iron pyrites	158,409	125,057	.....
Charcoal pig	38,406	41,713	2,851
Raw coal and coke pig	2,906,601	2,514,118	53,432
" (Luxemburg)	376,587	293,615	.....
Mixed fuel	3,218	8,280	.....
Spelter	108,545	100,617	4,861
Pig-lead	92,525	86,729	.....
Litharge	4,431	4,514	.....
Copper	20,011	14,802	.....
Copper matte	885	1,079	.....
Silver, kilograms	208,598	186,990	.....
Gold, "	376	381	.....
Nickel, tons	121	135	.....
Tin	102	106	.....
Bismuth	6·6	55·6	.....
Sulphur	3,456	2,631	273
Sulphuric acid	270,690	246,256	10,856

FURNACE, MILL, AND FACTORY.

The Knowles Steam Pump Works has changed the location of their salesroom from No. 86 Liberty street to No. 93 Liberty street, nearly opposite their old headquarters.

The George F. Blake Manufacturing Company announces that it has secured the large and commodious ware-rooms Nos. 95 and 97 Liberty street, to which it has moved from No. 83 Liberty street.

Messrs. Sperry & Co., manufacturers of mining machinery, of No. 12 Cortlandt street, this city, have issued a new catalogue, in which they illustrate stamp-mills, portable engines, tubular boilers, turbines, hoisting-engines, pumps, pipes, the Hoskin little giant, crushers, rolls, pans, settlers, ore-feeders, water-jacket furnaces, concentrators, skips, cages, buckets, blowers, rock-drills, compressors, horse whims, and cars. We note several specialties designed by Mr. Coleman.

The Selden steam-packing, manufactured by Mr. Randolph Brandt, of No. 534 Water street, this city, has been quite generally adopted by pump and engine builders, rods packed with it having been running for years without scratching them. Mr. Brandt has also brought out a safety lubricating compound for use on journals and crank-pins. It is applied through cups with a copper wire in the hole to act as a conductor of heat from the journal to the lubricant and feed only sufficient to keep the bearing thoroughly oiled.

Messrs. Riter & Conley, of Pittsburg, have just got in operation two machines for flanging boiler-heads, lately patented by Mr. A. Wilbur, of Alleghany, one for the outside flange and the other for inside flue-holes.

The Pittsburg Tool Company has purchased the business and machinery of Alker & Cromlish, which it proposes to remove to its works on the corner of North and Irwin avenues, Alleghany, where it will erect a building for the accommodation of the same. This company has largely increased its capacity for the manufacture of machinist tools, set and cap screws, and finished machine bolts.

The Philadelphia & Reading Railroad Company will erect new shops in Pottsville this summer. The *Miners' Journal* says that the erection will be begun without delay. Ground will be broken at an early day, and the work will be pushed forward to completion as expeditiously as possible. These works will be equipped with a plant adapted to the production of every variety of tools and manufactured supplies required for the operation of the Coal and Iron Company, as well as many of the requisites of the Railroad Company.

A company chiefly composed of Pennsylvania iron men has secured the Lawler iron ore mines in Page County, Va., and will erect a furnace on the property. One hundred and fifty thousand dollars have been subscribed for the purpose of pressing actively the work upon which the company has entered.

Topton furnace of Topton, Pa., will blow out for repairs.

J. A. Gilkerson's new machine-shop at Homer, N. Y., has been started up. The main building is 30 by 84 feet; engine-house, 16 by 24 feet; and blacksmith-shop, 12 by 12 feet. The productions will be light special machinery, steam-pumps, hand and power drills, Gilkerson's automatic screw slotting machines, and special tools.

C. G. Hussey & Co., Pittsburg, have been awarded the contract for supplying sheet-copper for the Custom-House at Memphis, at twenty-nine cents for twelve-ounce copper, and twenty-seven and a half cents for fourteen-ounce copper.

The Struthers furnace, located east of Youngstown, Ohio, has been leased by Receiver Brown, of Brown, Bonnell & Co., to the Brier Hill Iron and Coal Company, which has taken possession. It was damped down in February; prior to that time, it had been producing 125 tons of pig-metal per day.

The Blakeney Foundry Company, Springfield, Ohio, is erecting a foundry, 60 by 110 feet, and a machine-shop 48 by 102 feet. It will make the Blakeney cupola furnace. It is expected that work will begin about June 1st, with a hundred men.

The Ingersoll Rock-Drill Company has moved from its old quarters, which it had for so many years occupied at No. 1 Park Place, to the more commodious and spacious warerooms at No. 10 in the same street in this city. We are informed that the ever-increasing business done by this company in the manufacture and sale of its well-known rock-drill and air-compressors has of late taken such proportions that the space and facilities of its old office became entirely inadequate to meet the requirements of its trade, and a change to larger quarters was decided upon as a matter of absolute necessity. Aside from the increased comfort and convenience, the main feature of the company's new ware-rooms at 10 Park Place will be the display of a full line of the goods it manufactures and handles, such as rock-drills, air-compressors, hoisting machines, diamond core prospecting-drills, electric blasting batteries, and general mining and rock-excavating machinery; some of it in motion, so that visitors and intending purchasers may get a better idea of the construction and mode of working of the different machines. Simultaneously with its removal, the company has issued a new and handsome catalogue of 90 pages, full of illustrations and information of interest to all who are engaged in mining, quarrying, and all kinds of rock-work, for which the machinery sold by this company is specially adapted. Among work now in the hands of the Ingersoll Rock-Drill Company we may mention a complete plant of twenty drills, duplex air-compressor 21-inch by 42-inch cylinders, three 70 horse-power boilers, etc., for the Cornwall Ore Bank Company, of Pennsylvania, also ten complete drill and compressor plants for mines in New York and New Mexico. We learn that this company's new style of improved air-compressor is giving most satisfactory results. No change has been made in the location of the shops up-town; but even there, larger space had to be added and extensions made, in order to increase the manufacturing facilities, and thus keep pace with the demand. One hundred men are now constantly employed at the shops.

The great driving-rope which is to pull the cars across the Brooklyn Bridge has arrived at the wharf adjoining the Fulton Ferry from the J. A. Roebling Company's Wire-Works, Trenton, N. J. It is 1½ inches in diameter, 11,700 feet long, and weighs 19 tons. It is accompanied by a duplicate rope of the same weight and strength, which is to be held in reserve for use when the first rope wears out. Col. William H. Paine, in speaking of it to a reporter of the *Eagle*, said: "In all my experience, I have never seen a rope to equal it in manufacture; for the wire seems to be perfect, and the test which it has been subjected to gives ample assurance of its strength. Before it left the works, every wire held at least 1000 pounds and was stretched from four to six per cent more. The tarring observable on the surface is for the purpose of protecting it from the atmosphere and also to give the interior a kind of lubrication when it comes to be used."

A correspondent of the *Bulletin* sends the following item of interest: "The blowing-engine built by the I. P. Morris Company for the Crown Point Iron Company blows 13 pounds of blast with 14 pounds of steam, and gives entire satisfaction. With the old engines blowing eight pounds, steam goes down; but with the new engines blowing eight pounds, steam goes up rapidly and blows off.

It is reported that Amasa Stone, D. P. Eels, Col. W. H. Harris, C. A. Otis, and various other Cleveland stockholders of Brown, Bonnell & Co., have made a proposition to the creditors that they will organize a stock company with a capital of $1,000,000, take all the property of Brown, Bonnell & Co., and pay off the indebtedness in annual payments in four years, with interest at six per cent. The gentlemen whose names are mentioned above will have no trouble in carrying out their agreement if it is accepted. In many cases, it is believed that the creditors would accept stock in the new concern for their accounts.

The Pneumatic Pulverizer Company, of this city, has removed its offices to the Merchants' Building, Nos. 2 and 4 Stone street.

The St. Alban's Iron and Steel Mills, St. Alban's, Vt., have filed a petition of insolvency. The schedule filed shows liabilities of $505,000 and assets of $497,000. Boston and New York creditors are interested only in small amounts. A meeting will be held May 11th, to choose an assignee.

The Harrington & King Perforating Company has purchased the plant and succeeded to the business of the Harrington & Oglesby Company, of Chicago. It has new and improved machinery.

Mr. C. L. Dahler, President of the Virginia City Reduction Company, Virginia City, Montana, has ordered a concentrating mill of 25 tons daily capacity from the Fort Scott Foundry and Machine Works, Fort Scott, Kansas. It is reported also that the Hecla Consolidated Mining Company, of Glendale, will double the capacity of its 150-ton mill, built by the same firm.

The Mary furnace, in Lowellville, Ohio, will be lighted in a short time.

The new foundry of Duncan & Baldwin, of Pittsburg, near New Castle, Pa., was started last week. One hundred and fifty men will be employed, of whom ninety will go from this city.

The Gillespie Tool Company, of Pittsburg, has sold one of its artesian well drilling-machines to Mr. Joseph Jefferson, the actor, for his plantation in Louisiana. The company will send its own men to work the machine.

The Wheeling *News Letter* says that the Pittsburg gentlemen interested in the "Free Oil Company's" well, on Gravel Bottom, came down last Monday to take a look at their big spouter, and found that the telegram sent by Brown Humphries did not do the well justice. The heavy pressure and immense flow of gas are certainly unparalleled in the State. Several efforts to test the pressure of the gas, made while the gentlemen were at the well, proved abortive. As soon as the necessary piping and appliances can be obtained and attached, boring will be continued. The drillers have a theory, founded upon former experience, that a much greater volume of gas will be obtained a few feet deeper in the rock.

Some time ago, the Lane & Woodworth Glass Roof Company, says the Youngstown (Ohio) *Register*, sold the patent right of the State of California to Western parties, and a manufactory was established on the Pacific coast. The new concern prospered until a rival glass manufacturer in some way obtained control of a portion of the capital stock, and then threw the company into legal difficulties, putting an effectual dead-lock on the running of the works in opposition to his own factory, which, being the only glass-works on the slope, again became a monopoly. In consequence of these troubles, the Lane & Woodworth Company had to settle for some expensive machinery ordered by the California company, and which the old company had become security for.

The Excelsior Iron-Works, of Chicago, have just shipped two car-loads of machinery, comprising a complete smelting plant, engines, boilers, blowers, etc., to Sheridan, Montana, for the Western Mining Company.

The Armington & Sims Engine-Works, Providence, R. I., have within the last week received orders for twelve engines, 14¼-inch diameter by 18-inch stroke, for the village plant or system of lighting with the Edison incandescent light. Also for ten engines, 8⅛-inch diameter, 10-inch stroke, for smaller capacity of plant for a village isolated light; one engine, 9⅛-inch diameter, 12-inch stroke, for Ford's Opera-House, Baltimore, Md.; one 8½ by 10-inch engine for a Long Branch hotel; and one 8½ by 10-inch engine for St. Louis, Mo.

After an uninterrupted run of six months, the Warwick furnace recently damped down, to permit the cleaning of the boilers, six in number. This necessitated a stoppage of four days. To overcome this stoppage in the future, a duplicate battery of six boilers is now making at the boiler-works of Sotter Brothers.

The Westinghouse Engine Company is successfully using its new automatic cut-off in its larger engines. It has recently furnished motors for three large plants —a 110 horse-power engine for the Pennsylvania Electric Light Company at Harrisburg, Pa.; another, 43 horse-power, for the Brush Electric Light, Savannah, Ga.; another, 43 horse-power, for the New York & Brooklyn Company; besides several smaller engines, ranging from 4 to 18 horse-power, for various local companies.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents were issued between the 15th and 30th of April from the General Land-Office:

ARIZONA.

PRESCOTT DISTRICT.

Dosoris Mining Company, Dosoris and Buzzard lodes, and three mill-sites.

TUCSON DISTRICT.

Arizona May Mining Company, May lode. Black Rock & Pacific Company, Black Rock lode. Andrew Robertson *et al.*, Alps lode. San Pedro Mining Company, Survey lode.

CALIFORNIA.

HUMBOLDT DISTRICT.

New River Hydraulic Mining Company, Martinsville gold placer.

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SACRAMENTO DISTRICT.

Jeremiah Bliss, Kellogg placer mine.

SAN FRANCISCO DISTRICT.

David Speyer, Primera chrome mine.

SHASTA DISTRICT.

Jacob Paulsen *et al.*, placer, Trinity County. Henry Junkans *et al.*, Railroad placer, Trinity County.

COLORADO.

CENTRAL CITY DISTRICT.

J. Robert Fisher *et al.*, Jewel lode. Rudolph Wurlitzer, Girard and Rudolph lodes and mill-sites. George N. Hall, Treasury Vault lode. L. E. Park *et al.*, Standard lode. Rebecca Haywood, Pythagoras lode. Cornelia C. Nimson *et al.*, Revenue lode. Frank Strausser, Dumbarton lode. William J Lusher, placer, Summit County.

DEL NORTE DISTRICT.

Roscoe G. Jordan *et al.*, Pelican lode. Plattsburg Mining and Milling Company, Governor Seymour lode and mill-site.

DURANGO DISTRICT.

Santa Clara Mining Company, Santa Clara lode. J. M. Acker *et al.*, Pigeon lode. J. X. Tunnel Company, Toledo lode. Joseph Merideth *et al.*, Grand Duke lode. John W. Bailey, *et al.*, Aztec lode.

LAKE CITY DISTRICT.

Wabash & Democrat Consolidated Mining Company, Wabash lode. Galena Gulch Mining Company, Narrow Gauge lode, and North Star lode and mill-site. C. Monjeau *et al.*, Kansas and Romantic lodes. Ouray Union Mining Company, Standard and Monitor lodes. Colorado Mining and Land Company, McIntire lode. Theron Stevens *et al.*, Great Western lode. Windham Silver Mining and Smelting Company, Olympia lode. Engineer Mountain Silver Mining and Smelting Company, Adelia lode.

LEADVILLE DISTRICT.

Israel May *et al.*, Summit lode. Mary J. Riggnis *et al.*, Maramac lode. Frederick W. Rose *et al.*, Selma lode. J. B. Weston *et al.*, Old Mariner lode. William P. Dewey *et al.*, Small Hope lode. George H. Thatcher, Jr., Illinois lode. Frank Morrison *et al.*, Gildersleeve lode. Robert G. Withers *et al.*, Rocketts lode. Robert Morrison *et al.*, Little Alice lode. James Lyons *et al.*, Iowa Chief lode. George N. Essmer *et al.*, Sylvan Dell lode.

PUEBLO DISTRICT.

Game Ridge Consolidated Mining Company, Green Silver and Ditto lodes. Jennie H. Sears, Silver Rouble lode. Richard Irwin, Melrose lode.

DAKOTA.

DEADWOOD DISTRICT.

John T. Gilmer, placer, Lawrence County.

MONTANA.

HELENA DISTRICT.

Robert McMinn, Ringold lode. Claton Ramsdell, Little Annie lode. Patrick H. Meagher *et al.*, Malone lode. Nathan S. Vestel *et al.*, Last Hope lode. Athol F. Wright *et al.*, placer, Beaver Head County.

NEVADA.

CARSON CITY DISTRICT.

George E. Crowell, Lodi South lode. Ferdinand S. Van Zandt, Potosi, Silver Palace, and Silver Crown lodes. Ferdinand S. Van Zandt *et al.*, Cadiz lode.

EUREKA DISTRICT.

Richmond Mining Company of Nevada, Rearguard lode and mill-site. Martin White Mining Company, Morrill and Juno lodes. D. J. J. McLaughlin, Black Cat lode. Kit Carson Consolidated Mining Company, Young Mabel lode.

UTAH.

SALT LAKE CITY DISTRICT.

Samuel Holdeman *et al.*, Crown Point and Clyde lodes. John J. Daly, Silver Clift and Daly lodes. Frederick Auerbach, Hecla lode. Utah Southern Silver Mining Company, Antwerp lode. Thomas G. Winn, coal.

WASHINGTON.

Ahio S. Watt, coal. John R. Hanson, coal.

GENERAL MINING NEWS.

ARIZONA.

TIP TOP.—The mill and mine have been shut down since the early part of March, in order to put up new hoisting-works. Work will probably be resumed in June.

COCHISE COUNTY—TOMBSTONE DISTRICT.

EMPIRE.—This company has begun suits against settlers to decide the title to surface ground.

GRAND CENTRAL.—More pumps are required at this mine.

VIZINA.—Reports are, that a large body of rich manganese ore has been struck in the lower level; but at the offices of the company in this city, no dispatches to this effect have been received, and the report is unconfirmed.

PIMA COUNTY.

TOTAL WRECK.—The mine is located eight miles from Pantano. The Globe *Silver Belt* says that the greatest depth reached is 340 feet. Between that and the surface are four levels, all of which have developments that prove the continuity of the ore-body. On one of the levels, the ore-breast showed 27 feet, and one of the walls only—the foot-wall—has been reached. The ore-body has been developed, in its length, 130 feet. The ore is chloride, and is allied with iron and copper. The percentage of each is small, although, looking at the ore in place or handling it, the iron seems to be the prevailing mineral. It is stated that the ore averages $60 to the ton. A twenty-stamp mill is working steadily.

CALIFORNIA.

The following companies have filed articles of incorporation:

California Copper Company. Capital, $10,000; shares, $10 each. Operations, Placer County, Cal. Directors: M. C. Taylor, Jacob Weissbein, Joseph Weissbein, John Johnston, and J. J. Ott. Principal office, Grass Valley. Copper Chief Mining Company. Capital, $5,000,000. Directors: W. Meeks, John Henderson, J. H. Moyhew, William N. Meeks, and G. W. Brown. Esmeralda Copper Company. Capital, $2,500,000. Directors: Angus G. McAfee, Frederick Conn, De Witt T. Bisbee, John Curry, and Hiram D. Tuttle. Fair Play Mill and Mining Company. Capital, $500,000; shares, $5 each. Directors: Ira P. Rankin, J. S. Bacon, S. O. Putnam, John B. Lewis, and Joel Merchant. Principal office, San Francisco. Gladstone Mining Company. Capital, $500. Directors: William L. Locke. Charles C. Kinsey, Henry Hugg, George Renner, and Thomas W. Chinn. Principal office, San Francisco. Meridian Mining Company. Capital, $500. Directors: E. L. Graves, John D. Langhorne, Jr., O. F. Graves, Joseph Benner, and Edward E. Steirs. Mohegen Gold and Silver Mining Company. Capital, $600,000; 30,000 shares. Directors; William Campbell, John Kewes, John E. Phillips, Edward Orchard, and A. Robbins. Principal place of business, Grass Valley. Moscow Gold Mining Company. Capital, $1,500,000; shares, $15 each. Directors: W. E. Dean, Ramon E. Wilson, and Charles T. Bridge of San Francisco; James W. Becknell of Redwood City; and A. W. Rose, Jr., of San Mateo. North Banner Consolidated Tunnel Company. Capital, $1,000,000. Directors: William Ternan, Alexander Gault, John Masbrouck, David Bryam, and Albert Matteson. Oakland Petroleum Mining and Refining Company. Capital, $500,000. Operations, Contra Costa and other counties, Cal. Directors: James Teaff, Jesse S. Wall, A. C. Massey, C. A. Fairchild, and B. S. Burson. Oriental Mill and Mining Company. Capital, $10,000,000. Directors: Charles McLaughlin, Joseph G. Eastland, John O. Earl, William E. Brown, and Louis A Garnett. Peachville Consolidated Mining Company. Operations, Arizona. Directors: A. W. Blair, James C. Plunkett, R. A. Redman, V. W. Plunkett, and James R. Capell. Silver Crown Consolidated Mining Company. Capital, $10,000,000. Operations, Pima County, Arizona. Directors: J. C. Handy, A. A. Bean, H. L. Coye, E. E. Potter, and E. Bouton. Summers Consolidated Mining Company. Capital, $10,000,000; shares, $100 each. Operations, Mono County, Cal. Directors: James W. Wright, John F. Summers, Aaron D. Hunt, Martin Jones, and I. S. Hetch. Place of business, San Francisco.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended April 21st shows: Ore crushed, 163·08 tons; average assay value of pulp, $41.70 per ton; of tailings, $7.27. North drift from east cross-cut, 1000 level, is 46 feet long. The quartz, which is of low grade, has increased in quantity. North drift, 800 level, is 385 feet long. North drift, 672 level, is in 98 feet, and has cut the narrow vein running down from the Fortuna east of the vein. On the 21st, a winze from the 780 level was started on the rich vein north of rise No. 19. This winze will be known as No 5.

STANDARD CONSOLIDATED.—For the week ended April 21st, the official report shows: Ore extracted and shipped to mills, 1275 tons. East cross-cut, 1000 level, is in 1338 feet. Uprise from south drift, 700 level, is up 34 feet, and shows the vein 3 feet wide. West cross-cut from north drift is 190 feet long, and the face is in hard rock. North drift No. 1, 500 level, is in 656 feet, showing the vein 10 feet wide. The winze from north drift is down 80 feet, where the vein is 10 feet wide. North uprise is up 90 feet. South uprise No. 1 is up 190 feet. West cross-cut No. 1 is 405 feet long. South drift No. 2, 685 level, is 469 feet long; the vein is 5 feet wide. The uprise from this drift is up 170 feet, and shows 5 feet of vein. Uprise No. 5 is up 108 feet, and north uprise is up 89 feet. North drift No. 3 is in 89 feet. There is no change in the stopes.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GENESEE.—It is stated that the mill will be enlarged immediately and work at the mine pushed vigorously.

GREEN MOUNTAIN.—The tunnel has recently been in very hard ground. The rock is a gray quartzite, difficult to drill and requiring more holes to be bored to advance a given distance than any hitherto found since the tunnel was started. Notwithstanding the character of the ground, good progress has been made. The mills continue to run steadily.

SOUTHERN EUREKA.—Reports state that the present location of the mill, which is run by water-power, is such that it can not be worked to advantage. The mine shows favorable prospects.

COLORADO.

BOULDER COUNTY.

Several discoveries of rich ore-bodies, including tellurides and galena, have recently been made in the vicinity of Jamestown. A report says that there is a very good prospect for a second boom on the mining developments that are making, and many claims that have been unnoticed heretofore are coming to the front as valuable mines.

CLEAR CREEK COUNTY.

COSMOPOLITE TUNNEL.—This enterprise was begun about two years ago, to cut some lodes on Saxon Mountain. It is started almost at the foot of that mountain, about a mile this side of Alvarado. The breast is in from 1100 to 1200 feet, and makes considerable water; so much so that driving ahead has been temporarily suspended. Meanwhile, an immense lode, the Helen, seventy feet wide, which the tunnel has just crossed, is drifted on eastwardly. It is cut to a depth of 800 feet, and shows mineral of good promise.

KOHINOOR & DONALDSON.—Shipments of milling and smelting ore are made daily. At the Champion mine, the company is opening out the lower levels, in which the smelting ore is found in very massive bodies. The main shaft is to be sunk 150 feet deeper from its present depth of 600 feet.

SNOWDRIFT.—High-grade ore is shipped from four different places. In the drift easterly from the seventy-four-foot tunnel-shaft, ore has been found for the last thirty feet of the same character as that now sunk on, drifted on in two places and stoped in one, 250 feet farther east.

CUSTER COUNTY.

BASSICK.—The mine is in good condition. The mill will be moved from the mine to a creek a short distance away, on account of scarcity of water at the mine. A fine plant of hoisting machinery has been placed in the tunnel, and electric lights will be used in the mine.

BULL-DOMINGO.—Work will be resumed soon. All difficulties, it is said, have been settled.

DOLORES COUNTY.

Mr. Linwood O. Towne, of Rico, sends us the following notes:

GRAND VIEW.—The smelter has been steadily running and bullion shipped all winter. The mines of the company are in good condition and working a large force of men.

SANTA CLARA REDUCTION-WORKS.—These works, after being shut down for a part of the winter, have started again, and already a considerable amount of gold and silver bullion is on hand for shipment. Additional stamps and other machinery have been added.

PUZZLE.—Mr. C. A. Bacon, superintendent of this property, has just returned from England, where the mine is owned. Extensive machinery for proper working, including pumps and hoisting apparatus, will be at once put in, supplying a pressing need for developing what has proved one of the best paying mines in Southern Colorado.

PUZZLE EXTENSION.—Work is pushed and shipments made to the Santa Clara Company

PIGEON.—Considerable excitement is felt over a strike of high-grade ore, reported as being in large quantity. It is of the nature of the so-called "hard carbonate" of Leadville, with galenite.

GILPIN COUNTY.

The reports from the different mines around Central City continue to be favorable. The Wautoga lode, in Russell Gulch, is turning out smelting iron ore that mills $180 to the ton.

The Auderdell lode, in the same district, which has been idle for months, is now under lease. The crevice is large and easily worked. The ore mills from 3 to 9 ounces of gold to the cord.

The Fronteuac lode, also in Russell District, is doing splendidly. It is turning out smelting iron that pays $80 to the ton. The crevice is large and worked with but little trouble and expense.

The Star of the West, in Lake Gulch, is doing better than for a long period past. It is now producing steadily.

The Williams lode, in the same district, is leased, and is producing gold ore in one level.

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CALIFORNIA COMPANY OF GILPIN COUNTY.—The report presented to the stockholders shows that active operations were begun in September last. During the year, the mine produced 10,241 tons of smelting and milling ore, realizing $126,-119. The mine is worked exclusively by contract, and the ore is raised by stoping by square fathom in the richer portions and by tribute work in the less productive parts. The two systems have returned ore at the following rates:

STOPES.

	Per ton.
Excavation	$1.83
Mine charges	1.23
Tramming	0.55
Cobbing, etc	0.25
Salaries and expenses	0.30
Taxes, etc	0.075
Total	$4.235

TRIBUTE WORKS.

	Per ton.
Excavation (including tramming, cobbing, etc)	$7.49
Mine charges	1.23
Salaries and expenses	0.30
Taxes, etc	0.075
	$9.095

The cost of hauling to the mill at Black Hawk is $1.20 per ton, and milling, inclusive of its proportion of salaries and taxes, $1.805 per ton. The main shaft has been enlarged and retimbered throughout and arranged for hoisting through two compartments. The erection of machinery was completed some time in July, 1882. It was not till the 23d of August following that the mine was cleared of water, and still later when the lower levels got into working condition again. A steady development of the mine has been carried out since. Sixteen hundred and eleven feet of drifts have been added, costing on an average $3.30 per foot in labor and explosives; 594¼ feet of winzes and rises at an average cost per foot of $3.39; and a new lift of ground has been won by sinking the shaft below the 1300-foot level. About one hundred men are now employed at the mine and mill.

HINSDALE COUNTY.

BELLE OF THE WEST.—Work is progressing with encouraging results. The fourth level is now in 150 feet. The lode is improving, showing good gray copper.

ULE.—A new 100 horse-power engine has been ordered for the concentrator. It is the intention to extend the work as soon as the water supply increases. Higher grade ores for treatment will probably be bought during the season.

LAKE COUNTY.

The Leadville *Herald* reports upon a number of mines situated in the vicinity of South Evans Gulch and Little Ellen Hill as follows:

At the Bessie, a shaft is sinking on the lode, which is part of the Boulder property. The shaft is down fifty feet, and a vein of good-looking quartz two feet in thickness has been cut.

The lower shaft of the Cleveland mine is operated by lessees, and is down about ninety feet. A short drift was run at this depth, and a winze sunk to a depth of twenty feet. A drift has been started from this winze, and is now in about eight feet. A large body of contact-matter has been struck, and has not as yet been penetrated. A feeder about three inches wide of hard carbonate is shown in the contact, and the drift is running on this feeder.

The Little Ellen mine, the property of the American Mining and Smelting Company, is situated on Little Ellen Hill. The amount of development-work done proves the property to contain a large body of ore running high in lead and carrying some silver. Water has been struck, but the effect will be rather beneficial than otherwise, as there is less danger to the men from leading. Considerable ore is shipped to the company's works in Leadville.

On the east side of Breece Hill, a shaft has been sunk on the Mary A. mine to a depth of about fifty feet. A number of feeders were cut, and as they were evidently tending toward a body of ore, a drift was run, and there is now a four-foot breast of ore exposed in the drift.

The properties formerly known as the Miner Boy and Colorado Prince have, by recent decisions in the courts, been merged into one, and are now known as the St. Louis. The mine is worked under a lease. The work is done all the way from level No. 4 up to the eighty-foot level, and a large amount of ore is now in the bins awaiting shipment. Nothing is doing with the lower workings, which are full of water. The ore is a quartz which carries gold and silver. The average value of the ore is about $75 per ton. The shipments will be increased shortly. One of the best properties on Little Ellen Hill is the Tenderfoot. The mine is developed by a shaft about 100 feet deep, from which No. 1 level is run about 135 feet in a southeasterly direction. The contact is an iron liberally sprinkled with galena, and pitches southeast at an angle of about forty-five degrees. It was first encountered about fifteen feet from bottom of the shaft in the first level, and when first cut was about five feet in thickness. A second level has been run to the left, and about six feet below the No. 1 level. At fifty feet from the shaft, this No. 2 level has opened up a body of hard carbonates, which shows about four feet in thickness where first encountered. A winze has here been sunk in the No. 2 level to a depth of thirteen feet, making about a twenty-foot face, which is entirely mineral. A drift has been run from the bottom of this winze a distance of fifty feet, and in this drift the latest and most important strike in the mine has been made. It is a lead carbonate, and is much softer than the mineral above it. Chloride stain is seen all through this ore, and it is evidently of an excellent grade. The main shaft will be sunk fifty feet deeper, and a level run to tap the ore-body from below, thus facilitating the shipment of ore. No stoping has been done as yet, though considerable ore has been shipped.

BREECE.—About fifty tons of ore are shipped daily, which carries sixty per cent of iron. The shipments will be increased shortly. A twenty-five foot breast of this iron is exposed in the workings.

HUMBOLDT.—This company owns about sixty-five acres on Carbonate Hill. There are ten claims in all, most of which are patented and a number of which are at work. Among the most promising are the Gold Leaf, Modest Girl, and Thistle. The former of these is worked under a lease. A drift has been run in a southeasterly direction from the shaft, at a depth of 185 feet from the surface, and a body of sand carbonate three feet wide has been struck, the ore of which averages thirty-five ounces in silver. The vein is widening. The company is working the Modest Girl. A fine contact has been struck in the drift at a depth of 100 feet from the surface, and the company expects to strike the ore-body in a few days. The Thistle has not yet started up. This claim will also be worked by the company.

ROBERT E. LEE.—About forty men are employed, and only prospecting is done. No mineral is shipped.

SUMMIT COUNTY.

ROBINSON.—Eight hundred tons of ore were shipped last month. The grade of the ore seems to be improving. Mr. Greer, the lessee, has been experimenting with the wet method of concentrating, at Kokomo. A dry concentrator, consisting of a crusher and rolls, will be put up at Robinson, and will be in working order shortly.

DAKOTA.

A dispatch from Deadwood says that the only works in operation there now are the six mills of the Homestake companies, the Caledonia, Gustin, Esmeralda, and Florence, none of which present any thing of special importance to report.

CALEDONIA.—The lower winze is down 110 feet, and will be sunk thirty feet farther, to secure a vertical depth of 100 feet, when a drift will be run to a point beneath the present main shaft, eighty feet distant, and the two workings connected by working up rather than by sinking the shaft. The mine shows a fine body of ore.

ESMERALDA.—A dispatch to the *Tribune* says that the last clean-up was attached at Deadwood by the owners of the False Bottom ditch, from which water for the mill is obtained. It has not been made public why satisfaction of the claim (which amounts to $1000) was refused.

FATHER DE SMET.—The superintendent's report from April 15th to April 22d shows: Ore extracted from first, second, and third levels, 1925 tons. Ore milled, 1925 tons. North end tunnel advanced 5 feet; tunnel in 874 feet; Golden Gate north header advanced 7 feet; header in 83 feet.

PENOBSCOT.—The old mill is running ten stamps with sufficient profit to enable the owners to maintain thorough prospecting-work. The mine has been well developed and shows a fine body of ore. It is highly probable that a sixty-stamp mill will be erected this summer.

SITTING BULL.—The recent ten-days' run of the smelter yielded $63,287 base bullion. The smelter will remain idle the rest of the season, as with the addition and improvements to the mill, all ore can be successfully treated by the latter, and at a considerable saving over the old process. The new works are expected to be in operation before the close of May.

WELCOME.—The company has a twenty-stamp mill on the road for erection on its property near Terry's Peak.

GEORGIA.

BUFFINGTON.—The work of development by the new company has begun.

COLUMBIA.—The flume is pushed rapidly, completing about 200 feet a day. A vast amount of work outside the flume is doing. The expense of building the flume will not be so great as was expected. The old flume will be repaired.

CONSOLIDATED GOLD MINING COMPANY OF GEORGIA.—A giant is cleaning up the way for the new flume-line, which, when completed to the Martin cut, will be nearly one half-mile long.

IDAHO.

A number of the owners of claims on East Forks are arriving and starting work on their properties, and a number of others are looked for daily. The superintendent, with twelve miners, has arrived and resumed work upon the Paymaster group, which is owned by the Philadelphia Company. New buildings will be erected, and work pushed ahead.

ILLINOIS.

The following companies have filed articles of incorporation:

Lacy Coal Mining Company. Capital, $100,000. Incorporators: William R. Ogden, Charles H. Mason, and W. Q. Smith. Western Indiana Coal Company. Capital, $20,000. Incorporators: James J. Kelly, George M. Rogers, and Samuel P. McConnell.

MAINE.

STEWART.—During the present week, the 160-foot level was started from shaft No. 3, and will be run eastward. After the drift has reached the length of 20 feet or thereabouts, so that injury from blasting may be avoided, the Cornish bucket-pump will be put in place, and the plant, so far as hoisting and pumping are concerned, will be complete. A cross-cut to the north, to explore the foot-ground and reach the new "find," will be started from a convenient point in the drift, and underground work will be vigorously prosecuted. An open cut, some 50 feet in length, has laid bare good ore in the northern portion of the vein; and a slope down the hillside furnishes a natural stope, which is now worked.

MEXICO.

BOSTON & MEXICAN OIL COMPANY.—This company is working at Chapopote. The first well is down 600 feet, with every indication of a heavy body of oil. It is not definitely decided where the refining-works will be erected, but probably near Tuxpam. A recent analysis made of the bitumen which flows naturally on the surface in large quantities near the well gives over 30 per cent of paraffine oil, 10 per cent of illuminating oil, and 44 per cent of valuable black bitumen.

ENCINO.—This mine, situated at Pachuca, has been closed for three months, on account, as it is stated, of the inability of the company to get its ores worked at satisfactory prices. Upon the completion of the Progreso reduction-works, mining will be resumed.

NEW YORK MEXICAN.—The company has its machinery in operation and is now engaged in taking out and reducing its ore.

MICHIGAN.

The following company has filed articles of incorporation:

Iron Hill Mining Company. Operations, Michigan. Officers: President, Richard Oliver; Vice-President, John Stiles; Secretary, J. D. Sampson; Treasurer, James H. Gee.

CENTENNIAL.—The latest advices are, that there is great improvement in the amygdaloid in the north part of the mine. Openings on the lode are affording as good ground as its southern prolongation in the Osceola mine.

KEARSARGE.—The southern test pits on the amygdaloid have recently developed the best show of copper yet made on the property.

INDIANA.—The Marquette *Mining Journal* says that the shaft is going down 128 feet east of the present workings in clean blue ore of the very finest quality, while the developments underground prove beyond doubt the existence of a large body of ore. A drift north through the supposed foot-wall—which proved to be a mere shell of rock—shows nearly if not quite 20 feet of ore beyond; while another large drift south cut a few feet of mixed ore and some rock, beyond which it shows 22½ feet of ore in the back, and over 30 feet in the bottom, without the slightest mixture. A large amount of work has been accomplished, but considerable work remains to be done to get the mine into good shape for economical production; this is pushed forward as rapidly as possible.

MONTANA.

The following company has filed articles of incorporation. Société Anonyme des Mines de Lexington. Capital, 20,000,000 francs. Operations, Silver Bow County, Mont. Incorporators: Charles Wallnut, George Alfred de la Bouglaise, Laurent Goybert, William Booth Finlay, Charles Arthur, Viscount de Rafelis Brouves, Abraham Cremuitz, and Edmond Pierre Auguste Lemoine.

The Helena *Independent* says that the mines of Emigrant Gulch, discovered in 1864 and worked every season since, are expected to prove more remunerative than ever before. The pay-dirt is from twenty to one hundred feet thick. During the winter, drifts have been worked and as high as $1000 to the box secured during a clean-up. The water available is at no time less than 700 inches, and at the best season there are 3000 inches.

LEWIS & CLARKE COUNTY—MARYSVILLE DISTRICT.

DRUM LUMMON.—Work on the mine is now beginning in earnest. A tunnel has been started on the bed of Ottawa Gulch, to tap the vein at a distance of over 400 feet below the present workings, or about 600 feet beneath the surface. This tunnel will be between 1100 and 1200 feet in length; and as it will be the main working tunnel, it is to be large enough for all future necessities. It will be wide enough for a double track, and will penetrate the mountain from the north. It is the purpose of the company to push the work as rapidly as possible, and

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that end all modern appliances and machinery for tunneling will be brought into use. It will, however, require several weeks to complete the open cut necessary to be made in getting a face in which to start the tunnel. By that time, it is hoped to have all the necessary machinery on the ground for driving the tunnel as fast as possible. About 140 days will be required to complete it. No decision has been reached in reference to the character of the mill to be erected. The company intends to determine first what process will be the most economical in treating the ores, and to that end careful tests and assays of the ore are making.

MADISON COUNTY.

A correspondent of the Butte *Miner*, writing from Salisbury, says that the reports from Tidal Wave and surrounding districts are favorable, and are attracting attention all over the territory. One of the best mines in this district is the Magnolia. A tunnel has been run in 75 feet, which shows a body of galena over thirty inches wide. Assays made gave 60 ounces silver, $17 gold, and 68 per cent lead.

The Bald Mountain and Mineral Hill leads will be worked this summer. In these leads, the ledge is from five to seven feet wide, and runs from $60 to $70 in silver, 40 per cent lead, and $9 in gold.

The Holdfast and Wolverine, at the head of Georgia Gulch, are looking well. There are about thirty tons of ore each on the dump and fifteen inches of fine lead in the bottom of the shaft.

The lower end of the district is picking up. The Blue Sky lead shows up well. During the winter, a shaft now 95 feet has been sunk, which shows a ledge that is over ten feet wide. The ledge contains magnetic iron and carbonate rock.

NEVADA.

EUREKA COUNTY.

When the mill was closed last January, at Mineral Springs, says a correspondent of the Eureka *Sentinel*, it was understood that operations would be resumed in April; but the stormy weather has prevented, and no ore has been hauled to the mill as yet, and probably will not be for several weeks.

The outside mines are showing up considerable ore of various grades. A Chicago company has several men employed on a prospect just south of the Austin mine, and is taking out some good ore.

The old Bonanza is also showing some rich ore, but the seam is small.

The Livingston mine is also producing high-grade ore. Where the owners worked two years since, on the extreme western portion of the claim, the ore was base; while on the east end, it is mostly free milling. Possibly a shipment of this ore will be made to the mill soon after it starts crushing.

The Poor Boy is situated on the western slope of the hill, and is on the main belt of smelting ore, which runs along the foot of the mountain for a considerable distance. Owing to the amount of work done this spring, it shows perhaps better than any other property in this group. The ore was easily extracted and there are probably 100 tons on the dump. This carries too much lead to mill. The owners expect a furnace to be erected in this vicinity this summer.

RUBY-DUNDERBERG.—On the south side of Home Ticket Hill, this company is sinking a new shaft, upon which will be placed a small steam-hoist formerly used at the Continental mine. This shaft is sinking for the development of an ore-body that is assuming considerable proportions, the ore of which is becoming richer as the deposit is followed in a westerly direction.

NEW MEXICO.

The following companies have filed articles of incorporation:

Golden Rule Mining Company. Capital, $1,000,000; shares, $10 each. Directors: C. P. Crawford, N. Bell, T. Stevens, H. Booth, and J. D. Pancake. Hagan's Peak Tunnel and Mining Company. Capital, $1,000,000; shares, $100 each. Operations, Socorro County, New Mexico. Incorporators: Mariano Armijo, John H. Sullivan, Jacob M. Briggs, and A. C. Swift. Principal place of business, Albuquerque. Iron King Mining Company. Capital, $500,000; shares, $10 each. Operations, Grant County, New Mexico. Incorporators: Alexander B. Hill, Philip W. Holmes, and Robert H. Worthington. Niagara Mining and Refining Company. Capital, $2,500,000; shares, $50 each. Operations, Grant County, New Mexico. Incorporators: William W. Trevor, John A. Merritt, William W. Bowen, and Burt Van Horn.

NEW YORK.

The following companies have filed articles of incorporation:

Blue Ridge Copper King Mining Company. Capital, $500,000. Lenox Smelting Company. Capital, $10,000. Sterling Lead and Zinc Company. Capital, $500,000.

PENNSYLVANIA.

The following company has filed articles of incorporation:

Jorilla Copper Mining Company. Operations, Jorilla Mountains, New Mexico.

A vein of iron, five feet in thickness, and mining back into the hill at Bellevue Station, was recently uncovered by workmen on the Fort Wayne Railroad. Examination shows that the ore is of the same description as that found at Wampum and up the Alleghany River about Kittanning. Over it is a layer of a poor sort of fire-clay, and underneath it is a bed of soapstone. The vein looks rich, and, it is believed, will turn out a 40 per cent ore. The ore could be mined easily, as it is in a side-hill, and could be delivered at the furnaces for $2 a ton, while most of the ore of that grade costs from $4 to $8.50. There is not a vein worked within fifty miles of the city.

SOUTH CAROLINA.

PHŒNIX.—The product of this mine in sulphurets, with but little free gold, worked by the Mears chlorination process, yielded a gold bar which assayed at the U. S. Mint at Philadelphia 977 fine. The weight before smelting was 181·64 ounces, and after smelting 181·53 ounces. It was valued at $3673.75.

UTAH.

The following companies have filed articles of incorporation:

Albion Mining Company. Capital, $500,000; shares, $5 each. Operations, Big Cottonwood, Utah. Officers: Thomas C. Armstrong, President; Jacob S. Boreman, Vice President; and George Thackrah, Secretary. Principal place of business, Salt Lake City. Columbia Mining Company. Capital, $500,000; shares, $5 each. Operations, Big Cottonwood, Utah. Directors: George Thackrah, Thomas C. Armstrong, Adolph Hauerbach, all of Salt Lake, and Henry Thackrah, of Leeds, England.

The Lead mine, at Bingham, has begun shipping two cars of first-class ore per day; it is working thirty men, and the machinery has been put in better condition. A concentrator, with a capacity of 100 tons crude ore every twenty-four hours, with a force of 32 men, will be put in operation in about a week.

Reports from Park City state that the Empire mine has been shut down. The Ontario keeps up a steady output of bullion. The company is constantly making improvements, which are of a substantial nature, calculated to last for years. The ore-bodies increase in richness as depth is gained, and there is every probability that the mine will be worked to a depth of 3000 or 4000 feet. The ore in sight is ample to run two mills the size of the present one for years to come, and there is talk of a second one to be built, but arrangements are not yet completed.

On Rebellion Hill, the ore-bodies have increased in richness and size. The Crescent shows very favorable prospects. This company has recently taken in the Walker & Buckeye, and has a large tract of ground to explore.

The Apex Company has struck in the past two weeks a vein carrying ore similar to that of the Crescent, which is pronounced by miners to be the vein. Shipments from the Apex will be begun in a short time.

The Samson has also developed into a mine, and shipments have already been made, but they were cut short by bad weather and roads.

WYOMING.

A letter written from Lewiston to the Salt Lake *Tribune* says that the principal mine in the camp, and, in fact, the only developed one at present, is the Bullion, about which much has been said, while outside of the immediate neighborhood comparatively little is known. With no development in reality worthy of mention, the Bullion shows a large body of ore. The only work done on the mine has been the uncovering of the ledge to the extent of eighty feet in width and 150 feet in length, and one shaft sunk to the depth of thirty-two feet with ore that distance; several small cuts and a few shafts ranging from six to fifteen feet have been run and sunk on the ledge, in order to ascertain the depth of the ore-body. The ten-stamp mill situated on the ledge started up in April. The ore run through was a lot of 60 tons, second-class ore, and the result was 43 ounces of gold, a yield (at the rate of $17.50 to the ounce) of about $12 to the ton.

An abundance of water is at hand, and large quantities of wood and coal easy of access can be had for fuel. Men looking for work by day's wages will find this the poorest camp for them on the coast; in fact, the only men here working for wages are late importations from the Black Hills.

The first extension east, known as the Arkansas, and owned by R. M. Ricketts, is prospected with favorable results. The second extension east, known as the Anaconda, has, snake-like, wound its way, till, distant from the Bullion 3000 feet, the owners have struck, at the depth of 40 feet, a five-foot vein of quartz.

Still farther east, is another claim, known as the Overland, which has been developed sufficiently to show it to be the same as the Bullion. The owners of the two last named contemplate the erection of a twenty-stamp mill very shortly. It is stated that negotiations for the same with Denver parties are now pending.

Still farther east, are several other claims, only one of which the writer has been enabled to get the name of, namely, the Comet, which is to be developed this spring.

Returning to the Bullion, we find the first extension west, known as the Bullion Extension. The owners are working it, and rumor has it that they have struck the Bullion ledge.

On the second extension west, known as the Midas, and the third west, known as the Dahlonega, no developments have been made.

One thing remarkable in regard to this section is the presence of placer gold, for miles in any direction, where there is any depression in the ground. For instance, a swale, or slight depression in the land, will be found the receptacle of placers in paying quantities. Many gulches have been worked out, and dirt carted for miles and sluiced with good results. Some have barely paid, while others have yielded an ounce to the man per day. Many will not pay. The Miner's Delight mine, the Camissa, in South Pass District, the Mary Ellen, in Atlantic District, and the Bullion and Anaconda, all known to be good properties, were discovered upon working placers until the ledge was found at the head of the gulches.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED APRIL 3D, 1883.

274,907. Kiln for Drying Bricks, etc. Cyrus Chambers, Jr., Philadelphia, Pa.
274,910. Kiln for Drying Brick, etc. Harvey Cockell, Chicago, Ill., Assignor to Cyrus Chambers, Jr., Philadelphia, Pa.
274,911. Metal-Working Plant. Arthur Cooper, Middlesborough, County of York, England.
274,956. Ore-Crusher and Pulverizer. Robert McCully, Philadelphia, Pa., Assignor of one fourth to the Gunsight Consolidated Silver Mining Company, of Arizona.
274,990. Self-Feeding and Smoke-Consuming Furnace. Lichfield Watton Sutcliffe, Birmingham, County of Warwick, Assignor of one half to William Edmund Parkes, Soho Hill, Handsworth, County of Stafford, England.
275,031. Pulverizing-Machine. Herman B. Feldmann, Philadelphia, Pa., Assignor of one half to Stephen P. M. Tasker, same place.
275,057. Miner's Candlestick. John C. Martin, Tuscarora, Nev., Assignor of one half to George T. Redsull and William W. Rogers, both of same place.
275,119. Puddling-Furnace. John Bergqvist, McKeesport, Pa., Assignor of one half to Charles Funke, same place.
275,224. Steam Stamp for Crushing Ore. Erasmus D. Leavitt, Jr., Cambridgeport, Mass.
275,232. Cupel-Furnace. John Lynch, Alleghany City, Pa.
275,272. Roasting and Reducing Furnace for Gold and Silver Ores. Jacob E. Rice, Twin Lakes, Colo.
275,325. Apparatus for Sizing and Amalgamating Precious Metals. Charles D. Bigelow, Brooklyn, N. Y.

GRANTED APRIL 10TH.

275,357. Dumping-Car. Nathan W. Condict, Jersey City, N. J.
275,371. Apparatus for Regulating the Flow and Delivery of Water through Canals, Flumes, and Water-Ways. James Emerson, Willimansett, Assignor of one half to the Holyoke Water-Power Company, Holyoke, Mass.
275,451. Smoke-Consuming Furnace. Christof Zacharias, Vienna, Austria-Hungary.
275,532. Dumping-Car. John Smith and John P. Rhodes, Rockville Center, N. Y.
275,566. Pulverizer. Henry Bailey, New York City.
275,574. Device for Feeding Air to Furnaces. William J. Bradshaw and William W. Cowley, Cleveland, O.
275,719. Crushing and Pulverizing Machine. Gideon Sibley, Philadelphia, Pa.
275,729. Apparatus for Treating Ores. Elijah W. Stoufer, Salida, Colo.

GRANTED APRIL 17TH.

275,805. Boiler Furnace. Hiram Cowell, Zanesville, O.
275,809. Ore-Concentrator. Patricio W. Duffield, New York City.
275,885. Hand Drilling-Machine. Jacob Cherney, Denver, Colo.
275,992. Apparatus for Casting Hollow Chilled Rolls. John M. Case, Columbus, O., Assignor to the Case Manufacturing Company, same place.
276,002. Coke-Oven. Brodie Cochrane, Durham, County of Durham, England.
276,018. Manufacture of Steel Castings. George W. Francis, Middletown, Conn.
276,074. Extracting Nickel from Ores. Jean P. Prat and Jules P. Laroche, Bordeaux, France.
276,086. Rolling-Mill. Thomas Shaffer, Phœnixville, Pa., Assignor to the Phœnix Iron Company, same place.
276,116. Apparatus for Pumping and Flowing Oil-Wells. Eli S. Williamson, Bradford, Pa.
276,143. Preparation and Production of Mineral Phosphates. John James Knight, Widnes, County of Lancaster, Assignor of one half to Thomas Leech, Hough Green, Ditton, England.
276,145. Pulverizing-Machine. T. Mallon Rogers, Philadelphia, Pa., Assignor of one half to Stephen P. M. Tasker, same place.

GRANTED APRIL 24TH.

276,147. Machine for Pulverizing Clay for Making Brick. William Andrus, Keokuk, Iowa.
276,181. Dry Ore Concentrator. Joseph Hubert, San Francisco, Cal.
276,222. Charcoal-Furnace. John Burt, Detroit, Mich.
276,228. Brick-Machine. Israel Cullen, Pittsburg, Pa.
276,384. Metallurgical Plant. Robert Forsyth, Chicago, Ill.
276,394. Pulverizing Apparatus. Amos E. Griffiths, Philadelphia, Pa.
276,418. Shoe and Die for Amalgamating Pans. Joseph S. Johnson and Melzar Osborn, Dos Cabezas, Ariz.
276,453. Manufacture of Steel. Harry M. Nichols, New York City.
276,504. Coke-Furnace and Apparatus connected therewith. Richard Thomas, Carbondale, Ill.
276,534. Ore-Separator. Benjamin Hershey and Charles A. Hitchcock, Erie, Pa., Assignors of one half to Joseph A. Ege and Benjamin F. Thornton, both of Bradford, Pa.; said Hershey Assignor of one twentieth to said Hitchcock.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, May 4.

There is no change from our last to note in the mining market. Business has been remarkably dull, and the dealings have been confined to a few low-priced fancies. Sonora Consolidated, the chief stock dealt in, has developed considerable weakness and closed weak to-day. Sierra Grande has also become quite weak under heavy transactions. Robinson Consolidated was active and steady. The remainder of the market was dull and of no interest. We give a complete summary below. The total sales of mining shares at all the Exchanges aggregates 240,374, as against 326,892 last week.

The Comstock shares have been quiet and strong. California was dealt in to the extent of 6200 shares at 22@25c. Consolidated Virginia records a small business at steady prices; it sold from 47@50c. Sierra Nevada, with a small business, was strong, selling from $3.30@$3.70. Union Consolidated was fairly dealt in at steady prices; it sold from $4@$4.50@$4.25. Mexican was quiet and steady, and sold from $2.75@$2.80. Yellow Jacket was very quiet, and sold at $4.50. Sutro Tunnel records a large business at steady prices; it sold at 21@20c.

The Leadville stocks were moderately dealt in, and were steady. Amie was quite active and steady, selling to the extent of 11,900 shares at 21@20c. Chrysolite records a fair business at steady prices, selling from $1@1.05. Hibernia sold at 4c. Iron Silver was quiet and steady, and sold at $2.90. Leadville Consolidated records a small business at steady prices; it sold from 68@70c. Little Chief was fairly dealt in, and was strong; it sold from 48@55c. Little Pittsburg was very irregular, under a moderate business, selling from 50@65@55c. Climax was quiet and steady at 8@10c.

The Bodie stocks were quiet and firm. Bodie Consolidated sold at $1.25@$1.20, with a small business. Standard was quiet and steady, selling from $6.50@$6.75. Bulwer records a small business, and was weak; it sold from 84@70c.

The Tuscarora stocks had a very small business, but were strong. Grand Prize continues strong, under a small business, selling from $1.15@97c.@$1.10. Argenta records a small business and was strong, selling from $1.16@$1.30. Navajo was quiet at strong prices, selling from $2 35@$2.65. North Belle Isle sold at 30c., with a business of 200 shares. Independence showed considerable strength, under a fair business, and sold from 53@67c. Elko Consolidated was very quiet, the assessment-paid shares selling at 19c., and the assessment-unpaid shares at 6@4s.

In the miscellaneous list, Alice was quiet and strong, selling at $3@$3.35. The Green Mountain stocks were almost neglected, Green Mountain alone being dealt in; it was quiet and irregular at 84@76@79c. Hall-Anderson was very actively dealt in at strong prices; it sold from $1.35@$1.60@$1.50. Horn-Silver had a fair business and was irregular, selling from $7.88@$7.25@$7.63. Northern Belle was steady under a small business, selling from $8.50@$8.75. Robinson Consolidated was actively dealt in at steady prices; it sold from 79@85c., closing to-day at the latter figure. Sierra Grande has been quite weak; under a large business, it sold from $1.75@$1.25, closing at $1.30, the transactions aggregating 12,100 shares.

Alta-Montana was active and steady at 4@3c. Bradshaw developed considerable strength, under a small business, and sold from 27@42c. Caledonia (B. H.) was irregular at 75c.@$1@70c. Central Arizona sold at 30c. Decatur was quiet and irregular, selling from 2@4c. Durango had a small business, and was weak; it sold from 8@5c. Harlem records a small business at steady prices, selling from $1.45@$1.50. Lacrosse was active and steady at 10@11c. Oriental & Miller was fairly dealt in at steady prices; it sold from 13@16@15c. Rappahannock was quiet and steady at 8@7c. Silver Cliff sold from 20@18c., the business being small. Sonora Consolidated had a very active business and was very weak; it declined from 86@45c., closing at the latter figure. South Pacific sold at 6@5c., with a business of 3600 shares. The State Line stocks were almost forgotten. Nos. 1 & 4 were dealt in to the extent of 100 shares at 2c., and Nos. 2 & 3 to the extent of 500 shares at 3c.

The American Mining Stock Exchange, after an existence of nearly three years, has closed up its affairs and exists no longer. The lease of its rooms ended May 1st. About forty of its members have joined the New York Mining Stock and National Petroleum Exchange. Mr. J. R. Mullany, Chairman of the Governing Committee, announces that the office of the Governing Committee will be, until further notice, at No. 63 Broadway, Room 14.

The trustees of the Caborca Mining Company have levied an assessment of ten cents per share on its capital stock, delinquent in San Francisco May 21st.

Thomas B. Pheby has been arrested in this city by a deputy-sheriff, on an order of arrest issued by Judge Sedgwick, and confined in Ludlow Street Jail in default of $20,000 bail. The order of arrest was granted on affidavits of the Inyo Consolidated Mining and Milling Company of California, charging Mr. Pheby with having appropriated $50,468.46 belonging to the company. The affidavits recite that Mr. Pheby was made superintendent of the company on September 6th, 1881, and that on October 4th his salary was fixed at $500 a month. He was to take charge of the mill and the work of reducing the silver ore to bullion which he was to sell for the company. On January 30th, 1882, he made a report that he had $10,872.92 on hand, above all the claims against the company. It is charged that he afterward abstracted twenty-five bars of bullion valued at $25,865.54. The mill and machinery were damaged by fire in December last, and Pheby is said to have received $33,500 of insurance money in settlement of the damage. He afterward came to New York, it is charged, with $70,238.46, and put in vouchers for expenditures amounting to $69,901.93. An examination has since shown, according to the affidavit, that the actual expenditure was only $19,770, and Pheby is said to have acknowledged the fact and to have promised to make restitution. Failing to do this, the suit was brought upon which the order of arrest was granted.

MEETINGS.

Auraria Gold Mining Company, No. 709 Eighth avenue, New York City. Annual meeting of stockholders and election of trustees, May 24th, at one o'clock P.M.

Leadville Consolidated Mining Company, No. 92 Broadway, New York City. Annual meeting of stockholders and election of Trustees, May 21st, at two o'clock P.M.

DIVIDENDS.

The Castle Creek Mining Company, of Idaho, has declared a dividend (No. 12) of three per cent on the capital stock, payable May 16th.

The Holyoke Mining Company, of Idaho, has declared dividend No. 8 of two per cent, payable May 12th.

The Horn-Silver Mining Company, of Utah, has declared a quarterly dividend (No. 9) of $300,000, payable May 15th. Transfer-books close May 7th, and reopen May 16th.

The Leadville Consolidated Mining Company, of Colorado, has declared a dividend (No. 7) of five cents per share, payable May 10th. Transfer-books close May 5th.

The Sierra Buttes Mining Company, of California, has declared its semi-annual dividend of twenty-five cents per share.

The Standard Consolidated Mining Company, of California, has declared its usual monthly dividend of twenty-five cents per share, payable on May 12th, at the Farmers' Loan and Trust Company.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
April	28....	$0.89	$0.89	$0.85⅝	$0.85⅝	2,490,000
	30....	.87	.90½	.86⅞	.89⅛	3,009,000
May	1.....	.90	.92¾	.89⅝	.92⅝	2,519,700
	2.....	.93⅛	.95⅛	.92¼	.92⅝	3,287,000
	3.....	.93⅝	.93⅝	.89¾	.92⅝	5,052,000
	4.....	.93⅜	.94	.92	.92⅛	1.628,000
Total sales.....						17,985,700

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been quite active this week, and prices have been strong. The Comstock shares show an improvement under large dealings. There is nothing of importance from the mines. The outside stocks have also been strong, with a good business.

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. April 27.	April 28.	April 30.	May 1.	May 2.	May 3.
Albion	..	..	..	1⅛	1⅛	1⅛
Alpha	..	1⅛	..	1⅛	1⅛	1⅛
Alta	..	3-16	¼	¼	5-16	13-32
Bechtel	..	..	..	..	..	..
Belcher	..	29-32	1	1	1⅛	1¼
Belle Isle	..	13-32	..	7-16	7-16	..
Best & Belcher	..	3⅜	3⅜	3⅜	3⅜	3¾
Bodie	..	1⅛	1¼	1⅛	1⅛	1¼
Bullion	..	..	..	..	..	..
California	..	¼	¼	..	¼	..
Chollar	..	..	..	..	..	..
Con. Virginia	..	7-16	7-16	½	½	½
Crown Point	..	..	1⅛	1⅛	1⅛	1⅛
Elko Cons	..	5-32	..	..	3-16	3-32
Eureka Cons	..	5½	..	..	..	..
Exchequer	..	..	5-16	5-16	5-16	5-16
Gould & Curry	..	2¼	2⅛	2¼	2¼	2⅛
Grand Prize	..	31-32	1¼	1⅛	1	1
Hale & Norcross	..	3¼	3¼	3⅜	3⅝	3⅝
Independence	..	½	..	19-32	21-32	¾
Martin White	..	..	5-16	5-16	5-16	5-16
Mexican	..	3	2¾	2⅞	2¾	2⅞
Mono	..	..	..	..	..	..
Mount Diablo	..	..	..	..	..	..
Navajo	..	2½	2¼	2⅝	2½	2½
Northern Belle	..	..	8⅝	..	8¾	8⅝
North Belle Isle	..	¼	11-32	..	..	..
Ophir	..	2⅛	2	2¼	2	2⅛
Overman	..	..	..	..	..	..
Potosi	..	1¼	1¼	1	1⅛	1¼
Savage	..	1⅞	1⅞	2	2	2
Scorpion	..	..	..	..	..	..
Sierra Nevada	..	2⅝	3⅛	3⅛	3⅜	3⅝
Silver King	..	..	10½	..	..	..
Tip-Top	..	13-16	13-16	..	..	1
Union Cons	..	4⅜	4¼	4¼	4⅛	4¼
Wales Cons	..	3-16	..	3-16	..	5-16
Yellow Jacket	..	3½	3½	4½	4⅛	5⅛

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 3.

The market for copper stocks the past week has ruled dull and lower, with the exception of Calumet & Hecla, which, owing to the firmness of ingot, has advanced several points, and possibly the expectation of an extra dividend during the coming year may have tended to help the advance. Quincy has been the weak point, and shows a decline of about $4, with a tendency to still lower figures. Osceola declined on small sales from $23½@$22. Atlantic sold at $11, a decline of $1 per share since last sale (April 3d). Franklin, dull, with no disposition to trade in the stock; a small lot sold at $10. Pewabic was dull but steady at $4. Calumet & Hecla opened at $230¼, a decline of $½ from last week's closing sale, further declined to $230, when a steady advance set in to $234, which was bid to-day with no stock offering. Quincy steadily declined from $44@$40¼, at which price it sold to-day, and closed at $40 bid. Among the low-priced stocks, we note sales of Huron at $1¼; National, at $1¼; both assessment ($1) paid. Allouez, $2. Ridge, 62½c. The rest of the list was neglected.

In silver stocks, Bonanza Development advanced from $1¾@$2½ on reports that the company had received an offer for a portion of its property, the sale of which would enhance the value of the stock. About 5000 shares changed hands. Catalpa, dull but steady at 62½@65c. Silver Islet has had another of its periodical awakenings, the stock suddenly jumping from $2½@$5½, assessment ($1) paid. Just why, is a mystery, as we can not learn that there is any improvement in the outlook of the mine to warrant the advance. Sullivan maintains the advance of last week at $1¼. San Pedro declined from 60@50c., with plenty of stock offering at the latter price.

About the usual amount of business has been transacted at the Mining Exchange, but the market lacks vigor, and there is no inducement to operate in the specialties listed at the Board. Empire declined to 19c. Bowman Silver sold at 16@17c. Massachusetts & New Mexico was dull at 9@10c.

3 P.M.—The market was dull this afternoon, with prices fairly steady. Bonanza sold at $2 7/16. Osceola declined to $21½. Quincy sold at $40¼. Silver Islet, $4¾. Closing prices: Allouez, $1½ bid. Atlantic, $10 bid. Bonanza, $2 7/16 asked. Calumet & Hecla, $234 bid, $235 asked. Catalpa, 67½@70c. Crescent, 25c. asked. Huron, $1½ bid. National, $1¼ bid. Quincy, $40¼ bid, $40½ asked. Sullivan, $1⅛ bid, $1¼ asked. San Pedro, 47½@50c.

BULLION MARKET.

NEW YORK, Friday Evening, May 4.

The silver market abroad and here continues in

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DIVIDEND-PAYING MINES.

	NAME AND LOCATION OF COMPANY.		CAPITAL STOCK.	SHARES. No.	SHARES. Par value.	ASSESSMENTS. Total levied to date.	ASSESSMENTS. Date and amount per share of last.			DIVIDENDS. Total paid to date.	DIVIDENDS. Date and amount per share of last.				HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. April 28. H.	April 28. L.	April 30. H.	April 30. L.	May 1. H.	May 1. L.	May 2. H.	May 2. L.	May 3. H.	May 3. L.	May 4. H.	May 4. L.	SALES.	
1	Alice s. c.	Mont	$10 000,000	400,000	$25	*				$400,000	Dec.	1881	.10	1									3.00		3.45	3.35	300	
2	Amie Con., s. L.	Colo.	5,000,000	500,000	10	*				305,000	May	1880	.10	2	.21	.20	.20		.21		.21		.20		.20		11,900	
3	Atlantic, c.	Mich	1,000,000	40,000	25	$230,000	Apl.	1875	$1.00	220,000	Feb.	1883	$2.00	3														B.
4	Argent, s	Nev.	10,000,000	100,000	100	250,000	Mar	1883	.25	40,000	Feb.	1880	.20	4					1.15						1.30	1.20	340	
5	Barbee & Walker, s.	Utah	1,000,000	00,000	10	*				60,000	Nov	1880	.10	5														
6	Bassick, G. S.	Colo.	10,000,000	100,000	10	*				125,000	Apl.	1883	1.00	6											9.00		710	
7	Belle Isle, S.	Nev.	10,000,000	100,000	100	65,000	May	1882	.10	300,000	Dec.	1879	.25	7														
8	Black Bear, G.	Cal.	3,000,000	3 1,000	100	15,000	Sept	1879	.50	8 9,000	Sept	1882	.30	8														
9	Belcher, G. S.	Nev.	10,400,000	104,000	100	2,588,000	Apl	1883	.25	15,397,000	Apl	1876	1.00	9														S.F.
10	Birdseye, G.	Cal.		15,000							Dec.	1882		10														
11	Bodie Con., G.	Cal.	10,000,000	100,000	100	175,000	Mch	1883	.50	1,295,000	Nov	1882	.20	11									1.25		1.20		1.05	S.F.
12	Bonanza Developm't	C & M	3,000,000	300,000	10					135,000	Oct.	1882	.15	12														
13	Boston & Mont, G.	Mont	2,000,000	200,000	10	*				310,000	Jan.	1883	.05	13														
14	Breece, S.	Colo	5,000,000	200,000	25	*				2,000	Feb.	1880	.01	14														P.
15	Bulwer, G.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	155,000	Apl.	1883	.05	15			.84		.78		.80				.75	.70	910	
16	California, G. S.	Nev.	54,000,000	540,000	100	746,000	Feb.	1883	.20	31,320,000	Dec.	1879	.50	16	.22		.23						.25		.25	.24	6,200	B.
17	Calumet & Hecla, C.	Mich	2,500,000	100,000	25					25,350,000	May	1883	5.00	17														
18	Carbonate Hill, S. L.	Colo.								40,000	May	1883	.05	18														
19	Carbon Con., S.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10	19														
20	Carolina Queen, C.	N. C.	200,000	100,000	2					4,000	Oct.	1882	.02	20														
21	Castle Creek, G.	Idah.	100,000	100,000	1					36,000	May	1883	.03	21														B.
22	Catalpa, S. L.	Colo.	3,000,000	3 0,000	10	*				210,000	Dec.	1882	.10	22														
23	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,670,000	Feb.	1883	3.00	23														
24	Christy, S.	Utah	6,000,000	60,000	100					90,000	Jan.	1883	.10	24														B.
25	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*				1 600,000	Dec.	1881	.50	25	1.00		1.05	1.00	1.05	1.00	1.05		1.05				3,000	
26	Con. Gold Mining, G.	Ga.	500,000	100,000	5	*				96,000	Apl.	1883	.04	26														S.F.
27	Con. Virginia, G. S.	Nev.	54,000,000	540,000	100	897,000	Aug	1882	.30	42,930,000	Aug.	1880	.50	27	.47		.50	.48	.50	.47			.50		.50		6,000	
28	Contention, S.	Ariz.	12,500,000	250,000	50					42,336,500	Apl.	1883	.25	28														
29	Copper Queen, C.	Ariz.	2,500,000	2 0,000	10					975,000	Apl.	1883	.50	29														S.F.
30	Crown Point, G. S.	Nev.	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,585,000	Jan.	1875	2.00	30														
31	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*				4900,000	Jan.	1883	.10	31														B.
32	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*				200,000	July	1881	07½	32														S.F
33	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	150,000	Mch	1883	1.00	4,767,500	July	1882	.25	33														
34	Evening Star, S. L.	Colo.	500,000	50,000	10	*				1,225,000	O t.	1882	.50	34														
35	Excelsior, G.	Cal.	10,000,000	100,000	100	300,000	Jan.	1882	1.00	875,000	Oct.	1880	.25	35														
36	Father de Smet, G.	Dak.	10,000,000	100,000	100					590,000	Apl.	1883	.20	36														
37	Franklin, C.	Mich		54,000		360,000	Jun	1877		240,000				37														
38	Freeland, S.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.25	38														
39	Fresno Enterprise, G.	Cal.	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10	39														S.F.
40	Gem S.	Colo	125,000	125,000	1					21,250	Mch	1883	.02	40														S.F.
41	Glass-Pendery, S. L.	Colo.	5,000,000	50,000	20					25,000	May	1881	.10	41														
42	Glen, S.	Colo.	100,000	100,000	1					6,000	Mch	1883	.01	42														
43	Gould & Curry, G. S.	Nev.	10,000,000	108,000	100	3,476,000	Sept	1882	.50	3,826,000	Oct.	1870	10 00	43														S.F.
44	Grand Central, S.	Ariz.	1,000,000	10 ,000	10					625,000	Dec.	1882	.25	44														
45	Grand Prize, S.	Nev.	10,000,000	100,000	100	445,000	Mch	1883	.25	450,000	Sept	1880	.25	45	1.15	1.10	1.10	.97	1.10		1.10						1,350	
46	Granite, S.	Colo	125,000	125,000	1					5,000	Mch	1883	.01	46														
47	Great Eastern, G.	Dak.	3 0,000	300,000	1	*				16,000	July	1880	.01	47														
48	Great Western, Q.	al.	5,000,000	50,000	100	35,500	Aug	1873	.15	262,500	Oct.	1882	.25	48														
49	Green Mountain, G.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	07½	49	.84		.76								.80	.78	3,100	
50	Hale & Norcross, G. S	Nev.	11,2 0,000	112,000	100	4,006,000	Sept	1882	50	1,598,000	Apl	1871	5.00	50														
51	Hall-Anderson, G.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.05	51	1.50	1.35	1.50		1.60	1.40	1.55	1.45	1.55	1 45	1.60	1.50	14,300	
52	Hecla Con., S.	Mont	1,500,000	30,000	50					432,500	May	1883	50	52														S.F.
53	Henriett, L.	Colo.		270,000		*				27,000	Feb.	1883	.10	53														B
54	Hibernia, S. L.	Colo.	7,500,000	300,000	25					180,000	July	1881	.40	54									.04				100	
55	Holyoke, G.	Idah.	200,000	200,000	1					29,000	May	1883	.02	55														
56	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	1,992,500	Apl.	1883	.40	56													150	
57	Hope, S.	Mont	400,000	8,000	50	*				91,124	Mch	1883	1.50	57														
58	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				2,300,000	May.	1883	.75	58	7 88	7.50	7.75		7.75		7.75		7.63	7.50	7.75	7.25	3,670	
59	Hukill, G. S.	Colo	1,000,000	200,000	5	*				210,000	Dec.	1878	.10	59											.12		200	
60	Idaho, G.	Cal.	310,000	3,100	100					3,350,750	Apl.	1883	2.50	60														
61	Independence, S.	Nev.	1 ,000,000	100,000	100	215,000	Mch	1883	.30	225,000	Sept	1879	.25	61	.55	.53							.60		.67	60	2,500	
62	Indian Queen, S.	Nev.	250,000	125,000	2					365,000	Nov	1882	02	62														B.
63	Inyo, G.	Cal.	500,000	100,000	5	*				45,000	Apl.	1882	.05	63														
64	Iron-Silver, S. L.	Colo	10,000,000	500,000	20	*				1,000,000	Mch	1883	.20	64	2.90		2.90				2.90		2.90				1,900	S.F.
65	Jocuistitta, S.	Mex.	10,000,000	100,000	100					8 0,000	Feb.	1883	.50	65														
66	Kentuck	Nev.	3,000, 00	30,000	100	342,000	Nov	1881	.30	1,255,000	Apl.	1883	.10	66														
67	La Plata, S. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30	67														E.
68	Leadville, S. L.	Colo	4,0 0,000	400,000	10	*				290,000	May	1883	.05	68													1,000	
69	Leeds, S.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15	69														S.F.
70	Little Chief, S. L.	Colo	10,000,00	200,000	50	*				700,000	Aug.	1880	.50	70	.50	.48	.51	.50	.52				.55		.55	.54	6,000	
71	Little Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*				1,050, 00	Mch	1880	.50	7			.55	.50	.65				.55				630	
72	Marguerite, G.	Cal.	500, 00	23,000	20					18 750	Oct.	1882	.25	7														S.F.
73	Martin White, S.	Nev.	10,000,00	100,000	100	675,000	Mch	1883	.25	90,000	July	1879	30	73														B.
74	Minas Nuevas, S.	Mex	300,000	100,000	3	*				20,000	July	1882	.10	74														
75	Morning Star, S. L.	Colo.	1,000,000	100,000	10					565,000	Dec.	1882	.25	75														
76	Napa, Q.	Cal.	700,000	100,000	7					290,000	Jan.	1883	.10	76														
77	Navajo, G. S.	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	200,000	Apl.	1883	.25	77	2.35		2.40	2.35					2.65				700	
78	New York Hill, G.	Cal.	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10	78														
79	New York & Colo., G.	Colo.	1,25 ,000	50,000	25					25,000	July	1879	.10	79														
80	Northern Belle, S.	Nev.	5,0 0,000	50,000	100					2,400,000	Apl.	1883	50	80					8.75				8.50		8.75		350	B.
81	North Bell Isle, S.	Nev.	10,000,000	100,000	100	75,000	Nov	1882	.20	30,000	Aug.	1881	.15	81			.30		.30								200	
82	Ontario, S. L.	Utah	15,000,000	150,000	100					4,925,000	Jan	1 83	.50	82							26.00	25.38			25.87	25.50	335	
83	Ophir, G. S.	Nev.	10,000,000	100,000	100	3,495,000	Dec.	1882	1 00	1,595,000	July	1882	1.00	83														B.
84	Osceola, G.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	895,000	Mch	1883	1 00	84														
85	Oxford, G.	N. S.	100,000	100,000	1	*				10,000	Apl.	1883	.05	85														
86	Pleasant Valley, G. S.	Cal.	10,000,000	100,000	100					30,000	Dec.	1882	05	86														S.F.
87	Polonia, S.	Colo.	200,000	8,000	25					12.000		1882	1.50	87														
88	Prussian, S. L.	Colo	1,500,000	150,000	10					132,000	Jan	1883	.10	88														
89	Quicksilver, pref, Q	Cal.	4,300,000	43,000	100					654,000	July	1882	6.00	89							43.50						200	P.
90	" com., Q	al.	5,700,000	57,000	100					151,000	July	1882	.40	90									8.69	8 50			1,100	
91	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,570,000	Feb.	1883	6.00	91														S.F.
92	Renfrew, G.	N. S.	60,000	30,000	2					4.800	July	1882	20	92														
93	Richmond, S. L.	Nev.	1,350,000	54,000	25	*				3,907,587	Jan.	1883	2.50	93														E.
94	Rising Sun, S.	Dak.	750,000	150,000	5	*				52,000	May	1881	07½	94														
95	Robinson Bar, G.	Idah.	100,000	100,000	1	*				9,000	Dec.	1882	.03	95														
96	Robinson Con, S. L.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50	96	.83	.79	.83	.81	.83	.82	.84	.79	.85	.83	.86	.84	18,900	
97	Robert E Lee, S. L.	Colo.	250,000,000	500,000	500					100,000	Dec.	18 2	.10	97														E.
98	San Francisco, C.	Cal.		50,000						25,000	Jan.	1883	.05	98														
99	Savage, S.	Nev.	11,20 ,000	112,000	100	5,484,000	Nov	1882	.50	4,460,000	July	1869	3.00	99														B.
100	Shoshone, G.	Idah.	150,000	150,000	1					7.5 0	Apl.	1883	.01	100														
101	Sierra Buttes, G.	Cal.	225,000	22,500	10					1,485,308	Apl.	1883	.25	101														S.
102	Sierra Grande, S.	N. M.	10,000,000	400,000	25					600,000	Apl.	1883	.25	102	1.75		1.75		1.65		1.55	1.50	1.50	1.40	1.35	1.25	12,100	
103	Sierra Nevada, G. S.	Nev.	10,000,000	100,000	100	5,250,000	Mch	1883	1.00	102,000	Jan.	1871	1.00	103			3.30				3.55		3.70				450	B.
104	Sta Pmas Euroka, G	Cal.		40,625							Apl.	1883		104														B.
105	Silver King, S.	Ariz.	1,000,000	100,000	100					1,225,000	Apl.	1883	.25	105			10.50								10.75		400	S.F.
106	Silver King, S.	Colo.	1,000,000	500,000	2					50,000	Aug.	1881	.10	106														
107	Smuggler, S. L.	Colo.	600,000	6 ,000	10					27,000	Mch	1883	.10	107														
108	Socorro, G.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾	108														B.
109	Spring Valley, G.	Cal.	2 0,000	200,000	1	*				50,0 0	Jan.	1881	.25	109														
110	Standard, G. S.	Cal.	10 000,000	100,0 0	100					4,150,000	May	1883	.25	110			6.75	6.50					6.50		6.75		220	
111	Stormont, S.	Utah	200,000	2 0,0 0	1	*				155,000	Nov	1881	.05	111														
112	St. Joseph, L.	Mont	1,000,00	100,000	10	*				390,000	Dec.	1882	.20	112														
113	Tip Top, S.	Ariz.	10,000,000	100,0 0	100	195,000	Mch	1883	.25	100,00	Nov	1881	.20	113														
114	Tombstone, G. S.	Ariz	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10	114														B.
115	United Gregory, G.	Colo	300,000	300,000	1					26,250	Oct.	1882	.50	115														
116	United Gold Min. Co.	Colo.									Oct.	1883	.05	116														
117	Vizina, S.	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1882	.10	117														E.
118	Yellow Jacket, G. S.	Nev.	12,000,00	12 ,000	100	5,368,000	Feb.	1882	1.00	2,184,000	Aug.	1871	1.50	118									4.50			4.50	25	B.
119	Yuba, G.	Cal.	5,000,000	200,000	25					4,000	Sept	1881	1.00	119														

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ This company, as the Western, up to December 10th, 1881, paid $1,475,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British mines. Dividend shares sold, 100,415.

he nominal condition which has been noted by us for he last fortnight.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Apl. 28.	50⅜	109¾	May 2..	50⅜	109⅝
30.	50⅜	109⅝	3..	50⅜	109¾
May 1..	50⅜	109¾	4..	50⅜	109⅝

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended May 4th, as compiled from various sources, amounted to $130,000, as against $286,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,679,713.53.

METALS.

NEW YORK, Friday Evening, May 4.

Copper.—There have been sales of copper other than Lake as low as 14⅛c. and upward to 14½c., the cheap lots being temporarily cleared out of the market. We quote 14⅜@15¼c. as the range of the different brands, and 15⅛@16c. for Lake, of which there is little in the market, 15¾c. having been bid in vain for large lots.

We may note here that contracts have been closed in England for the purchase of several thousand tons of high-grade ore from the Anaconda mine, of Butte City, Montana.

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NON-DIVIDEND-PAYING MINES.

	NAME AND LOCATION OF COMPANY.		CAPITAL STOCK.	SHARES. Number.	SHARES. Par Value.	ASSESSMENTS. Total levied to date.	ASSESSMENTS. Date and amount per share of last.			HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. April 28. H.	April 28. L.	April 30. H.	April 30. L.	May 1. H.	May 1. L.	May 2. H.	May 2. L.	May 3. H.	May 3. L.	May 4. H.	May 4. L.	SALES.	†
1	Advance M & M. Co.									.20	.18	.19	.18	....	....	....	.	....	....	....	....	500	
2	Albion, S. L.	Nevada	$15,000,000	150,000	$100	$547,500	March	1883	.50	....	....	.50	....	..	....	....	....	....	....	....	....	100	S. F.
3	Allouez, C.	Michigan	2,000,000	80,000	25	200,000	January	1883	....	....	....	....	....	....	....	....	....	....	....	....	....		B.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.5	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	2,112,090	April	1883	.25	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
6	Alta-Montana, G. S. L.	Montana	5,000,000	500,000	10					.01	....	....	....	.04	....	.04	....	....	....	.04	.03	15,000	
7	American Flag, S.	Nevada	5,000,000	200,000	25					....	....	....	....	....	....	....	....	....	....	....	....		
8	Barcelona, G.									....	....	....	....	....	....	....	....	....	....	....	....		
9	Battle Creek									....	....	....	....	....	....	....	....	....	....	....	....		
10	Bear Creek	California	300,000	300,000	1					....	....	....	....	....	....	....	....	....	....	....	....		
11	Beauce									....	....	....	....	....	....	....	....	....	....	....	....		
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
13	Best & Belcher, G. S.	Nevada	10,080,000	100,800	100	1,345,790	November	1882	.50	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*				....	....	....	....	....	....	....	....	....	....	....	....		
15	Black Jack, G.	California	250,000	100,000	2½					....	....	....	....	....	....	....	....	....	....	....	....		
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*				....	....	....	....	....	....	....	....	....	....	....	....		
17	Bonanza King, G. S.	California	1,000,000	10,000	100	*				....	....	....	....	....	....	....	....	....	....	....	....		
18	Bondholder	Colorado	500,000	200,000	2½				.25	....	....	....	....	....	....	....	....	....	....	....	....		
19	Bonson Con., G.	California	10,000,000	100,000	100	9,000	October	1882	....	....	....	....	....	....	....	....	....	....	....	....	....		
20	Boulder Con.	Colorado								....	....	....	....	....	....	....	....	....	....	....	....		
21	Bradshaw, S.	Arizona	2,250,000	225,000	10					.28	....	....	....	.27	....	.32	.30	.40	.38	.42	.40	4,600	
22	Buckeye	Colorado	2,000,000	400,000	5	*				.02	....	....	....	....	....	....	....	....	....	....	....	100	
23	" preferred	Colorado								....	....	....	....	....	....	....	....	....	....	....	....		
24	Bull Domingo, S. L.	Colorado	10,000,000	200,000	50	*				....	....	....	....	....	....	....	....	....	....	....	....		
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,747,000	October	1882	.50	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*				.01	....	.01	....	..	....	....	....	....	....	....	....	200	
27	Calaveras, G.	California	500,000	500,000	1	*				....	....	....	....	....	....	....	....	....	....	....	....		
28	Cal. W'r & M. Co., G.	California								....	....	....	....	....	....	....	....	....	....	....	....		
29	Caledonia, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15	....	....	.75	....	....	....	....	....	....	....	1.00	.70	199	
30	Catskill, S.	Nevada	1,500,000	30,000	5					....	....	....	....	....	....	....	....	....	....	....	....		
31	Central Arizona, S.	Arizona	10,000,000	100,000	100					....	....	....	....	....	....	....	....	.30	....	....	....	100	B.
32	Chapparal	California								....	....	....	....	....	....	....	....	....	....	....	....		
33	Cherokee, G.	California	1,500,000	150,000	10					....	....	....	....	....	....	....	....	....	....	....	....		
34	Chollar, S.	Nevada	11,200,000	112,000	100	521,000	March	1883	.50	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
35	Climax									.09	.08	.10	....	....	....	....	....	....	....	....	....	1,100	
36	Colorado Central, S.	Colorado	3,000,000	300,000	10					....	....	....	....	....	....	....	....	....	....	....	....		
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50					....	....	....	....	....	....	....	....	....	....	....	....		
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,425,000	January	1882	.10	....	....	....	....	....	....	....	....	....	....	.07	....	1,000	
39	Con. Pacific, G.	California	6,000,000	60,000	100	150,000	March	1883	.15	....	....	....	....	....	....	....	....	....	....	....	....		
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*				....	....	....	....	....	....	....	....	....	....	....	....		B.
41	Crowell, G.	North Car.	500,000	500,000	1					....	....	....	....	....	....	....	....	....	....	....	....		
42	Dahlonega, G.	Georgia	250,000	250,000	1	*				.04	....	....	....	....	....	....	....	....	....	....	....	1,200	
43	Dardanelles, G.	California	1,000,000	100,000	10					....	....	....	....	....	....	....	....	....	....	....	....		
44	Decatur									.09	.02	.04	.03	....	....	....	....	.03	....	.04	....	4,000	
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*				....	....	....	....	....	....	....	....	....	....	....	....		
46	Durango, G.	Colorado	500,000	500,000	1	*				.05	....	.08	.05	.07	....	.07	....	.05	....	....	....	3,800	
47	Eastern Oregon									....	....	....	....	....	....	....	....	....	....	....	....		
48	Elko Con., S.	Nevada					April	1883	.15	.06	....	.06	....	.04	....	....	....	.19	....	.19	....	3,900	
49	Empire, S.	Utah	10,000,000	100,000	100					....	....	....	....	....	....	....	....	....	....	....	....		B.
50	Enterprise	Colorado								.28	.24	.25	....	....	....	....	....	....	....	....	....	400	
51	Exchequer	Nevada	10,000,000	100,000	100	630,000	January	1882	.3	....	....	....	....	....	....	....	....	....	....	....	....		
52	Fannie Barret, S.	Colorado								....	....	....	....	....	....	....	....	....	....	....	....		
53	Globe Copper	Arizona								....	....	....	....	....	....	....	....	....	....	....	....		
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*				....	....	....	....	....	....	....	....	....	....	....	....		
55	Goodshaw, G.	California	10,000,000	100,000	100	200,000	October	1882	.10	....	....	....	....	....	....	....	....	....	....	....	....		
56	Granville, G.	North Car.	300,000	300,000	1	*				....	....	....	....	....	....	....	....	....	....	....	....		
57	Harlem M. & M. Co, G.	California								1.50	1.45	1.45	....	1.50	1.45	....	....	....	....	....	....	1,500	B.
58	Harshaw, S.	Arizona	10,000,000	100,000	100					....	....	....	....	....	....	....	....	....	....	....	....		
59	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20	....	....	....	....	....	....	....	....	....	....	....	....		
60	Hortense, S.	Colorado	2,000,000	200,000	10					....	....	....	....	....	....	....	....	....	....	....	....		
61	Julia, G. S.	Nevada	11,000,000	110,000	100	1,405,000	April	1883	.10	....	....	....	....	....	....	....	....	....	....	....	....		
62	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15	....	....	....	....	....	....	....	....	....	....	....	....		
63	Lacrosse, G.	Colorado	1,000,000	100,000	10	*				....	....	.10	....	.11	.10	.10	....	.10	....	.11	....	5,000	
64	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25	....	....	....	....	....	....	....	....	....	....	....	....		
65	Lucerne, S.	Colorado	5,000,000	500,000	10	*				....	....	....	....	....	....	....	....	....	....	....	....		
66	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881	....	....	....	....	....	....	....	....	....	....	....	....	....		
67	" common, G.	California	10,000,000	100,000	100	1,975,000	February	1883	.25	....	....	....	....	....	....	....	....	....	....	....	....		
68	May Belle, G.	California	10,000,000	100,000	100	34,000	December	1881	.20	....	....	....	....	....	....	....	....	....	....	....	....		
69	Mayflower, S.	Colorado	10,000,000	100,000	100	*				....	....	....	....	....	....	....	....	....	....	....	....		
70	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,269,000	February	1883	1.00	....	....	2.80	....	....	....	....	....	2.80	2.75	....	....	135	S. F.
71	Michoacan Synd.	Mexico								....	....	....	....	....	....	....	....	....	....	....	....		
72	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*				....	....	.01	....	....	....	....	....	....	....	....	....	100	
73	Miller	Nevada	5,000,000	200,000	25					....	....	....	....	....	....	....	....	....	....	....	....		
74	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
75	Moose Silver, S.	Colorado	3,000,000	300,000	10	*				....	....	....	....	....	....	....	....	....	....	....	....		
76	Moulton, G. S.	Montana	10,000,000	400,000	25	*				....	....	....	....	....	....	....	....	....	....	....	....		
77	Nevada Syndicate									....	....	....	....	....	....	....	....	....	....	....	....		
78	North Standard, G.	California	10,000,000	100,000	100	20,000	November	1881	.10	....	....	....	....	....	....	....	....	....	....	....	....		
79	North Horn-Sil., S. L.	Utah		400,000						....	....	....	....	....	....	....	....	....	....	....	....		
80	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
81	Old Dominion, C.	Arizona	20,000,000	200,000	100	*				....	....	....	....	....	....	....	....	....	....	....	....		
82	Oriental	Nevada	2,000,000	200,000	10					....	....	....	....	....	....	....	....	....	....	....	....		
83	Oriental & Miller, S.	Nevada	10,000,000	400,000	25					....	....	.14	.13	.14	....	.15	....	.16	.15	.15	....	9,500	
84	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
85	Potosi	Nevada	10,200,000	112,000	100	528,640	March	1883	.25	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
86	Quartz Creek				100					....	....	....	....	....	....	....	....	....	....	....	....		
87	Rappahannock, G.	Virginia		250,000		*				.07	....	.07	....	.08	....	....	....	.07	....	....	....	2,700	
88	Red Elephant, S.	Colorado	500,000	500,000	1	*				....	....	....	....	....	....	....	....	....	....	....	....		
89	Retort M. & M. Co.	Colorado			10					....	....	....	....	....	....	....	....	....	....	....	....		
90	San Pedro, G. S. L.	New Mex.		400,000						....	....	....	....	....	....	....	....	....	....	....	....		
91	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*				....	....	....	....	.20	....	....	....	.18	.	....	....	200	B., P.
92	Silver Islet	Canada	1,000,000	40,000	25					....	....	....	....	....	....	....	....	....	....	....	....		
93	Sonora Con.	Mexico								....	....	....	....	....	....	....	....	....	....	....	....		
94	South Bodie, G.	California		100,000		100,000	March	1882	.15	....	....	....	....	....	....	....	....	....	....	....	....		
95	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25	.85	.84	.86	.83	.83	.79	.79	.76	.75	.50	.50	.45	48,400	
96	South Hite	California	10,000,000	100,000	100		January	1883	.05	....	....	....	....	....	....	....	....	....	....	.45	....	2,500	
97	South Pacific	California			5					.05	....	.06	.05	....	....	.05	....	.05	....	.05	....	3,600	
98	State Line, No. 1, S.	Nevada	200,000	200,000	1					....	....	....	....	....	....	....	....	....	....	....	....		B.
99	" No. 2, S.	Nevada	5,000,000	20,000	25					....	....	....	....	....	....	....	....	....	....	....	....		
100	" No. 3, S.	Nevada	5,000,000	200,000	25					....	....	....	....	....	....	....	....	....	....	....	....		
101	" No. 4, S.	Nevada	5,000,000	200,000	25					....	....	....	....	....	....	....	....	....	....	....	....		
102	" Nos. 1 and 4, S.	Nevada			25					....	....	.02	....	....	....	....	....	....	....	....	....	100	
103	" Nos. 2 and 3, S.	Nevada								....	....	....	....	....	....	....	....	....	....	.03	....	500	
104	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25	....	....	....	....	....	....	....	....	....	....	....	....		
105	Sutro Tunnel	Nevada		2,000,000						.20	....	.21	.20	.21	.20	.20	....	.20	....	.20	....	27,700	B.
106	Taylor-Plumas	California			10					.17	....	.17	.16	....	....	....	....	....	....	....	....	600	B., P.
107	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10	....	....	....	....	....	....	....	....	....	....	....	....		
108	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15	....	....	....	....	....	....	....	....	....	....	....	....		
109	Unadilla, S.	Colorado	50,000,000	500,000	100	*				....	....	....	....	....	....	....	....	....	....	....	....		
110	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,570,000	January	1883	1.00	4.00	....	4.50	4.20	4.50	....	....	....	4.25	....	4.25	....	1,195	
111	Utah, S.	Nevada	2,000,000	20,000	100	1,380,000	February	1883	1.00	....	....	....	....	....	....	....	....	....	....	....	....		S. F.
112	Vandewater	Nevada	20,000,000	200,000	100	*				....	....	....	....	....	....	....	....	....	....	....	....		
113	Washington	Arizona	2,000,000	200,000	10					....	....	....	....	....	....	....	....	....	....	....	....		
114	Whalen Copper	Nevada	2,500,000	100,000	25					....	....	....	....	....	....	....	....	....	....	....	....		
115	Wide West									....	....	....	....	....	....	....	....	....	....	....	....		
116	Willshire	California	250,000	50,000	5	*				....	....	....	....	....	....	....	....	....	....	....	....		

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F., San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 139,929. Total shares sold, 240,374.

England cables £62 for Chili Bars, and £69 for Best Selected.

Messrs. Vivian, Younger & Bond, of London, under date of April 19th, quote ores and regulus, Liverpool or Swansea, 12s. 3d.@12s. 9d.

Messrs. J. Berger Spence & Co., of Manchester, report the price of cupreous pyrites 6d. per unit, and non-cupreous 7d. per unit of sulphur.

Tin.—Business in spot lots has been restricted, while there has been considerable speculative purchasing. The metal appears to be in a sound condition. We quote Straits, spot, 21¼c. cash, round lots; Australian, 21⅜c.; and Lamb & Flag, 21⅞c. England cables £95 5s@£95 15s.

Lead.—A large business has been done at steadily declining prices. Beginning with sales of 500 tons at 4·55c., sales followed of 900 tons at 4·50c., 800 tons at 4·45c., and 400 tons at 4·42½c., Common and Refined, for May, June, and July delivery. Nine hundred tons more were offered at 4·42½c., but found no buyers, and subsequently a sale was made of 100 tons July delivery at 4·40c., with some bidding at that figure. The great bulk of this lead was Pittsburg and Aurora desilverized, only a few hundred tons being Pueblo and Germania. It was distributed among at least a dozen buyers, the bulk going to the trade, which is now pretty fully supplied. The stock of the Richmond Company, and the lead in the West at the large works, were not touched, which leaves a visible supply of

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nearly 10,000 tons, with a very restricted market in the East. At the close, lead is dull at 4·40c. for Common and 4·45c. for Refined.

Messrs. John Wahl & Co., of St. Louis, wire us as ollows to-day:

Our market has declined slowly since our last report. There are more sellers than buyers in the market, and hence prices are weak. We quote Refined 15@4·20c., and Hard lead nominally 4·10c.

From Chicago, Messrs. Everett & Post wire us as ollows to-day:

Our market is weak and dull. Sales during the week aggregate 500 tons at 4·25@4·20c. The market closes very quiet at nominally 4·20c.

Freights from Chicago are 23c. per 100 pounds.

Spelter.—This metal is dull, and is offered here from the West at 4·65@4·80c., according to brand.

Antimony.—Hallett's is firm at 9¾@9⅞c., round lots, while Cookson's is weak at 10¾@10⅞c.

Quicksilver.—The market is flat and devoid of all animation, quotable at 35@35½c. per flask.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 4.

American Pig.—The recent decline in quotations has had the effect of bringing out a few buyers, who feel safe in at least covering immediate requirements. They seem, however, generally to hold the opinion that something may be gained by holding off for a while to await developments, in the hope that even the unfavorably located furnaces will not give up without a struggle, and that some accumulated stocks may be thrown on the market. We have evidences that such has been the case with some of the furnaces in this State which have been selling iron recently at low figures. It will take some time before the situation is clear, and not until an actual turn begins to show will buyers come forward with any confidence, probably at too late a time then. We quote No. 1, $21.50 @$22.50; No. 2, $19.50@$20; and Gray Forge, which is comparatively in a strong position, $18@$19. There is very little doing in Bessemer pig, $21.50@$22 being asked for foreign at tidewater, while we hear of offerings of American at furnace in Pennsylvania at little less than $19. A fair trade is done in spiegeleisen of the higher grade at $32. Lower grade spiegel is neglected at $26.

Scotch Pig.—The arrivals appear heavy from the fact that the Anchor line put on two extra steamers. They foot up to 2000 tons this week. Steamer freights from Glasgow are firmer, being quoted 5@6s. The business during the week has been very small, and the market is dull at the following quotations: Coltness, $24@$24.50, ex ship; Glengarnock, $22 asked; Eglinton, $21@$21.25; and Summerlee, $24@$24.25. The last cable quotations at the New York Exchange are, May 2d: Eglinton, 49s. at Ardrossan; Glengarnock, 54s. 6d. at Ardrossan; Summerlee, 60s. f.o.b. Glasgow; Gartsherrie, 69s. 6d. f.o.b. Glasgow: Langloan, 68s. f.o.b. Glasgow; Coltness, 62s. 6d. f.o.b. Glasgow. Warrants were 47s. 4d.

Rails.—Business has been small, sales aggregating 10,000 to 12,000 at mill, at $38. Eastern mills are now well supplied for summer delivery, and are in the market only for partly August and fall delivery. England cables £4 17s. 6d.@£5.

Old Rails.—There is no business of importance to report, and quotations remain $23.50@$24 for Ts.

Scrap.—Scrap is without feature. We quote $25 nominally, ex ship.

Philadelphia. May 4.

Pig-Iron.—The outcome of the reduction announced last week in crude iron has been thus far in favor of a greater volume of business. The impression gains ground that the purpose of these reductions is two-old. First, to restrict the surplus output to actual quirements, and second, to induce buyers to come in and cover requirements. This wise policy is bringing about the intended result, and already a few furnaces have gone out of blast, and others will follow in a short time. Quotations for Foundry iron are given at $20@$22, for standard brands; but these figures are shaded for brands less well known, and the volume of business since Monday shows that consumers admit that these are the lowest prices likely to be reached. Some large transactions have been closed and others are on their way. Notwithstanding the low prices, however, the full requirements of the trade will not be filled because of fresh uncertainties likely to arise. A great deal of caution is exhibited; but as it is improbable that lower prices will prevail, consumers feel safe in taking care of from one to two months' production. The lowest prices for fair iron were $19.50@$21.50. Forge iron has been moving with a little more freedom of late, and at prices ranging from $17.50@$19 at furnace. Bessemer Iron is quoted to-day at $22@$22.50, with offers at $21, which is about the best that can be expected until the market settles. Spiegeleisen is in negotiation at $32.50. Scotch iron would sell at $24 for Coltness; $21.50 for Glengarnock.

Muck Bar.—Transactions in Muck Bar were closed at $34.50 for ordinary. Sales of Charcoal Blooms were made at $64 for better qualities, and $62 for common. A few lots of Anthracite were disposed of at $53.50@$55. There is less inquiry, and a further weakness is probable.

Merchant Iron is feverish and fluctuating between 2@2·25c., according to make and size of order. There is more movement in the market, both here and in the interior, because supplies in consumers' hands have reached very low limits. There will be no great activity until affairs in the Western end of the State are settled; and from present indications, they will be settled in a manner which will improve the market for finished iron and depress prices for crude. A few round lots of Bars were sold at 2·15c. for June delivery, which is about the best figure in a large way. Country mills have secured a few orders for ordinary iron at 1·85c.

Nails.—The active demand for nails which has been heretofore reported continues, and prices range from $3 in car-load lots to $3.25 in jobbing lots, with an active inquiry and steady demand. Building operations have taken a fresh start, and the stock of nails will be depleted if inquiries in hand result in business, as is most probable. A half-dozen fair-sized orders for structural iron were placed at shadings from recent quotations. Retail lots move at 2½c. for Angles and 3½c. for Beams and Channels.

In *Plate and Tank*, there has been a little activity, but not as much as is necessary to prevent buyers of large lots obtaining concessions. Prices have no very well-defined limits.

Steel Rails.—This week's transactions in Steel Rails in various Bessemer mills are large in bargain at about $39. A number of small transactions were closed at $39.50@$40. Steel rail makers are satisfied with the present turn of the market, and are confident that no further depression in prices will take place.

Old Rails are quoted at $24 for Tees and $27.50 for Double Heads. There are several inquiries in hand; but the offers are about a dollar below asking prices, and hence only occasional small lots change hands.

In *Scrap-Iron*, a dozen small transactions have taken place at yards at about $26@$26.50 for No. 1. Cast is moving slowly at $18@$19. Stocks are large.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 4.

Anthracite.

Coal in its last issue reviews the situation as follows:

The anthracite coal trade is in a demoralized condition. Individual operators and middlemen who must keep coal moving are selling at very low figures, which but very few buyers avail themselves of to cover any thing beyond immediate requirements. At no time has the policy of abstaining from any thing like purchases for the future been so general. Buyers have learnt a good deal during the past few years, and are not as willing to accept the fact that an entire year's prices are practically to be mapped out for them. This year, they are general in holding the opinion that a "break" must come. While recognizing the force of some of the arguments advanced in favor of this view, it must not be forgotten that the position of the companies is different now from what it has been in past years. They are financially much stronger, and can not be forced to market their coal at any price, to meet fixed charges and current expenditures. They are able and apparently willing to check overproduction; and from their point of view, it is better to mine and carry a smaller amount of coal and make a good profit than to allow the market to get beyond all control by a struggle for placing a large tonnage.

It is conceded that, with due allowances for the fact that the consumers and dealers are lightly stocked, the demand is not as good in many quarters as it has been, while, on the other hand, the output is large. The manufacturing industries are not doing well, and have become very cautious buyers, having besides, in their favor, low prices of soft coals. Notwithstanding all this, the position is not as desperate as many seemed ready to believe. The important point, and one upon which the happenings of the next few weeks will throw ample light, is the development of the Western trade. Should there be room for all, as there is reason to believe, then the companies may be strengthened in their position and buyers may find that they have made a serious mistake.

The only point on which we would dwell in addition to the above is, that the doings of the individual operators appear to be creating a feeling of irritation on the part of the leading companies, which may lead to some movement to check their plan of constantly sailing a little closer to the wind than the companies.

Bituminous.

The trade continues in a demoralized condition, and it appears that the Georgetown prices of Cumberland are very low, while Clearfield is cutting under pretty deep in this market. Four dollars is very glibly spoken of as the price in this market. We quote, however, nominally $4.15@$4.30 for Clearfield, and $4.20@$4.40 for Cumberland.

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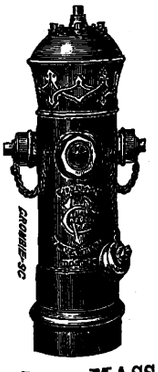
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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF Jr. M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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UNTIL further notice, the address of Mr. LUTHER WAGONER, of Messrs. WAGONER & HAMMOND, mining engineers, San Francisco, will be care of T. ROBINSON BOURS & Co., Alamos, Sonora, Mexico.

IT is reported that in a suit involving the patents of the Siemens regenerative furnace and the Ponsard furnace, the latter has been decided to be an infringement of the former. The case came up for trial in Philadelphia.

PROF. WILLIAM P. BLAKE has gone to Tombstone, Arizona, where he will probably remain during this month, in attendance as expert for the Copper Queen Company, in the suit of Copper Prince *vs.* Copper Queen, which is set for trial on the 17th at Tombstone.

THE outlook in the Western iron trade is not promising. The manufacturers held a meeting yesterday, at which no formal action was taken, but which gave occasion for an interchange of opinion, the drift of which appears to have been decidedly against the acceptance of any concessions on the part of the men. The position favors the makers, and they are not likely, in view of the demoralized condition of the trade, to yield in their demands.

AFTER many years of hesitation, due to a number of causes, the basic Bessemer process has been adopted by one of our great steel-works. It has been repeatedly stated that the Edgar Thomson works had been blowing in a basic converter; but so far as we can learn, the process is not a part of the regular practice. The Pennsylvania Steel Company, of Harrisburg, under the management of Major BENT, has recently begun regular work in making steel from phosphoric pig under the THOMAS and GILCHRIST patents.

FROM Michigan come glowing accounts of the development of very important deposits of rock-salt, which threaten to make the future of the Syracuse District a more problematical one than it now is, and promise to create a formidable rival to the newly-discovered Warsaw District and the older Saginaw and Canada salines. Making due allowance for the optimism which always seems to buoy up young enterprises, the new Marine City discoveries appear to have all the elements capable of making a rapid development possible. From an elaborate account in the Detroit *Evening News*, written evidently by one familiar with the industry, it appears that, a little more than a year ago, Mr. CROCKET MCELROY, of Marine City, began putting down a well at that point, and at a depth of 1633 feet struck a deposit of rock-salt, into which the hole penetrated for 115 feet, without passing through the salt. It appears that, in passing southwestward successively by Inverhuron, Kincardine, Goderich, Warwick, and Petrolia, in Canada, to St. Clair and Marine City, the salt is struck at increasing depth and in greater thickness, the wells at Detroit, farther southwest, apparently not having gone deep enough to strike the main body. It is urged in favor of the Marine City District that it combines the advantages of a pure, strong brine, cheap fuel, and proximity to the high-roads to the greatest markets.

ACID mine water is getting to be an intolerable nuisance in some of our collieries, and it may be of interest to summarize what has been done in other countries in trying to get over the trouble. At the mines of the Königshütte, the lack of feed-water for the boilers of the colliery and the adjacent blast-furnaces made it necessary to devise some means of using the acid mine water. As early as 1858, large ponds were provided above ground in which the mine water was mixed with milk of lime, which was afterward allowed to settle ; but the plant was abandoned after it was found possible to get sweet water elsewhere. This arrangement did not, however, overcome the trouble experienced in keeping the pump-mains, etc., from corroding rapidly. To meet this, the water-pipes were coated internally with a layer of cement, and the plungers and cylinders of the pumps were made of bronze. The managers of the mines some years ago decided to get at the root of the evil, and began the undertaking of neutralizing the acid waters in the mine, before they reached the pumps, using milk of lime as a neutralizer. The slime is pumped to the surface without causing any trouble in choking valves, etc., as it is so finely distributed and light; and since the plan has been in use, no trouble has been experienced from corrosion. Settling-tanks are provided above ground. The quantity of water to be raised by the pumps of the Krug colliery, in which this system is in use, is 165,500 cubic feet daily, while the capacity of the four settling-ponds is 200,000 cubic feet. A test of the water with litmus paper is made daily.

THE English mining journals contain this week two reports of companies, which, though operating in widely different parts of the world, are yet of great interest. One relates to the Panulcillo Copper Company, one of the few public companies working Chili copper properties; and the other to the Tharsis Sulphur and Copper Company. From the first we learn that it required 57,864 tons of ore to produce 6272 tons of regulus, containing about 2924 tons of pure copper, so that apparently the yield of the ore was only five per cent. The consumption of fuel was 7288 tons of coke and 3906 tons of coal, costing $186,540.22 ; the total cost, including $98,277.34 loss in exchange, footing up to $840,498.96 ; while the receipts from the sale of regulus were $1,077,018.16, leaving a net Chili profit of $236,519.20. During the past three years, the company has paid £65,000 dividends on £200,000 capital, has wiped out an indebtedness of £67,515, and has £10,000 undivided profits in the treasury. The company is making efforts to reduce the cost by the introduction of crushing and rock-drilling machinery, so that, notwithstanding the low grade of the ore, the high price of fuel, and the low price of copper, it may be able to hold its own.

The Tharsis is one of the famous pyrites mines of Spain. In 1882, it shipped 212,218 tons of pyrites, 5534 tons of precipitate, and 184,059 tons of iron ore, and yielded a profit of £335,676, distributing £314,479, or 27½ per cent, dividends on its paid-up capital. It should be noted, however, that the Tharsis Company is exceptionally well situated in having no trouble in marketing its pyrites, some of the greatest alkali manufacturers being among its customers, so that it has been as yet little affected by the decline in the Leblanc soda industry.

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THE Prussian Fire Damp Commission has begun active work, and is printing occasional notes of progress which give promise of a thorough study of the great questions at issue. Herr A. HASSLACHER, one of the members, has compiled statistics, according to which forty-three out of the 377 collieries of Prussia are worked through tunnels, twenty-five by tunnel and deep shafts simultaneously, and 309 by shafts exclusively; 174 collieries show fire-damp, while 203 are free from it. The former employ 103,419 men and produce annually 27,631,404 metric tons of coal, while the latter are worked by 52,278 men and yield 14,641,709 tons of coal, so that 65·4 per cent of the production comes from fiery mines, which employ 66·4 per cent of the entire force. The proportion, of course, is very different in the various districts. In Upper Silesia, the percentages of the product and of the force of the fiery mines are 7·4 and 7·0 respectively. In Lower Silesia, they are 58·0 and 60·6; in the Aix-la-Chapelle District, 82·6 and 80·3; in the Ruhr District, 85·4 and 85·3; and in the Saar District, 94·7 and 94·5. The ventilation in Prussian collieries is as follows: Natural draught is relied upon in 129 mines; natural and occasional artificial ventilation, 29 mines; while exclusively artificial ventilation is resorted to in 219 collieries. In the latter, there are in use 14 injectors, 23 air-compressors, 109 chimneys, 169 ovens, and 136 ventilators, distributed according to make, as follows: Guibal, 74; Rittinger, 9; Zimmermann, 3; Fabry, 17; Kaselowsky, 3; Winter, 3; Pelzer, 11; and Körting, 2.

Another direction in which investigation has begun is the chemical examination of the air from the upcast shafts of a number of German collieries. Dr. SCHONDORFF, of the Bochum laboratory, has found that the air coming from the Kaiserstuhl shaft of the Westphalia colliery contained 1·05 per cent of fire-damp, although the ventilation of the mine was going on at the rate of supplying 36,000 cubic feet of air per minute. The air coming out of the new shaft of the New-Iserlohn colliery, a sadly famous one in Germany, contains 1·5 per cent of fire-damp when over 50,000 cubic feet of air are delivered into the colliery each minute. It will be readily understood how easily a mine can get to the dangerous point as soon as the slightest mishap affects the ventilation.

THE programme of the summer meeting of the American Institute of Mining Engineers at Roanoke, Virginia, has just been announced. The following gives a summary of the excursions and the time appointed for the holding of sessions:

Monday, June 4th.—The opening session will be held in Roanoke, on Monday evening at eight o'clock. Addresses of welcome will be made by Mr. J. B. AUSTIN and Mr. LUCIEN H. COCKE, Mayor of Roanoke. Reading and discussion of papers.

Tuesday, June 5th.—Visit to Lynchburg by special train on the Norfolk & Western Railroad. On arrival at Lynchburg, a train, kindly provided by the Richmond & Alleghany Railroad, will take the party to the iron mines on the James River at Riverville, and, if time allows, also to Stapleton. In the afternoon, a session of the Institute, for the reading and discussion of papers, will be held in the hall of the Lynchburg Chamber of Commerce. Return to Roanoke in the evening.

Wednesday, June 6th.—Local excursions around Roanoke, visiting the Crozer Furnace, Upland and Houston mines, Rorer Iron Company's mines, and the Roanoke Machine-Works. Evening session.

Thursday, June 7th.—Excursion to Pocahontas (Flat-Top Coal-Fields), and the Southwest Virginia Improvement Company's coal mines and coke-ovens. Returning, the Ripplemead mines and Bertha Zinc-Works will be visited. The night will be spent at Abington or Wytheville.

Friday, June 8th.—Excursion to the Cranberry magnetic iron ore mines in East Tennessee, returning to Roanoke in the evening.

On returning home, via the Shenandoah Valley Railroad, members can stop at the Natural Bridge and the Caves of Luray. Those wishing to visit the Cripple Creek ore region can do so by remaining after the close of the meeting, the Norfolk & Western Railroad having kindly extended the courtesies of the road for this purpose.

Mr. J. H. BRAMWELL is chairman, and Mr. J. H. SYKES, secretary of the local committee in Roanoke, and Capt. C. M. BLACKFORD chairman of the committee in Lynchburg. It is urged that members promptly notify the Secretary of the Institute, Dr. T. M. DROWN, Easton, Pa., of their intention to attend the meeting.

CALIFORNIA FREIGHT RATES.—California freight rates from the Atlantic seaboard are said to have been cut severely of late. The California traffic has been carried from Eastern ports under special contracts, the routes over which it passed being under the control of the Central Pacific. The rates on freight from New Orleans to San Francisco are the same as from Chicago to San Francisco. From Galveston they are the same as from Kansas City. In order to divert the freight from the trunk lines, the lines of steamers from New York to the gulf ports have been cutting rates, making the through rate 25 per cent less than recent contract rates. The Texas Pacific is said to have joined in the cut, making a rate as low as $4, but raising it to $5. The Delaware & Lackawanna Railroad, which is not in the trunk-line pool, and the Union Pacific & Santa Fé route, are said to have already joined in the cut, and are taking a reasonable share of such traffic.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

American Pyrites for Acid-Making.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have read with interest the timely and useful article of J. D., Jr., in your issue of May 5th, on the subject of pyrites-burning in this country, believing fully that the time has come for our acid-makers to follow the example of their European rivals, and to make sulphuric acid from pyrites.

I regret that J. D.'s article should contain an inaccuracy on one very essential point, namely, the supplies in this country open to the manufacturer. He has, of course unintentionally, so utterly misrepresented the largest and best pyrites mine in New England that I feel warranted in demanding space to correct him. He says: "From Maine and New Hampshire come some pyrites; but it is so contaminated with blende and galena . . . that its value for acid-making is seriously impaired."

The only mine in either of these two States producing pyrites for the market is, I believe, the Milan mine in Coos County, New Hampshire, which has been worked continuously for the past eighteen months, and is now ready to furnish any amount of first-class pyrites for acid-making.

As we have worked the Milan mine with an open cut, as well as with a shaft and drifts, we know the quality of the ore. In a width varying from 14 to 40 feet, there have been found various metals, including several veins of copper, some narrow ones of zinc, and occasional pockets of galena. As we have built a smelter at the mine, no galena or copper is allowed to go into the pyrites pile, as will be evident to any reader. The lead, therefore, only exists in the imagination of J. D.

As to zinc, it happens at Milan, as I understand it has elsewhere, that the first 40 or 50 feet of ore, working from the surface, contained some streaks of zinc ore. These are plainly visible in the mundic, and are as easily separated as two layers of stone would be. Below fifty feet, these streaks, which occur only on one side of the main vein, disappear: the great body of mundic has always been free from zinc.

I can not agree with J. D. that zinc impairs the value for acid-making. Its presence reduces the percentage of sulphur; so would an equal amount of silica. But, be that as it may, we keep all of this grade by itself, and sell it as second-grade ore, and find appreciative customers for the little we produce.

But as to our main bodyof pyrites, allow me to quote the opinion of a competent witness:

"In answer to your inquiry in regard to your pyrites, I would say that I have found no difficulty whatever with them in the manufacture of sulphuric acid. They burn freely without scarring or clinking; and I have found only the slightest traces of arsenic, so small as to be utterly insignificant. WILLIAM ATWOOD."

This testimony from the well-known manager of the Atwood Lead Company is doubtless sufficient, although I could refer to other well-known concerns.

But the best guarantee I can offer is the ore itself; and I am ready to send samples to any acid-maker who wishes to try it; and I am ready to contract for any amount to be bought and sold on the samples.

As to the percentage of sulphur, I have the certificates at hand of three lots sold during the present year, analyzed by Mr. Amory Austin, of this city, as an expert. These stand at 48·48 per cent, 49·30 per cent, and 50·29 per cent, and these figures mean, of course, that the pyrites are equal to any found in Spain or America.

I hope I have not exceeded due bounds in correcting the error of J. D. I might refer all inquirers about the quality of the mine to Mr. J. H. Huntington, the well-known mining expert, who recently examined it at the request of persons not connected with our company. But business men will prefer contracts to opinions, and these I am prepared to make. I am sure that J. D. intends to give true information, as he points out a defect in the otherwise excellent ore from Rowe, namely, its softness. The Milan ore is firm and strong, and makes the minimum of smalls. The Rowe ore, however, is no more free from arsenic than the Milan, as I am well informed. Both ores give *a trace only*, under the most delicate tests. And by a trace is meant an amount too delicate to be weighed or estimated. It is not the one quarter per cent of the Spanish ores, but an amount which, as I was told, will be found in commercial acid made from brimstone.

Lastly, while claiming that the Milan ore is equal to any produced by any mine, I do not claim to be able to supply all the acid-makers in the country. Our mine is on the Grand Trunk Railroad; and wherever that line reaches, we can compete with all others. We are 100 miles from Portland only, and can therefore supply acid-makers on the sea-board. Other mines will doubtless have special advantages in supplying other markets.

It is, however, a point worth considering by our acid-makers whether they can at any price afford to use pyrites like the Spanish and Canadian, which undeniably contain arsenic. Even for the manufacture of fertilizers, the presence of a deadly poison in the acid must be a hinderance. I think that our American supplies will be free from this evil, whether found at Milan, or Rowe, or Virginia.

I do not propose to undervalue any mine, either intentionally or accidentally, as I believe the market is large enough for all, and that the prosperity of the country will be greatly increased by the establishment of this new and important industry. I am convinced that our acid-makers can only find out their best and cheapest source of supply by testing samples and comparing prices; but it is beyond doubt that every acid-maker on the sea-board or near a line of railroad is perfectly safe in erecting pyrites-burners, with the certainty that he can procure a supply of ore at reasonable prices; and that the figures given in J. D.'s article will be a safe guide. I remain yours very truly, WILLIAM H. WHITMORE,

BOSTON, MASS., May 8, 1883. Treasurer Milan Mining Company.

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OFFICIAL STATEMENTS AND REPORTS.

THE TOMBSTONE MILL AND MINING COMPANY, TOMBSTONE, ARIZONA.

The annual report of the Tombstone Mill and Mining Company for the year ended March 31st contains a brief summary of the condition of the company by the board of directors, and a very full and valuable account of the operations of the company during the year, by Prof. John A. Church, the superintendent.

Beginning with the report of the directors, it should be noticed that as yet no decision has been reached by the Arizona Supreme Court in the case against the Way Up Mining Company, an appeal to that court having been taken from an adverse decision by the lower tribunal, which only temporarily, it is believed, cuts off the company from following the rich ore-body in the Good Enough claim. The gross debt of the company has been reduced from $401,951.09 to $355,353.02, no deduction being made for assets, of which the supplies on hand already amount to $48,697.48. Members of the board assumed the debt, taking six per cent bonds to the amount of $446,000, of which $85,000 have been redeemed, leaving bonds outstanding, payable in 1883, $115,000; in 1884, $116,000; and in 1885, $130,000. It is expected that the balance of $251000 due the San Francisco Bank will be paid before the 1st of July. The working results of the treatment of the tailings have been so encouraging that the board declined to entertain the proposition made to provide for the immediate extinguishment of the debt by their sales. Professor Church expects to realize a profit of $660,000 from the tailings now on hand, when worked in connection with manganese ore from the Lucky Cuss mine, belonging to the company.

Professor Church gives the following as the product of the company:

	Fine silver.	Fine gold.	Lead.	Market value.
Mill	532,373 ozs.	1.813 ozs.	.....	$603,265.38
Furnace	40,884 "	299 "	132 tons	55,062.31

The average fineness of the bullion from the mill was 835·74 in silver and 2·85 in gold.

With the deduction of 16 per cent, the milling ore, which also represents the product of the mines separate from the product of the tailings, has had an average value as follows:

	Ounces.	Currency.	
Gross value of ore per ton silver	32·190	$34.92	
" " gold	0·180	3.72—	$38.64
Yield per ton silver	24·710	$26.81	
" " gold	0·084	1.74—	$28.55

Percentage extraction of silver, 76·76; gold, 46·67; average, 73·88.

The production of the different mines during the year was as follows:

	First 6 months.	Second 6 months.	Total.
Main works	3,346	2,305	5,651
Combination	8,006	1,468	9,474
West Side	1,281	4,253	5,534
Lucky Cuss	78	802	880
Defense	. ....	50	50
Tribute	.....	116	116
Northwest	287	.....	287
Limestone and fire-clay	... ..	(61)	(61)
Total	12,998	8,994	21,992

A leading event of the year is the practical transfer of mining work from the Good Enough and Tough Nut to the West Side mine, and the rise of the latter to the position of the most promising mine in Tombstone District. At present, the two mines first mentioned are almost idle, after yielding nearly 67,000 tons of ore and probably ninety-five per cent of all bullion the company has produced. The reasons for this change of operations are twofold: In May, 1882, the case of this company against the Way Up Company was decided against the former, and though an appeal was taken, and has been argued, no decision has been reached yet, and operations on the Good Enough mine have necessarily been controlled by the first decision. The Way Up mine adjoins the Good Enough, in such a position as to intercept 600 feet of the vein as it dips into the earth. The result of the suit not only deprived the company of about $100,000 worth of ore, but prevented it from following the vein beyond the lines in a part of the claim, and made it imprudent to do so in the remaining part. All the *known* ore-bodies in the Good Enough have been exhausted, and most of the ground within the claim has been prospected, leaving the future almost entirely to the finding of ore within the vein, but outside of the surface lines, where the law allows the company to search for it.

The stoppage of work on the Tough Nut was due to very different causes. Like its neighbor, the *known* ore-bodies in this claim are exhausted, and little ground remains unprospected within the lines; but the dip of the ore is protected by the Defense and Survey, two claims belonging to this company, and legal complications are not looked for.

But neither of the two mines on the Tough Nut claim was well opened. The Northwest never had permanent works, and the main shaft at the other end of the claim was badly planned. The expense of prospecting became so heavy that it was decided to take advantage of the favorable position of the Survey and Defense and utilize them to prospect the Tough Nut. The West Side vein, which runs through the former, has been opened with great success, and some work has been done on the Defense, which will very soon be attacked more vigorously. As yet, the Tough Nut has not been reached from the West Side, because the independent development of the latter has been so successful, and perhaps no effort will be made to reach it until another level is opened; but the ore in the latter mine works in such a way as to show the wisdom of the general plan adopted.

Mr. Church says: "I do not believe that either the Good Enough or Tough Nut is exhausted, but am strongly of opinion that the ore-bearing formation is productive below the depths we have reached. Our deepest level is only 268 feet deep in the Tough Nut, and 300 feet in the Good Enough, and the formation is not one that lies level, but dips with considerable steepness, probably thirty degrees at least. The condition of the deepest working on the West Side almost demonstrates the continuance of ore to a greater depth than we have yet reached in the Tough Nut, and I believe the future work will reveal important ore-bodies lying between the center of the West Side claim and the Tough Nut side-line.

The following detailed account of the West Side mine will be of interest: This mine is now the most promising claim of the company. lies nearly at right angles to the Tough Nut, is 1496 feet long, and h an extension 140 feet long in the Survey, which abuts upon the Toug Nut. Vein croppings run almost continuously through the ground for a length of 1300 feet.

Three shafts known by numbers have been sunk on the vein, and are connected by drifts underground. No. 1 is 523 feet north of the south end-line of the claim; No. 2 is 470 feet farther north; and No. 3 is 232 feet north from No. 2. Drifting on the vein extends 230 feet south from No. 1 and 180 feet north from No. 3, so that the vein is opened for a length of 1210 feet.

Ore is found through nearly the whole of this distance, sometimes in a thin vein or in bunches, sometimes in continuous bodies from 100 to 200 feet long, and from 2 to 10 feet thick. The greatest thickness yet opened is on the 3d or lowest level. Owing to the character of the vein, it has been found advisable to open levels at successive depths of 75 feet, so that the 3d level is 230 feet below the surface, and 238 feet below the timbered mouth or "collar" of No. 3 shaft. This level is also 72 feet above the 3d level of the Tough Nut, and it is intended to carry this or the 4th level northward to a connection with that mine. The West Side vein crosses a gentle hill, and rises to the crests of two adjoining hills, and the principal ore-chute lies in the central elevation. There are signs that each one of these hills will carry its separate important ore-body, the different masses being connected by smaller bunches and thin veins of ore. This central hill contains shafts Nos. 2 and 3. Most of the mining already done has been in the central mass, which appears to be about 180 feet long, and from one to ten feet thick, with occasional cross-veins running for twenty feet east and west. It stands in the vein with an inclination northward, the vein itself running north and south and dipping slightly east. This bonanza reaches from the surface to and below the 3d level, and its croppings cover the whole space between shafts Nos. 2 and 3. The work of opening the 3d level between these shafts was finished in March last, and sinking was immediately resumed and is now 25 feet below that level. The ore continues throughout this depth, and has been opened on the 3d level for a length of 85 feet. Since the West Side was opened, the bullion made has increased materially in gold. In general, the grade of the ore is not remarkably high, though it is good and seems to be improving in depth. In fact, the ore itself is of excellent grade, quite as good as any thing ever mined by the company, but much of the rock that lies next it is so loose and crumbling that it is impossible, in a vein of the dimensions given, to keep the ore clean. As sent to the mill, the ore probably contains about 40 ounces silver and half an ounce of gold, and is worth in legal value $63, and in market value about $54.58 per ton at current rates. At present, the prospects of this mine are very bright. There appears to be in the mine at least one half more ore than was taken from it during the last year, or say 8000 tons. The ore mills well, and, if large ore-bodies are found, the mine will be the cheapest to work of all the company's properties, the rock being much easier to work than in the Good Enough or Tough Nut. Hitherto, the thinness of the vein has made the work costly.

The Lucky Cuss is the seat of large deposits of silver-bearing manganese ore, which is now mined as a flux for use in the furnace. Two lines of these deposits are known. That on the north end appears to be a continuous vein, while in the southern line the ore-bodies are entirely separated from each other, though they appear to lie in two definite directions. The ore is quite a pure and rich oxide of manganese, containing about 10 per cent of silica and 25 ounces of silver. As one half the smelting charge is manganese, this flux affords quite an important supply of precious metal. Probably 10,000 tons of the flux will be needed with the concentrates that can be made from the tailings now on hand, and there is every prospect that the Lucky Cuss can supply it. So far, only 880 tons have been mined. The Lucky Cuss was one of the first mines to be opened in Tombstone, and the resumption of operations upon it has been matter for congratulation in the camp. The country-rock is a hard white limestone, in which the manganese occurs in chutes, which have a small horizontal section, but appear to be quite persistent vertically. A depth of 100 feet has been reached in three places, and in all the ore is continuous from the surface. In one, it forms a cylindrical body, 10 to 12 feet in diameter; in another, it is lens-shaped and about 3 by 40 feet in section; and in the third, the ore-body is longer. Small bunches of galena and carbonate of lead occur in the manganese, and these are always rich, usually running up to 200 ounces silver per ton. With the manganese, the rule is, that the richer in silica the richer also in silver, though we have sometimes had a mixture of manganese and lime-spar that was richer than the average. The richest ore is too siliceous to serve as a flux and too manganiferous to mill well, so that we are able to use it only with great slowness. All the work done in the claim is in preparation for the extraction of ore, and as this is the most expensive part of mining, the cost has been temporarily high. So far, the ore has cost $10.18 per ton, but when the ore now uncovered is removed, the cost per ton will be much less.

At all points of extraction, a well-tried system of handling the ore has been introduced. Bins, holding from 40 to 500 tons, are built at each hoisting-shaft, and large enough to allow the large ore-wagons to load from them without shoveling. The cover of the bin forms a sorting-floor, to which the ore from the mine is dropped, first running over a screen which separates the fine stuff. The coarse ore is picked over by hand, and the waste removed. This is a costly work, and also causes some loss, but the distance of the mill and the cost of hauling make it necessary and profitable.

In the following statement, the expenses of mining and milling are shown in detail. The item of "outside mining" refers to the cost of extracting a quantity of smelting ore from a vein near the mills, on property not belonging to the company:

MINING (21,903 TONS).

	Total.	Per ton
Labor	$190.531.00	$8.70
Contract	4,372.10	0.20
Supplies	34,703.48	1.58
Repairs and renewals	980.60	0.05
Ore-hauling (21,064·85 tons)	63,204.65	3.00
Total	$293,791.83	$13.53

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MILLING (21,474 TONS).

Labor	$56,367.84	$2.62
Supplies	47,152.97	2.19
Repairs and renewals	2,506.08	.12
Total	$106,026.89	$4.93

CONCENTRATION.

Labor	$9,672.40	.....
Supplies	873.13	.....
Total	$10,545.53	.....

FURNACE.

Labor	$7,529.60	.....
Supplies	23,353.63	.....
Lucky Cuss mining (manganese)	9,665.56	.....
Outside mining	379.62	.....
Ore purchased	3,752.13	.....
Ore hauling	3,640.18	.....
Bullion hauling	263.89	.....
Total	$48,584.61	.....

SUNDRIES.

General expense	$8,367.51	$0.38
Administration	22,262.84	1.02
Total	$30,630.35	$1.40
Grand total of mining, milling, and sundries	$430,449.07	$19.86

EXTRAORDINARY.

Legal expenses	$15,827.49		
Mine construction	8,847.70		
Mill construction	2,188.15		
Furnace construction, including concentrators	13,524.98		
Tribute ore	7,559.16		
Adjoining mining claims	6,400.00—	$54,347.48	1.90
Total of all expenses		$543,926.69	

There is now on hand, of supplies by inventory:

Mine supplies	$4,187.01	.....	$0.19
Mill	9,180.02	.....	0.43
Furnace	29,280.93	$42,647.96	.....

The record of the year shows a considerable decrease in all expenses which are within control. Mining and milling expenses are $19.86 per ton, against $23.96 for the previous year, and, including extraordinary expenses, the comparison is as $21.76 to $27.16 for the same items. The improvement commenced in the latter half of the first year, and has been carried forward with increasing success. The comparison is fair, with the exception that ten cents per ton should be deducted from the first year's average expense for cost of the first trials in concentration, an item that is not included in the computation for this year.

The reducing machinery of the company has necessarily followed the fortunes of the mines. Up to June, 1882, thirty-five stamps were at work; but the falling off in ore supply then caused a reduction to twenty stamps, and the failure to find new ore-bodies in the well-worked ground under the surface of the Tough Nut and Good Enough finally compelled a further reduction to ten stamps. In March, 1883, this decrease was stopped, and fifteen stamps were run nearly all the month, a scale of work which present prospects indicate may be maintained in future. From 2800 tons a month in April and May, 1882, the ore treated sank in quantity to 1800 tons monthly for the seven following months, and finally to 881 tons in February, rising again to more than 1000 tons in March, 1883.

The yield of bullion did not fall off proportionately to the ore. Indeed, the heavy output of the early months of the year was due to the fact that large masses of low-grade ore existed which could be worked at a small profit. The estimated market value of the ore per ton was for the four periods named, $25.25, $31, $41.79, $52.34. On this account, the reduction in output and milling has been profitable by reducing expenses materially, while the product did not fall off in the same proportion. The amount of ore treated by 35 stamps was 5716 tons, by 20 stamps 12,718 tons, by 10 stamps 1877 tons, and by 15 stamps 1163 tons; total, 21,474 tons. No changes of moment have occurred in the mills, except the re-introduction of chemicals, that is, salt and bluestone, in April, 1882, a change in the character of the ore making this step necessary, and the use of sodium amalgam in the last months of the year, in an effort to save a larger percentage of the gold in West Side ore. In this we have been partially successful.

At present, the Corbin Mill only is running. No concentration takes place there, but machines will soon be introduced for the purpose. At Gird mill, amalgamation has stopped. The furnace and concentrators are situated there. The mill accounts show the following work and results during the year:

Tons ore received at mills		21,186
Tons ore milled		21,474
Average battery assay, ounces	32·19 silver	0·18 gold
Average tailings assay	8·01 silver	0·10 gold
Average per cent saved	76·07 silver	44·44 gold

	Total.	Per ton ore.	Per cent.
Pounds (avoir.) amalgam produced	266,026·00	12·390	.....
Pounds (avoir.) retort metal	46,888·00	2·180	.....
Retort metal ratio to amalgam	1 : 5·67	.....	.....
Troy ounces retort metal	682,637·00	31·790	.....
Troy ounces bars	641,978·00	29·890	.....
Loss in melting	40,659·00	1·900	5·95
Average fineness of bars silver	823·90	.....	82·39
Average fineness of bars gold	2·80	.....	0·28
Troy ounces in bars silver	528,946·02	24·630	.....
Troy ounces by assay silver	519,010·00	24·180	.....
Gain over assay silver	9,936·02	0·450	1·91
Troy ounces in bars gold	1,821·99	0·084	.....
Troy ounces by assay gold	1,444·52	0·067	.....
Gain over assay gold	377·47	0·017	26·13

These results illustrate one of the peculiarities of work in Tombstone mills, and I believe all the mills in the district have the same experience. Taking the battery assays as the standard of value, and deducting the assay of the tailings, the bullion product is invariably a *plus*, or in excess of the apparent extraction of metal, as shown by the assays. This is the more noticeable with high than with low-grade ore. Necessarily, the error is either in too low assays of the battery pulp or in too high assays of the tailings, and probably it is the former, as indicated by our results in concentration, which are a check upon the tailings assays. Repeated efforts have been made in this company's mills to correct the error, but without result.

The *plus* in gold is still more striking, if the percentage is considered. The gold assays are made once a month from the collected buttons of the daily assays; and as the latter are made upon samples, taken every half-hour throughout the year, there is no reason why the samples should not be true averages, especially as all questions connected with the mode of sampling have been carefully considered. There is one source of error which may explain the small *plus* of silver. The sample is taken from the stream of pulp at the end of the battery launder, and as the inclination of this trough is somewhat insufficient, an entirely free flow of the pulp is not secured and the heaviest portion of the ore settles in it, removing a certain part of the richest ore from the sample. This is undoubtedly the source of the error in silver returns; but it can not explain the remarkable error in the gold, unless there is free gold in the ore heavy enough to settle almost completely in the trough, leaving only the mineralized gold to fall into the sample dipper. Free gold may exist in the ore, but it is not coarse enough to be visible, and it is difficult to see how fine scales should settle so readily.

MATERIALS CONSUMED.

	Total.	Per ton.
Cost of fuel	$22,838.56	$1.06
Chemicals	13,624.79	0.64
Illumination	729.49	0.03
Lubrication	845.02	0.04
Castings	6,757.06	0.31
Hardware	555.62	0.03
Tools	240.42	0.01
Sundries	3,018.03	0.14
Labor	56,892.43	2.65
Total	$105,501.42	$4.91

	Total.	Per ton.
Quicksilver, pounds	21,629	$1.00
Salt, pounds	110,094	5.12
Bluestone	22,366	1.04
Cords wood	2,526¾	0.12
Days' labor	13,011¼	0.60

The quantity of quicksilver here given is that which was *added* during the year, without taking account of what was in the pans in the beginning and end of the twelvemonth, and, as there has been a reduction in quantity of ore, the amount given per ton is undoubtedly too low.

In regard to the treatment of tailings, Professor Church says: When I examined the mines of this company in the year 1880, the problem of utilizing the tailings had already assumed importance, though only about 15,000 tons of ore had been worked. Now nearly five times that quantity is represented in the tailing-beds. The advice then given was to concentrate the tailings and smelt the concentrates with manganese from the Lucky Cuss mine, where important bodies of this ore, carrying from fifteen to thirty ounces of silver per ton, are found.

The plan was beset with difficulties; for the fine condition of the material prevents good work in concentration and hinders smelting, and manganese as a flux, though not a positive novelty, had not been successfully relied upon, I believe, as the sole dependence of a furnace that has no access to iron either in its ores or flux. But this advice was given for the reason that the remilling of tailings has been almost uniformly a failure, and nothing was to be looked for from this mode of treatment, while concentration and smelting offered a promising though untried field. The result has been a great success, the treatment of about 3500 tons of tailings having paid all the costs of construction and work and a profit besides. The treatment includes two branches, concentration and smelting, which will be considered separately.

After preliminary experiments in 1881, six Frue vanners were obtained from Messrs. Adams & Carter, of San Francisco, and regular work commenced at the end of February, 1882. The records which are summarized in the table given below cover the whole of the intervening period, or thirteen months. In January, 1883, two revolving buddles or round tables were built and worked with such success that others have been ordered and will be put in at once.

The problem presented is one of the most troublesome in ore-dressing. All the material is in the finest condition, having been reduced to a *maximum* of $\frac{1}{16}$ and $\frac{1}{10}$ of an inch diameter, to prepare it for amalgamation, and in this process the ore is ground for hours, not only increasing the proportion of fine slimes, but making the latter sticky by trituration. The greatest loss in concentrating has been due to the fact that these fine slimes run over the table, without yielding their silver. This defect, however, is now cured mostly by the buddles. The method adopted is as follows: The tailings are thrown into an agitator, where they are stirred with water, and the heaviest sands settle, giving the first concentrated product. The pulp is then run on the Frue vanners, where a finer concentrate is obtained. After concentrating, the tailings are raised to a buddle, which removes about one third of the silver still remaining in them. From this buddle the finest material, which still runs off without concentrating, will be delivered to a second buddle of lighter slope, and concentrated there. The buddles have not been running long enough to furnish an estimate of their production. In this way it is hoped to raise the extraction of gold to a satisfactory point, that portion of the work having always been defective in amalgamation.

The concentrating mill is situated close to the Gird mill, and the distance from the tailing-beds has always caused a large expense for wheeling. At present, this difficulty has been increased by the removal of the nearest tailings, and the mill will now be moved to the area cleared away in the tailing-bed. For this purpose, an engine has been

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provided, and the new machinery will be erected at the new point. The purchase of this machinery was made necessary by the fact that the works as first established were not large enough to keep the furnace constantly supplied.

Concentration has now been going on for thirteen months, and the whole of this period is included in the table of results given below. The value of the tailings in lead is not determined by daily assays, as the silver is, but the proportion of lead is estimated at 8 per cent.

	Tons.	Assay per ton. Silver, oz.	Gold, oz.	Lead, p. c. Per cent.
Mill tailings treated	11,467	13·21	0·22	(?)8·00
Production,				
From the agitator	93	52·65	0·48	23·20
From the Frue vanners	1,483	45·23	9·58	30·90

Percentage saved by weight..... 13·31
Weight of tailings required to make 1 ton of concentrates, 7·5 tons.
Percentage saved, by value: Silver, 41·29; gold, 34·09; lead, 50·61.

COST OF WORKING.

		Tailings.	Concentrates.
Labor	Total, $9,672.40	Per ton, $0·843	$6.34
Supplies	" 873.13	" 0·076	0.57
Total	$10,545.53	$0·919	$6.81

The extraction of silver in the mill has been about 80 per cent and of gold about 45 per cent, and the treatment of the tailings increases this by 41·29 and 34·09 per cent respectively, so that the final results are as follows:

Silver, extracted by amalgamation	80.00 per cent.
" " concentration, 20 by 41·29	8·26 "
Total	88·26 per cent.
Gold, extracted by amalgamation	45·00 "
" " concentration, 55 by 34.09	18·70 "
Total	63.70 per cent.

These results are not satisfactory; but the improvements in concentration will add probably 4 per cent to the silver and perhaps 12 or even 15 per cent to the gold. If these results can be reached, the whole method of treatment will be in a higher state of perfection than has been obtained heretofore in American milling.

In September, 1882, the building of the furnace was completed, and a short trial-run was made, which could not be continued nor resumed for some time, owing to the failure of the coke supply. Afterward, several short runs were made. The fine condition of the materials and the low fusing-point of the manganese, combined with the complete absence of sulphur in the charge, caused great trouble. The impurities of the charge collect in the form of a hard lead, which separates from the remaining metal and sinks in the lead bath, obstructing circulation and cooling the crucible. The use of manganese as a flux has approved itself, and the company enjoys the great advantage of using as flux a material that furnishes an important amount of silver, and is also mined on their own ground. To meet the sandy condition of the concentrates, a brick-machine has been purchased, and the concentrates will be made into bricks, using fine slimes as binding material. This work has been done by hand and with success, and the machine will undoubtedly improve upon the hand work.

The lead bullion made has been sent to refining establishments in the East. It is of good grade, fair softness, and carries a higher proportion of gold to silver than the mill bullion. As a considerable part of the silver is derived from manganese ores without gold, this proves that the reworking of the tailings will be especially valuable in saving gold. Four general classes of expenditure are necessary to the working of the furnace, as shown in the following table. The sinking fund charged against construction is not calculated by time, but upon the proportion of tailings that have been worked, and is somewhat high, as no account is taken of new ore that will be concentrated in future. Construction includes both concentrators and furnace:

	Expended.	On hand.	Total.
Construction	$603.97	$12,921.01	$13,524.98
Manganese (mining and hauling)	6,046.58	6,810.77	12,857.35
Concentrates and ores	6,043.99	7,927.62	13,971.61
Furnace supplies, hauling and labor	16,522.70	14,542.54	31,065.24
	$29,217.24	$42,201.94	$71,419.18

Among these items, purchased ores and hauling of them amount to $1889.43, and purchased manganese and its hauling to $2680.03. These expenditures were made in testing the ores of the district, and are not absolutely necessary to the work of the furnace, as the company has similar material in its own mines.

The furnace work has consumed the following materials:

	Tons.	Percentage of charge.	
Concentrates	438·00	23·65	
Tailings	438·00	23·65	
Ore	47·92	2·70	
Manganese	625·25	33·80	
Silver-bearing material		1549·17	83·80
Limestone	33·02	1·80	
Slag recharged	260·80	14·40	
Cleanings recharged	6·00		
Fluxes		299·82	16·20
			100·00
Colorado coke	168·17		
English coke	81·00		
Charcoal	67·84	317·01	17·15
Total materials	2166·00 tons.		

Production, 2708 bars; 144·88 tons, containing

	Silver, ounces.	Gold, ounces.	Lead, pounds.
In bullion shipped, 131·95 tons	40,883·57	298·81	263,333
In bullion on hand, 12·93 tons	4,654·80	34·00	25,537
	44,538·37	332·81	288,870
Market value of bullion shipped	$44,170.28	$6,013.22	$9,068.52
Total value			$59,251.92
Freight and charges			4,189.61
Net return			$55,062.31

The value of this product is as follows, the return from the bullion on hand being estimated:

Returns from 131·95 tons shipped net	$55,062.31
12·93 on hand	6,000.00
Returns from 93 tons concentrates amalgamated	5,500.00
Total product from re-working tailings	$66.562.31

The portion of concentrates sent to the mill contained more quartz and less lead than the average product. They milled to about 65 per cent of their value, and will be re-concentrated when the Corbin tailing-beds are worked.

In preparing the concentrates for the furnace, they are mixed with about half their weight of fine slimes from the oldest bed of tailings. It was hoped that the whole of this bed, which is the richest portion of the tailings, could be smelted without concentration, but its poverty in lead prevents this result. The greatest result experienced in operating the furnace was when the attempt was made to utilize the unconcentrated tailings.

Amalgamation of the concentrates will probably not be resorted to again, and the calculations of future operations may be based upon the furnace work alone. Changes that are necessary in treatment, such as using a smaller proportion of unconcentrated tailings, prevent a close reliance upon the results already obtained, but the following figures are very near the truth:

Three thousand eight hundred tons of tailings will be concentrated and smelted for $29,217 or $7.69 per ton, and, together with the fluxes and ores which will be smelted with them, and the cost of which is included in the foregoing calculation, will yield $61,000 or $16.05 per ton; profit, $8.36 per ton of tailings.

This calculation includes the cost of construction, mining, flux, and all accessories, with expenses at a higher rate than they will be in future. It affords a means of estimating the probable value of the tailing-beds, taken in connection with the Lucky Cuss mine, and the estimate seems to be faulty only in one respect. The results obtained from the tailings are not uniform. The sandy portions concentrate best, and so far we have treated a better material than we shall treat again until the Corbin sands are reached. On the other hand, the work will improve with experience and attention, and it is assumed these opposite conditions will balance each other.

The value of the tailing-beds can be reached in two ways. In the above calculation, a profit of $8.36 per ton of tailings is ascertained on the supposition that the proportion of unconcentrated tailings worked with the concentrates will be 1 : 2 in the future instead of 1 : 1 as in the past. This assumption disturbes the result somewhat; but a profit of $8.36 per ton on 72,000 tons is $601,920.

On the other hand, the results actually obtained are these: From 10,417 tons of tailings there were obtained in twelve months 1480 tons of concentrates, or in the proportion 7·08 to 1. Of the concentrates, 438 tons, or 29·6 per cent, were smelted with an equal weight of tailings, so that the quantity of tailings represented in the furnace product is $438 \times 7{\cdot}08 + 438 = 3540$ tons. This yielded $61,000, or $19.61 per ton, at a cost of $29,217.24, or $9.42 per ton, and if the whole pile of tailings could be smelted with equal results, it would yield a *profit* of $668,000. The difference between the two computations shows the influence of silica in the charge, which, by demanding manganese to flux it, increases the profit. On account of the moderate proportion of lead in our charge, we are not able to treat a mixture so siliceous as that given by equal weights of concentrates and tailings, and therefore the first and lower computation is the more trustworthy one. Either calculation exhibits clearly the great value of the tailings owned by this company, a value which is due to the unusually large proportion of lead in its ores as compared with the ores of other mines in this district. The result obtained fully justifies the advice I have given the company upon this question. The whole cost of construction, materials used, and labor in concentrating and smelting (to the end of February, 1883), has been $49,693.71, and the returns $66,562.31, so that all expenses have been paid and a substantial profit earned during an experimental campaign made upon only a small per cent of the tailings available. A year ago, tests were made by milling a small lot of the tailings; but the gross return was only about $1.50 per ton, or say $100,000 for the whole pile. It is worth noticing that, by merely stirring the tailings with water and floating off the fine part, a sandy residue has been obtained forming 0·8 per cent of the whole mass of tailings, and yielding in the mill $5500, as shown above. This amounts to 48 cents per ton of tailings, but it is doubtful whether the same proportion will be maintained when the lower portion of the beds where the slimes are most abundant are reached.

THE WEAR OF IRON RAILS IN BELGIUM.—The *Bulletin* of the French iron-works gives the following table of the rails renewed in Belgium in the twelve years from 1869 to 1880, inclusive:

Years rails were laid.	Years in service.	Percentage that had been renewed in 1880. Iron.	Steel.
1869	12	65·74	0·89
1870	11	84·54	....
1871	10	95·74	....
1872	9	72·41	0·44
1873	8	41·41	....
1874	7	17·44	....
1875	6	26·66	....
1876	5	14·98	....
1877	4	4·19	....
1878	3	.....	....
1879	2	0·23	....
1880	1	.....	....

The most striking thing in this, says the *Railroad Gazette*, is the long life of the iron rails. That one third of the rails laid in 1869 should be in service twelve years later on roads with so active a traffic as that of Belgium indicates an unusually good quality of iron. It is true that of the rails laid in each of the three next years a large proportion has failed, though they have been in track a shorter time. The steel rails can hardly be said to have worn out at all—less than 1 per cent of those in track twelve years and less than ½ per cent of those laid nine years, and none of those in track a shorter time. The number of each kind laid is not given, but iron was largely used in Belgium until quite recently, and most of the tracks there must still be of iron.

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THE SILVER KING MINE.*

By Prof. William P. Blake.

(*Concluded from page* 256.)

Mineralogy.—The mine is prolific of minerals and silver specimens of great beauty, highly interesting to mineralogists and collectors. There is, as usual, a great contrast between the surface ores and the ores from the lower levels. The surface ores are partially oxidized and decomposed, and are more earthy and less metallic in appearance than the ores from below. The rock inclosing them is also changed to a rusty brown color. The surface ores were, however, brilliant in the coloring, generally presenting masses of malachite-green and of azure blue, due to the carbonate of copper, with small sheets and filaments of snow-white pure silver in beautiful contrast. Here, also, were the nuggets, generally in irregular nodular forms, with smooth surfaces, and jet-black in color. Pyrites was rarely found. But when the mine was opened below the open cut, the true mineralization of the mass was found to consist, generally, of sulphides—the sulphides of silver, of lead, of zinc, and of copper, disseminated, together with native silver, in the quartz veinlets through the rock.

The following list comprises the principal mineral species which I have found occurring in the mine: Native silver, stromeyerite, argentite, sphalerite, galenite, tetrahedrite, bornite, chalcopyrite, pyrite, quartz, calcite, siderite, barite. Near the surface, in the decomposed parts of the vein, where the ores are partially oxidized and desulphurized, we find in addition horn-silver (cerargyrite), malachite, azurite, native copper, cuprite, besides oxides and carbonates of lead, and possibly embolite, the chloro-bromide of silver; also the argentite, in pure black lumps.

Development.—The mine is now opened to a vertical depth of 830 feet below the initial point of the cross at the summit of the open cut. This includes the open cut and the sump 36 feet deep. The summit is about 80 feet above the level of the mouth of the main engine-shaft. The shaft, exclusive of the open cut and the sump, is thus 714 feet deep. This shaft is vertical and is well and thoroughly timbered in the best manner from the top to the bottom. There are two compartments, each four feet in the clear, and fitted with guides and cages. It is in perfect order, as shown by the smoothness with which the cages run. There is not sufficient water to require a pump; what there is comes from the 114-foot level, and does not exceed 2000 gallons a day. It is hoisted by a tank fitted to the cage. A large sump reservoir at the seventh level serves to hold it while accumulating.

There are seven main levels, as follows:

Number.	Depth from surface.
I.	114·6
II.	256·0
III.	354·9
IV.	408·0
V.	570·0
VI.	612·0
VII.	714·0

An intermediate level, between II. and III., is at a depth of 302·9 feet below the surface.

Level I. passes throught 80 feet of quartz and extends some 30 feet into the country-rock, or ore-bearing rock, beyond it. It has not been cross-cut, and can not be considered to be a full test of that level of the mine. At the time it was run, the distribution and the position of the ore were not as well understood as they now are.

Level II., 256 feet, passes through about 75 feet of quartz, and shows very rich silver ore in detached bunches throughout its mass.

The next level below, the 302·9 feet, or intermediate level, follows the lower side of the quartz for 30 feet, and has a cross-cut extending at right angles for 50 feet, all in quartz. The underlying ore-ground back of the quartz has not been explored.

Level III., 354·9 feet, extends on both sides of the shaft, and has been driven around the quartz chimney so that the two levels started in opposite directions are now connected. This level penetrated a large body of fine ore of high grade, rich in silver, underlying the quartz, upon which considerable stoping has since been done but without reaching, as yet, any definite limits of the ore. The size of the floor is approximately 63 by 43 feet, or 2700 square feet.

Each floor in succession upward, to the 303-foot level, is smaller in area than the one below it. There are seven such floors or stopes from the sill-floor, on the third level, to the upper one just under the 303-foot level. This opening upward is one of the largest stopes of the mine, and represents an excavation in the aggregate of 97,921 cubic feet, which, taking 10 cubic feet to a ton, would represent about 9792 tons. I found the specific gravity of a sample of dark porphyry with some ore in it to be about 3, which would require about 10·7 cubic feet to weigh a ton. A considerable part of the rock-ore taken out should be estimated at from 11 to 12 cubic feet to the ton. This stope has been one of the best of the mine. Large quantities of silver sulphides were turned out of these floors and were rich enough to be sorted out by hand and shipped directly without being passed through the mill. The assays of ores from this stope were very high, and for the roasted ore were from $250 to $400 per ton for months in succession. For the present, the work on these floors is not prosecuted. They remain as they were a year ago. It is believed that the stopes may be considerably extended on the sides, so as to extract a large additional quantity of ore from each of the floors.

Level IV. Stoping has been extended on this level up to the 356 and above to the 300-foot level. A body of quartz, about 8 feet thick, is cut in the extreme northwest corner. The area of this sill-floor is 2557 square feet, and the cubic measurement of the stopes above it to the third level is 133,788 feet, representing an extraction of 13,378 tons, as nearly as can be calculated by measuring each floor. A portion of the excavated space for one and a half sets up is filled in with rock waste, to aid in supporting the ground above. This work is now in progress. The waste is hoisted from the fifth and the seventh, instead of being sent to the surface. It is carefully piled between the timbers, so that mining can be extended at will beyond the limits of the present excavations.

Level V. This level is but partially opened. It looks remarkably well, showing an abundance of ore on the north and northwest sides of the sill-floor. The porphyry is very dark-colored on the western side, and appears to contain chlorite. Amethystine quartz and galena ore are abundant.

The area of this excavation is approximately 3348 square feet. There are no stopes above; the ground is all standing up to the fourth. The cubic measurement of the ore extracted is 28,457 feet, and the tonnage may be placed at 2845 tons. Two winzes connect this level with those above and below for the purpose of ventilation. One extends down to the sixth and the other up to the fourth. The other levels are similarly connected.

Level VI. This consists of a mere drift, extended 82 feet from the shaft on the northwest side, to connect with a winze from the seventh level. It is also connected by winze with the fifth level above. No stoping has been done here, but the ground is ready to be opened out when required. The cubic measurement of the ground removed is, as estimated by calculation of the dimensions of the drift at 3150 feet, equivalent to 315 tons. The direction of this drift is the same as that of the seventh level, directly under it.

Level VII., 714 feet. This is the lowest level in the mine, and it is also the largest. It extends northwest from the shaft, and is ore-bearing from the shaft to the extreme face. The limits of the ore are not yet ascertained. The faces around the excavation of the sill-floor are still in ore, and are showing finely, especially at the bottom. The floor of the whole level is said by the miners who worked it to be very rich. It is the most brilliant level of the mine, and gives great promise for the extent and value of the ground below and above it. The distance between the posts is six feet from center to center, and the total area of the floor as now excavated is 5904 square feet. Stoping has been carried upward three floors higher, or 32 feet above the sill-floor. The aggregate extraction from this level and the connected floors above, including the winze to the sixth, is 166,228 cubic feet, or about 16,623 tons.

The aggregate extraction from the mine below the open cut, or rather from the 304-foot level to the seventh, inclusive, may be summed up as follows, the extraction from each level and the stopes above it being recapitulated from the foregoing descriptions:

AGGREGATE OF EXTRACTION FROM THE LEVELS BELOW THE 300.

Levels.		Cubic feet.	Tons.
Number.	Number of feet deep.		
III.	354–303	97,921	9,792
IV.	408–354	133,788	13,378
V.	510	28,458	2,846
VI.	612	3,150	315
VII.	714	166,228	16,623
		429,545	42,955

In calculating the number of tons, 10 cubic feet have been allowed to the ton. The pure dark porphyry, without ore, is found by experiment to have the specific gravity of 2·68, or 12 cubic feet to the ton.

The sump, 36 feet lower than the sill-floor of the seventh, is reported to be in ore, thus proving the continuous existence of ore from the surface to the lowest point yet opened in the mine.

The strength of the ore-ground in the lowest level is very encouraging for the future of the mine below, and it indicates, also, that the upper levels may be more extensively opened to advantage. So far, there is nothing to indicate any giving-out of the ore in depth. The changes of grade of ore from level to level are as likely to be in favor of higher grades of ore as of lower grades.

Production of the Mine.—The records, if any exist, of the earliest workings of the mine before its incorporation, are very imperfect. It is therefore difficult to ascertain with precision the aggregate production. Much ore is known to have been taken out and sold before the incorporation of the Silver King Company. It is believed that the value of the ores so sold is not less than $1,000,000.

The production since the incorporation up to the end of 1881 (January 1st, 1882), was $1,973,458.68 gross, in value. It was estimated by the general manager that 19,200 tons had been reduced and concentrated up to the 31st of December, 1879. The sale of ore for the same period amounted to $819,141.58.

The exceptionally rich character of the Silver King ore is best shown by the records of the shipments and sales, and by the assays of average samples. It varies of course in different parts of the mine. Some of the levels yield richer ore than others, as, for example, the third and the fourth, where an unusual amount of rich sulphide of silver was found. Before the construction of the railroad from San Francisco to Arizona, at Fort Yuma, access to the mine and transportation to and from it were not only tedious but very expensive. The development of the mine was therefore not only retarded but it was impracticable to work ores of a grade that ordinarily would pay a handsome profit. During that period of isolation and inaccessibility, the shipments were of necessity restricted to hand-sorted ore of high value, carefully selected, and averaging $1000 per ton, being such ores as would bear the great cost of extraction and transportation. All these extraordinary expenses have been gradually reduced, and since the completion of the railroad through the territory it has become practicable to ship ores of ordinary average grade with advantage. Much of the lower-grade ore, which for a time was laid aside, has since been sorted over and concentrated.

It is now found most profitable to crush and concentrate the ore and to ship the concentrates for sale to reduction-works. Considerable quantities have been sent to Castle Dome Mining and Smelting Company at Melrose, California, to the Selby Works, and to the Omaha Smelting-Works.

The mill of the company is at Pinal, five miles from the mine, and 20 stamps are kept constantly running. The amount crushed per day ranges from 50 to 57 tons. In the month of November last, 1532 tons were crushed, being an average of a little over 51 tons a day. The stamped ore, wet, flows to eight Frue concentrators, which are made to "handle" the entire product. For the same month of November, the total product of concentrates was 78·944 tons, being 5·2 per cent of the amount of ore

*Abstracts from a work entitled *Description of the Silver King Mine of Arizona.* New Haven, March, 1883. 48 pages.

stamped; the tailings, by difference, amounting to tons 1453·056, or 94·8 per cent. These tailings contained, by assay, $4.95 per ton in value of silver, and the concentrates, by assay, contained $1094.15 in value per ton in silver, being a total value of $86,377.01, which, deducted from the gross valuation, by assay, of $93,574.56, shows a loss of $7197.55 in value, or 7·69 per cent.

The battery samples for the period averaged $61.08 in value.

There is unusual difficulty in the way of obtaining closely correct samples of the concentrates, owing to the amount of native silver they contain. Samples taken from the same lot, and in the same way, will often give very different results. Great care has to be exercised to take every particle of the bottom layer of dust next to the rubber cloth upon which the powder is mixed.

These concentrates are dried and sacked for shipment in strong canvas sacks. The average content in lead, as determined from many shipments, is 21½ per cent, and of zinc 18 per cent. The chief value is in the native silver disseminated in the stamped mass in the form of irregularly shaped scale-like fragments.

At the time of my first visit to the mine, in the spring of the year 1880, desiring to check the statements of the value of the ore-bearing rock by assays entirely under my own control, I took four samples, as follows:

I. On 356-foot level. Along drift for 10 feet, corresponding to the part sent to mill.

II. On 356-foot level. Face of drift for 10 feet.

III. On 304-foot level. Quartz and "Horse-flesh" copper ore with some "yellow copper."

IV. On 256-foot level (second). Large pieces of quartz, with some gray copper and yellow copper.

I took these samples to Messrs. Huhn & Luckhardt, of San Francisco, for careful assay, and received the following returns, as per the original certificate, a copy of which is subjoined:

RESULTS OF ASSAYS.

SAN FRANCISCO, May 15, 1880.

SAMPLE NO. 9876—Marked "No. I." Silver King. One parcel of ore. The whole was crushed and pulverized, and an average sample proved to contain—Gold, none; silver, 114·23 ounces = $147.69 per ton (2000 pounds).

SAMPLE NO. 9877—Marked "No. II." Silver King. Small sack of ore. The whole was crushed and pulverized, and an average sample proved to contain—Gold, none; silver, 243·05 ounces = $314.24 per ton (2000 pounds).

SAMPLE NO. 9878—Marked "No. III." Silver King. Small sack of ore. After being crushed and pulverized, an average sample proved to contain—Gold, none; silver, 77·99 ounces = $102.13 per ton (2000 pounds).

SAMPLE NO. 9879—Marked "No. IV." Silver King. Small sack of ore. The whole was crushed and pulverized, and an average sample proved to contain—Gold, none; silver, 14·58 ounces = $18.85 per ton (2000 pounds).

The seventh level yields beautiful masses of native silver, associated with stromeyerite and blende. Specimens have been sent forward since my last visit in December, and are equal to any seen in the upper levels. The area of the excavation has been extended, and full details are given in the Annual Report of the Superintendent, dated January 1st, 1883.

Since then, some important additions have been made to the facilities for crushing and delivering ore to the mill, and to the plant for concentrating.

A large crushing-mill has been erected at the mine, where the ore is passed through a large-sized Blake rock-breaker, and is stored in bins with chutes and gates, so that it is loaded directly into the wagons to be taken to the mill at Pinal.

The batteries have been changed so as to deliver from both sides, and four additional Frue tables will be set up. It is expected that with these improvements the daily product can be increased to seventy-five tons of concentrates.

IRON-MAKING IN NEW ZEALAND.

For many years past, the deposits of iron-sand on certain parts of the shores of New Zealand have been well known, and have been the object of much solicitude on the part of the New Zealand government, as well as of those who have endeavored to use the raw material to commercial advantage. It was urged, says the *Ironmonger*, that the absence of suitable fuel within reasonable distance of the deposits would always be an insuperable obstacle in the way of using up the sand on the spot; yet that obstacle, serious as it seemed, would appear to have been overcome, judging from information just at hand. As is well known, there are immense deposits of the iron-sand along the West Coast of the North Island, and these have been the scene of many costly efforts to produce the iron. The Titanic Steel Company, of New Plymouth, for instance, spent thousands of pounds in vain attempts to reach the goal it had in view, and other speculators also failed to reduce the sand into the iron of commerce. While these experiments were going on in New Zealand, however, a New Jersey man named Joel Wilson had grappled with and conquered the difficulty. He patented his invention, and it is now in use in several parts of the United States. It is by means of his process that the iron-sand of New Zealand has at length been successfully dealt with. The enterprise has been carried out by Mr. John Chambers, one of the managing directors of T. & S. Morrin (Limited), Auckland, in conjunction with Mr. Gardner, of New York. They have selected a site at Onehunga, Manukau Harbor, where there are millions of tons of iron-sand on the foreshore. A furnace has been erected under the superintendence of Mr. Jones, formerly of the Rockaway Iron-Works, New Jersey. According to the New Zealand *Herald*, the plant on the ground at present consists of a furnace 32 feet in hight and 7 feet diameter; a reverberatory puddling-furnace with the deoxidizer over it, in which the sand is deoxidized by the waste heat from the puddling-furnace; and a magnetic separator. The iron-sand is brought by sea from the Manukau Heads, and is in the first instance taken to the separating-shed, where, by the aid of magnets, the iron is separated from the other foreign matter, and they fall into separate chutes. The iron-sand contains from 70 to 75 per cent of pure iron after the separating process; but it is estimated that 5 per cent is still left in the refuse, which is partly beach sand, with a small percentage of titanium. The iron-sand, thus cleansed, is then hoisted to the top of the furnace, into which it is introduced by a number of small openings into a series of retorts, where it is subjected to a reducing process. Upon opening a valve, any required quantity of red-hot sand is run into the puddling-furnace, where the carbon is burnt out of it, after which the iron is treated as in an ordinary puddling-furnace, blooms being taken from the furnace and finished. It is stated that the yield from the sand is greater than from pig-iron, as regards puddling, twenty blooms of 1¼ cwt. each being produced daily by a furnace of the size just mentioned. Greymouth coal was used at the preliminary trials, but it is stated that Waikato coal will answer well enough for all practical purposes. According to one of the principals, the cost is set down as under: Pig-iron for iron-making was worth in England from 45s. to 80s. (say 60s.) for good quality per ton. Against this they placed 1¼ tons of iron-sand, at 10s., making 15s.; charcoal, 20s.; making 35s. for charcoal iron, or 25s. for ordinary iron made with coal. It was not proposed to use any thing but slack coal, which could be placed here for 10s.; and as the right to use Wilson's patent gas-producers had been secured, Waikato slack would answer every purpose for these works. The quantity of imported bar iron last year was 8122 tons; hoop-iron, 757 tons; sheet-iron, 543 tons; plate-iron, 705 tons; fencing wire, 9215 tons; total, 21,928 tons. It was proposed at present to manufacture only bar-iron and wire, but the manufacture of hoop, sheet, and plate-iron would no doubt come in time.

FURNACE, MILL, AND FACTORY.

The Bennington (Vt.) Machine-Works are now building gunpowder machinery for the American Powder Company, Boston, and for the Pennsylvania Powder Company. Besides this, they have just shipped to the Miami Powder Company, of Xenia, Ohio, a large drying apparatus, capable of drying 25,000 pounds of saltpeter per day. The machine is furnished with Colonel Scott's automatic devices for handling the material.

T. C. Snyder & Co., of Canton, Ohio, have recently made a shipment of their roofing, packed in bundles, so as to be readily transferred from the railroad on pack-mules to the mine.

Jefferson furnace, located in Schuylkill County, Pa., a short distance above Auburn, which had been idle since December, was blown in few days ago. It is a charcoal plant, and is owned and operated by J. M. and H. Y. Kauffman.

Charles F. Elmes, of Chicago, is building another batch of hydraulic pumps and Harrison coal mining machines.

The Link Belt Machinery Company, of Chicago, is building a coal elevator for the Soddy Coal Company, of Chattanooga, Tenn.

The Cummer Engine Company, of Cleveland, will soon break ground for the new additions to its works, which additions will comprise new boiler and pattern-shops. Rodee & Bill, Ogdensburg, N. Y., have ordered this week of the above firm a 200 horse-power engine, with boilers, independent condenser, and complete outfit. Hill, Clark & Co., the Boston agents of the Cummer Engine Company, have also this week sent in orders for two of the Cummer automatic engines, to be placed in the last-named city.

The Lebanon Iron Company, located on the grounds of the old pipe-mill, at Lebanon, Pa., started up on Tuesday last. Four furnaces were started at first. The mill will turn out muck iron, to be used in the nut and bolt-works.

The Gates Iron-Works, of Chicago, have just shipped to Topeka, Kansas, one of their largest-sized rock-crushers, for ballasting the Atchison, Topeka & Santa Fé Railroad.

The French Spiral Spring Company is getting ready for an open-hearth steel plant.

It is announced that the North Chicago Rolling-Mills, which have been idle for the past six months, and furnish employment to 2000 men, will resume work early next week.

Citizens of Mercer, after raising $10,000 to secure the Union Tube-Works, of New Castle, were informed by the proprietor that he had concluded not to move.

The Gaylord Rolling-Mill and Steel-Works, having received offers of large donations from other cities to move there, are considering the same, and the chances are, that Portsmouth, O., may lose them unless liberal inducements are offered by the citizens to retain them there. Steps are taking toward this end.

The Oregon Iron and Steel Company, recently incorporated, is to erect mills at Portland, Or. Capital stock, $3,000,000. The plant has been purchased, and it is expected that the mills, furnaces, etc., will give employment to 2000 men.

The large and valuable property formerly owned and occupied by the Revere Copper Company has been sold to a couple of enterprising capitalists for improvement. It comprises more than forty acres, and constitutes nearly the whole of the peninsula known as Point Shirley, in the town of Winthrop, Mass., the exception being a few acres within whose boundaries stands Taft's Hotel. The total water frontage of the purchase is 6000 feet, 2500 feet of which is a capital sand beach, while the inner land forms a long hill, which affords an extended view inland as well as to the sea. It is accessible by the Boston, Winthrop & Point Shirley Narrow-Gauge Railroad. The Revere Copper Company occupied the premises from 1844 to 1870, at the latter date centering its interests in Canton, the present location of the mills.

Messrs. Fraser & Chalmers, of Chicago, report that they have the following orders on hand: One 75 horse-power engine, with boilers, shafting, pulleys, etc., complete for driving two 40-light dynamo machines for lighting the city of Albuquerque, N. M., by the Albuquerque Electric Light Company; and the following smelting plant: One 36 by 60 wrought-iron water-jacket furnace, with No. 5 Baker blower, slag-pots and all fixtures, and a 40 horse-power engine and boiler for the Republic Mining Company of Bozeman, Montana; a 36 by 84 and a 42-inch wrought-iron water-jacket smelting furnace, with No. 6 Baker blower, for the Benson Mining and Smelting Company, of Benson, Arizona; and a 36 by 48 water-jacket furnace for the Aurora Smelting and Refining Company, of Aurora, Ill. They are building a 30-stamp gold mill, with engine, boilers, etc., for the Santa Cruz mine, Honduras; a 20-stamp mill, with Corliss engine and boilers, to go to Venezuela; a 20-stamp gold mill, with engine, boiler, and Frue vanners, for the Golden Rule mine, Dragoon, Arizona; and a 5-stamp mill, with Frue vanners, for the Ropes Gold and Silver Mining Company, of Ishpeming, Mich. Two Frue vanners each have been ordered by the Argyle Mining Company, of Winnipeg, Manitoba; the Little Annie Gold Mining Company, of Summit, Colo.; Mr. M. V. B. Gillette, of Boulder, Colo.; and the Terrible mine, Silver Plume, Colo.; and one Frue vanner by the Iowa & Colorado Mining Company, of Summit, Colo. A complete hoisting and pumping plant has been bought by the Corralitos Mining Company, of Mexico. In addition to these, Messrs. Fraser & Chalmers are building a six-foot Murphy Champion ventilator for the Osage Coal and Mining Company, of Missouri, and for the Mining Association, of Halifax, Nova Scotia, and a four-foot Champion ventilator for the Coal Run Coal Company, of Streator, Ill.

Mr. George Miles has moved from his old boiler-works, on Granite street, South Boston, where the firm has carried on business for nineteen years, to his new building on A street. He has purchased new tools and machinery, and in a few months' time will have facilities for a large business.

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GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

COPPER QUEEN.—The product of this company from January 1st, 1883, to April 30th, is officially reported at 2,835,799 pounds of copper. The superintendent reports, May 1st: Production last month (768,097 pounds of copper) is a few tons greater than we have hitherto produced in any one month. During the past week, the ground in incline has become softer, and our progress has been six feet. Depth now below 300 level is forty-three feet. We are not bothered with much water at bottom of incline; the tank just below the sill-floor of 300 level catches the greater portion. You will notice from monthly statement that more than one half of the ore mined last month came from the stopes of 300 level. These stopes continue to look very fine.

PEABODY.—One of the smelters has started up and the other is expected to be ready to start up on the 15th.

TOMBSTONE DISTRICT.

CONTENTION.—A dispatch says that the superintendent has gone to San Francisco, to purchase pumps for use in the mines to aid the Grand Central in controlling the water. A twenty-foot ledge of ore at the water-level in the Contention assays higher than any other ever taken out of the mine.

WORONOCO.—Considerable work has been done on the San Diego mine, the main shaft being down 475 feet, while numerous drifts and cross-cuts on various levels have exposed large bodies of good ore, the average of which may be safely stated to be 75 ounces per ton, silver, with 20 per cent lead. La Grande claim, which the company has bonded, lies north of the San Diego, and has a shaft down 100 feet, with drifts running to the north and south, 20 feet each way. The ore assays 20 per cent lead, with results in silver running from 20 to 60 ounces per ton. A thirty-ton water-jacket smelter, which was successfully completed a few days ago, has been started up.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended April 28th shows: Tons of ore crushed, 163·62; average assay value of pulp, $31.04 per ton; of tailings, $4.17. North drift, 1000 level, is now 70 feet long. North drift, 800 level, is 404 feet long. North drift, 672 level, is in 113 feet. Work was resumed in the south drift from winze No. 6 at the 640 level; the drift is now 134 feet long. On the 21st, a winze on the rich seam was begun from the north drift at the 780 level. This winze is to be known as No. 5; was sunk four feet during the week.

STANDARD CONSOLIDATED.—The official report for the week ended April 28th shows: Ore extracted and shipped to mills, 686 tons; bullion shipped, $29,720.10. East cross-cut, 1000 level, is in 1348 feet. Uprise from south drift, 700 level, is up 42 feet, and shows 3 feet of vein. West cross-cut from north drift is 200 feet long, and is still in hard ground. North drift No. 1, 500 level, is in 663 feet, and shows 10 feet of vein. The winze from north drift is 88 feet long; vein 10 feet wide. North uprise is 100 feet high. South uprise No. 1 is up 200 feet. West cross-cut No. 1 is 412 feet long. South drift No. 2, 885 level, is in 494 feet, and shows 5 feet of vein. Uprise from this drift is up 176 feet, where the vein is 5 feet wide. Uprise No. 5 is up 115 feet, and north uprise is up 98 feet. North drift No. 3 is in 95 feet. The stopes are looking well.

CANADA.

PROVINCE OF NEW BRUNSWICK.

QUEEN MANGANESE MINES.—A cargo of 105 tons has been shipped to Liverpool. New crushing machinery is going up.

COLORADO.

CHAFFEE COUNTY.

It is stated that not far from Calumet, in Cree camp, and on Monarch Mountain, are immense ledges of white and variegated marble, that are attracting much attention. The marble runs nearly 100 per cent pure carbonate of lime, and is pronounced by experts of a No. 1 quality.

Reports from different mines in Monarch District show that the Columbus, at Columbus City, is working forty men in the mine, and the mill of twenty stamps is running night and day. Six companies have been doing development-work all winter on Middle Fork, and several of them have cut their leads and have large ore-bodies in sight. On Monarch Mountain, work is steadily going on. The Monarch and Fairplay are shipping ore steadily. Only a few men are at work now at the Madonna mine, but early in the season a large force will be put on and the ore will be shipped to Pueblo. The Eclipse has large ore-reserves in sight. The Silent Friend is 65 feet in solid ore. The North Fork Consolidated Mining and Smelting Company will resume work early in the season. Its tunnel is now over 1300 feet.

CLEAR CREEK COUNTY.

LITTLE MATTIE.—In the lowest level, a fine body of ore measuring about two feet in width, of a fine average, was struck near the shaft. At a short distance farther on, what appeared to be the hanging-wall was blasted away, and a streak was found constituting what seemed to be the wall. This contains an unusual amount of gray and yellow copper.

PAY ROCK.—The machinery was started May 5th for a test of its working.

SEVEN-THIRTY.—The ore mined last month netted about $8000 over mill charges. A mill-run has been had on ore from the 80-foot level east as follows: First-class, 192 ounces of silver, 30 per cent lead per ton; second-class, 120 ounces silver, 27 per cent lead. From forty to fifty men are constantly employed.

DOLORES COUNTY.

A larger amount of steady development-work is going on in the vicinity than at any previous period, while large sums of money are waiting the advent of good weather to begin operations in many mines owned by companies. The Rico Pasadena Mining Company, of Rico, is well supplied with capital and is ready for active operations. At the Dolores Valley Mining Company, work will be commenced on its many properties.

There are three smelters and reduction-works in operation, and the Rico smelter is expected to fire up soon.

PIGEON.—While running a cross-cut, a body of ore was recently struck, fully three feet in width, and within the vein, which is enormously wide, that gave 240 ounces in silver and a mill-run of 160 ounces in silver and 26 per cent galena.

SOUTH PARK.—The mine is developed by a 300-foot tunnel. In a cross-cut hirty feet from the main tunnel, some manganese silver and galena ore was truck which assays high.

FREMONT COUNTY.

The oil-well near Cañon City is now 1400 feet deep. Its capacity is about 10 barrels per day of a very superior lubricating oil. The present bottom of the shaft is still in sandstone, and it is expected that when greater depth has been attained or the sandstone cut through, a well of greater capacity will be developed. The company contemplates sinking another well about three miles north and west of the present one.

GARFIELD COUNTY.

Prof. B. Clark Wheeler, who has recently visited Garfield County, states, according to the Denver *Republican*, that it has vast and easily accessible fields of coal, excelled by none this side of Eastern Pennsylvania, with bodies of iron ore near at hand, together with timber, grazing, and agricultural lands. He feels great confidence in the carbonate section, which is quite extensive, at least ten by twenty-five miles. It is not a mountain range, but an elevated rolling plateau, averaging 10,000 feet above the sea, with all the Carboniferous, Devonian, and other rocks eroded away down to the dolomitic limestones in the Silurian measures, in which the mineral characteristics are of two kinds—one similar to Leadville, the other like portions of Utah lime fissures. Large bodies of mineral exist, low grade at the surface, to be sure; but what little development has been made shows great improvement, yet surface assays frequently run as high as 70 ounces silver and 40 per cent lead.

GILPIN COUNTY.

The coming season, says a correspondent of the Denver *Tribune*, will undoubtedly be one of the most important and interesting in the history of this county. Among the different mines with good prospects near Central City are the Anglo-Celt, with a shaft 118 feet deep. The Tryone lode, with a shaft 80 feet deep; the last ore shipped milled $180 to the ton. The Argo lode has been leased to a Denver company, and will begin operations with as little delay as possible. The mine is said to be of surprising richness. The Harlem lode is in good condition. The pay-streak is well-defined. From the shipments of ore made by the Barnacle and London mines, recently, the discoveries show up well. The Manitoba, in Vermilion District, has struck silver ore between 3 and 4 feet thick in the 105-foot level running west. Near Black Hawk some fine prospects have been discovered. The mines are north of the Gray Copper lode.

LAKE COUNTY.

Reports state that Governor Grant intends to erect a new smelter in Leadville, the location to be but a short distance from the one destroyed by fire.

The latest Leadville exchanges state the following:

CARBONATE.—Considerable work is done in the Little Grant, Shamrock, and Carbonate shafts. The ore carries from 45 to 135 ounces in silver, and from 3 to 13 per cent in lead, and the shipments are averaging about 15 tons per day.

CHRYSOLITE.—The Bulcher shaft is looking exceptionally well at present, a lime contact having been struck upon which there has almost invariably been found mineral.

CLIMAX.—A body of iron ore has been encountered in a drift run from shaft No. 6.

EAGLE'S NEST HILL.—The property of this company is located near Twin Lakes, and consists of seven full claims. The Dutch Kate is developed by a tunnel 160 feet in length. A vein of ore has been tapped which runs from $70 to $540 per ton. Three stamp-mills will be in operation at the lakes this season, and this company, in conjunction with the Falls lode, will probably furnish from ten to twenty tons of ore per day.

IRON.—Work has been resumed on the Mayer shaft in California Gulch.

LITTLE DIAMOND.—A body of chlorides, which is said to be from six to eight feet on the face, has been struck.

LITTLE PITTSBURG.—At the annual meeting of the stockholders, the following trustees were elected: W. H. Barnum, D. S. Draper, William Bond, C. J. Canda, T. E. Canda, and H. A. Kirkham. The old officers were re-elected. The report of the managing director shows the total surplus April 1st, 1883, $76,056.08, of which $53,727.36 is cash. Ore shipped during the year, 10,573 tons; settled for, 10,343 tons; unsettled for April 1st, 379 tons. Cash received for ore during year, $103,054.79. The official report for the month of April shows: Tons of ore shipped, 999 tons, about two thirds of which came from the leased grounds. These leases expired May 1st, and the subject of renewing them is now under consideration. Prospect-work is pushed vigorously, mostly in the north end of the property. The northwest drift from shaft No. 6 has been run 131 feet during the month. Most of the distance has been in iron, with small stringers of galena carrying from 50 to 150 ounces of silver. Some of the iron assays as high as 30 ounces silver. A drift from shaft No. 9, parallel to this, is also pushed rapidly. In other portions of the mine there is no material change.

MIKE & STARR.—The breast of copper ore is eight feet in thickness and has been cross-cut for a distance of nineteen feet. The smelter returns are forty-six ounces silver, two tenths of an ounce of gold, and about 14 per cent copper. The refractory nature of this ore has forced the owners to have it treated in Denver, and an average of fifteen tons per day is now shipped to Eddy, James & Co.'s sampling-works. This body is capped by a stratum of red iron of a carbonate nature, which carries twenty-seven ounces of silver, and will admit of treatment here. The entire mineral body is pitching almost directly south at an angle of ten degrees, and lies between lime walls, about one foot of talc covering the red iron.

PRINTER BOY HILL.—The *Herald* says that of all the hills surrounding Leadville, Printer Boy Hill is now attracting the most attention. The Iowa Gulch side especially presents a scene of activity similar to Fryer Hill during the early days of the camp. Development is pushed with great vigor.

At the Siberia mine, the shaft has attained a depth of 215 feet.

Adjoining the Brian Boru is the Blacktail, which is one of the oldest and best known producing properties on the hill. The tunnel is in a distance of about 200 feet, and shows a breast of ore three feet in thickness. This ore is a lead carbonate and nets between twenty and twenty-five dollars per ton above all expenses. The property is worked under a lease.

Little is done at the Oro Boy's mine at present, owing to a law suit.

At least five leases have been made on the Brian Boru property, and three of these leases are in mineral. The largest and most important strike has been made in the upper lease, adjoining the Nellie S. The shaft is down thirty-one feet. The ore is of at least two varieties, one of which is a gray sand running very high in lead, and the other a hard lead carbonate. All of the ore carries gold. The ore nets about twenty-two dollars per ton over all expenses.

The McClelland lease, south of the upper lease, is worked through a tunnel, which is in a distance of forty feet. A five-foot body of contact, carrying some mineral, has been passed through, and the workings are looking well.

In the lower lease on the old workings of the Brian Boru, some ore is exposed. This ore carries gold, silver, and lead, and although no shipments are made at present, the ore in sight would justify a regular output.

Under the new arrangement, the Cliosophic is known as No. 1 lease of the Altoona Consolidated, which embraces the Altoona, the Minnehaha, and the Cliosophic. A tunnel is now in a distance of about ten feet. A shaft has also been started and mineral uncovered at a distance of twenty feet from the surface. The Altoona is worked under a lease. Work is done on the surface and ore-bins and shaft-houses are in course of construction. The mine is developed by a tunnel 275 feet in length, from which an uprise has been run for a distance of 138 feet. A contact body eighty feet in thickness has been exposed, and there is a fine body of mineral shown in the uprise.

Adjoining the Brian Boru, and within twenty feet of the upper lease, a shaft has been sunk on the Little Fraction, a strip of ground which is only thirty-five feet wide by 130 long. This shaft is now down 75 feet, and has gone through between eight and ten feet of mineral.

The most productive property on the Iowa Gulch side of Printer Boy Hill is the Nellie S. About seventy men are worked in the mine, and the shipments are between 80 and 90 tons per day. This ore nets above all expenses about twenty dollars per ton. The shipments will be increased shortly to over one hundred tons per day. The formation is very irregular, and the ore-body pinches and widens continually.

PARK COUNTY.

BOAZ.—This company is a consolidation of five claims. The property is now worked under a lease on twenty-five per cent royalty. A new strike was reported

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recently of ore carrying crystallized silver and sulphurets. The mineral before this last strike carried 251½ ounces silver and fourteen per cent lead.

LONDON.—The new twenty-stamp mill and concentrator at London Junction is fast approaching completion.

POOR MAN'S HOPE.—This lode, situated in the carbonate field south of Platte station, is making a good showing. The shaft on this claim is down eighty-five feet, and mineral was struck at thirty feet. The ore runs from twenty-seven to forty-two ounces in silver. Regular shipments will soon be made to Denver.

SAN JUAN.

A mining suit which involves an aggregate of about half a million dollars worth of property in, and dividends from the San Juan Consolidated Mining Company, the Bull Dog Gold Mining Company, and the San Juan Consolidated Gold Mining Company, has been filed in the United States Circuit Court, at Denver. The complaint is filed by Charles F. Gillett, of Chicago, and the defendants named in the complaint are the mining companies mentioned above and Thomas M. Bowen and Charles W. Tankersley.

DAKOTA.

BLACK HILLS PLACER MINING COMPANY.—The company owns some valuable claims, and there is every indication of activity about the works. Men are now at work putting in order the bed-rock flume, two miles below Rockerville.

FATHER DE SMET.—The superintendent writes, under date of April 19th, as follows: Herewith express company's receipt for bar No. 157, 701·42 ounces gold, the result of run of mill for the first half of April. This is a pretty light bar; but I promise a larger one for the last half of the month. The body of ore on the third level is improving in size and quality as work progresses. On the second level west cross-cut from Cook's chamber, we have a fine body of ore, sampling an average of $8 per ton; it is quite hard, but it will prove of much real value, as the body must be quite extensive. On 15th inst., I drew for $22,000, expenses for March.

HAMMOND.—The five-stamp mill, five miles below Galena, has been purchased by the St. Elmo, and will immediately be removed to that location. A sufficient stream of water runs in close proximity to the St. Elmo to supply motive power to the mill.

HARNEY HYDRAULIC MINING COMPANY.—This company has leased for the season the ground known as the Mitchell Bar, together with flumes, water rights, etc. The lessee is to have from the product $4 a day to the man; the remainder to go to the company. No work will be done directly by the latter this season. A contract will, however, shortly be awarded for running a drain ditch 2500 feet long, beginning below Harney. The gulch has been thoroughly prospected, and the presence of gold in large quantities established.

IRON CITY.—This company is successfully operating the old Lexington ten-stamp mill and the Foote mine. The latter under a five-year lease.

ORO CACHE.—One tunnel is now in 280 feet and another 300 feet, with 60 feet of cross-cuts, all in ore of average value, $7.50. It is probable that a mill will be erected at an early day.

IDAHO.

FLORIDA MOUNTAIN MINES.—Work is doing on a number of mines with satisfactory results. At the Empire State, a good quality of quartz is taken from the ledge, which holds its average width. As soon as the weather will permit, ore will be hauled to the mill, and a larger force of men put on the mine.

Work at the Leviathan is progressing, and good quartz is extracted as the drift is pushed into the hill. The ledge is of good size, and is easily worked.

WAR EAGLE MOUNTAIN.—There is nothing of importance to report from the different mines. The work of development continues, and the product of some of the mines shows a fine quality of ore.

MAINE.

Our correspondent "Dirigo" writes us as follows from Blue Hill, under date of May 7th:

DOUGLASS.—The large cupola furnace, four feet by ten feet, at the Douglass, has been running nearly three weeks, smelting about 20 tons per day. One reverberatory is just now in use as a calcination furnace, but the other is treating the matte from the cupola. The refining furnace is completed and ready for use. Every available team is now at work hauling coal and coke from the wharf to the mine, and every thing about the premises looks lively and prosperous.

STEWART.—The underground work is progressing without interruption. It is proposed to put on sufficient force to run the drifts and levels in the shortest possible time, so that the mine may be having a regular output and established value before putting in any concentrating-works. The difficult and annoying portions of the work of opening the mine are well-nigh passed.

SULLIVAN.—The force of miners is increased.

MEXICO.

Two rich lodes of gold have been denounced in the State of Oaxaca.

Five hundred petroleum claims have already been staked in the State of Vera Cruz. The last four were discovered in the vicinity of Ozuluama and Tantoyuca.

Considerable interest prevails over the recent discoveries of rich lodes of silver and cinnabar in the State of Puebla.

The legislature of Zacatecas has granted *amparo* of one year to the following mining properties: Ave Maria mine, of the district of Pico de Teira; San José y Concordia; and the mines of William Patterson.

HIDALGO.

The stockholders of Santa Gertrudis, at a recent meeting, by a majority vote censured the directors for mismanagement. Although the mine was never in better condition, internal discord has a marked influence upon the stock.

Work on the Encino mine has been discontinued for a period of three months.

Telephone communication has been established between the mines of El Cristo, San Cayetano el Bordo, and the reduction-works of La Purisma Chica, Pachuca.

Work is pushed with favorable results in Californias, Real del Monte. The mines of Santa Rosa District are looking well. Cueva Santa continues to yield, although work is not pushed at present.

Dr. J. A. Skilton, who for years has possessed extended mining interests at and about Pachuca, is preparing the way for the establishment of a cosmopolitan mining journal, to be published at Mexico City. Mr. Skilton, from a personal knowledge of Mexico and her mineral resources, is equal to the demand of such an enterprise, and doubtless will meet with the co-operation of American merchants and friends of Mexico as well as the press of both countries. Frank A. Skilton, of Jacksonville, New York, represents his interests in the United States.

MICHIGAN.

The product of the following mines for April was: Calumet & Hecla, 1642 tons 505 pounds; Quincy, 250 tons 310 pounds; Franklin, 170 tons 1505 pounds; Atlantic, 152 tons 794 pounds; Pewabic, 70 tons 370 pounds.

BELT.—A large mass of copper has been struck in the shaft of the Knowlton vein, the extent of which is not yet known. The Butler vein is producing good stamp rock.

NEW BARNUM.—The mine is shipping ore.

ROPES.—The five-stamp mill to be erected at this mine has been purchased from Messrs. Fraser & Chalmers. The water for the mill will be pumped from the adjoining creek, which is of a size large enough to operate a mill of fifty stamps.

MONTANA.

LEWIS & CLARKE COUNTY.

BOSTON & MONTANA.—According to the Helena *Independent*, some successful experiments have been made recently, at the Gloster mine, with results that reach as high a saving as ninety-two per cent of the gold in the ore and fifty-six per cent of the silver. Considering the magnitude of the mine and the importance of the works, this success is worthy of note. While the gold in the Gloster does not decrease, the silver seems to increase, and the great difficulty has been to save it on the plate of the battery; but this question seems to be solved, and it only remains to put the requisite pans into the mills, when the product from the stamps will be more than double the present output.

CONSOLIDATED GREGORY.—The blast-furnace will start up shortly, and run out about 300,000 pounds of base bullion. Another run will be made about the first of June, when about 200,000 pounds more will be added. The quantity already made and on hand amounts to 434,000 pounds, which makes nearly one million pounds of base bullion that will be ready for shipment when the Northern Pacific Railroad reaches Helena. The works will be improved somewhat after the close of the run to be made in June. The concentrator is to be reconstructed and enlarged to such an extent as to enable it to produce enough concentrations to run four reverberatories constantly, and that will result in the production of about six tons of argentiferous lead daily; for it is thought that, with the contemplated improvement, the blast-furnace will be kept running almost continuously. The mine continues to show well, and the output of ore is about sixty tons per day. In making a cross-cut from the fifth level toward the north, from the hanging-wall of the main vein, and about twenty feet outside, four feet of excellent galena were encountered, and it has been found to hold for a distance of 150 feet along the vein and as far as the stoping has been prosecuted, or for nearly forty feet above.

SILVER BOW COUNTY—SUMMIT VALLEY DISTRICT.

ALICE.—The surface strike in the Magna Charta, 500 feet east of the main shaft, promises to prove a bonanza. An open cut 10 feet deep has been run for a length of 50 feet along the vein, and the average width of $75 ore is seven feet. Twenty tons a day are now taken out of the cut, and as a result the battery samples in the mill have been raised to $40.

ANACONDA.—It is stated by the *Inter-Mountain* that the location of the smelter has at last been definitely determined. The smelter will be built on Warm Springs Creek, and the construction of the works will begin as soon as the required building material can be got on the ground. The smelter will begin operations with a capacity of 300 tons per day, and the facilities for reduction will be increased as rapidly as advisable until the productive capacity of the Anaconda mine shall be fully taxed. A town-site located near the proposed works will be surveyed and platted, and post, express, and telegraph offices will be established. During the approaching summer, a branch of the well-known banking house of Hoge, Brownlee & Co. will begin business. The sinking of the Anaconda shaft, which was suspended for some months, has been resumed, and without any further delay it will be sunk to the depth of 1000 feet. It is now something over 600 feet in depth. The main shaft of the St. Lawrence, which is now 300 feet deep, will also be sunk 1000 feet.

BELL.—The smelter continues in successful operation. Only the east furnace is running, and the amount of ore reduced daily averages 25 tons. Enough ore is on hand to supply the furnace until the new workings of the mine shall be opened, after which both furnaces will run full blast, and at least 60 tons of ore will be treated every twenty-four hours. The shaft at the mine is 245 feet deep, and is going down at the rate of five feet a day, a change having occurred in the rock in the bottom which renders the sinking much easier than formerly. About 65 men are now employed. The matte shipments average about ten tons daily, assaying 55 per cent copper and from $70 to $150 in silver per ton.

SILVER BOW.—In the face and shapes of the drifts run from the bottom of the 130-foot shafts in the Mount Moriah, work is actively progressing on a vein of ore varying in width from two to six feet, with an average width of four feet, and assaying between $35 and $40 per ton. The daily output is 15 tons, which is shipped regularly to the Silver Bow mill for reduction.

NEVADA.

MARTIN WHITE.—There is no important change in the appearance of the mine or in the value of the ore extracted. All of the work in the mine is done in the northerly end of the 160 level. The amount of ore put in the dump for the week ended on the 22d was 35 tons, assay value $30.02 per ton.

NAVAJO.—The superintendent reports: Have begun work on the station at the 550 level, making good progress. Drift south, 450 level, has been advanced 14 feet. No material change in the vein-matter. It carries a little good ore at some points along the vein. South drift, east lateral vein, 350 level, extended 15 feet It shows a good, strong vein, and fair indications of ore. The usual quantity and grade of ore have been milled.

YELLOW JACKET.—The water in the mine remains at the same hight. At the Winters shaft, about 140 tons are extracted and shipped daily. The north lateral drift on the Sagebrush level is now within 60 feet of the north line; the old stope is still on the east side of this drift. Work has been resumed in the north drift on the second level. This drift is found to be in very bad condition and expensive to reopen.

PENNSYLVANIA.

The ore-washers in Berks County belonging to the Allentown Iron Company have been stopped. Business has also been suspended at some of the washeries of the Temple Iron Company.

A large vein of iron ore, which has been pronounced very rich by experts, was discovered a few days ago on the farm of Rev. William Hertzler, near Elizabethtown.

Mr. Randolph Brandt, manufacturer of Seldon's packing and general mill, mine, and steamship supplies, has removed to No. 38 Cortlandt street, New York City.

UTAH.

SAMPSON.—The manager telegraphs from Salt Lake City that he has received and sold two cars of ore, netting the company $1600—$62.50 per ton. Two cars received later netted $75 per ton. Roads continue bad. Reports received by mail state that from four to five tons of ore are taken from the Sampson daily, and that the quantity will be increased to fifteen tons as soon as the new shaft is down.

TELEGRAPH.—The Salt Lake *Tribune* says that a very important mining transaction has just been consummated, by which the well-known Telegraph West Extension mine, Bingham, has passed into new hands. Messrs. Knight, Sutton, and Avis, of Brooklyn, New York, have arrived in Salt Lake City for the purpose of receiving the property and making payment in the name of the Brooklyn Mining Company. The amount paid for this valuable property is a private matter, but we understand it is in the neighborhood of $100,000. The property is known as a lead mine, and the body of ore is said to be large. It is provided with fine machinery for operating, and with concentrating-works which have been turning out 600 tons of ore per month, assaying 55 per cent lead and 10 ounces silver per ton.

SILVER REEF.

STORMONT.—Full returns for the month of April just received show gross bullion product for April $19,676.54. Under date of April 28th, the superintendent at Silver Reef estimates about 3000 tons of ore in sight. Assays for the week ended April 28th ran from $18 to $27.33.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, May 11.

The mining market continues very dull, and there is nothing in the transactions this week worthy of mention. The Pipe Line certificates occupy all the attention of the brokers, and mining stocks are almost entirely neglected. Of the stocks dealt in, Robinson and Sonora hold the lead, while some of the low-priced fancies have been moderately dealt in. A complete summary in detail is given below. The total number of mining shares sold at all the Exchanges aggregates 173,917, as against 240,374 last week.

The Comstock shares have been very quiet at steady prices. California sold to the extent of 2250 shares at 25@23c. Consolidated Virginia was quiet and irregular, selling from 50@55@52c. Sierra Nevada was also irregular, under a small business, and sold from $4.25@$3.60@$3.80. Union Consolidated records a transaction of 100 shares at $3.80. Best & Belcher has been quiet and steady; it sold from $3.55@$4. Sutro Tunnel, with a business of 10,870 shares, sold at 21@20c.

The Leadville stocks were very moderately dealt in and prices were steady. Amie was active and steady, selling to the extent of 12,000 shares at 20c. Chrysolite had a small business at steady prices, selling from $1@$1 05. Leadville sold to-day at 64@60c., and Iron Silver at $2.95. Little Chief sold to the extent of 900 shares at 55@52c. Little Pittsburg was strong under a small business, selling from 58@63c. Climax was moderately dealt in at irregular prices; it sold from 8@10@9c.

The Bodie stocks were quiet and steady. Bodie Consolidated sold at $1.15. Standard records a small business at steady prices, selling at $6.50. Bulwer was moderately dealt in, and was weak; it sold from 70@60c., the sales aggregating 925 shares.

The Tuscarora stocks record but moderate transactions at steady prices. Grand Prize was quiet and steady, selling from 90c.@$1. Argenta sold at $1.05 with one transaction. Belle Isle was quiet, and a little weak, selling from 45@40c. Navajo records a fair business at strong prices; it sold from $2.35@2.45. Independence was quiet and steady, selling from 57@60c. Elko Consolidated sold at 20@21c., assessment paid; the transactions were small, amounting to 5900 shares.

In the miscellaneous list, Alice was quiet and steady, selling at $3.25. Bassick records a small business, and was weak; it sold from $9@$8. Eureka Consolidated was irregular, selling from $5.38@$4.75@$5, under a small business. The Green Mountain stocks were quiet and steady. Green Mountain was strong at 75@83c. Rising Sun sold at 3c., and Cherokee at 4c. Hall-Anderson had a small business, and was weak; it sold from $1.45@$1.25. Homestake declined from $16.25@$15.75, and was strong to-day, closing at $16.25; the business was small. Horn-Silver has been quiet and weak; it sold from $7.75@$6.50@$6.75. Hukill sold to the extent of 450 shares at 11@9c. Northern Belle has been very weak, selling as low as $7.70 to-day from $8.75 on Tuesday; the transactions have been small. Quicksilver, Common, records a fair business at irregular prices; it sold from $8.25 @$7.75@$8. Robinson Consolidated has been active at irregular prices; it sold from 80@92@89c. Sierra Grande was moderately dealt in at irregular prices during the week, but reacted and closed strong to-day; it sold from $1.25@$1@$1.25.

Alta-Montana has been quiet and steady at 4@3c. Bradshaw records a small business at steady prices, selling from 42@40c. Caledonia (B. H.) was quiet and steady at 80c. Decatur had a small business at irregular prices; it sold from 5@3@4c. Durango sold at 5c., the transactions aggregating 6000 shares. Harlem has had a fair business at strong prices; it sold from $1.45@$1.50. Lacrosse was quiet and steady at 11@13@12c. Oriental & Miller was quiet and steady, selling at 14@15c. Sonora Consolidated has been active and weak; it sold from 47@37c., with a business of 26,406 shares. South Pacific was quiet and steady at 6@5c. The State Line stocks were almost forgotten, only Nos. 2 & 3 being dealt in, to the extent of 1500 shares at 5@4c.

The Jocuistita Mining Company has issued the following statement of the business of the company from March, 1882, to March, 1883:

RECEIPTS.

Balance in the hands of treasurer, last annual statement	$440,216.86
Balance in the hands of superintendent Jocuistita, last annual statement	1,503.10
Net proceeds, bullion, 631 bars, Nos. 1075 to 1644 and new Nos. bars 1 to 61	653,494.37
From merchandise, sales in excess of purchases	12,470.94
Current accounts—From superintendent mine and mill	2,175.19
Horse and mule account—Mules sold	386.00
Materials account—Consumed in excess of purchases, Jocuistita	14,554.43
Exchange—Premium on drafts	32,216,09
Total	$1,157,016.98

DISBURSEMENTS.

Mine expense—Jocuistita	$106,987.88
Mill expense, "	85,270.24
Bullion expenses—Export duty, freight from Jocuistita to Mazatlan, etc	71,581.84
General expenses—Jocuistita and Mazatlan	6,719.22
Wood—Purchase in excess of consumption	2,489.11
Ore account—Jocuistita and Mazatlan expenses	82.99
Incidental expenses—San Francisco & N. Y.	1,389.09
Current accounts—Paid account superintendent's salary, S. F.	3,449.50
Office rent, clerk and secretary's salary, N. Y. and S. F	3,300.00
Directors' fees, New York	670 00
Advertising dividends, etc., New York	399.55
Supplies forwarded from San Francisco	7,175.11
Quicksilver " " "	12,634.25
Powder " " "	2,625.00
Machinery " " "	7,195.71
Sulphate of copper " "	3,057.53
Office safes forwarded from New York	290.27
Salary of William McCaskell	7,000.00
Insurance on merchandise	10.80
Dividends	450,000.00
Cash in hands superintendent Jocuistita	533.43
Cash in hands of treasurer	384,155.46
Total	$1,157,016.98

MEETINGS.

Dana Mining Company, of Michigan, No. 70 Devonshire street, Boston, Mass. Annual meeting of stockholders and election of trustees, May 21st, at three o'clock P.M.

The Young America Copper Company, No. 39 Broadway, Rooms 16 and 17, New York City. Annual meeting of stockholders and election of trustees, May 24th, at half-past one o'clock P.M.

DIVIDENDS.

The Carbonate Hill Mining Company, of Colorado, has declared a dividend (No. 5) of five cents per share, payable June 1st. Transfer-books close May 19th, and reopen June 2d.

The Jocuistita Mining Company, of Mexico, has declared a quarterly dividend of $50,000, being fifty cents per share, payable at the office of Lounsbery & Haggin, Mills Building, No. 15 Broad street, New York, on May 31st.

The Silver King Mining Company, of Arizona, has declared a dividend of twenty-five cents per share, payable on the 15th inst.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week ended May 11th at half-past twelve P.M.:

One week ago, the market opened at 91¾c., and since that time 95⅛c. has been the highest point reached, which was attained Thursday by a gradually hardening process. The market yesterday afternoon, however, yielded to 92⅞c., on reports of the opening of the Balltown Oil Company's well No. 6, which started off good for about 25 barrels per hour, and the announcement that the Anchor Oil Company's No. 15 was doing better than reported on its opening the evening before. The market this (Friday) morning opened at 93c., and rose to 94⅞c., closing at half-past twelve at 94¾c.

The news this morning is rather bullish in its tendency. It shows the Cooper production from 56 wells to be 4158 barrels. The Glatzau well, lot 324, and Markham, lot 740, both "wild-cats," are reported to be dry, and the market would probably be more buoyant were it not that another important well is expected in to-day. This is the Murphy or Porcupine No. 3, which is 600 feet north of the No. 1 well, which started off at the rate of 800 barrels the first twenty-four hours. This well should be good, and the market might in consequence sell off a trifle; but there is a large short interest which may easily be frightened to cover, thus insuring a good demand for oil on a turn. The statement for April of the United Pipe Line Company is decidedly bullish, as it shows an increase in net stocks of only 11,700 barrels. The company was itself a purchaser of 443,000 barrels of oil during the month for "surplus and sediment account." This adds 25 per cent to its holdings, and would indicate that it does not believe in lower prices. It is a noteworthy fact that it reduced its surplus account last October by about 500,000 barrels, and it so happened that dollar oil prevailed at that time. A large fire occurred in the yards of the National Storage Company yesterday, destroying about 100,000 barrels of oil. The runs from the oil-wells to the Pipe Line Company during the first seven days of this month are considerably less than the deliveries, and they would indicate that the visible supply of oil on June 1st will be less than on May 1st, notwithstanding all the new wells we hear so much about. Petroleum is good goods, and buyers in the neighborhood of from 90 to 93 cents will probably see good profits during the next few weeks.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange.:

		Opening.	Highest.	Lowest.	Closing.	Sales.
May	5....	$0.91⅞	$0.92	$0.91¼	$0.91⅝	1,059,000
	7....	.91¼	.93¼	.91⅝	.93	1,722,000
	8....	.93⅝	.94¼	.93	.93½	1,974,000
	9....	.92⅞	.94⅜	.92¾	.93¾	2,319,000
	10....	.95	.95⅛	.92⅜	.93	2,129,000
	11....	.92⅞	.93⅞	.92½	.92¾	2,153,000
Total sales						11,356,000

At the annual election of the New York Petroleum Exchange, Mr. L. H. Smith was re-elected President without opposition. The rest of the ticket elected is as follows: First Vice-President, W. H. Johnson; Second Vice-President, D. R. Offley; Treasurer, Henry M. Curtis; Secretary, William Fisher; Directors, Nicholas Mehlen, E. K. Willard, James A. Waugh, H. L. Hotchkiss, P. V. C. Miller, C. E. Orvis, Frank Kimball, H. L. Horton, P. B. Crosby, W. H. Henriques, James L. Anthony, J. W. Copmann, G. R. Gibson, Livingston Roe, F. H. Cohn, F. D. Stead, Irving S. Bernheimer, H. O. Beebe, Minott Mitchell, Josiah Lombard.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. May 4.	May 5.	May 7.	May 8.	May 9.	May 10.
Albion	....	....	....	....	....	....
Alpha	1⅛	1¼	1¼	1⅝	1⅛	1⅛
Alta	11-32	11-32	11-32	5-16	¼	¼
Bechtel	....	....	....	....	....	....
Belcher	1	1	1⅛	1⅛	1	1
Belle Isle	13-32	....	11-32	....	....	11-32
Best & Belcher	3¾	3¼	4¼	3¾	3¾	3⅝
Bodie	1¼	1¼	1⅛	1⅛	1	1
Bullion	....	....	....	....	....	....
California	¼	¼	....	¼	....	....
Chollar	....	....	....	....	....	....
Con. Virginia	⅛	⅛	9-16	⅛	9-16	9-16
Crown Point	1⅛	1⅛	1⅝	1⅛	1⅛	1¼
Elko Cons	....	....	3-32	3-32	....	....
Eureka Cons	....	5⅛	....	5	....	....
Exchequer	7-16	13-32	13-32	11-32	13-32	5-16
Gould & Curry	2⅛	2⅛	2⅝	2⅝	2⅛	2⅝
Grand Prize	1	1⅛	1⅛	1⅛	1	1
Hale & Norcross	4	3⅝	3⅝	3½	3⅝	3⅝
Independence	....	....	19-32	19-32	19-32	19-32
Martin White	....	....	....	9 32	5-16	5-16
Mexican	3	3	3	2¾	2¾	2¾
Mono	....	....	....	....	....	....
Mount Diablo	....	....	....	....	....	....
Navajo	2⅛	2⅝	2⅛	2⅛	2⅛	2¼
Northern Belle	8¼	8⅝	3½	8½	8⅝	....
North Belle Isle	....	....	....	....	....	....
Ophir	2⅝	2¼	2¼	2⅛	2⅛	2
Overman	....	....	....	....	....	....
Potosi	1⅝	1¼	1¼	1¼	1¼	1¼
Savage	2	2	2⅛	2	2	2
Scorpion	....	....	....	....	....	....
Sierra Nevada	4⅛	3¾	4	3⅞	4	4
Silver King	....	....	10½	....	10½	....
Tip-Top	4	....	1	....	....	....
Union Cons	4⅛	4⅛	4¼	4⅛	4	3⅝
Wales Cons	3-16	....	....	3-16	....	3-16
Yellow Jacket	4⅝	4⅛	4⅞	4¼	3½	3¼

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 10.

The market continues to rule generally dull, and with a single exception prices are fairly steady. Ingot copper is firm at about 16c., which tends to hold the dividend-paying stocks firm, while the absence of any speculative demand for low-priced stocks has a tendency to render the market dull and uninteresting. The feature of the week in coppers is the rise in Quincy, which, in the early dealings, sold very freely at $40⅛@$40½; but the market being cleared of all the

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floating lots, the price readily advanced on small sales to $45⅛, closing quite strong to-day at $45 bid. There is nothing that we can learn to warrant the advance beyond the fact that it has been unduly depressed, and that for a dividend-paying mine like the Quincy forty dollars seems a very low price, and this naturally brought in buyers. Calumet & Hecla declined from $234@$232, but rallied later and sold at $233. The April product of the mine was over 1600 tons. Franklin advanced from $10@$10¼ on sale of 25 shares only. Pewabic improved from $4@$5. There is but little of this stock offered in the market at present, holders being disposed to pay the assessment and wait for results. Osceola continues to be heavy, and declined from $21½@$21. Huron sold at $1⅛, same as last week.

In silver stocks, Bonanza, which last week sold up to $2⅛, has been heavy, and declined to $2. Catalpa advanced from 67½@77½c., and has been fairly active. Sullivan sold as before at $1¼. Harshaw, at $⅝@$½. San Pedro, at 50c.

At the Boston Mining Exchange, there has been no feature of interest, and prices are without material change.

3 P.M.—At the afternoon Board, Quincy sold at $45⅛@$45, closing at $44½ bid. Osceola, $21. Allouez, $2 asked. Atlantic, $11 asked. Bonanza, $2@$2⅛. Catalpa, 72½@75c. Franklin, $10 bid. Pewabic, $4½@$6. Silver Islet, $4@$5. Sullivan, $1 bid. San Pedro, 50c. asked. Huron, $1⅛ bid. Harshaw, $½@$¾.

BULLION MARKET.

NEW YORK, Friday Evening, May 11.

The declining tendency of the market noted by us for several weeks past has been more marked the past few days. But for an advance in sterling exchange, the rate would be only about 109 per fine ounce. The market in London is very dull and nominal, with no demand for the East Indies.

DATE.	London	N. Y.	DATE.	London	N. Y.
	Pence.	Cents.		Pence.	Cents.
May 5..	50 5-16	109⅝	May 9..	50 3-16	109½
7..	50¼	109½	10..	50⅛	109½
8..	50¼	109½	11..	50⅛	109½

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended May 11th, as compiled from various sources, amounted to $157,000, as against $130,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,836,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended May 5th	$98,000
Corresponding week last year	2,534,760
Since January 1st, 1883	5,326,867
Corresponding period last year	17,454,113

Imports.

Week ended May 5th	$29,251
Corresponding week last year	37,798
Since January 1st, 1883	6,495,259
Corresponding period last year	1,504,879

United States Assay-Office at New York.—Statement of business for the month ended April 30th, 1883:

Deposits of gold:		
Foreign coin	$960,000.00	
Foreign bullion	43,500.00	
United States bullion	470,000.00	
United States bullion (re-deposits)	47,200.00	
Jewelers' bars	59,300.00	
Refined gold	127,000.00	$1,707,000.00
Deposits of silver:		
Jewelers' bars	16,000.00	
Foreign coin	4,700.00	
Foreign bullion	23,000.00	
United States bullion (contained in gold)	6,000.00	
United States bullion (re-deposits)	200.00	
United States bullion, Arizona	7,500.00	
United States bullion, Colorado	23,000.00	
United States bullion, Dakota	12,400.00	
United States bullion, L. Superior	600.00	
United States bullion, Montana	58,500.00	
United States bullion, Nevada	7,.00.00	
United States bullion, N. Mexico	20,700.00	
United States bullion, Utah	109,300.60	
Refined silver	109,000.00	398,000.00
Total deposits		$2,105,000,00
Gold bars stamped	1,351,472.99	
Silver bars stamped	326,300.21	1,714,673.20

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, advanced the bank's minimum rate for discount from 3 to 4 per cent. During the week, the bank lost £462,000 bullion, and the proportion of its reserve to its liabilities was reduced from 34 1-16 to 33 7-16 per cent, against 42¾ per cent at this date a year ago. The weekly statement of the Bank of France shows losses of 537,500 francs gold and 1,675,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of April.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$234,193
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"		12,604
Bodie, G. S.	Cal	25,085	91,342
Bodie Tunnel, G.	"	6,254	41,103
*Bonanza King, G.	"	57,000	199,077
*Boston & Montana, G.	Mont		53,577
*Central Arizona, S.	Ariz		35,845
*Christy, S.	Utah		68,405
*Chrysolite, S. L.	Colo	24,146	142,238
*Contention, S.	Ariz		209,260
Crescent, G.	Cal		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		120,231
*Derbec Blue Gravel, G. S.	Cal		24,803
*Father de Smet, G.	Dak		101,389
*Frisco M. and S. Co., G. S. L.	Utah		$60,718
*Head Center and Tranquillity	Ariz.		4,593
*Hecla Cons., G. S.	Mont		177,924
*Homestake, G.	Dak		330,060
*Hope, S.	Mont		20,574
Horn-Silver, S. L.	Utah	291,000	1,055,000
*Independence, G. S.	Nev		26,943
*Kentuck, G. S.	"		6,137
*Lexington, S.	Mont	96,317	421.204
*Little Pittsburg, S. L.	Colo		19,577
*Marguerite, G.	Cal		33,200
*Martin White, G. S.	Nev		136.317
*Moulton, G. S.	Mont		123,288
Mount Diablo	Nev	57,586	67,443
*Navajo, G. S.	"		211,980
Northern Belle, S.	"	75,700	343,015
*Ontario, S. L.	Utah	222.274	807,695
*Oxford, G.	N. S.	6,181	21,324
*Phœnix, G.	S. C.		†3,666
*Pinal Cons., S. L.	Ariz		§49,810
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		34,246
Standard, G.	Cal	78,757	341,763
Star, S.	Nev		27,095
*Stormont, S.	Utah	19,677	74,281
Syndicate, G.	Cal	4,869	14,086
Tintic M. and M. Co.	Utah		7,632
*Tip Top, S.	Ariz		‡22,983
*Tombstone, G. S.	"		‡193,159
Yellow Jacket, S.	Nev	54,120	152,873
Total amount of shipments to date			$6,279,649

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, May 11.

Copper.—So far as Lake copper is concerned, the position is better, and it could not be possible to do much better than 16c. even in round lots. Small parcels have already sold at that figure, and 15⅛c. is in vain bid for rounder lots. In sympathy therewith the best brands of outside copper, like "Anchor" and Baltimore-Arizona, are more firmly held, while some outside brands have still been sold as low as 14¼c. England cables this week £68@£68 15s. for Best Selected, and £62@62 5s. for Chili Bars.

Tin.—Our market has been quiet, with limited transactions at 21¼c. cash for Straits, and 21⅛c. for futures, 21⅛c. for Australian, 22c. for Banca, and 21⅛c. for Lamb & Flag. England cables at the close £96.

Lead.—The market has been very quiet and dull. We hear that offers have been solicited at 4·30c. for Common, without leading to any business, while the best offer for Refined has been 4.40c.; the outlook is not promising.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day:

The market is a little easier. Sales for the week run up over 350 tons. Refined at 4·67½c., a small lot at 4·15c., 140 tons at 4·12½c., and 90 tons of Hard lead at 4·05c.

Messrs. Everett & Post telegraph us from Chicago to-day:

Our market is quiet and dull. Sales amount to 400 tons at 4·15@4·10c. Refined is nominally 4·15c.

Spelter.—There have been small sales of good ordinary brands at $4.75, while other brands are quoted as low as $4.70.

Antimony.—Nothing has been done. We quote Hallett's 9¾@9⅞c., and Cookson's 10¾@10⅞c.

Quicksilver.—The San Francisco *Commercial Herald* says that sales are making from the wharf at 35½c., as occasion offers. The market is flat and devoid of all animation, quotable at 35@35½c., or $27.25@$27.50 per flask.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 11.

Mr. James M. Swank has compiled from the reports of Mr. Edward J. Shriver, of the New York Iron and Metal Exchange, the following table of the imports of iron ore, iron, and steel at the port of New York in the first four months of the present year, in gross tons:

Articles.	Jan. Tons.	Feb. Tons.	March. Tons.	April. Tons
Iron ore	2,539	7,598	1,756	5,·55
Pig-iron	7,801	8,815	9,673	5,205
Spiegeleisen	1,106	1,010	3,169	4,312
Old rails	1,624	852	740	54
Scrap-iron	3,569	798	2,806	1,655
Scrap steel		370	1,051	1,344
Steel blooms	138	100	14	
Steel rails	270	403	2,460	1,559
Steel wire rods	11,641	8,898	12,873	9,661
Iron wire rods	714	1,378	202	493
Swedish iron	619	981	1,306	839
Iron bundles and bars	21	44	213	43
Iron beams	652	123	408	269
Hoop iron		310	370	144
Sheet iron	246	182	356	214
Steel bundles, bars, etc.	675	567	480	382
Steel tires and forgings	177	291	303	362
Tin plates	6,965	6,821	8,181	8,494
Total, except ore	36,018	31,943	44,605	35,069

American Pig.—The market is a little better; sales during the week, chiefly small lots, aggregate from 2000 to 3000 tons of Foundry, standard brands, at prices very near $20@$22. Outside brands are selling for 50c.@$1 less, but there are indications that the supply of Foundry pig will be soon reduced to a proportion more closely approaching the consumption. We learn that one or two furnaces have already blown out, and that eight in all in the Lehigh and Schuylkill valleys will follow at an early date. Until definite news to that effect has been obtained, and buyers have the assurance that there are no surplus stocks to work off, they will continue to operate very cautiously. We quote, as last week, good to choice brands at tide-water, $21.50@$22 50 for No. 1; $19.50@$20.50 for No. 2; and $18@$19 for Gray Forge.

Nothing of interest is to report in Bessemer pig, while Speigeleisen moves off fairly at $26.50@$27 for 10 to 12 per cent, and $32 for 20 per cent.

Scotch Pig.—The market is quiet, sales being light and being chiefly in very small lots. Arrivals are moderate, the iron partly going into store and partly into consumption. Freights are 5s. We quote: Coltness, $24@$24.50 ex ship; Glengarnock, $22@$22.50; Eglinton, $21@$21.50; and Summerlee, $24@24.25.

Steel Rails.—Eastern mills are well supplied until fall, and some of them as late as November, and it is difficult to place orders for any thing earlier than September. Little business has been done, and quotations remain nominal at $38 at mill.

Old Rails.—There is nothing of interest to report. We quote $23@23.50 for Ts.

Scrap.—Scrap is dull and weak, with values at $24@25 ex ship.

Philadelphia. May 11.

Leading consumers in the iron trade who have been interviewed this week in regard to the outlook for trade during the summer are of opinion that consumption will be large; but they look for declining prices, and are unwilling to accept offers made by furnace companies for ninety days' delivery at present quotations, which are $20@$22. A few consumers have made offers of $21.50@$19.50 for standard Foundry

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 5..		May 7.		May 8.		May 9.		May 10.		May 11.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon..	3.25		3.25		3.25								1,000
Amie Con., Co	.20		.20		20		.20		.20				12,000
Argenta, Ne											1.05		100
Bar. & Walker, Ut													
Bassick, Co	9.00				9.00		8.50				8.50	8.00	425
Belle Isle, Nc					.45		.45				.42	.40	700
Bodie Cons., Ca									1.15				100
Breece, Co													
Bulwer, Ca	.70		.65		.61	.60							925
California, Ne	.25				.25				.24		.23		2,250
Cal. & Hecla, Mich													
Carbonate Hill													
Caribou Con., Co													
Chrysolite, Co	1.00		1.00		1.05		1.05				1.05		2,200
Cons. Va., Ne	.52	.50	.51		.55		.50		.52	.51	.52		6,100
Crown Point													
Deadwood-Terra, Dk													
Dunkin, Co													
Eureka Cons., Ne					5.38		4.75		5.00				210
Excelsior, Ca													
Father de Smet, Dk													
Findley, Ga													
Gold Stripe, Ca													
Gould & Curry, Ne													
Grand Prize, Ne	.90												
Great Eastern, Dk							1.00						120
Green Mountain, Ca			.80	.75			.83						900
Hale & Norcross, Ne													
Hall-Anderson, N. S	1.45	1.40	1.35	1.25									3,900
Hibernia, Co													
Homestake, Dk	16.25				16.00		16 00		16 00	15.75	16 25		584
Horn-Silver, Ut	7.75	7.38			6.63	6.50	6.50		6.75				957
Iliad, Co			.11	.10					.09				450
Independence, Ne	.57				.60				.60				900
Iron Silver, Co											2.95		900
La Plata, Co													
Leadville C., Co											.64	.63	1,400
Little Chief, Co	.55								.51		.52		900
Little Pittsburg, Co			.60		.60	.58	.62						415
Martin White, Ne													
Moose, Co													
Navajo, Ne	2.35		2.40	2.35	2.45	2.35	2.40	2.35			2.45	2 40	3,200
Northern Belle, Ne	8.50				8.75						7.50		455
North Belle Isle, Ne													
Ontario, Ut	26 25										25.38		200
Opur, Ne													
Plumas, Ca													
Prussian, Colo													
Quicksilver Pref., Ca					8.25	8.00	8.00		8.13	7.75	8.00		1,450
" Com., Ca			.03										2 0
Rising Sun, Ca													
Robinson Cons., Co	.89	.80	.91	.89	.92	.90	.90	.87	.91	.90	.89		30,850
Savage, Ne													
Sierra Grande, N. M	1.25	1.00	1 10	1.05			1.05		1.20		1.25	1.10	4,450
Sierra Nevada, Ne	4.25		3 60		4.00				3.80				700
Silver King, Ar													
Spring Valley, Ca													
Standard, Ca	6.50										6.50		125
Stormont, Ut													
Tip Top, Ar							.75						100
Tombstone, Ar													
Vizina, Ar													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 5.		May 7.		May 8.		May 9.		May 10.		May 11.		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H	L.	
Advance													
Alta-Montana, G	.04		.03		.03		.03				.03		3,500
Am. Flag, s													
Barcelona, G													
Bear Creek													
Bechtel Con., G													
Belvidere													
Best & Belcher, G. S.			3.55		4.00						.40		1,000
Big Pittsburg, S. L													140
Bondholder													
Bradshaw, S	.42	.41			.40								
Buckeye											.40		2,400
" pref													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G													
Clav'r's W.&M.Co.													
Cal., B. H., G			.80				.80						
Central Ariz'na, S													2,200
Cherokee, G			.04								.31		100
Climax, Co	.09	.08	.10	.09	.09								200
Cons. Imp'ri'l, G.S.													1,700
Crowell, G													
Dahlonega, G					.03								
Decatur	.05		.03		.03		.04						2,000
Dunderberg											.04		3,800
Durango, G													
Eastern Oregon											.05		6,000
Elko Cons					.21	.20	.21		.21	.20	.21		5,900
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G													
Granville, G													
Harlem M.& M.Co.	1.45		1.50	1.45	1 50	1.45	1.50	1.45			1.50	1.45	4,900
Hortense, S													
Lacrosse, G							.12	.11	.12		.13	.12	6,000
Lucerne													
Mariposa Pref., G													
" Com., G													
Mexican, G. S													
Miner Boy													
Mono													
North Standard, G													
N. Horn-Silv'r, S.L.													
Orl'nt'l & Miller, S.	.15						.15		.14		.15		3,600
Quartz Creek													
Rappahannock, G									.08				1,000
Red Elephant, S													
Ruby, of Arizona													
Silver Cliff, S			.18										200
Sonora Con	.47	.45	.46	.41	.41	.40	.41	.40	43	.41	.41	.37	26,406
South Bodie, G													
South Bulwer, G													
South Hite													
South Pacific					.05		.05		.06		.05		2,700
State Line, 1 & 4, S													
" Nos. 2 & 3, S	.05										.04		1,500
Sutro Tunnel	.20		.21	.20	.20				.20		.21	.20	10,870
Taylor-Plumas													
Unadilla, S			.03										500
Union Cons., G. S.											3 80		100
Vandewater													
Washington													

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 79,111. Non-dividend shares sold, 94,836.

BOSTON MINING STOCKS.

	May 4.		May 5.		May 7.		May 8.		May 9.		May 10.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez									2.00				100
Amie													
Atlantic			11.00										15
Aztec													
Bodie Con													
Bonanza D.	2.44	2.36	2.25	2.13	2.00		2.19		2.19				1,400
Bowman Sil	.16		.15		.16	.15	.16	.15	.17	.15			13,053
Bruns. Ant													
Bulwer													
California			.25		.25				.25				900
Cal. & Hec.	224				233½		232½	232	233		238		100
Catalpa	.70		.70	.67½	.79½	.65	.80	.75	.77½				5,495
Central Ariz													
Cherryfield													
Co. Virginia													
Copper F'lls													
Copperop													
Crescent							.27½	.25	.29				400
"Cusi"			1.68				1.50		1.68				500
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan							.07						200
Franklin							.24						100
Empire					.21								1,000
Eureka Con									5.45				50
Franklin	10.50								10.25				50
Hancock G.	9.13												100
Harshaw			.62½				.50						150
Huron			1.50		1.50								600
Independ'ce													
Indian Q'n													
Mammoth													
Mass. & N.M.	.09				.09		.08		.09				6,900
Milton													
Napa													
National													
North Belle													
Ontario	25.25												10
Osceola	22.00	21.50			21.00						21.00		101
Penn-Breck													
Pewabic											5.00		50
Pine Tree													
Plymouth	.18								.18				1,200
Quincy	40.50	40.13	41.50	40.50	41.00	40.50	43.00	41.50	44.50	43.00	45.50	45.00	1,128
Ridge													
Robinson							.90						200
San Pedro	.20		.50		.50				.30				650
S'ra Nevada	3.70				4.25				4.00				300
S'ra Grande													
Silver Islet	4.75				4 75				4.60				150
Silver King					10.88								10
Simpson Gd							.05						3,000
So. Pacific			.05										300
Standard					6.50								25
Sullivan	1.25		1.25										750
Sutro Tun	.20		.21		.20		.20		.20				2,500
Sycamore			.24	.20	.27		.27						900
Twin Lead									.05				1,000
Vizina													

PHILADELPHIA MINING STOCKS.

	May 4.		May 5.		May 7.		May 8.		May 9.		May 10.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American													
Argent					.17		.18	.17			.18	.17	10,400
Battle Mt													
Black Sul			.02										4,000
Bodie													
Buena													
California	.24										.08		15,000
Calista													400
Chrysolite													
Cincinnati			.10								1.00		1,000
Comprom'e	.25												20
Contention											.24		2,900
Con. Virg	.50										3.75		600
Dauntless											.53		2,400
Denver City					.15						.19		1,400
Fairview													
Eureka													
Girard	.11	.10	.12	.11	.11		.12				.11		10,700
Goiconda													
Governor	.09		.09		.10	.09	.09				.09		11,500
Grand Uni'n	.20				.18	.17	.17				.19		18,600
Gunnison	.90	.87½	.90	.87½	.95	.90	1.12½	1.00	1.10	1.07½	1.12½	1.10	32,658
Homestake											16.00		50
Horn Silver	7.50												300
Iowa Gulch	.07		.08								.08		34,208
Iron Silver	2.90						2.90						2,500
King Bul'on											2.90		1,000
Ledger Con			.02								.01		7,500
Little Chief											.02		
Little Maud													3,000
Little Pitts											.06		800
L'g & D'y H											.62½		
Magnolia													
Montana	.05												300
Mt. Lincoln													
Mt. Sheridan													
Navajo	2.65												300
Orion					.65								1,000
Orion Pref													
Palmetto E													
Pembina	.14				.13								5,500
Penn-Breck			.12		.13		.12		.13		.13		11,100
Permanent							.02		.02		.02		9,500
Pizarro													
Pizarro Ex											.02		4,000
Potosi													
Rara Avis											.85		800
Rara Avis E	.09		.09		.10	.09	.10		.85		.11	.10	48,200
Record													
Rico Pion'r													
Robinson	.85						.92½		.92½				3,000
San Pedro													
Sierra G'nde	1.35	1.25	1.25	1.00	1.12½	1.05	1.15	1.07½	1.12½	1.10	1.27½	1.15	94,225
Sierra Nev	3.70								4.00				315
Silver Cord									1.65				100
Silv'r Plume							.02						5,000
Sovereign													
Standard													
Sultana					.01		.01						3,400
Sutro Tun'l													
Tombstone	.85				.77½		77½		.75				2,600
Victor											.01		4,800
Yale Mt					.05		.04		.05		.05		4,800

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brands, but these figures are not even considered for good Lehigh irons. Some inferior stuff from the Lehigh Valley would be sold at this figure, and small sales have been already made under $20 @$22. The local mill-owners are reticent as to the probable condition of trade. They are not buying more iron than is needed from week to week, and have declined concessions made by furnace representatives to buy at $18 at furnace. Inferior brands have been offered at $17@$17.50; but consumers look for a weakening of prices of standard brands, in consequence of a probable suspension of consumption in the West. At least until this uncertainty is disposed of, they will not place large orders. Forge iron was bought at $18 at furnace this week, and this is about a fair quotation for good iron. Bessemer is offered at $22@$22.50, but no transactions of note are heard of. The offers of $21@$21.50 are still on the market. Handlers of Scotch iron report a dead market.

Muck Bars are quoted all the way from $33.50@$35. A good many sales have been made at an average of $34.50, mill. Charcoal Blooms are in dull request at $62@$64. Anthracite are quoted from $53@55. The downward tendency has induced buyers to hold off, though consumption is as large as heretofore.

Merchant Iron.—The store-keepers are selling iron in small lots to the retail trade at 2·30c. Manufacturers are seeking business at 2·20c. Large lots could be sold at 2·15c. Small orders are not so much desired as two or three weeks ago. Mills have very little business on hand. Common iron is in quite active demand at country mills at 1·80@2c. Mills in the interior are better supplied with business than in this city. Skelp iron is moving in occasional large lots, but at very low prices.

Wrought Pipes and Tubes.—Discounts on wrought pipes are 70 per cent off, and even this figure is shaded in occasional instances. Tubes are 60 off. There is a very fair consumption, but buyers are purchasing mostly in small lots.

Nails.—Manufacturers of nails are quite satisfied with the past and present condition of the trade and its prospects. Country mills are selling at $3.05, and city mills are filling orders at $3.10@$3.20. Prices are perceptibly firmer, and, with the heavy consumption going on, there is every indication that business will continue in its present satisfactory shape.

Structural Iron.—Two or three specifications have been submitted by bridge-builders for iron for August and September delivery. The present is considered a good time to place orders, and manufacturers are shaving very closely to secure the business. Trade, as a general thing, is confined to small lots of from 10 to 25 tons. Retail quotations are 2·40@2·50c. for Angles and 3½c. for Beams and Channels.

Plate and Tank.—There is less to say of Plate and Tank than usual. Quotations are given at 2½c. for Common Plate, 4¼@4½c. for Flange, and 3¼c. for Shell. The business is in retail lots; but few large orders have been brought before the market.

Sheet-Iron.—Sheet-iron manufacturers are doing a fair business in a retail way, but large buyers still hold back.

Steel Rails.—Nothing of an unusual character has taken place for a week, but inquiries have been responded to at $38 for large blocks for fall delivery. Rail-makers are still anxious to secure business, especially in large orders. Small lots are $39@$40. Light sections, $42@$43.

Old Rails.—Old rails are dull at $24 for Tees and $28 for Double-Heads. There are buyers around, but they will not pay these prices.

Scrap.—Cast scrap sold as low as $17.50@$18. No. 2 Scrap sold at $23.50@$24.50; No. 1, $25.50@$27.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 11.

Anthracite.

We can not record any changes in the situation. The only point of interest discussed to some extent is whether or not half-time work will be decided upon for the rest of the month. The feeling is, that it is decidedly desirable, unless the much more efficient course of stopping for a whole week or two is adopted.

Navigation of the lakes is fairly opened, and shipments to lake ports have begun.

The election of the New Jersey Central Railroad was held to-day, and a Gowen-Garrett board was elected, which decides the question of the lease. The proposition of the Reading Railroad is, to acquire the Central road from September 1st, under a lease for 999 years, paying all fixed charges, and guaranteeing a dividend of 6 per cent a year, semi-annually.

Bituminous.

The bituminous coal trade is in an attitude of suspense. The annual battle for the control of the season has been practically fought, and nothing but one or two railroad and steamship contracts remain to be fought over. The Cumberland interest has been badly beaten, the bulk of the business having been carried off by the Clearfield operators, who have not alone held the ground captured during the past few years, but have conquered additional territory. It is estimated that while the Cumberland operators have taken 500,000 tons of tide-water to order, the Clearfield operators have secured three times that amount. When it is remembered that the former district has no local trade worth speaking of, while the latter has an important outlet along its line, it will be conceded that the situation is a very painful one. It is of no use to inquire into the manner in which this victory has been achieved. The question at issue now is, What are the great Cumberland mines and the Baltimore & Ohio Railroad Company going to do about it? It is regarded in some quarters as being too late; while in others the opinion is held that there is a prospect of a heavy fight, and there are indications that this struggle will be made. It is understood in the trade that the Baltimore & Ohio Railroad is now giving special rates, and it is argued that, if the railroad company were to decide to make a heavy cut, and thus run prices at tide-water down, the result would be that contractors would back out of their engagements, and supply themselves with the cheaper coal obtainable in the open market. This argument, forcible as it is, presupposes, however, that such a condition of affairs would be kept from the shippers who supplied contract coal, and that the Pennsylvania Railroad would not promptly follow. It is urged that, even if not much coal would be thus diverted to the Cumberland region, the loss to the Pennsylvania Railroad would be immeasurably larger than to the Baltimore & Ohio, and might be adopted by the latter as a retaliation. Such is the current talk among the trade, and it has its foundation in the recent concessions by the Baltimore & Ohio, which were too late in most instances, but early enough to secure a portion of the Old Colony Railroad contract of 20,000 tons to the Cumberland Company shipping from Baltimore, the rest going via Georgetown.

The contract for supplying the Long Island Railroad was taken for $3.75 alongside, the lowest figure of any yet reached, and entirely exceptional. The bulk of the steamer contracts, including that of the Inman line, was taken by Clearfield.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended May 5th, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co..	50,142	1,152,483	30,379	1,004,611
D. L. & W. RR. Co.	63,731	1,449,980	60,950	1,285,774
Penna. Coal Co.....	18,134	328,283	14,950	335,653
L. V. RR. Co.....	15,417	341,297	11,277	324,715
P. & N. Y. RR. Co..	2,636	63,362	3.785	61,133
C. RR. of N. J.....	13,553	785,762	32,084	713,803
Penna. Canal Co....	.....	30,872	14,770	61,192
North & West Br. RR.....	4,344	169,162	.....	.....
	167,957	4,391,201	168,195	3,786,881
Lehigh Region.				
L. V. RR. Co.....	66,399	1,514,564	69,924	1,354,096
C. RR. of N. J.....	22,593	713,841	32,737	635,325
S. H. & W. B. RR..	439	12,089	.....	15,000
	89,431	2,240,494	102,661	2,004,421
Schuylkill Region.				
P. & R. RR. Co.....	95,274	2,096,076	103,045	1,904,597
Shamokin & Lykens Val.....	26,466	426,335	24,150	345,101
	121,740	2,522,411	127,195	2,249,698
Sullivan Region.				
St Line&Sul.RR.Co.	999	20,059	1,279	17,218
Total	380,127	9,174,165	399,330	8,058,218
Increase.....	.....	1,115,947	.....	.....
Decrease.....	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878.....4,480,405 tons.
" " " " 1879.....7,573,795 "
" " " " 1880.....7,150,235 "
" " " " 1881.....8,481,532 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 103,369 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended May 5th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	2,506	19,435	10,248
Coal for shipment at South Amboy.....	15,869	290,520	258,883
Coal for distribution.....	11,199	277.570	233.605
Coal for company's use	1,799	51,133	45,688
Total.....	31,373	638,658	548,424
Increase.....	.....	90,234	.....
Decrease.....	.....	.....	.....

The Production of Bituminous Coal for the week ended May 5th was as follows:

Tons of 2000 lbs., unless otherwise designated

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.....	49,756	681,412
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	5 654	117,422
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.....	3,416	73,780
East Broad Top.....	807	19,149
Clearfield Region, Pa.		
Snow Shoe.....	4,852	87,642
Tyrone and Clearfield.....	47,174	951,658
Alleghany Region, Pa.		
Pennsylvania RR.....	6,122	171,534
Pittsburg Region, Pa.		
West Penn RR.....	8,460	168,542
Southwest Penn. RR.....	1,812	42.271
Penn & Westmoreland gas-coal, Pa. RR	25,138	476,368
Pennsylvania RR.....	4,511	180,564
Total.....	157,702	2,970,342

The Transportation of Coke over the Pennsylvania Railroad for the week ended May 5th and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region).....	2,098	42,123
West Penn. RR	1,802	35.801
Southwest Penn. RR	42 659	676,511
Penn. & Westmoreland Region, Pa. RR	4,483	84,337
Pittsburg, Penn. RR.....	....	274
Snow Shoe (Clearfield Region).....	579	6,713
Total.....	51,621	845,759

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Newburg.....	.....	3 95	3 90	3 95	4 05	4 15
Scranton at Hoboken.....	3 90	3 90	3 90	4 00	4 20	4 30
Lackawanna at Weehawk'n	3 90	3 90	3 90	4 00	4 20	4 35
Wilkes-Barre at P. Johnston	3 90	3 90	3 90	4 00	4 20	4 20
Plymouth R. A. at P. John.	.....	4 15	....	4 30	4 75	4 50
LEHIGH COAL.						
Honey Brook at Port John.	5 00	4 25	.....	4 25	4 20	4 2 0
Fulton at South Amboy....	5 25	4 40	.....	4 40	4 30	4 4 0
U.L. & Coun. Ri'ge at Eliz'pt	.....	.....	.....	.....	.....	.....
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash.....	4 85	4 85	4 50	4 10	4 35	4 10
Free-Burning White Ash...	.....	3 90	3 90	4 00	4 30	4 10
Schuylkill Red Ash.....	.....	.....	.....	4 10	4 55	4 10
Shamokin.....	.....	.....	.....	4 25	4 55	4 10
Lorberry.....	.....	.....	.....	4 25	4 65	4 20
Lykens Valley (Brookside).	.....	.....	4 70	5 00	5 25	5 00
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash.....	4 50	4 50	.....	3 75	4 00	3 75
Free-Burning White Ash...	.....	3 55	.....	3 65	4 00	3 75
Schuylkill Red Ash	.....	.....	.....	3 75	4 20	3 75
Shamokin.....	.....	.....	.....	3 90	4 20	3 85
Lorberry.....	.....	.....	.....	3 90	4 30	3 85
Lykens Valley (Brookside).	.....	.....	.....	4 65	4 85	4 65

Wholesale Prices of Bituminous Coal.

Clearfield, at Philadelphia.....	$3.40@$3.50
" " South Amboy.....	4.20@ 4.30
" " New York, alongside.....	4.40@ 4.50
Cumberland, at Baltimore.....	3.25@ 3.3
" " Georgetown.....	3.25@ 3.3
" " South Amboy.....	4.30@
" " New York, alongside...	4 50@ 4.6

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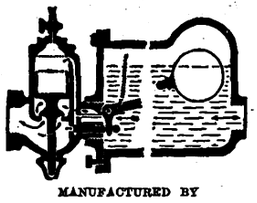
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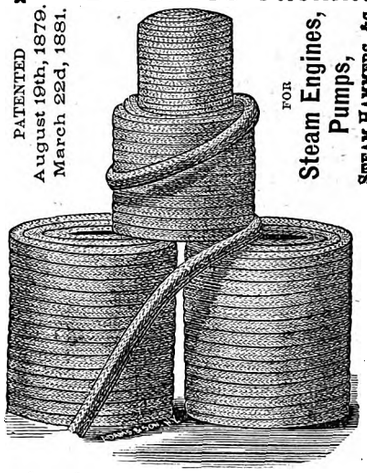
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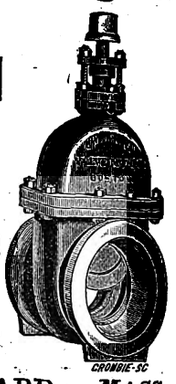
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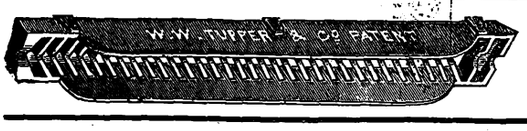


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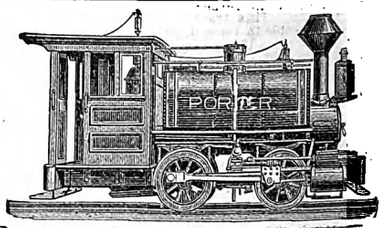
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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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DURING the course of a discussion before the Hanover Section of the German Society of Engineers, on a paper dealing with the Loiseau process of manufacturing artificial fuel, some points were brought up in regard to the treatment of lignites which may be of value to those in the West to whom only that fuel is accessible. Experiments have been made by F. FISCHER with lignite containing 60 per cent of water and having a calorific value, when coming from the mine, of from 1000 to 1500, and when dry of from 3000 to 3500. He found, after a series of trials with an experimental plant, that the best temperature for coking lignite with the aid of steam was 450 degrees Celsius, obtaining thereby 32 per cent of the weight of the moist lignite in the form of coke, holding from 6 to 7 per cent of ash, and having a calorific value of 7500, equal to a fair bituminous coal. Coking lignite with superheated steam has been for many years in practical operation at Vordernberg, Austria.

FRANCE glories in a new mining paper, paying special attention to gold, silver, copper, and diamond mining enterprises. The *Bulletin des Mines*, as our new friend is called, appears to be quite an enterprising journal, and has a wonderfully well-posted American "correspondent," who, we shall be rash enough to presume, resides somewhere in this country. That person promptly appropriated an article on the Lexington mill, written by Mr. C. A. STETEFELDT; but finding it impossible to appreciate some of the most important sections of the paper, dealing with intricate metallurgical questions, let them severely alone, simply sweeping them aside, because lacking the brains to understand their value. He took unto himself all the facts submitted to the public through the ENGINEERING AND MINING JOURNAL by Mr. MEDHURST, of the Lexington Company, and calmly submitted them as the result of his own profound researches, until, emboldened by success, he threw aside a thin disguise, and appeared upon the scene as the editor in person! In our issue of March 31st, Dr. EDWARD D. PETERS, Jr., of this city, warned our readers against the processes for the electro-amalgamation of gold ores, which are now attracting so much attention in England, and it seems in France. In the last issue of the *Bulletin*, we find this communication in full, but without any signature, prefaced with the following words, "The following letter has been sent to us," and to its end we find tacked the following bit of editorial comment: "Without wishing to displease our correspondent, we persist in believing that the last word has not been spoken on the treatment of ores by electricity. We shall perhaps before a long time prove that it is capable of being practically solved." We are glad to see that the editor is afraid to displease Dr. PETERS, although an ocean rolls between them, and although that gentleman probably does not know of the existence of the polite but unscrupulous editor of the *Bulletin*, who is welcome to the valuable matter he finds in the ENGINEERING AND MINING JOURNAL, which he may "translate" as much as he likes without giving credit, so long as it does not bear the full signature of a correspondent or appear as an original paper by a contributor whose full name is published. In such cases, we cease to be indifferent, and must insist that full credit be given at least to the writer, if not to the JOURNAL.

THE island of Elba has for many centuries enjoyed the reputation of being an inexhaustible treasure-house of iron ore. These illusions have been rudely shaken of late by the careful study of the deposits by competent engineers. FABRI, PELLATI, MELLINI, and CZYSZKONSKI have in turn cut down the estimates of the ore in sight, and now MM. JEAN BECO and LEON THONARD, in a very interesting paper contributed to the *Revue Universelle des Mines*, furnish additional evidence pointing to the early exhaustion of the mines of Elba. The source of the enormous aggregate production of iron ore from the island was five deposits, named, in their order going from north to south, Rio Albano, Rio, Vigneria, Terra-Nera, and Calamita. Large quantities of mineral were and are still obtained by washing the ancient dumps. The greatest mine, the Rio, is estimated to have yielded between twenty and twenty-five million tons of ore; and yet, with the adjacent Vigneria, it does not contain more than three million tons still in place. Terra-Nera is practically exhausted, while Rio Albano is still good for two million tons. Calamita has apparently two million tons of magnetite, and may develop great resources; but as the ore is much mixed with rock and copper pyrites, many believe that the deposit does not hold much marketable ore. MM. BECO and THONARD put it down for one million. The old dumps have been similarly overestimated, and, according to recent observations, are not regarded as capable of furnishing one million tons; thus carrying the total to approximately seven millions of tons, which would furnish supplies for only thirty-five years at the rate of 200,000 tons per annum. If any effort is to be made to build up an Italian iron industry consuming at the rate of 100,000 tons of ore per annum, an export of iron ores to any extent can not be thought of. MM. BECO and THONARD urge that, however gloomy this outlook for Elba may appear, the prospects are not much better for Africa and Spain. The mine at Bone, Africa, is exhausted, and the Mokta, which, twenty years since, held out such a brilliant future, is not far from its end, so that the company owning it had to buy at a high price the Tafna mines, east of Oran, and was forced to provide at great expense new shipping docks. The famous Sommorostro mines near Bilbao, Spain, have been similarly overestimated. A few years ago, the ore in sight was placed at one hundred millions of tons; but recent investigations have cut that figure down to one tenth.

Should these statements be borne out by the facts—and so far as Elba is concerned, they can not be much shaken—then the year 1890 may witness some very important changes in the iron industry of the world. England, France, and Germany are getting to be more and more dependent for supplies of ores upon the very countries named, and are taking ever-increasing quantities of foreign ores. Should the more accessible deposits become exhausted, or be unable to maintain their present enormous rate of export, the prices of ores would be increased by the greater cost of developing new ore ground at a greater distance from the coast, thus bringing foreign iron-masters closer to our level so far as access to ores is concerned. The prospect is one which may well serve as a consolation to our poor Lake Superior ore miners, who are now subjected to such intense suffering because they can not sell all the ore they have mined, and propose to take out this year at the bed-rock price from $5 to $8 per ton at Cleveland.

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CORRESPONDENCE.

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Our Mining Interests.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: There are some facts in the mining statistics from Colorado this year, which unavoidably set one to thinking whether taking out from the earth's depths its mineral deposits of gold and silver is not a safer and more profitable and legitimate business than much that Americans have heretofore considered as their secure and more conservative enterprises.

We see by the statistics in regard to Leadville production, that the output of bullion has steadily increased since 1879, when its gigantic stock companies were floated, from $10,333,740.69 to $18,220,892.64 in 1882. Notwithstanding the gross mismanagement which at that early period loaded the entire district down with stock companies of monstrous size, there has been a steady increase annually of the output of the precious metals.

The whole bullion product of the State for 1882 was $26,750,898, which, according to a mathematical authority, would provide each family in the State with a sum of over $400, which is, we believe, considerably in excess of the results shown per family in the agricultural and manufacturing States. In one county, San Juan, we notice that, with the advent of a railroad in July last, the bullion output sprang from an average for several years of about $25,000 to an average of over a million dollars. There certainly seems to be something worth thinking about in all this. If, with poor management and ill-tempered speculation, and hostile criticisms, and holdings aloof by capitalists, mining districts can go steadily forward, increasing by solid millions each year their product of gold and silver, and almost doubling it in the course of five years, it is a question whether there is not a field in Colorado, and probably in other Western States, for the immediate employment of American capital in safer and vastly more profitable investments than those usually made in other forms of business. We speak entirely of legitimate mining and not of illegitimate stocking. And it would also seem that, unless we seize the opportunity, the English and other people will realize the better part of the business. Already during 1882, several of the lodes or mineral veins of the San Juan have changed hands, and the new owners have been English parties. These people have for a great many years made mining a legitimate and profitable business in other countries than the United States. That many of their investments here have not proved profitable has been because hitherto they have purchased stocks in outrageously overstocked mines, as they have also done in some of our outrageously overstocked railroads, and losses in both cases have been the result. Their present system seems eminently the wise one, that of buying at fair figures the controlling interest in mines, and then working them for the output.

This is legitimate mining, as building a railroad at fair cost is legitimate railroading. The statistics of mining show that, even as badly managed as the business has been in this country by speculators, yet the actual capital invested in mining has given a profit of something over 18 per cent. Of course, capital invested in mining does not include amounts for which property may be stocked. A mine that would be cheap property at one hundred thousand dollars, and possibly prove a bonanza to its owners, can be crushed and loaded down with a stock issue of from five to ten millions of dollars, and then "skinned" for a year, in order that a forced production of ore may sell the stock on the market. Then the next step may be to "hammer" the stock and decry the mine, so that the great multitude is glad to get out at any price, while a few sharp tricksters get the property at pretty much their own figures.

The great showing of Colorado for 1882, with only part of its mines yet reached by railroads, and the fact that much-abused Leadville has constantly increased its bullion product, and almost doubled it since the days of the big excitement, show that even mismanagement, while it may bring stock speculators to grief, yet can not crush the business of mining, which is as old as man himself. Take this same Leadville, as perhaps the most ready example at hand. Suppose that any of the ill-managed banks, iron mills, or railroads, the ownership of stock in which has caused considerable grief, were asked for a show of assets since the time their stock went down with a run. It would be a novel showing indeed for them could the assets be proved to have increased annually, notwithstanding their troubles, and at the end of five years to be yielding almost double what they did in their time of greatest prosperity.

Indeed, it seems very much as if the miners of the Centennial State could very fairly twit their conservative brethren of the East with being engaged in very much the most hazardous kinds of business.

The number of highly respectable banks, rolling-mills, railroads, factories, and what not that have plunged their stockholders and owners into weeping and wailing in the twelve months sets one to thinking and asking, How shall American capital be invested? And why can not the taking out of the precious minerals be the safest business that speculative man indulges in to-day? Suppose that a man or a set of men purchase a mining property, for instance, a fissure-vein that has been developed sufficiently to demonstrate the existence of a body of promising mineral. Suppose they set men and appliances at work to mine the ore, the same as coal is mined for shipment to a market, using the same good judgment and the same economical use of labor that the owner of a coal mine uses in mining his coal and shipping it to market for a profit. With gold and silver ores, the immediate product is cash, solid cash, and nothing else; no credit given, no trusting on time sales with payments running into months and years; no material and no manufactured stock to carry, subject to the ups and downs of commercial and manufacturing life.

If they find the mining and shipping of ores profitable, well and good; they are satisfied, and the business goes steadily forward year after year, yielding its 10, 20, 50, or more per cent of profit. Should a time ever come when the ores can not be profitably mined and shipped, they stop work. There would be comparatively little dead material on hand except the mine itself, which, in its past working, may have paid for itself a hundred-fold, as mines have done time and again. At any time, and on very short notice, they can stop work and be quit of it all, at least, and need not take a year, or five years, to be able to let go of the thing, as it does in many other forms of business.

As a fair illustration perhaps of what legitimate mining may accomplish, the Rio Tinto mine, capital six million pounds sterling, managed by English capital, and the Tharsis, capital one million pounds sterling, also owned and managed by an English company, and both situated in Spain, may be cited. The total value of the different minerals taken from these mines is but $10 per ton, being less than one seventh of the value of what would be called very ordinary ore in America. And yet the Tharsis mine, which is now an old one, sells in London at £45 for £10 shares. The Rio Tinto, which is yet but a few years old, sells at £17 for £10 shares, with a constantly increasing value. These figures may fairly give an inkling of the future that awaits the great mineral deposits of Colorado when business management has fairly taken, as it is now rapidly doing, the place of mere stock speculation.

An eminent English engineer, while lately examining the large fissure-veins of the San Juan region, in Colorado, declared that English companies could make all the money they desired from such masses of mineral if they should yield but $20 per ton of silver. As the average of the large bodies of mineral in the San Juan is stated to be about $60 per ton, it would seem as if legitimate mining might be made rather profitable there.

From the statistics of mining the world over, it would at least seem fairly certain that *legitimate* mining can rather more than hold its own, in comparison with other methods of popular investment. One can have the reins of venture more firmly in hand if he will, than either in railroading or manufacturing, and whatever product he may get certainly possesses the advantage of a universal and fairly regular market. He can own and entirely control his venture, which is rather more than can be said of the ordinary stocks and bonds that seek and very often ingulf the investing public. As we have before remarked, mines can be stocked illegitimately and worked disastrously, as many railroads and financial institutions are, or they can be worked legitimately for their output, and fortunes be realized by their owners. We believe also that they can be worked on a prudent basis more easily, and let go of more quickly when one wishes, than is the case in many other ventures.

NEW YORK, May 10, 1883. W. E. W.

The Bessemerizing of Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of April 21st, I stated that I *believed* that oxidizing copper sulphides by a blast of air so rapidly as to generate a great quantity of available heat (to which I perhaps too closely restricted the term Bessemerizing) had been first described by Hollway, as applied to rotating Bessemer converters, and first by myself, as applied to reverberatories. I did not then, nor can I now, make a positive statement, not having leisure for the complete study of the history of the subject which should precede such a statement. Perhaps I should have limited the supposed priority to utilizing the heat so generated for fusing fresh portions of sulphides, which is indeed the important point claimed by Hollway and by Eustis and myself.

Messrs. Johnsson and Raht reply, in your issue of May 5th, by quoting the processes of Raht, of Jossa and Laletin, of Rittinger, and of Stridsberg and Kollberg. The patent of W. L. Raht, which I suppose to be the one referred to, as given in your 27th volume, page 260, does not even suggest the generation of heat at all. Jossa and Laletin indeed treated matte in a Bessemer converter. But I can not find that they looked for any *great* generation of available heat. In their calculations, they counted on making two blows a day in each converter. Besides strongly preheating the converter, they evidently considered that it might be necessary to add fuel, and even melted cast-iron, to keep up the heat. Their blows lasted as long as two hours, while Hollway's required only from 11 to 18 minutes in his first series of trials.

From this, I infer that they hardly contemplated generating more heat than that needed to make up for the losses by radiation, etc. As with this process, so with those of Tessié du Motay, of Rittinger, of Keates, and others, it was, perhaps, foreseen that a certain amount of heat would be generated; but I find no proposal to generate in this way an amount of available heat which could be called great, when compared with that projected by Hollway and by Eustis and myself. Of course, my failure to find such a proposal recorded does not prove that it does not exist.

From what Mr. Johnsson says as to the origin of the ideas which he claims, we must admit that he may be simply the victim of an unfortunate chain of circumstances. H. M. HOWE.

BOSTON, May 15, 1883.

Arsenic and Zinc in Pyrites.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I must take exception to some parts of Mr. Whitmore's article in your issue of the 12th inst. He says he has "been informed" that the Rowe ore (Davis mine) contains as much arsenic as the Milan. This I most emphatically deny. The ore from the Davis mine has no trace of arsenic in its composition. We have a laboratory at the mine, with all the necessary chemicals and apparatus for arsenic tests by at least two methods, our chemicals being bought from Messrs. Eimer & Amend. I challenge Mr. Whitmore, or any reputable chemist he may send to our mine, to take samples from the mine directly and obtain therefrom in our laboratory the faintest trace of arsenic.

Mr. Whitmore further says (probably has been informed) that on top of pyrites deposits are usually found zinc and galena. I beg to say that I have seen several pyrites mines, and so far the only one of which this is true is the Milan mine.

He also states that J. D., Jr., says our ore is soft. If I remember correctly, J. D., Jr., says that it is granular in structure, rendering it easily broken. To this fact is largely due its remarkable free-burning quality and its dense gas. With our ore, at least one third less brick is required to build the kilns, and one third less iron for

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supporting pont, etc. This is an important item in first cost. An average of several thousand tons of our ore actually made into acid by different firms shows over 45 per cent sulphur recovered. Our ore contains no deleterious impurity, and almost no silica.

Nearly one thousand tons of our ore are burned monthly at present, and the quantity is gradually increasing. I shall be glad to have any one interested in burning pyrites personally or by representative visit and examine our mine, and obtain ocular information. We have two hundred thousand tons of ore that can be seen in the mine, and ten thousand tons which we have raised to the top of the ground. We are raising two thousand tons monthly, and have sufficient hoisting power erected to increase this to seven thousand tons.

I think too many wild statements have been made on this subject by parties interested in the sale of ore. Acid-makers can accurately calculate the relative cost of brimstone and pyrites after they know for a certainty where a permanent supply of first-class ore can be obtained, and its price, delivered at a certain point. As far as transportation to market is concerned, we certainly are advantageously situated.

The Davis mine is in the town of Rowe, Franklin County, Mass.; is four miles from the railroad at Charlemont, and eight miles from the Hoosac Tunnel. Every rod of the road is descending from the mine to the railroad. We can easily and cheaply build a gravity or tram railroad whenever required. The railroad is owned by the State of Massachusetts, and all connecting lines have equal privileges and rates. Four lines already run over this road, namely, the Boston, Hoosac Tunnel & Western and the Troy & Greenfield Railroad run to tide-water at Troy, 60 miles; the Fitchburg Railroad to Boston, 119 miles; and the New Haven & Northampton Company, to New Haven, 108 miles. We are now shipping to these points. Thanking you for your valuable space,

I am, yours truly, H. J. DAVIS.

CHARLEMONT, MASS., May 16.

NEW PUBLICATIONS.

ELECTRO-MAGNETS: THE DETERMINATION OF THE ELEMENTS OF THEIR CONSTRUCTION. By TH. DU MONCEL. (Translated from the Second Edition.) New York: D. Van Nostrand. 1883. 18mo, 122 pages.

The reputation of the Count du Moncel as a practical electrician, a scientific investigator, and a writer on subjects connected with electrical science is so thoroughly established that this little book scarcely needs a recommendation. To all who are engaged in the practical construction of electro-magnets, it will be extremely useful. The mathematical investigations connected with this subject are of so high an order that it is difficult to separate that which is practical from that which is purely theoretical. This Du Moncel has done, verifying the formulas adopted by the most careful experimental research. If we are not mistaken, this intelligent and satisfactory translation was made by Prof. G. W. Plympton, the accomplished editor of Van Nostrand's *Engineering Magazine*.

POCKET LOGARITHMS TO FOUR PLACES OF DECIMALS, *including Logarithms of Numbers and Logarithmic Sines and Tangents to Single Numbers; to which is added a Table of Natural Sines, Tangents, and Cotangents.* New York: D. Van Nostrand. 1883. 18mo, 139 pages.

To the practical computer, a table of four-place logarithms is extremely useful, especially in astronomical, geodetic, and electrical field-work. For office use, the card form is perhaps the most desirable; but for use in the field, nothing could be more convenient than this little book. It is clearly printed, and small enough to be carried in the pocket. The table of Natural Trigonometrical Ratios is a very useful addition. It is rarely given, though it always ought to be, in connection with logarithmic tables.

TECHNOLOGISCHES WÖRTERBUCH IN ENGLISCHER UND DEUTSCHER SPRACHE. (Technical Dictionary, English and German.) By GUSTAV EGER. Part I. English-German. Revised by OTTO BRANDES. Brunswick: Vieweg und Sohn. New York: B. Westermann & Co. 1882. 8vo, 710 pages. Unbound, $4.40.

Technical dictionaries are of all the most difficult to compile, and are usually among the most unsatisfactory. In all branches of arts and manufactures, there are so many local terms, and in the different languages there are words used to designate so many different things, that the task becomes fairly bewildering. There is another circumstance which tells against such works. Technical dictionaries often fall into the hands of persons who have not even a faint notion of the subject they have taken in hand. Such persons seize at haphazard one out of many words before them, and build up with much toil and much ignorance those wonderful translations that occasionally startle and amuse the public. Naturally an incompetent translator tries to fix the blame on the technical dictionary. In the work before us, brief explanations are occasionally given of obscure terms. Examination of words in engineering, mining, and metallurgical practice shows careful work, and the long list of names of gentlemen who have aided in the compilation gives assurance that other departments have not been neglected. Prof. J. G. Lunge, of Zurich, has supervised chemistry and chemical industries; Mr. G. Schaeffer, of Newcastle-on-Tyne, engineering; Dr. Bedson, of Manchester, mining and metallurgy; Dr. Burghardt, mineralogy; Dr. Carnelly, botany; and Mr. W. Carleton Williams, forestry, these three last-named gentlemen being also of Manchester.

SMELTING PLANTS. By JOSEPH M. LOCKE, C.E., M.E. Cincinnati: Published by the Lane & Bodley Company. Square 8vo, 26 pages, illustrated.

With the object of educating their customers, many of our manufacturers of machinery are beginning to publish brief monographs, elementary in their character generally, on the particular branch of their business in which experience has taught them such enlightenment is necessary. However much the fact may be deplored that parties having no knowledge of the working or the adaptability of a given kind of plant are the ones who order it, our machinery firms have to meet the case as they find it. They take orders from any responsible party; and though it can not be a matter of indifference to them whether the machinery will rust away in some nook in the mountains after a brief spurt of activity, they do the best thing under the circumstances, in advising and instructing their customers. The little book before us, containing only 26 pages, handsomely printed and well illustrated, is a good example of the class of literature which these circumstances have called forth. It does not pretend to give any data with which every practical smelter is not thoroughly familiar; but it does furnish information, well arranged, to those who probably never saw a copper or lead smelting furnace before. The first chapter contains a good description of the water-jacket furnace built by the Lane & Bodley Company; the second is entitled, "The Selection of the Site of Smelting Plants, and the Adaptation and Equalization of the Plant." We are particularly struck with the utility of the latter chapter. By following the hints there given, many stupid blunders committed in the past may be avoided in the future.

DESCRIPTION OF THE PORTER-ALLEN ENGINE. By CHARLES T. PORTER. Philadelphia: Published by the Southwark Foundry and Machine Company. 1883.

After many years of work, sustained by an enthusiastic conviction of the correctness of his views on steam engineering, Mr. Charles T. Porter has had the gratification of seeing the engines built in accordance with his plans gaining rapidly in favor as mill engines, in rolling-mills, steel-works, etc. The work before us—for it rises far above the level of the ordinary trade catalogue—gives a description in detail of the different parts of the engines, and enters into a discussion of the advantages of high speed, of the conversion of heat into work in the cylinder, of the attainable limit of economy, the merits of superheating, as against steam-jacketing, etc. The book is beautifully illustrated, and should be studied closely by all who have the management of undertakings in which economy of fuel and efficiency are important factors.

THE ASSAYER'S MANUAL. By BRUNO KERL. Translated from the German by WILLIAM T. BRANNT. Edited by WILLIAM H. WAHL, Ph.D. Philadelphia: Henry Carey Baird & Co. 8vo, 301 pages. (*Index.*) $3.

Prof. Bruno Kerl's great merits as a book-maker as well as his faults are fully understood by metallurgists and mining engineers, his treatises having served generations as works of reference and of study. His industry as a compiler is occasionally marred by his lack of judgment and by his apparent faith in every thing that has received the dignity of print. The practicability of easily and thoroughly testing the accuracy of methods of assaying proposed, and a very long personal experience as a teacher, have made it possible to eliminate faults which his other works exhibit; and therefore both his treatise and his manual on assaying are more accurate and complete than his metallurgical works. His earlier and larger work, of which a second edition was recently published, is extremely elaborate, and is a very valuable book of reference for the assayer's office. Professor Kerl, however, in 1879, wisely published an abridgment, and it is this manual which has now been made available to American readers. Professor Kerl is methodical in this as in all his works. He carefully describes the mechanical and chemical operations, furnaces, tools, appliances, and reagents. In the second part, he goes into a detailed account of the different methods of assaying lead, copper, silver, gold, platinum, nickel, cobalt, zinc, cadmium, tin, bismuth, mercury, antimony, arsenic, uranium, chromium, manganese, and fuels. Iron and steel are entirely omitted as having a field of their own. He has carefully brought up to date all the methods, and we note only a few minor omissions: for instance, the addition of fine silver in assaying slags for lead.

The translation is good, although we notice that occasionally translator and editor have evidently despaired of rendering some of the German technical words, and have printed them without a word of explanation. Thus, on page 134, we find "Darrkupfer," "Fluthafter," "Kiehnstöcke." We may state that "After" or "Fluthafter" are the tailings of dressing-works. "Darrkupfer" and Kiehnstöcke" are the residues of working argentiferous copper by two obsolete processes, by fusion with lead and by subsequent liquation.

The book is well printed and strongly bound, fitting it to resist the hard usage to which such books are occasionally put in the laboratory.

LARGE ANVIL-BLOCKS FOR STEEL-WORKS.

Owing to the rapid and very extensive growth of the manufacture of Siemens steel in Scotland, there has been a somewhat extraordinary demand, says *Engineering*, for large anvil-blocks north of the Tweed within the past few years, and during the past week two, of immense size, have been cast. Until now, there has not been any anvil-block in Scotland weighing more than 140 tons; but on Saturday of last week, one was cast at the Dalziel Steel-Works, Motherwell (Messrs. Colville's), which is said to contain 170 tons of metal, and there is in progress at the steel-works of the Govan Forge and Steel Company, Glasgow, an anvil-block which is estimated eventually to contain about 165 tons of metal. In both cases, these anvil-blocks are intended for use with 12-ton steam-hammers, of which there are already several in regular work in Scotland. The Govan anvil-block will be in two pieces, the larger of which, weighing about 140 tons, was cast last Saturday, in the presence of a large number of representatives of the engineering and allied branches of industry. It was cast in a mold occupying the position which the block will eventually occupy after it has been slowly cooled, and has been canted over upon its proper base. The other portion, which will form the top piece or swage-block, and will weigh about 25 tons, will be cast within the next few days. The mixture used in the anvil-blocks under consideration was about one fourth No. 3 Gartsherrie pig-iron and three fourths scrap cast-iron, two of Ireland's patent cupola furnaces, each capable of melting six tons of metal per hour, being used in the operation and the blast being obtained from a No. 7 Root's blower. The manufacture of this anvil-block is intrusted to Mr. William Ireland, of Manchester, who, during the last fifteen or twenty years, has had a most extensive and peculiar experience in connection with the casting of such blocks, both in this country and in Germany; indeed, in the last-named country he has superintended the construction of somewhere about thirty, of which no fewer than thirteen, of a total of 2000 tons, were made for the Union Company, of Dortmund, five of them being blocks of 175 tons each. For the Osnabrück Steel and Iron Company Mr. Ireland made three blocks, one of which weighed 250 tons, which, like the Govan and Motherwell blocks, was intended for use with a 12-ton hammer.

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THE APPLICATION OF ELECTRICITY TO EXPLOSIVE PURPOSES.

Sir F. A. Abel, in the course of a recent lecture before the Institution of Civil Engineers, spoke on the application of electricity to the explosion of submarine mines, for purposes of defense and attack, which received some attention from the Russians during the Crimean war under the direction of Jacobi; thus a torpedo, arranged to be exploded electrically when coming into collision with a vessel, was discovered at Yeni-Kale, during the Kertsch expedition in 1855. Some arrangements were made by the British, at the conclusion of the war, to apply electricity to the explosion of large powder charges for the removal of sunken ships, etc., in Sebastopol and Cronstadt harbors. In 1859, a system of submarine mines, to be fired through the agency of electricity by operators on shore, was arranged by Von Ebner for the defense of Venice, which, however, never came into practical operation. Early in 1860, Henley's large magneto-electric machine, with a supply of Abel fuses, and stout India-rubber bags, with fittings to resist water pressure, was dispatched to China, for use in the Peiho River, but no application appears to have been made of it. The subject of the utilization of electricity for purposes of defense, however, did not receive systematic investigation in England or other countries until some years afterward, when the great importance of submarine mines as engines of war was demonstrated by the number of ships destroyed and injured during the war in America. The application of electricity to the explosion of submarine mines was very limited during that war; but arrangements for its extensive employment were far advanced in the hands of both the Federals and confederates at the close of the war; men of very high qualifications, such as Captain Maury, Mr. N. J. Holmes, and Captain McEvoy, having worked arduously and successfully at the subject.

The explosion of submerged powder charges by mechanical contrivances, either of self-acting nature or to be set into action at desired periods, was accomplished as far back as 1583 during the siege of Antwerp by the Duke of Parma; and from that period to 1854 mechanical devices of more or less ingenious and practical character have been from time to time applied to some small extent in different countries for the explosion of torpedoes. The Russians were the first to apply self-acting mechanical torpedoes with any prospect of success, and had the machines used for the defense of the Baltic been of larger size (they only contained eight or nine pounds of gunpowder), their presence would probably have proved very disastrous to some of the English ships which came into collision with and exploded them. Various mechanical devices for effecting the explosion of torpedoes by their collision with a ship were employed by the Americans, a few of which proved very effective. But although, in point of simplicity and cost, a system of defense by means of mechanical torpedoes possesses decided advantages over any extensive arrangements for exploding submarine mines by electric agency, their employment is attended by such considerable risk of accident to those at whose hands they receive application that, under many circumstances which are likely to occur, they become almost as great a source of danger to friend as to foe.

The most important advantages secured by the application of electricity as an exploding agent of submarine mines are as follows: They may be placed in position with absolute safety to the operators, and rendered active or passive at any moment from the shore; the waters which they are employed to defend are therefore never closed to friendly vessels until immediately before the approach of an enemy; they can be fixed at any depth beneath the surface (while mechanical torpedoes must be situated directly or nearly in the path of a passing ship), and they may be removed with as much safety as attends their application.

There are two distinct systems of applying electricity to the explosion of submarine mines. The most simple is that in which the explosion is made dependent upon the completion of the electric circuit by operators stationed at one or more posts of observation on shore; such a system depends, however, for efficiency, on the experience, harmonious action, and constant vigilance of the operators at the exploding and observing stations, and is, moreover, entirely useless at night, and in any but clear weather. The other, which may also be used in conjunction with the foregoing, is that of self-acting mines, exploded either by collision with the ship, whereby circuit is completed through the inclosed fuse, or by the vessel striking a circuit-closer, whereupon either the mine, moored at some depth beneath, is at once fired, or the necessary signal is given to the operator on shore.

Continental nations have followed in the footsteps of the English, in providing themselves with equipments for defensive purposes by submarine mines, and the Danes, Swedes, and Norwegians have pursued the subject of submarine mines with special activity and success. In the United States, the subject of the utilization of electricity as an exploding agent for war purposes is actively pursued, and important improvements in exploding instruments, electric fuses, and other appliances have been made by Smith, Farmer, Hill, Striedinger, and others already mentioned, while no individual has made more important contributions to the development of the service of submarine explosions than General Abbot, of the United States Engineers.

Illustrations of actual results capable of being produced in warfare by submarine operations have hitherto been very few; but of the moral effects of submarine mines there have already been abundant illustrations. In the war carried on for six years by the empire of Brazil and the republic of Uruguay and the Argentine Republic of Paraguay, the latter managed by means of submarine mines to keep at bay for the whole period the Brazilian fleet of fifteen iron-clads and sixty other men-of-war. In the Russo-Turkish war, submarine mines and torpedoes were a source of continued apprehension, and the French naval superiority was paralyzed during the Franco-German war by the existence, or reputed existence, of mines in the Elbe.

The application of electricity to the explosion of military mines and to the demolition of works and buildings has been of great importance in recent wars in expediting and facilitating the work of the military engineer. The rapidity with which guns, carriages, etc., were disabled and destroyed by a small party of men who landed after the silencing of the forts at Alexandria illustrated the advantages of electrical exploding arrangements, combined with the great facility afforded for rapid operations by the power possessed of developing the most violent action of gun-cotton, dynamite, etc., through the agency of a detonator.

The application of electricity to the explosion of mines for land-defenses during active war is not an easy operation, inasmuch as not only the preparation of the mines, but also the concealment of electric cables and all appliances from the enemy, entails great difficulties, unless the necessary arrangements have been made in ample time to prevent a knowledge of them reaching the enemy.

But few words need be said to recall to the minds of civil engineers the facilities which the employment of electricity to explosive purposes affords for expediting the carrying out of many kinds of works in which they are immediately interested. Electrical blasting, especially in combination with rock-boring machines, has revolutionized the operations of tunneling and of driving galleries; and although, in ordinary mining and quarrying operations, the additional cost involved in the employment of fuses, conductors, and the exploding machine, is not unfrequently a serious consideration, there are, even in those directions, many occasions when the power of firing a number of shots simultaneously is of great importance. There is little doubt, moreover, that accidents in mining and quarrying would be considerably reduced in number if electrical blasting were more frequently employed.

The conveniences presented by electric firing arrangements, under special circumstances, were interestingly illustrated by a novel proceeding at the launch of a large screw steamer at Kinghorn, in Scotland, which was recently accomplished by placing small charges of dynamite in the wedge-blocks along the sides of the keel, and exploding them in pairs, hydraulic power being applied at the moment that the last wedge was shot away.

In the deepening of harbors and rivers, and in the removal of natural or artificial submerged obstructions, the advantages of electric firing are so obvious that extended reference to them is unnecessary.

A substitute for electrical firing, which has been applied with success to the practically simultaneous firing of several charges, consists of a simple modification of the Bickford fuse, which, instead of burning slowly, flashes rapidly into flame throughout its length, and hence has received the name of instantaneous fuse or lightning fuse. The fuse burns at the rate of about 100 feet per second; it has the general appearance of the ordinary mining fuse, but is distinguished from the latter by a colored external coating. Numerous lengths of this fuse are readily coupled up together, so as to form branches leading to different shot-holes, which may be ignited together, so as to fire the holes simultaneously. In the navy, this fuse is used as a means of firing small gun-cotton charges, to be thrown by hand into boats when these engage each other, the fuse being fired from the attacking boat by means of a small pistol, into the barrel of which the extremity is inserted.

JAMES NASMYTH'S GEOLOGICAL VIEWS.

The following abstract from Mr. James Nasmyth's autobiography are of interest as showing what peculiar views that great engineer, whose judgment was so sound in mechanical matters, held on geology. In speaking of an ascent to Vesuvius he says:

"During my visit, the mountain was in its normal state. I mounted the volcanic ashes with which it is strewn, and got to the top. There I could look down into the pit from which the clouds of steam are vomited forth. I went down to the very edge of the crater, stood close to its mouth, and watched the intermittent uprushing of the blasts of vapor and sulphureous gases. To keep clear of these, I stood to the windward side, and was thus out of harm's way.

"What struck me most was the wonderfully brilliant colors of the rugged lava rocks forming the precipitous cliffs of the interior walls of the crater. These brilliant colors were the result of the sublimation and condensation on their surfaces of the combinations of sulphur and chloride of iron, quite as bright as if they had been painted with bright red, chrome, and all the most brilliant of tints. Columns of all manner of chemical vapors ascended from the clefts and deep cracks, at the bottom of which I clearly saw the bright, hot lava.

"I rolled as big a mass of cool lava as I could to the edge of the crater, and heaved it down; but I heard no sound. Doubtless the depth was vast, or it might probably have fallen into the molten lava, and thus made no noise. On leaving this horrible pit-edge, I tied the card of the Bridgewater Foundry to a bit of lava and threw it in, as a token of respectful civility to Vulcan, the head of our craft.

"I had considerably more difficulty in clambering up to the top edge of the crater than I had in coming down; once or twice, indeed, I was half choked by the swirls of sulphureous and muriatic acid vapor that environed me before I could reach the upper edge. I sat down in a nook, although it was a very hot one, and made a sketch of two of the appearances of the crater, which may, perhaps, interest my readers. But I feel that it is quite beyond my power, either by pen or pencil, to convey an idea of the weird, unearthly aspect which the funnel-shaped crater of Vesuvius presented at that time. An eruption of unusual violence had occurred shortly before I saw it. Great rounded blocks of lava had been thrown high into the air again and again, and had fallen back into the terrible focus of volcanic violence. Vast portions of the rugged and precipitous sides of the crater had fallen in, and were left in a state of the wildest confusion. When I visited the place, the eruption had comparatively subsided. The throat of the crater was a rugged opening of more than forty feet diameter, leading down to—where? Echo answers, Where?

"And yet there is no doubt but that the great mass of materials which lay around me, as I made my sketch, had been shot up from inconceivable depths beneath the solid crust of the earth. There still remains an enormous mass of molten materials that has been shut up beneath the crust since the surface of the globe assumed its present condition. The mineral matter had converged toward its center of gravity, and the arrestment of the momentum of the coalescing particles resulted in intense heat and the molten lava of the volcano.

"This seems to me to be the true origin of volcanic heat. It has played a great part in the physical history of the globe. Volcanic action has been, as it were, the universal plow; it has given us mountains, hills, and valleys; it has given us picturesque scenery, gorges, precipices, water-falls. The upheaving agent has displayed the mineral treasures

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of the earth, and enabled man, by intelligent industry, to use them as mines of material blessings. This is, indeed, a great and sublime subject."

In another part of his work, we find the following somewhat glowing account of the greatest Swedish iron mine:

"My visit to the Dannemora mine, at Osterby, was one of peculiar interest. I may, in the first place, say that the immense collection of iron at that point has been the result of the upheaval of a vast volume of molten igneous ore, which has been injected into the rock, or deposited in masses under the crust of the earth. In some cases, the quarried rock yields from fifty to seventy and even as much as ninety per cent of iron. The Dannemora mine is a vast quarry, open to the sky. When you come near it, the place looks like a deep pit with an unfathomable bottom. Ghost-like, weird-looking pinnacles of rock stand out from its profound depths, but beyond these you see nothing but wreaths of smoke curling up from below. The tortuous chasm in the earth caused by the quarries beneath is about half a mile long and about a thousand feet wide.

"The first process of the workmen in the quarries below is devoted to breaking into small fragments the great masses of ore scattered about after the previous night's explosions. These are sent to the surface in great tubs, attached to wire ropes, which are drawn up by gins worked by horses. Other miners are engaged in boring blast-holes in the ore, which displays itself in great wide veins in the granite sides of the vast chasm. These blast-holes are charged with gunpowder, each with a match attached. At the end of the day, the greater number of the miners are drawn up in the cages or tubs, while a few are left below to light the slow-burning matches attached to about a hundred charged bore-holes. The rest of the miners are drawn up, and then begins the tremendous bombardment. I watched the progress of it from a stage projecting over the wild-looking, yawning gulf. It was grand to hear the successions of explosions that filled the bottom of the mine far beneath me; then the volumes of smoke, through the surface of which masses of rock were sometimes sent whirling up into the clear blue sky and fell back again into the pit below. Such an infernal cannonade I have never witnessed. In some respects it reminded me of the crater Vesuvius, from which such dense clouds of steam and smoke and fire are thrown up. In the course of the night, the suffocating smoke and sulphureous gases had time to pass away, and next morning the workmen were ready to begin their operations as before."

THE INTRODUCTION OF IRRIGATION INTO NEW COUNTRIES, AS ILLUSTRATED IN NORTHEASTERN COLORADO.

At the meeting of the British Institute of Civil Engineers, a paper was read on the Introduction of Irrigation into New Countries, as Illustrated in Northeastern Colorado, by Mr. P. O'Meara, the object of which was stated to be three-fold: First, to give an account of the development of irrigation in Northeastern Colorado; secondly, to inquire into the principles which should guide the introduction of irrigation into new countries; and thirdly, to examine how far the methods pursued in Northeastern Colorado were in accord with them. The *Engineer* gives the following report of the paper in question: The development alluded to was influenced by most of the defects manifested in older countries, such as inaccurate measurement of water, growth of ill-defined rights, excessive waste water, etc., but there was a prospect of improvement through better legislation. The climate of Colorado was described as such that agriculture was all but impossible without irrigation. Both were begun in 1860. There were 155,000 acres under cultivation in 1880, and it was estimated that in 1883 there would be 465,000 acres, with prospects of still further development. The amount of irrigation possible would be limited by the quantity of water obtainable, and by the area which each unit of it could be made to irrigate. It would amount to 9,750,000 acres under an hypothetical water duty of twelve inches in depth for one season.

It was laid down that the duty of water in irrigation must vary with (1) the character and condition of the soil; (2) the rain-fall, temperature, and evaporation; (3) the method of application; (4) the kind of crop; and, in some cases, (5) the depth of the water-line below the surface of the ground. As regards (1) the influence of different soils, this must affect the duty of water, because on the nature of the soil depended the quantity of water it should absorb, and the rate of filtration and of evaporation from within it. The author gave details of experiments made by him to ascertain the amounts of water, and the times required to moisten two different typical soils in the Cache La Poudre Valley, and he drew some inferences from them. The formation of swampy lands and the prevalence of rust in wheat on some of the older farms were held to indicate that the quantity of water required for beneficial irrigation became gradually less year by year for a few years after the commencement. (2) The rain-fall of the season should be added to the artificial irrigation, and account should be taken of the surplus water not absorbed by the soil, otherwise all estimates of water duty must be misleading. The use of ordinary statistics of temperature and evaporation was at present vague and unsatisfactory, owing to the absence of experiments on the drying of soils. Nevertheless, the question of evaporation was so important that it was doubtful if any loss of irrigating power occurred in Colorado other than that which was due to it. (3) Irrigation methods were conducted on two antagonistic principles, namely, to increase to the most profitable extent, in the one case, the quantity of water supplied to a given area, and in the other the area irrigated by a given volume of water. The "Marcite" cultivation of Italy and the "asbestine sub-irrigation method" of California were cited as instances of these. Methods of irrigation were classed under four heads: by sprinkling, by flooding, by distributing through furrows, and by distributing through pipes or drains underground. Sprinkling had been tried in Scotland on seven acres of land by the Duke of Sutherland. The methods of flooding with compartments and of distributing through furrows were described in detail, as also the method of flooding without compartments, as practiced in Colorado. This was characterized as extremely wasteful. It was shown from the experiments on dry soil, before alluded to, that 6 inches or 8 inches in depth, instead of 42·84 inches, as at present extended, ought to suffice for cereals in Colorado. The experience of Professor Blount, of the State Agricultural College, was quoted to show that excellent crops of wheat could be grown with a rain-fall of 4½ inches only without irrigation. As regards (4) the water duty for different crops, it was the degree of moisture required in the soil around its roots, and not the absolute quantity which the plant itself absorbed, that had to be considered. The author furnished, in a tabular form, a list of statistics, derived from various sources, in which he had endeavored to include the essential elements. He considered it, however, to be nothing more than an approximation, because of the incompleteness of almost every statement of the kind. In the column of "totals," the limits of water duty appeared much narrower, because of the rain-fall being added to the irrigation depth, than they would be otherwise. Countries where good crops were grown without irrigation were included in the table, being considered to furnish a "natural duty of water," which should be useful for comparison with water duties in places where irrigation was practiced. Some remarks followed with respect to the peculiarities of certain crops, namely, rice, alfalfa, sugar-cane, summer meadows, potatoes, cereals, and tea. The author then discussed the sources and works of supply, and the legislation of irrigation. The sources were stated to be two, namely, springs and rivers. The supplies were made available for direct irrigation by canals, and for indirect irrigation, after storage, by reservoirs. The works of the North Poudre Irrigation Canal, of a capacity of about 300 cubic feet per second, which had been carried out under the author's charge, were described. Those most worthy of remark were a crib-dam, 30 feet 6 inches high, some shelf-work, tunnels, and "gulch" bridges. Details were also given of a larger canal, the Northern Colorado. These works show a considerable departure from the practice of older countries, owing to the abundance of timber and to the preference of Americans for economy and rapidity in construction over durability. The principal supplies of water in Colorado came from the snows of the Rocky Mountains. The rivers rose, reached their maximum, and fell again, frequently before the end of the irrigation season. Hence measurements of the snow remaining on the mountains were of importance to agriculturists. The construction of reservoirs was dealt with as a means of reducing risk in cultivation in countries where the rivers failed in the crop season. Reservoirs were distinguished as of three kinds: "River-bed" reservoirs for equalizing the flow; "main" reservoirs, which received the entire volume of a canal; and "detached" reservoirs, which received a portion only. A serious error in the construction of some reservoirs in Colorado was pointed out. The gauge first used for measuring water in Colorado was the Max Clark's gauge, and the improved system at present in use, with the formula of Francis: $Q = 3{\cdot}33\,(l - 0{\cdot}1\,n\,h)\,h^{\frac{3}{2}}$, were described and commented on. A short account of the legislation affecting irrigation in Colorado followed. The legal definition of an "inch of water" was given in full. Those laws were such that any holder of land in the State was entitled to take and use the waters of the rivers, and any one could construct reservoirs and store unappropriated water. A fruitful crop of litigation had, as a matter of course, been developed in the State; and some cases were still pending. A series of laws was passed in 1879 to determine the order and priority of existing and future claims, to fix the price of water, and to control its distribution. The author finally directed attention to the report of the State Engineer of California on similar laws, concurring generally with the principles advocated therein, and suggesting a free exchange of water rights, and the condemnation of such reservoir sites as were used for direct irrigation only.

THE EFFECT OF REPEATED HEATING ON STEEL AND IRON.

Mr. J. F. Barnaby has lately presented to the Controller of the British Navy a report giving the results of a series of experiments which he made at the Cyclops Works, Sheffield, to ascertain the effect of repeated heating and cooling on the strength of different makes of iron and steel. The metals submitted to trial were Siemens or open-hearth steel, and Bessemer steel, of about the maximum and minimum strengths allowed by conditions of contract, and Bowling iron and iron of B. B. quality, as made by Messrs. Cammell & Co. for use in her majesty's service. In making the tests, it was endeavored to subject the several samples, as far as possible, to treatment similar to that which they would receive if forming portions of a boiler in actual use. Herewith we give a table showing the average results of the tests of the higher strain Siemens and Bessemer plates, and of the B. B. iron plate:

Treatment of Sample.	Siemens or open-hearth steel.		Bessemer steel, ⅝ boiler plate.		C. Cammell & Co.—B. B. boiler.		Bowling iron.	
	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.
Normal condition.....	31·115	24·60	31·26	19·14	22·66	7·41	21·08	13·67
Sample heated 3 times ...	30·080	26·56	33·15	21·48	.....	.....	20·28	14·64
" 8 times....	30·580	25·97	32·70	22·06	20·56	7·22	20·36	15·71
" 12 times...	30·620	25·38	33·10	22·06	21·51	9·17	20·64	17·96
" 20 times....	30·750	24·99	32·43	22·45	20·15	7·81	20·02	16·79
" 40 times....	30·750	25·97	32·80	22·45	20·75	8·28	20·70	18·54
" 60 times....	31·440	26·75	32·63	23·25	20·83	8·60	20·35	16·40
Sample placed in the flue of a stationary boiler 16 days	30·770	26·55	28·64	20·11	21·68	7·22	20·20	14·65
Sample placed in smoke-box of a locomotive 16 days...	30·010	26·16	31·09	24·60	20·97	8·17	20.50	13·28
Samples placed in annealing furnace 16 days.....	26·100	28·51	28·25	24·61	15·27	5·85	15·24	11·32

Each result is the average of four tests, two lengthwise of the plate and two across it, except those of the first horizontal line, which are deduced from two experiments only. These show the normal tensile strengths and percentages of elongation of the several plates, each five eighths thick, from which the samples were cut. In the second to the seventh lines inclusive, are shown the strengths per square inch and the elongations obtained after the samples had been heated in a furnace arranged similarly to an oven, so that the heat should be uniform. They

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were exposed until they attained a heat of about 800 degrees Fahr., which was ascertained by withdrawing them and noting if small pieces of zinc would melt if placed upon them. They were then allowed to cool and the process repeated 3, 8, 12, 20, 40, and 60 times, as recorded in the table. The samples from which the tests shown in the eighth line were obtained were placed in the flue of a stationary boiler for sixteen days, care being taken to keep them clear of ashes, so that they received the heat from the boiler on their under sides, while their upper surfaces were exposed to the heat radiating through the fire-bars from the fire. Mr. Barnaby considers that the heat of these samples was often up to 800 degrees, and at other times was very much below that point. The determinations shown in the ninth line were obtained from samples suspended for sixteen days from a bar fitted in the smoke-box of a colliery locomotive. As the engine was subject to considerable variations of work, and was idle at night, the samples would be alternately heated and cooled. Experiments with various alloys showed the maximum temperature to be about 800 degrees Fahr. The last line gives the results of tests made on samples which had been placed under the bridge of an annealing furnace in such a position that the flames could not impinge upon them. They were kept in this situation for sixteen days, the furnace being allowed to cool down each evening, and being got up to the required heat again next morning, so that the samples were exposed to a black heat at night, and during the day time to a red heat, sufficient in the sixteen days to scale them to the extent of one eighth inch.

The results of the tests showed that Siemens steel retains all its good qualities, except after the very severe treatment of being subjected to long and continued red heat; that Bessemer steel suffers no deterioration except a slight falling off in its flexibility; that, even after being heated and cooled sixty times, it has only slightly increased in tensile strength, while it has maintained its percentage of elongation; and that, after the samples had been subjected to the continued red heat, the results obtained were most satisfactory, and greatly superior to those of iron; that the irons only deteriorated under a continuous red heat, under which circumstances they suffer much more than the steel.

After the samples had been broken in the testing-machine, they were bent by a hammer over a bending-block as far as they could go, and illustrations are appended to the report showing how far the process was carried before cracks were developed. As might be expected, the results were very uncertain; but on the whole, the Siemens steel came the best through the trial, after bending into horseshoe shape without the development of a flaw. The preliminary stretching appeared to have completely destroyed the flexibility of the iron, which cracked upon the slightest curvature.

THE RIO TINTO COMPANY.

The report of the directors, prepared for presentation at the forthcoming meeting, states that, unlike the accounts of the two previous years, those now submitted show no change in the capital account, except in respect to the 5 per cent bonds of 1880, which are further reduced by £33,220, the amount of the year's drawings. This amount has, as usual, been charged to the revenue account, and written off the cost of mines, which is thus reduced to £3,572,460. The profit on sales of produce and other items at the credit of revenue account, including £10,456 2s., brought down from the previous year, amount to £748,764 3s. 7d. After providing for all interest and expenses of administration, and the £33,220 amount of drawn bonds, there remains a net profit available for dividend of £477,183 16s. 4d., which the directors propose to appropriate thus: Interim dividend of 12s. per share, paid November, 1882, on 325,000 shares, £195,000; dividend now recommended to be paid, 16s. per share on 325,000 shares, £260,000, making together 28s. per share. or 14 per cent per annum = £445,000, and leaving a balance of £22,183 16s. 4d. to be carried forward in revenue account.

For the development of the property, 556,610 cubic meters of overburden on the south lode have been removed during 1882. Balance at debit of overburden account at end of 1882 was £196,624 7s. 9d. In both the San Dionisio and the North lode, the quantity of ore already laid open and prepared is such that the output can at any time be largely augmented. The tunnel to connect the north with the south lode is also steadily driven with the same object in view. The large masses of ore made available by the works already carried out will render any further heavy outlay unnecessary, whether on account of overburden of extensions and development-works, or of buildings, machinery, etc., and the charge which is regularly made upon the ore as extracted will steadily reduce the balance of overburden and of extension and development-works until they are finally liquidated.

The quantities of pyrites extracted were, in tons: In 1880, for shipment, 277,590; for extraction of copper by local treatment, 637,567= 915,157. In 1881, for shipment, 249,098; for extraction of copper by local treatment, 743,949=993,047. In 1882, for shipment, 259,924; for extraction of copper by local treatment, 688,307=948,231. The quality of the mineral is well maintained, and its average copper contents over the entire quantity have been 2·805 against 2·75 per cent for the previous year. The amount of the company's pyrites actually consumed in England, Germany, etc., during the year has been 272,826 tons, against 256,821 in 1881, and 274,201 in 1880. The copper produced during the year by treatment at the mines was estimated at 10,822 tons of 1000 kilos., and there were brought to market and realized 9651 tons of 21 cwts., leaving the balance to be carried forward to the current year at cost price. The comparatively small increase of production this year is entirely due to the exceptionally dry season, and, owing to the unprecedented scarcity of water, the expensive pumping back of used liquors has added to the cost of the copper to the extent of about 10 per cent. As regards water supply, it was reported last year that means had already been adopted to construct a large reservoir to contain about 2,500,000 tons of water. This reservoir is now nearly finished, and as rain began to fall in January of this year, it contains about two fifths of its full capacity—over 1,000,000 tons—available for 1883, besides the ordinary storage of water in the previously erected reservoirs of about the same quantity, which are now full. The railroad and pier have been maintained in good order, and are in full operation. All repairs and cost of maintenance have been charged to revenue.

THE VENTILATION OF COAL CARGOES.

Messrs. William Lindsay & Co., of Greenock, have addressed the following letter to the British Board of Trade:

"The question of spontaneous combustion of coal cargoes on long voyages is of such vital importance to ship-owners and underwriters, and has received so much attention from your board, that the following information, which we have to-day received from the captain of our bark Inchgreen, concerning his experience on a voyage from Dundee to San Francisco with a coal cargo, is our excuse for troubling you with a long letter. The Inchgreen sailed from Dundee on the evening of the 22d April, 1881, with 1509 tons of Watson's splint coal on board for cargo. These were shipped during fine weather, and, so far as we can remember, were perfectly dry when being loaded. The vessel has got two decks, between decks being laid, with the exception of a middle space of three feet, running right fore and aft, for which there are hatches, but with coal cargoes these are not put on. With this particular cargo, the coals were about two feet from the main deck from the after-hatch to the fore-hatch, sloping down at both ends, leaving a free space of about forty feet aft, and about the same forward on the between decks. The ship is very well ventilated, having two bell-mouth ventilators on the forecastle, the forward one 7 inches diameter at deck and 14 inches at bell-mouth, the after 9½ inches diameter at deck and 16½ inches at bell-mouth, ventilating both lower holds and between decks; a ventilator of 11 feet by 9 inches through the house on deck between the fore and main hatches for the between decks only; another, 3 feet square, ventilating lower holds and between decks abaft the mainmast; another, 2½ feet square, ventilating between decks about twelve feet from the after collision bulkhead. With ordinary cargoes, such as sugar, etc., the forward and after ventilators alone are used, and so well has the ventilation been arranged that, with a cargo of low Manila sugar, it was impossible to detect that there was sugar on board from the smell on the vessel's arrival in London; and at present, with a cargo of Java sugar, there is not the slightest appearance of sweat or discoloration on any of the baskets so far as can be seen, thus showing the thorough efficiency of the ventilation. On the 12th of May, after being three weeks out from Dundee, in latitude 36° 14′ N., longitude 19° W., Captain Miller discovered that the coals were heating, and that there was a dense vapor rising from them, which the ventilation then in use did not seem capable of carrying off. He caused a passage to be dug from the main hatch forward, and, with the view of improving the ventilation, cut a circular opening in one of the fore-hatches, into which he shifted one of the forward ventilators, erecting a small windmill at its mouth, he believing this would draw off the vapor and heated gases much more rapidly than by the ordinary action of the ventilators. The coals at this time had become so heated that it was almost impossible to stand on them, and Captain Miller was very apprehensive of the safety of his ship. Soon after the application of the windmill, an improvement was observed, which daily continued, until at the end of three weeks there was no sign of heat in the holds, the coals continuing cool until the termination of the voyage at San Francisco on the 2d of October, one hundred and sixty-two days from Dundee. At that particular time, nearly all the ships sailing from Dundee and arriving at San Francisco were more or less affected by fire in their cargoes. So far as we at present know, the Dunottar Castle, Caitlock, and Traveler had their cargoes on fire, and the British Sovereign, which succeeded the Inchgreen at the coal-crane, has never been heard of. We think it probable that the Inchgreen's immunity from fire is owing to the simple contrivance arranged by Captain Miller, and we bring the matter before you with the desire of its being made known to ship-owners and ship-masters loading similar cargoes.

THE CONDITION IN WHICH CARBON EXISTS IN STEEL.

Two series of experiments have been made recently by Sir F. A. Abel and W. H. Deering, the results of which have just been published. In the first series, disks of steel 2·5 inches in diameter and 0·01 inch thick were employed. They were all cut from the same strip of metal, but some were "cold-rolled," some "annealed," and some "hardened." The total carbon was found to be, "cold-rolled," 1·108 per cent; hardened, 1·128 per cent; and annealed, 0·924 and 0·860 per cent. Some of the disks were submitted to the action of an oxidizing solution consisting of a cold saturated solution of potassium bichromate with 5 per cent by volume of pure concentrated sulphuric acid. In all cases, a blackish magnetic residue was left undissolved. These residues, calculated upon 100 parts of the disks employed, had the following compositions: "Cold-rolled" carbon, 1·039 per cent; iron, 5·871. Annealed, carbon, 0·83 per cent; iron, 4·74 per cent. Hardened, carbon, 0·178 per cent; iron, 0·70 per cent. So that by treatment with chromic acid in the cold, nearly the whole of the carbon remains undissolved with the cold-rolled and annealed disks, but only about one sixth of the total carbon is left undissolved in the case of the hardened disk. The authors then give a *résumé* of previous work on the subject. In the second part, they have investigated the action of bichromate solutions of various strengths on thin sheet-steel, about 0·008 inch thick, which was cold-rolled, and contained—Carbon, 1·144 per cent; silica, 0·166 per cent; manganese, 0·104 per cent. Four solutions were used The first contained about 10 per cent of bichromate, and 9 per cent of sulphuric acid by weight; the second was eight tenths as strong, the third about half as strong, the fourth about one and a half times as strong. In all cases, the amount of solution employed was considerably in excess of the amount required to dissolve the steel used. A residue was obtained as before. With solution 1, the residue contained, carbon, 1·021; solution 2, carbon, 0·969; solution 3, carbon, 1·049 (the atomic ratio of iron to carbon was iron, 2·694 : carbon, 1; iron, 2·65 : carbon, 1; iron, 2·867 : carbon 1); solution 4, carbon, 0·266 per 100 of steel. The authors conclude that the carbon in cold-rolled steel exists not simply diffused mechanically through the mass of steel, but in the form of an iron carbide, Fe_3C, a definite product, capable of resisting the action of an oxidizing solution (if the latter is not too strong), which exerts a rapid solvent action upon the iron through which the carbide is distributed.

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THE HENDERSON GAS-FURNACE.

After years of study, Mr. James Henderson has designed a gas-furnace for metallurgical purposes which combines a number of details looking toward as complete a utilization of the fuel as possible, together with the rapid generation of the highest heats practically required. The principle which appears to have guided him is, that the supply of air for the generation of the gas in the producer and the quantity needed for its combustion—partial or complete as the requirements of the process may be—can only be supplied with the needed accuracy by separate engines.

In the plan of the drawing which we give this week, the air for converting the fuel in the producer *A* into gas is furnished by an engine—a vertical fly-wheel engine in this case—with a steam cylinder *s*, and an air cylinder *N*. In order to make the flow of air more regular, a receiver *P* is provided, from which it is carried to the blast-pipe of the producer, being distributed into the furnace by the tuyeres *i*. The coal is charged into the safety-hopper *a*, and falls into the upper part of the producer *r'*, provided with a boiler-iron skirt, serving as a retort in which the bituminous substances of the coal are partly distilled off and forced to pass downward into the current of gas. The aim of Mr. Henderson is to produce a gas containing one third by volume of hydrogen, and two thirds by volume of carbonic oxide, and he introduces steam whenever it is necessary to effect that end. Mr. Henderson has adopted the plan of removing the ash and clinker in the coal by fluxing it and tapping the cinder through *d*, the fluxes being so chosen that the cinder carries three parts of silica to two parts of lime and one part of alumina; and to effect this, varying quantities of lime are generally added. We are informed that this plan has worked very well at the experimental plant put up at Bellefonte, Pa. It will be noticed that, in accordance with modern practice, Mr. Henderson places his producer in close proximity to his furnace, thus avoiding any loss of heat by radiation in long flues. Flowing through the flue *B*, the gas passes downward at its end and mixes thoroughly with the preheated air, discharged, through the pipe *T*, through a large number of small holes in a direction at right angles to the direction of the current of gas. Thus thoroughly mixed, the burning gases enter the reverberatory chamber *C*, impinging upon the metal in the hearth *V*. The air for the combustion of the gas is furnished in the exact quantity needed by the blowing-engine *I J*. It passes through the regulating receiver *K*, the pipe *L*, into the hot-blast pipes *S*, placed under the boiler *O*, where the waste heat of the gases of combustion is utilized. To prevent radiation of heat, the blast-pipe *T*, conveying it to the point where it is to be burned, is well covered with non-conducting material, and an expansion-joint is also provided. The melter has it in his power to obtain a neutral, oxidizing, or reducing flame by regulating the quantity of air to be mixed with the gas. In the case of the two former methods of working, the gases of combustion leave the reverberatory chamber *C* through the flue *D*, and this heat is first utilized to preheat materials to be melted on the hearth *E*. The heat of the waste gases is further reduced by heating the air in the pipes *S*, and making steam in the boiler *O*. In case a reducing flame is required in the reverberatory chamber, the combustion of the gas has been only partial. In order to fully utilize it, Mr. Henderson diverts the excess of air for combustion not passed through *T*, into the pipe *c''* under the hearth of the preheating chamber *E*, carrying it upward in flues along the free side-wall of the hearth, to be further heated, and making it flow through the slanting holes in the roof at the end of the flue *D* into the current of unconsumed gases coming from the reverberatory chamber *C*.

The hearth itself is mounted on a rotary platform which can be raised into position by hydraulic power. A sand-box is used for sealing the joint. The hearth makes from 3 to 4 revolutions per minute. By lowering the platform, two wheels, with which it is provided, rest on a track over which it can be drawn out sideways.

The furnace we have described has been experimented with at Bellefonte, the capacity of the hearth being 2½ tons. It was principally built to test its performance compared with the Siemens regenerative furnace, the lack of proper handling appliances making it impossible to enter into any regular work in melting and casting steel. The furnace, of course, is capable of being enlarged to the dimensions given to modern open-hearth furnaces.

Fig 1

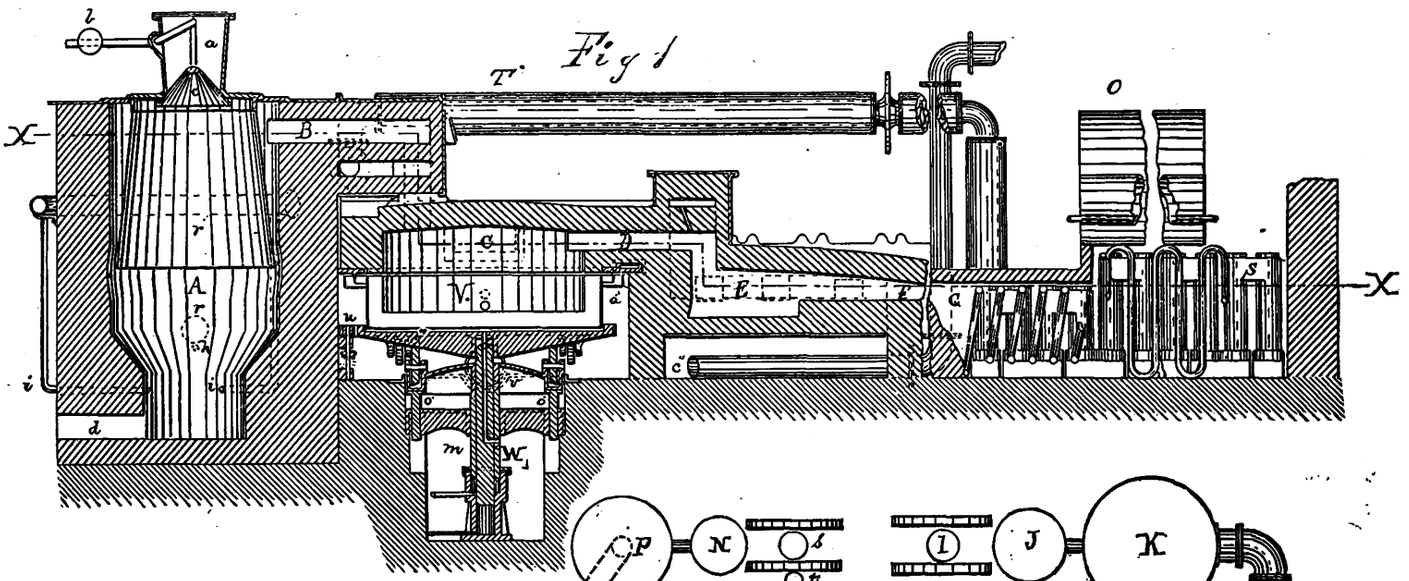
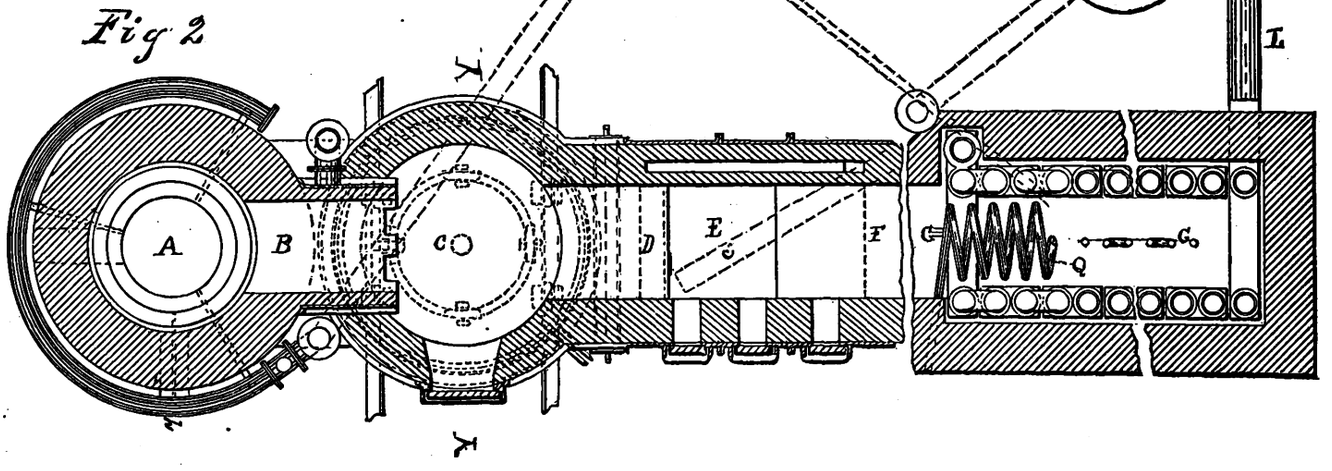


Fig 2



THE HENDERSON GAS-FURNACE.

Mr. Jonathan Jinks, steel-melter of the St. Albans Steel-Works, St. Albans, Vt., gives the following record of an operation of the Henderson direct-acting furnace:

MAY 1ST,	1	P.M.—Furnace lighted, using one sixth of a cord of wood.
	4	P.M.—Blast put on. The furnace was heated with coke for 12 hours during the night, to keep the producer hot and enable the men to rest.
MAY 2D,	4	A.M.—Furnace charged with gas-coal.
	8	A.M.—Furnace hot.
	12	M.—Began making bottom.
	12	P.M.—Bottom made. Furnace idle 4½ hours.
MAY 3D,	4.30	A.M.—Charged metal.
	9	A.M.—Tapped out the heat.

This makes a total of 44 hours, from which 16 hours must be deducted, leaving the actual working 28 hours. Comparing this with the Siemens furnace, we have: The latter requires one day's heating with wood fire at

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the start, with a consumption of from 3 to 4 cords of wood. It takes 48 hours before it is hot with gas and from 2 to 3 days more to make a sand bottom. Working a charge of half pig and half scrap-iron is completed in from 11 to 12 hours, to produce as low a carbon steel as that made with the Henderson furnace. In the latter, the charge referred to was: 1000 pounds No. 2 Bessemer pig, 600 pounds of steel scrap from the former heat, 300 pounds of wrought scrap, 30 pounds of ferro-manganese, and 220 pounds of Lake Superior iron ore. Mr. Jinks estimates the waste at 6 per cent. It is claimed that the repairs to the Henderson furnace will not be more than those of an ordinary puddling-furnace, the principal parts, the inlet and outlet of the flue, being readily accessible. Mr. Henderson's furnace, which has been patented, is certainly well designed, and the fuel consumption, as shown thus far, 3 cwts. per hour for the 2½-ton furnace, is low.

THE SIEMENS REGENERATIVE FURNACE PATENT.

Judge Butler, in the United States Court in Philadelphia, has filed an important opinion, in which he dismissed a bill in equity of Charles M. and Frederick Siemens against the directors of the Midvale Steel Company, claiming a royalty upon the use of the Siemens regenerative gas-furnace from 1878 to 1881. The Midvale Company contended that the patent expired in 1878, and refused to pay any penalties after that date. The patentees claim that their rights did not expire until 1881, and demanded a royalty for the three years. A number of manufacturers paid the royalty. The Midvale Company contended that the furnace having been patented in England in 1861, the English patent limited the duration of the American patent under an act of 1839, as amended by an act of 1861, to seventeen years, to July 22d, 1878. The complainants contended that their patent, which was of March 1st, 1864, and on its face was for seventeen years from that date, was not limited by the English patent, because the improvements patented here were substantially different from those described and shown in the English patent, and because, even if it were otherwise, the act of 1861 gave all patents thereafter issued a term of seventeen years from their date of issue. The American patent, it was consequently contended, did not expire until March 1st, 1881. Judge Butler, in the course of his opinion, said: "The language of the act of 1861, that all patents hereafter granted shall remain in force for seventeen years from the date of issue, considered in connection with former and existing legislation respecting inventions first patented abroad, was well calculated to create the doubt and embarrassment which have followed. In the absence of decisions by other courts, I believe I would have reached the conclusion that the language first quoted was intended simply to increase the duration of all patents thereafter issued equally, giving to each an additional period of three years without interfering with the distinction so long maintained between inventions originally patented here and those patented abroad. The question, however, having been fully considered by Judge Blatchford in a case requiring his decision, I am content to adopt his views. The reasons on which he rests his conclusions commend themselves to my judgment."

SAMPLING AND ANALYZING ORES AND CHEMICAL PRODUCTS.

Prof. George Lunge, of the Zurich Polytechnic School, has sent out the following letter, the contents of which, though applying more directly to the chemical industries, touch questions which have long agitated those engaged in various branches of mining and metallurgy:

The committee of the German Society for the Promotion of Chemical Industry has resolved, upon a suggestion made by the representative of the chemical manure manufacturers, to submit to the next general meeting of the society the following proposal, namely:

"That steps may be taken for bringing about an international agreement concerning uniform analytical methods for estimating the commercial value of certain products."

I have been honored with the request to lay a report upon this matter before the meeting, and for this purpose I take the liberty of addressing myself to you, to obtain the favor of your opinion thereon.

It will not be doubted that the confusion at present reigning in that matter is very awkward indeed. In the transactions between manufacturers and their buyers and sellers, unpleasant discussions or even lawsuits are frequently caused by the employment of different methods of sampling or testing, or both—methods which must needs lead to differing results; and an appeal to a commercial analyst sometimes increases the confusion by the introduction of a third method. This would be avoided if all those concerned were agreed upon employing certain standards for sampling and testing the goods, the same specific gravity tables, and so orth.

It is, moreover, most desirable that the results of analysis should be expressed in a uniform manner. Mutual understanding is greatly impeded if, for instance, one party calculates phosphoric acid as such, the second as tricalcic phosphate, the third perhaps as monocalcic phosphate. The strength of soda-ash is expressed in a different way each in England, France, and Germany, and many other similar instances might be quoted. Not merely for commercial purposes, but also for comparing results of work, it would be most desirable to establish some such agreement. An English acid-maker, who learns that his German neighbor consumes so much nitric acid at 36° Baumé for each cwt. of sulphuric acid, has no notion what that may mean in terms of 96 per cent nitrate of soda per 100 parts of sulphur, etc., etc.

A considerable number of the German chemical manufacturers has taken steps for improving this state of affairs, at least within their own country. The chemical manure makers have agreed upon uniform and binding modes of testing, and the alkali trade is aiming at the same object by means of a *Manual for Alkali, Potash, and Ammonia-Works*, just published. The success already attained in this direction in Germany has been an encouragement to conceive the idea that the great advantage of uniform methods might be extended internationally, and it is just the object of the present communication to gather information about the possibility of realizing this.

Nobody, of course, will overlook the difficulties standing in the way of such an agreement. Some of the countries concerned do not even possess suitably organized unions of chemical manufacturers, and international unions of such a character are altogether out of the question. Even if such existed, they would never succeed in *compelling* their members to employ certain methods, or even the same way of expressing the results, and still less would they be able to exert such a compulsion upon the buying and selling public and the commercial analysts. Nor can it be denied that great differences of opinion exist as to the value of many analytical methods, and that constantly new, if not always better, methods come to the fore. Hence a rigid compulsory code, binding forever, or even for a long period, is not to be thought of. But, on the other hand, those go too far who for this reason deny the possibility, or even the desirability, of an agreement in this respect. Even in public matters no law can be made which embodies absolute truth and justice; in the long run, with changing circumstances, the best laws become unsuitable, and must be changed; but nobody pretends that therefore we must do without laws altogether. Without laying too much stress upon this simile, it will be conceded that an agreement among the leading manufacturers and chemists of the great industrial countries upon the matters concerned, even though it would not either possess or claim absolute binding power, would be invested with sufficient authority to serve, in a large majority of cases, as a standard in the intercourse between buyers and sellers. It would soon become a regular practice to stipulate for those standards in contracts and sale notes, and they would be acknowledged as decisive in courts of law.

With this view, I beg to lay the following questions before you, in the respectful hope of receiving as full an answer as possible, to be made use of, either with mention of name or otherwise, as you may wish, in my report to the meeting of German chemical manufacturers:

1. Do you believe that an international agreement concerning exact standards of *sampling* ores, raw products, and chemicals could be attained?

2. Do you believe that a similar agreement could be attained in the matter of *analytic methods*, and more particularly in which definite branches of industry?

3. Do you believe that in some definite branches of chemical industry a uniform international *way of expressing the results* could be agreed upon, and have you any specific proposals to make in this respect?

4. In case you should answer one or more of the above questions in the affirmative, what *organs* would you think suitable for establishing an international agreement?

5. Do you think that such agreements should be made for an indefinite time, or that their *revision*, evidently called for from time to time, should be from the first provided for by a periodical action of the just-mentioned organs?

6. In what *form* do you think that the results of such an agreement should be made accessible to the public?

Whatever your opinion may be upon these points, I shall consider it a special favor if you will impart it to me at your convenience, in order to make use of it in my official report.

A ROAD OF SILVER.—The following tall story is going the rounds, and is gravely printed: In Clinton County, N. Y., Peter Trembly, of the Trembly Iron Company, in making roads, has been using cinders resulting from the ore passing through the heat of the forge. It has been noticed that a road covered with these cinders has been glittering. An investigation showed that a rich vein of silver had been struck in the iron mine, and the precious metal melting in the forge had run through upon the cinders that had been so freely distributed along the road. Mr. Trembly gathered up his cinders, deciding not to have a road of silver in this world.

FURNACE, MILL, AND FACTORY.

Mr. A. T. Chur, agent of the Abernant Dinas fire-brick and cement, has removed to the Mills Building, Room 14.

The Graydon & Denton Manufacturing Company has opened an office for the sale of its Dynamic rock-drill at No. 1 Park Place, in this city.

Dr. Edwin Fowler, President, and Professor Theodore Stahl, General Manager, of the Southern Colorado Bismuth and Silver Mining and Smelting Company, of Silverton, Colorado, have placed their order with the Fort Scott Foundry and Machine-Works for the erection of a concentrator at their mines, of sixty tons capacity per day.

The No. 1 stack of the Saucon Iron-Works, at Hellertown, Pa., has been blown out for repairs. It is likely the furnace will remain out of operation until there is a larger demand for iron, and a consequent increase in its value.

In going over a pamphlet issued by the John Ashcroft Manufacturing Company, of this city, we came across the following figures relating to competitive tests made with ordinary boiler furnaces and with furnaces provided with the Ashcroft furnace-door and grate-bars. At the Manchester Print-Works, an ordinary furnace, during a trial-run of thirty-six hours, consuming Lackawanna anthracite, the evaporation of water from 212 degrees Fahr. was 10·97 pounds per pound of coal, while with the same fuel and the same type of furnace, fitted with the appliances referred to, the evaporation was 11·90 pounds, a gain of 8·47 per cent, while the amount of clinker taken out was considerably less than in the first case. Another test, carried out at the works of the Troy Steam Heating Company, showed a gain of 5·52 per cent in efficiency.

Uniform steam pressure being a necessity in the production of a perfect electric light, the Edison Light Company, of New York, has secured it by the use of the Curtis pressure regulator. The company uses 5-inch regulators on its large engines.

P. J. Dalton, of Latrobe, Westmoreland County, Pa., has closed a contract for the building of twenty coke-ovens at Clarksburg, West Va. They are for the Despard Coal and Coke Company, of Baltimore.

The Crozer Steel-Works, at Roanoke, Va., are nearly ready for work.

The Sarven Wheel Works, at Indianapolis, will soon be completed. Messrs. Hadley & Wright are furnishing the boilers and engine and are now turning up the large belt-wheel, 14 feet in diameter and 24 inches face, said to be the largest wheel of the kind ever made in Indianapolis.

The Reading *Herald* says: The Harrisburg Nail-Works have been experimenting in the manufacture of nails from steel, and have succeeded in producing a fine article. The nails are manufactured from steel made at the Pennsylvania Steel-Works, the quality the same used in making rails; the nails are pronounced

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to be superior in quality to the iron nail. They are nicely finished ; and drive into the hardest of wood without bending.

Shawnee furnace, No. 2, at Columbia, Pa., is about to be closed for the present, on account of the limited demand for iron. Work will be resumed on the revival of business. The employés will not be discharged, but will be engaged in making repairs about the furnace.

The project of building a steel plate mill at Wheeling, West Va., for the common use of the nail mills there, is said to have fallen through.

Every portion of the Allentown, Pa., Rolling-Mill Company's Works has been closed, and work has also been suspended at the fire-brick works of Messrs. Ritter & Saylor, in that city.

At the Wando Phosphate Works, Charleston, S. C., the centrifugal mill of the Lucop & Cook Pulverizer Company, size D, has been running with marked success for several months upon the Charleston River rock. The product obtained is one ton per hour of fine powder, more uniform than the ordinary buhr-stone yield, and commanding a ready sale in preference to it. Woodward & Thiers, the well-known brokerage firm of Philadelphia, Pa., recently ordered from the Wando Phosphate Company three thousand tons of the centrifugal mill product, which is supplied as rapidly as possible, the Wando Works having ordered two more D mills, in addition to the one already running. The Lucop & Cook Company is also building mills to fill orders from the Atlantic and Ashepoo companies of Charleston, the Bradley Fertilizer Company of Boston, and others ; and the general introduction of its mill in place of the present cumbrous and expensive methods of buhr-stone grinding seems probable, as the power required by its centrifugal mill does not exceed eight horse, and it is prepared to guarantee that the cost of wear and tear and replacement of working parts will not exceed eight cents per ton of material pulverized.

The Grace furnace, Marquette, is to be put in blast in the near future, by a stock company, of which Sturges, Kruse & Travers, Chicago, are the prime movers. It is said that the money sufficient to put the property in shape is now ready, and that the work of improvement will be commenced at once. This will be a benefit of some little value to the district.

The Lechner Machine Company, of Columbus, O., is building a coal elevator at Straitsville, for the Columbus & Hocking Coal and Iron Company.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following patents bear date May 15th, 1883 :

ARIZONA.

TUCSON DISTRICT.

Woronoco Mining Company, San Diego lode. Lemuel J. Webster, Rescue and Champion lodes. Ferre Mining Company, Bee lode. Peter Whitman *et al.*, Silver Queen lode.

CALIFORNIA.

LOS ANGELES DISTRICT.

Seth Marshall, Jr., Rio Vista and Painsville lodes.

MARYSVILLE DISTRICT.

H. F. L. Strover *et al.*, Goods Flat quartz mine. Eben McKenney, Mountain placer mine. Alure Kerrigan *et al.*, Eastern Star placer. Red Hill Hydraulic Mining and Water Company, placer, Butte County.

SACRAMENTO DISTRICT.

William Irelan, Sr., Yuba and Arabian quartz mines. Frederick Safried, Yuba Extension quartz mine. C. E. Purington *et al.*, Golden Gem placer, Placer County. Lorenzo Herrick *et al.*, placer, El Dorado County.

COLORADO.

CENTRAL CITY DISTRICT.

Albert Ford, F. W. Crain lode. William E. Martins *et al.*, Anna lode. Henry M. Teller, Copper Bottom lode. John A. Fish *et al.*, Alaska lode. W. W. Thompson *et al.*, Mineral Point lode. William M. Roworth, Gunnell lode. Jacob J. Elliott, Specie Payment Extension lode. Charles W. Pollard, Seminole and Christie lodes. M. S. Claypool, Hamilton lode and mill-site. Cornelia C. Munsen *et al.*, First National lode. American Consolidated Gold and Silver Mining Company, Ajax lode. Thomas Kennedy *et al.*, West Gregory lode. William H. Hampton, Jr., Seneca lode. Frank Kilbaum, St. Louis Extension lode.

DURANGO DISTRICT.

Paul D. Wallis, Seal lode. Cream City Mining Company, Seymour lode. George W. Miles *et al.*, Stephen B. and John B. lodes. John W. Bailey *et al.*, Columbia lode. H. B. Adsit *et al.*, Little Dora lode. Consolidated Rico Mining and Milling Company of Colorado, mill-site, Dolores County.

LAKE CITY DISTRICT.

William Story *et al.*, Flagstaff lode. Thomas C. Wilson, Ram's lode. Edward S. Douglass *et al.*, John Wesley lode. Germania Mining and Smelting Company, Silver King lode and mill-site.

LEADVILLE DISTRICT.

Alexander M. Cochran *et al.*, Cumberland lode. George H. Whitelaw, Senator and Wanderer lodes. Crown Prince Mining Company, Crown Prince lode. James Beattie *et al.*, Little Susie lode. D'Estaing S. Covert *et al.*, Phat Purse lode. Park Range Mining and Prospecting Company, Hidden Treasure, Pick, and Ætna lodes. Cadillac Consolidated Mining Company, Trainer, P. J. C., and Buffalo Girl lodes. Robert Crawford *et al.*, Andrew Jackson lode. Ira A. Cammeth *et al.*, Ridge No. 1 lode. Arthur Ingram *et al.*, Pilot lode. P. H. Tompkins, Dauntless lode. J. C. Taylor, Amboy lode. John F. Campion *et al.*, Clara Burbank lode. Bethnel M. Newcomb *et al.*, Mary B. lode.

PUEBLO DISTRICT.

Consolidated Mining Company of Seven Mines, Waverley lode.

DAKOTA.

DEADWOOD DISTRICT.

Avery D. Clark, Steward lode. George A. Springer, Gustin lode. Deadwood-Terra Mining Company, Justice No. 2 lode. Giant & Old Abe Mining Company, Old Abe lode.

IDAHO.

OXFORD DISTRICT.

Bay Horse Mining and Smelting Company, Sky Lark lode.

MONTANA.

HELENA DISTRICT.

John C. C. Thornton *et al.*, Caledonia lode. John F. Forbis *et al.*, Eveline lode. Harry Gassert *et al.*, Blue Bird, Burlington, and Mono No. 2 lodes. John Downs, Sister lode. David Morgan, Independence lode.

NEVADA.

CARSON CITY DISTRICT.

Manuel San Pedro *et al.*, Star of the West lode and mill-site.

EUREKA DISTRICT.

Madeline Goetz *et al.*, Pride of the West lode. Day Silver Mining Company, Jack Rabbit lode. J. W. M. Cardeza, Thompson lode, and a mill-site, Lincoln County.

UTAH.

SALT LAKE CITY DISTRICT.

Mineral Point Consolidated Mining and Milling Company, Baby mine. Frederick Auerbach, Protector lode. Joseph R. Walker, Williams lode. William Halter, coal. Edward H. Evans, coal. Charles H. Evans, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

Experts for the Copper Queen and Copper Prince mines have arrived, and the case will come up in the District Court in a few days.

TOMBSTONE DISTRICT.

BONANZA.—The mine, it is stated, has been bonded to Chicago parties for $20,000.

GRAND CENTRAL.—The pumps have been stopped for the present, and will remain idle until the Contention pumps are ready for work, when both companies will resume sinking below the water-level. It is expected that the delay will not exceed sixty days.

OLD GUARD.—Work has been resumed, and ten tons of ore are extracted daily. The milling ore is sent to the Randolph mill, and the smelting ore to the San Diego smelter.

PROMPTER.—A rich body of ore has been struck in the No. 5 shaft. The entire face of the shaft is in bromide ore.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

There is nothing new to report from the mines in this district. The production and work of development continue as usual.

PLUMAS COUNTY—GREENVILLE DISTRICT.

ARCADIAN.—A clean-up was made at the mill, and the bullion obtained left a profit of one hundred per cent on the total expenses of the mine and mill during twenty-five days' run. In this are included wages, timbering, mine supplies, liberal estimate for wear and tear of machinery, and the cost of water-power. All the ore milled on this run was taken from the upper tunnel in the Sunset ledge ; the stope on this ledge is now open 125 feet, and the vein runs from five to eight feet wide. The ore is low grade, but is soft and easily worked. Twenty tons are produced daily. Six hundred feet distant from where the above ore was taken and at a farther depth of 200 feet, another pay-chimney is open on the same ledge. This mine has only lately been opened, but the prospect thus far gives warrant to the belief that it will turn out to be a valuable property.

GOLD STRIPE.—The agent of this company, who now has charge of its affairs at Greenville, says the *Bulletin*, expects to be able in a few days to make a proposition to parties who have claims against the property to offer fifty cents on the dollar, in liquidation of the same.

INDIAN VALLEY.—This mine is now at a greater depth than any other in the district ; the shaft is six hundred and five feet deep, the entire distance being sunk on the ledge, and from top to bottom the ledge is less than two feet out of perpendicular. The ore is low-grade, and, being so hard, is expensive to work ; a fair profit is made ; but to secure this, the closest attention and most careful management are necessary in both mine and mill. In the mill, nearly all the rock has to be put through a rock-breaker before going to the batteries. Every precaution is taken to save the gold, which is very fine and difficult to catch.

CANADA.

PROVINCE OF MANITOBA.

HAY ISLAND.—This company has perfected arrangements for the active prosecution of the development of its claim, which is a continuation of the now well-known Keewatin. The sinking of a shaft has begun.

KEEWATIN.—Work is progressing very satisfactorily. Good ore was struck in the shaft recently. Some of this ore will be crushed and concentrated and shipped East for treatment.

ISABELLA.—Operations are active, and negotiations for the purchase of machinery are pending.

LAKE WINNIPEG.—Cross-cutting has been commenced, and the ore shows up well. Operations on a working-shaft will begin shortly. It will be started about 100 feet north of the trial-shaft.

WINNIPEG CONSOLIDATED.—The bullion produced shows $25.83 per ton saved, and the tailings a value of $16.61 per ton, giving a total of $42.44.

There is considerable activity in the phosphate regions of Canada. On the disappearance of the snow, numerous prospectors took the field, and new developments and discoveries are chronicled every day. The Cobden District is exciting the greatest amount of attention. Pan analysis made by Messrs. Ledoux & Ricketts of apatite, taken from a property worked by Messrs. Benedict & Cole, of New York, showed 89 per cent bone phosphate.

THUNDER BAY DISTRICT.

In Thunder Bay District, North Shore, Lake Superior, operations are carried on to a considerable extent, and several new companies have been formed for the purpose of working recent discoveries made in the district. The Jack Fish Lake mine promises to be one of the leading gold and silver producers. Prospecting will be carried on this summer to a greater extent than ever before.

WINNEPEG.

The assays of ore from the Canada Gold Mining Company's claim at Lake of the Woods are reported at $30 of gold per ton. Work is vigorously pushed forward at this and the Winnepeg Consolidated Company's two mines, between which it is situated. Mining claims are rapidly picked up in this vicinity.

Mr. Dobie has bought the Pine Portage mine for a sum said to be near $100,000. He is also bound to erect a ten-stamp mill.

At the Keewatin mine, three shifts have been employed for some time back, and sinking is proceeding in a satisfactory manner. The vein has not increased materially in width, nor is it at all likely to increase much before the lake level is reached. The shaft is down over sixty feet.

At the George Heenan mine, Superintendent Nagle is pushing work rapidly but substantially forward. He has lately made some valuable discoveries on the property. Three new veins have been found, not the most valuable of which is the uncovering of the Frenchman lead near where the present shaft is located, and where it had been industriously sought for years, but had eluded search. From what has been discovered, astonishing developments may confidently be expected in the next few months.

Arrangements have been made for the development of the Minnesaubie vein, on the lake, the property of Messrs. Rideout and Gibbons. Two shafts are sinking, each to be 7 by 10, 25 feet deep. The contract price for sinking is $28 per foot.

Mr. William Young, Superintendent of the International Mining Company, says work is progressing favorably at the Maiden location, although but a small staff is operating at present. The shaft is down some 18 feet. As soon as navigation opens, a double shaft will be put on, and the Climax, another valuable property belonging to the same company, will be opened.

COLORADO.

The following companies have filed articles of incorporation :

Bridal Veil Mining Company. Capital stock, $2,500,000. Directors : M. D Monsor, William H. Durham, and Samuel H. Gregg. Operations, Colorado

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Principal office, Crawfordsville, Ind. Brittle Silver Mining Company. Capital stock, $200,000; shares, $10 each. Directors: George McGinley, H. M. Trueheart, Louis Wilbur, J. J. Hunter, and John Summers. Operations, Colorado. Offices at Galveston, Texas, and Silver Cliff, Colo. Buckeye State Mining Company. Capital stock, $1,000,000. Directors: Judge C. M. Hughes, W. B. Simons, R. Jones, and D. J. Roap. Bullion Prince Mining and Smelting Company. Capital stock increased to $600,000, and name changed to the Bullion Prince Mining Company. Bunker Hill Gold and Silver Mining Company. Capital stock, $1,000,000; shares, $10 each. Directors: E. H. O'Neall, W. T. Bensel, B. R. Russell, W. R. Risting, J. Q. W. Wilhite, T. H. B. McCain, and Charles A. Miller. Operations, Gunnison County, Colo. Principal office in said county, and branch office at Crawfordsville, Ind. Chicago & Kansas City Mining Company. Capital stock, $1,000,000; shares, $10 each. Directors: George W. Jones, W. Small, J. H. B. Beckford, F. Howard, and E. P. Hatch. Operations, Chaffee County, Colo. Office, Maysville, Colo. Clayton Mining Company. Capital stock, $500,000; shares, $10 each. Directors: Clayton French and David T. Burr, of Philadelphia, and Charles Buckland, of Montezuma, Colo. Operations, Summit County, Colo. Principal office, Montezuma, and branch office, Philadelphia, Pa. Columbus Mining Company. Capital stock, $3,000,000; shares, $10 each. Principal office, Columbus, Colo. Congress Copper Mining Company. Principal office, Silverton, Colo. Cosmos Mining Company. Capital stock, $3,000,000; shares, $10 each. Directors: Carl Wulsten, Edward Chiles, S. D. Hayward, and two others to be hereafter elected. Operations, Colorado. Principal office, Denver; branch office, Rosita, Colo. Denver Gold Company, Limited. Capital stock, £60,000; 240,000 shares. Directors: Francis Frederick Powell, Charles Henry Dunhill, Alfred Marshall, and Jay and Philip Bennett Marshall. Operations, Gilpin County, Colo. Office, Nevada, Colo. Enterprise Mine Developing and Milling Company. Capital stock, $15,000. The purpose of the company is to develop mines and to operate mills for the reduction of ores, take leases on mining property and mills, to acquire by purchase, lease, entry, grant, devise, gift, or otherwise, real estate or other property, etc. Directors: S. S. Griswold, J. G. Brown, H. M. Johnson, A. B. McGill, and F. E. Bushby. Fountain Mining Company. Capital stock, $1,000,000. Directors: S. H. Appel, President; I. N. Zeang, Robert Colton, John F. Miller, T. O. Batch, George H. Allen, George Rousberger, Harry Palmer, and George Brandel. Operations, Colorado. The principal office will be at Bellefontaine, Ohio, with a branch office at Salida, Colo. Goldfinch Mining Company. Capital stock, $300,000. Directors: Louis D. Oviatt, Henry W. Preston, Abraham Clawson, George T. Dell, and Lewis H. Dickson. Office, Longmont, Colo. Grand Duke Mining Company. Capital stock, $800,000; shares, $10 each. Directors: John C. H. D. Block, Henry L. Rozier, Gustavus St. Gem, Edward A. Rozier, and Joseph Meredith. Operations, Colorado. Principal office, St. Louis, Mo., with a branch office at Rico, Colo. Grant & Sherman Mining Company. Capital stock, $30,000. Operations, Chaffee County, Colo. King Mining Company. Capital stock, $400,000; shares, $5 each. Directors: Joseph K. Baker, President; Clarence F. Whitaker, Secretary; Stephen C. Perry, Daniel T. Copeland, and Thomas Appleton Operations, Colorado. Principal office, Portland, Me. Leadville & Aztec Mining Company. Capital stock, $500,000. Directors: Theodore Dugalshe, Simeon Dunbar, and William Laild. Mint Mining Company. Capital, $175,000; shares, $50 each. Directors: Relief Jackson, James K. Pattison, John Levering, William Wallace, H. W. Moore, Joseph S. Hanna, A. W. Abbott, Dr. J. M. Smith, William H. Keller, James S. Warwick, all of Lafayette, Ind.; and James M. Harris, of Georgetown, Colo. Operations, Clear Creek County, Colo. Principal office, Lafayette, Ind. Nestor Mining Company. Capital stock, $1,000,000. Operations, Park County, Colo. New York & Colorado Mining Syndicate and Company. Increase of capital stock from $100,000 to $200,000; shares, $100 each. Principal office, Denver, Colo. Pacific Mining Company Capital stock, $100,000. Directors: Eli Punston, William Stockston, S. P. Weller, R. J. McConnell, Benjamin Ives, J. Piccioli, and W. Smith. Operations, Garfield County, Colo. Principal office, Denver, Colo. Palmer Group Mining Company. Capital stock, $1,000,000. Park County Sampling and Concentrating Company. Capital, $32,000; shares, $100 each. Directors: Hon. T. M. Patterson, H. Butler, Cecil C. Morgan, William M. Clarke, and Felix Leavick. The officers are: Hon. T. M. Patterson, President; H. Butler, Secretary; Cecil C. Morgan, Manager; William M. Clarke, Superintendent of Works. Operations, Park County, Colo. The principal offices are at Denver, with a branch at London Junction, Park Co., Colo. Royal Gorge Smelting Company. Capital stock, $50,000; shares, $50 each. Directors: A. R. Gumaer, W. R. Harp, and J. W. Taylor. Operations, Fremont County, Colo. Principal office, Cañon City, Colo. Rustler Mining Company. Capital stock, $75,000. Directors: John W. Blades, Jeff Harper, William O. Parker, and William Brown, of Chaffee County, and John O. Fry, of Ringgold County, Iowa. Operations, Chaffee County, Colo. Snow Mass Mining and Milling Company. Capital stock, $150,000; shares, $10 each. Directors: James L. Peck, John S. Blankman, George H. Pays, and Henry T. Spring. Operations, Gunnison County, Colo. Principal office, Denver, Colo. Sterling Mining Company. Capital stock, $100,000; shares, $1 each. Directors: Oscar G. Roedel, Hiram A. Johnson, Jesse V. A. Craighead, Heinrich Hemmerling, and Reinhard T. Nicgold. Operations, San Juan County, Colo. Principal office, New York City, with a branch office at Mcgoldstown, Colo. St. Louis Syndicate Mining Company. Capital stock, $2,000,000. Directors: John F. Watkins, William A. Adams, and E. L. Davis. Union Reduction-Works. Capital stock, $50,000. Incorporators: William K. Burchinell, P. J. Cunningham, George W. Bittinger, E. A. Gilbault, Matthew Moynahan, William Walsh, and Christopher E. Bloome. Operations, Chaffee, Lake, and Pitkin counties, Colo. United Silver Mining Company. Capital stock, $1,000,000; shares, $10 each. Directors: John A. Reid, John T. Sheaver, and Martin Johnson. Operations, Saguache County, Colo. Principal office, Chicago, Ill. Ute Pass Mining Company. Capital stock, $1,000,000. Directors: James Hadley, George O. Willard, Charles A. Hunt, Leander W. Jones, and William Hamilton. Operations, Colorado. Principal office, Salida, Colo. Warrior Mining Company. Capital stock, $300,000. Directors: C. W. Burke, Samuel Batchelor, and J. M. Fitzpatrick. Principal office, Cincinnati, Ohio.

BOULDER COUNTY.

Among the mines now worked in the vicinity of Boulder are the Senator Hill, Little Pittsburg, Lamon, Alice Fay, Eclipse, Reliable, American, Mountain Lion, and several others. The Senator Hill has four shafts; but two of these are now worked, with a force of ten men. Good ore is shipped regularly every week. On the Little Pittsburg, rich mineral has been encountered in shaft No. 2, which is 40 feet deep, and is timbered to the surface. The ore mills 161 ounces gold per ton. The Ward-Lamon continues to show good prospects. At a depth of 20 feet, good ore has been encountered in the Alice Fay. The Eclipse, located east of the famous Kekionga, has encountered a large body of low-grade ore. The American Eagle continues to ship regularly. The Mountain Lion is nearly ready for the resumption of work. Men have been diligently at work getting out water and rubbish, and this week the lower levels will be cleaned, when a large force of men will begin work.

CHAFFEE COUNTY.

MADONNA.—It is estimated that there are more than twenty thousand tons of ore in sight. This mineral carries forty per cent lead and from seven to ten ounces of silver per ton.

MONARCH.—The mine shows a vein a foot and more in width of good ore; the property is worked.

CLEAR CREEK COUNTY.

DIAMOND TUNNEL.—A new lease has been taken on the surface of the Corry City, and arrangements are making to put up machinery to pump out the water in the shaft and to otherwise prosecute work. There is a fine body of milling ore in the bottom of the shaft, but the shaft will have to be re-timbered before any more work is done there. Drifting is done on the lodes cut in drifting through the Corry City in the main tunnel, and as work progresses, better results are obtained, the streaks becoming more solid. Work is pushed on No. 5 lode with good results, the lower grade from this lode going 60 ounces silver and 10 per cent lead. In the V lode west, water has been encountered.

GOLDEN DUSTMAN.—It is reported that a strike of two inches of carbonate of copper has been made in this lode, on Soda Creek, at a depth of twenty-five feet. The crevice is two and a half feet wide; and besides this, the carbonate of copper which is on the hanging-wall carries from two to five inches of iron on the foot-wall.

KOHINOOR & DONALDSON.—The company will have the extensive building for its new mill completed and all ready to receive the machinery by the end of the present month. The dimensions of the building are 160 by 150, with a wing. The mill, when finished, will be one of the largest in the State. During the past week, regular shipments of smelting and milling ore have been made from the Champion and Donaldson mills.

DOLORES COUNTY.

An idea of the vast mineral resources of our district, writes a correspondent of the Denver *Republican* from Rico, may be gained from the number of pay mines which are now profitably operated, namely, the Grand View, Phœnix, Yellow Jacket, Newman, Chestnut, Swansea, Swansea Extension, Uncle Ned, Puzzle, Puzzle Extension, Lillian Davis, Pigeon, South Park, Garfield, St. Louis, Little Maggie, Zulu Chief, Johnnie Bull, Iron Clad, C. B. & Q., Spanking Jack, Parole, Santa Clara, Waubath, R. E. Lee, Carbonate, Nora Lilla, Corsair, Tex, Utah, Legal Tender, Fort Wayne, Hog Back, Black Demon, Bilzora, Sundown, Bancroft, Mogul, Bay State, Hope & Cross, Paymaster, Nos. 1 and 2, Petzite, Sinbad, Lackawanna, Midnight, Grand Duke, Nevada, Shamrock, Uncle Jess, Rico, Gunshot, Elgin Boy, François, Australia, Silver Duke, Black Hawk, Mabel King, Maid of the Mist, Camp Bird, Franklin, Orphan Girl, Santa Rosa, Belle of Rico, and Aztec. About one half of the above list is now shipping ore daily. The others may properly be classed among the mines not at present operated. All the mines will be worked this season.

GRAND VIEW.—The mines of the company are among the early locations of the camp, and are in name the Grand View, Yellow Jacket, Pelican, Major, Aztec, and Elliott lodes. They are well developed, there being in the aggregate 2308 feet of tunnels, shafts, drifts, and rises. So far this season, they have produced 1650 tons of ore. The smelter has been running successfully for some time. The company owns extensive coal-banks, operates its own coke-ovens, has a fire-clay claim, mines its own coal, burns its coke, and makes its brick. Notwithstanding the fact that the works are extensive, large additions will be made this season.

GILPIN COUNTY.

COLORADO DRY ORE CONCENTRATING AND SAMPLING COMPANY.—This company has been organized at Central City, with a capital of $600,000, for the purpose of constructing and operating concentrating and sampling-works in Colorado. The concentrating mill of Messrs. Thurmond & Hamilton, in Russell Gulch, and the State right for the Thurmond dry ore concentrator, have, according to the *Register-Call*, been purchased. The company will build a mill of from sixty to seventy tons capacity at Bonanza, Saguache County.

GUNNELL.—The statement for April shows smelting ore sold, $4549.88; gold retorts, $2503.50; tailings sold, $261.66. Total, $7314.99.

KEYSTONE.—This lode is now opened up for a distance of over 400 feet. The main shaft is down 110 feet; another shaft has attained a depth of 80 feet; both are connected by a drift. West of the deep or main shaft, a level has been driven 40 feet in length, which thus far has passed through a good-sized body of ore. In fact, so far as the developments have been extended in sinking or drifting, the vein shows up well, and in places six feet of crevice-matter are exposed. The average of the ore is stated to be four ounces gold per cord. The average width of the pay-matter is fully four feet.

MARGARET GLENNAN.—This lode has been tapped through the working of the Midas tunnel, 600 feet in from the entrance. At the point where the vein was intersected, a wide body of crevice-matter has been passed through 300 feet below the surface. Work on this vein was closed down some months ago, awaiting the driving of the Midas cross-cut, which will drain the vein to the depth as above stated. Levels are driving each way from the shaft, and an uprise to make connection with the main shaft.

GUNNISON COUNTY.

A correspondent of the Denver *Republican* states that considerable work has been done during the past winter. Among the most promising properties worked are the Whopper, Lulu, Eureka, Brittle Silver, Scorpion, Gray Copper, and Clarke No. 2, which has a fine large vein, and is developed by a 150-foot tunnel. At the depth of 140 feet, they struck a large body of mineral, which carries silver glance and galena.

Rock Creek will show up considerable mineral the coming summer. As there is good coal, it would be well to erect a smelter or concentrator at Crystal City this season, this point being the richest section of Rock Creek, with very little snow to interfere with the operating of mills all the year round, and mines within 1000 feet of town, and coal-banks eight miles from here, with a wagon-road most of the distance.

LAKE COUNTY.

COLONEL SELLERS.—The lower portion of this property, on Iron Hill, is operated by lessees, and a shaft has been sunk in the gulch. This shaft is 128 feet deep, and a large body of contact has been struck and penetrated about three feet. Assays have just been made which returned thirty-two per cent in lead, one and a half ounces gold, and sixteen ounces silver per ton.

ELGIN SMELTER.—A company of Chicago capitalists will start up the smelter very shortly. The machinery is now overhauling and remodeling, and the smelter placed upon a basis equal to any of the others in the camp. Contracts will be made for ore.

IRON SILVER.—In the Seventy-Six portion of the Iron Silver property, which is operated under a lease, a new strike was made recently. New prospect-drifts have been run from the old workings, and a body of high-grade lead carbonates has been cut, which is five feet in thickness.

LA PLATA MINING AND SMELTING COMPANY.—The result of the working for the quarter ended March 31st shows, according to the London *Mining Journal*, a net profit of $20,500. The management states that the only indebtedness of the company consists of money required from time to time to pay for ore purchased, and that such borrowings are represented in the ordinary course of business by ore on hand awaiting smelting, or bullion in stock or in transit. The profits realized as above stated will go to improve the financial position of the company and reduce the amount of loans, for which the directors at present give the banks their personal guarantee.

A dispatch from Denver says that the Harrison Reduction-Works at Leadville, a branch of the St. Louis Smelting and Refining Company, was destroyed by fire May 17th. The loss is from $60,000 to $70,000.

SAGUACHE COUNTY.

The erection of a concentrator and sampling-works of the same pattern as those now in operation in Russell Gulch in Gilpin County, has begun.

JUNE.—Active work is doing in this mine, the extension of the Rawley, and large quantities of ore will be shipped as soon as the road is constructed.

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SUMMIT COUNTY.

A very large and enthusiastic meeting of citizens and miners was held at Kokomo recently, for the purpose of making a united effort for the development of the mineral resources of Summit County, and especially to bring into prominence the rich mineral deposits lying adjacent to Kokomo. The Denver *Republican* says it is a well-conceded fact that this rich mineral district has largely contributed to the bullion output of Lake County, for which it has not been properly credited, and the miners and mine-owners are determined that in this year's output they shall not be misrepresented, but will take their place as the second largest mineral-producing county in Colorado, to which they are justly entitled.

ROBINSON.—The machinery for the new concentrator to be erected at the mine by Mr. Greer, the lessee, has begun to arrive. The process will be dry, and, according to the stipulations of the lease, must be capable of treating 144 tons per day.

QUEEN OF THE WEST.—It is stated that another pocket of sulphurets has been struck in the tunnel. The ore will probably mill-run one hundred dollars per ton.

DAKOTA.

It is reported that a group of five mines, the Emma, Carrie, Nebraska, Flora Temple, and Marietta, together with the Mountain Lion Gulch water-right, has been leased to two Toronto capitalists, who have the option to purchase the property on or before July 1st for $250,000. The mines are in Nevada Gulch, Bald Mountain District, and are said to be valuable.

The Estrella del Norte, Deadwood, and Rockerville hydraulic companies are working with large forces, and are engaged almost wholly in placer mining. Prospects are good.

FATHER DE SMET.—The superintendent's report from April 22d to May 1st shows ore extracted from first, second, and third levels, 2700 tons. Ore milled, 2700 tons. North end tunnel advanced 10 feet; tunnel in 884 feet. Golden Gate north header advanced 11 feet; header in 94 feet. Tramway level rise up 59 feet.

MINNESOTA.—A dispatch to the New York *Tribune* says that the bond held by Boston parties on this mine, Silver Creek District, has expired, greatly to the satisfaction of the owners, who, after having tied themselves through the bond, discovered that middlemen were endeavoring to make for themselves $60,000, or considerably more than the owners were to receive by the agreement. The mine would now doubtless be producing largely but for the circumstances mentioned.

PANTHEON.—A large force of men is at work on this group, Box Elder, recently purchased by an English syndicate. The property will be thoroughly opened prior to the erection of two 120-stamp mills this season.

SITTING BULL.—Work at the mill has been delayed by bad weather, and the enlargement will not be completed for several weeks yet. The old part—ten stamps—continues in operation.

GEORGIA.

A correspondent of the New York *Evening Telegram* writes that, owing to the recent opening of a new railroad—the Georgia Pacific—through this country, the gold fever has again broken out in places, and this section is attracting the attention of men who have the inclination and the means to test the real merits of Carroll County as an ore-producing region. The people of Villa Rica are not very much worked up over their prospects of making speedy fortunes, although they have the strongest confidence in the wealth of the surrounding country. The owner of an abandoned mine near the town has been offered $8000 for her property, but indignantly refused the offer, and announced $100,000 as the very lowest cash price. On rainy days—and such days are very frequent here during February and March—the farmers around the village economize their time by "surface mining" for gold. Some of these farmer-miners have succeeded in getting rich returns for their rainy-day work. While none of the old mines is developed by the regular processes, owing to the great cost of improved machinery, the amount of placer mining done is surprisingly large, and in many cases where this surface mining is followed as a regular business it is very lucrative. The region about Dahlonega, in upper Georgia, is quite different in its geological formation from the country about Carrollton. Until this revival of the gold mining fever in Carroll County, the fact that Georgia is a gold-bearing State has been associated almost entirely with the region about Dahlonega. Should the experiments in Carroll County turn out as well as it is expected, it will not be long before Georgia will rank well as a gold-producing region.

IDAHO.

The Paragon, Hawkeye, Bull Dog, and Silver Dome mines, located in Little Wood River Mining District, one mile north of the Solid Muldoon mine, have been sold for $10,000. An undivided interest of 1400 feet in the American mine, and an undivided interest of 1350 feet in the Gray Eagle mine, have been sold to the same parties for $4000.

DAVITT.—The mine improves in depth. The force of miners is increased. The shaft is 40 feet below the lower tunnel. The first lot of ore from the mine, thirty-five tons, has been taken to the Hailey Sampling-Works.

EMERY.—The ledge is 12 feet wide, of which 4 feet are mixed carbonate and galena, assaying from 63 to 210 ounces, and carrying from 60 to 76 per cent lead to the ton. It is tapped, at a depth of 45 feet, by a tunnel about 100 feet long.

MEXICO.

A correspondent of the Mexican *Financier* says that a number of miners have been discharged from the Encino mine. It is understood that, as soon as the new Progreso mill is finished, work will be resumed and the ores will be sent there for treatment. There are from six to seven thousand cargas (112 pounds to the carga) of ore ready for milling, of an average value of at least eleven dollars per carga.

The Real del Monte is sinking the San Ignacio shaft to the Aviadero water-level. This will open up a sixty-foot stope of ore thirty feet wide and averaging 150 per ton.

The lawsuit pending between Landero & Co., as representatives of the Real del Monte Company, and a Mr. Pascoe, for the possession of the San Patricio mine, promises to be a long and bitter struggle, which may help to explain to outsiders some of the recent proceedings of this powerful company. The almost undisputed monopoly long enjoyed by these people in this mining district has certainly been an immense detriment to the country; for foreign capital has hesitated to invest in a district where it might at any moment come in conflict with the claims or pretentions of this well-established monopoly. The above case will probably be fought out, although it is an open secret that large sums of money have been offered for a compromise and withdrawal of the suit. The decision in this case will determine many other cases of disputed possession here.

At the La Blanca, the perpendicular shaft has been sunk 140 feet with a windlass. The purpose is to drive it still deeper until it intersects the Santa Gertrudis lode.

The Rosario, in El Chico District, has just erected a small horizontal steam-engine, which has already drained the mine to a depth of 200 feet. The property was abandoned some years ago from inability to handle the water.

At the San Sebastian mine, they are driving a cross-cut to intersect the lode which yielded rich metals at a depth of about 80 feet. This new cross-cut will strike that lode at a depth of about 250 feet.

The Guadalupe reduction-works have begun operations. It is a combination of the patio process and the Cornish crusher. The first run has been made.

A report from Chihuahua says that Mr. James Hitchens, the owner of most of the slags situated within and around the city, has, in connection with some Eastern capitalists and first-class metallurgists, commenced a general and thorough sampling of the slags, for the purpose of ascertaining their value and to decide upon the best class of metallurgical works for their proper and most efficient reduction. It is also the intention of the company to provide for the purchase and reduction of large quantities of silver, lead, and copper ores from the numerous surrounding mines.

NEW YORK & HONDURAS-ROSARIO MINING COMPANY.—Important strikes are reported to have been made recently in the mines of this company. The superintendent has telegraphed that every thing was highly satisfactory, and he assures good shipments of bullion during the present month. The great difficulties to be overcome and the large amount of work necessary in putting up pans, building flumes, etc., prevented an earlier start of the mill. Mining Captain Smith reports large bodies of rich ore in the Rosario, Matraca, Encinos, and New York mines. The vein in the fifth level of the Rosario is five feet thick, and is improving. The rich ore reported in the Encinos last December has not been removed, it being thought best to leave it in position until the mill was ready to receive it. It is now the intention to extract it at once.

MICHIGAN.

JACKSON.—A curious occurrence of ore has been developed by a drift to the south from the second level of No. 7 pit. This drift has been driven nearly 400 feet south from the main ore-body, following a narrow lead of ore from 4 to 5 feet thick, and which shows indications of widening out as it goes down. This deposit or lead seems to lie almost at right angles with and across the jasper formation, which lies to the south of the main opening, and apparently with entire non-conformity to the surrounding rocks.

NORWICH.—It is stated that arrangements are making to reorganize this company.

MONTANA.

POSER.—This mine, located on the east end of the great Rainbow lode, is developing into a property of great productiveness. Two shafts are sinking on the claim, the east shaft now being down 95 feet on the vein, and showing good ore all the way from the surface. At the 100-foot station, a cross-cut will be run north and south, to determine the full width of the ledge. It is from the west shaft that the ore is extracted. It is down only to the water-level, about 45 feet; the east and west drifts are vigorously forwarded, and in each drift a breast of ore 8 feet wide is extracting. No attempt is made to extract the full width of the ledge. Three eight-hour shifts are employed, and the daily product of the mine averages 25 tons, which could readily be doubled if desired. The Poser is leased, and its product is treated in the Silver Bow mill.

NEVADA.

ALBION CONSOLIDATED.—The superintendent writes that the fissure drift for the last week has run into hard lime. I have started a cross-cut at the point where the drift showed the best indications, and am now running the cross-cut nearly under the old chamber found in the east rise workings. I have discontinued in the second drift, as it had run beyond the uprise of the ore-bodies found near the line, and have started a drift near the ledge cave, which is more promising ground. The Uncle Sam rise is still in good ground. I have opened the most southerly of the flue-drift tunnels, and will continue it into the hill. Some of the ore-bodies found near the line and a few feet below the level of this tunnel and this ground can be developed to good advantage from this tunnel. We have developed some ore making above the large caves, and are now taking out some rich ore from this point. Some ore has also been found making off from the inside chamber, but very little has been done in it yet.

NEW MEXICO.

An important strike of gold ore has been made thirteen miles southeast of Santa Fé, and four miles northwest of Glorieta.

A report states that at a sheriff's sale at Socorro, the Silver Bar and Olla mines were purchased by J. D. Caughran, the highest bidder, for $55,600. These mines compose the Cooney group, in the Mogallons. By bad management, the owners became involved for about $80,000, and this sale was the result of judgment for debts.

SANTA RITA DEL COBRE MINES.—The Secretary of the Interior has declined the request of Martin B. Hayes to vacate the approval made by the Commissioner of the General Land-Office of entries upon the mines known as Santa Rita del Cobre, consisting of forty-five lode claims entered by D. H. Moffat, Jr., and patents will accordingly be issued in favor of the mining claimants.

TEXAS.

Advices from the Cariso Mining District, in Western Texas, state that an immense deposit of chloride and horn-silver has been discovered in the neck of country lying between the Pecos and Rio Grande rivers. The surface croppings of horn-silver are said to be very rich.

UTAH.

ANTIMONY REDUCTION-WORKS.—The works, which are situated 120 miles from Juab, are completed. The output of the property promises to be a steady one.

MAMMOTH.—Although the work at this mine has been disturbed somewhat by complications among the purchasers, it has not ceased by any means, says the Salt Lake *Tribune*. The refining-works have been completed, and there are fourteen furnaces done. The ores taken out during the last three months averaged $53 in value, summing the gold, silver, and copper. The mine is said to be improving. The theory has been adopted that it bends and pitches into the hill, like so many other big mines, about 300 or 400 feet below the croppings, although, if it is a contact vein, this is against the rule. But an incline has been started from the 400 level on this theory, and at 70 or 80 feet it is in a fine body of ore, which is opening by drift and cross-cut. This level has been driven farther north with encouraging results. A tunnel has been run into the big cave, and the loose material is to be taken out. The Young Mammoth, worked from the surface, lying just back of the old patented ground, is growing larger under working than the original ore-body, although there were few ever seen of such proportions. Something like $200,000 has been paid on the property, besides the money expended in the reduction-works.

ONTARIO.—The present run of the mill began eight months ago. The mill is now to be shut down for fifteen days, in order that it may be thoroughly repaired. Work has not been stopped in the mine. The inflow of water is great just at present, but not greater than can be handled. As the mine drains a large space of ground, large quantities of water flow into it in the spring. This is now decreasing, as the snow is rapidly disappearing.

WYOMING.

The mines of South Pass are looking well, and give fair promise of making a good showing this season. The Carrissa property has been leased. The mine has a large body of $15 free-milling ore in sight. Belonging to the property is a five-stamp gold mill, operated by water power. This mill can be doubled in capacity, the water-wheel and quantity of water being ample for this. This mill is located only half a mile from the mine, hence the cost of getting ore to the mill and reducing is small, and can be further reduced by putting in mo stamps, which will require no more hands to operate. On the Pitkin and G born, considerable work has been done. A shaft has been sunk; but owing to t water that was encountered, work was abandoned and a tunnel 400 feet length driven. The present outlook of the district is very good.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, May 18.

There was a better feeling in the mining market this week, and the transactions have been of a more general and better character than for some time past. The Comstock shares show quite an improvement in prices, and have been fairly dealt in. Some of the Leadville stocks have also improved in price. Sonora was the active stock of the market, but the price did not change materially either way. Eureka Consolidated was a feature of the market on account of its weakness. It suffered a very heavy decline, closing weak to-day. The total number of mining shares sold at all the Exchanges aggregates 237,700, as against 173,917 last week.

The Comstock shares were fairly dealt in, and were strong. California was quiet and steady, selling from 21@23c. Consolidated Virginia had an active business at strong prices; it sold from 48@55c. Sierra Nevada showed considerable strength under a small business, and sold from $3.90@$5.75. Union Consolidated was also strong, the sales aggregating 730 shares at $4@$5.13@$5. Mexican records a small business at steady prices, selling from $2.75@$3. Consolidated Imperial sold at 8c. Yellow Jacket records one transaction at $3.75. Best & Belcher was quiet and strong, selling from $3.75@$4.25. Sutro Tunnel had a fair business at steady prices; it sold from 21@20c.

The Leadville stocks were moderately dealt in at steady prices. Amie Consolidated had a small business and was irregular, selling from 20@17@18c. Chrysolite was steady throughout at $1.10, recording a business of 1700 shares. Iron Silver was fairly dealt in at steady prices; it sold from $2.90 $3.05@$3. Leadville had a small business, and was a little weak; it sold from 65@60c. Little Chief was quiet and steady, and sold from 52@50c. Little Pittsburg was very strong, under a fair business, selling from 57@90@88c. Climax sold at 9c.; the transactions were small.

The Bodie stocks had a small business, and were weak. Bodie Consolidated sold from $1.05@95c.@$1, with a business of 1000 shares. Standard was quiet and irregular, selling from $6.50@$6@$6.25. Bulwer records a business of 900 shares at 60@50c.

The Tuscarora stocks record small transactions, and were generally a little weak. Grand Prize sold from $1.15@$1, with a business of 1000 shares. Argenta sold at $1.15, with a small business. Navajo was a little weak, under moderate transactions, and sold from $2.40@$2. Independence was quiet and weak at 56@40c. Elko Consolidated sold at 20@21c., with a business of 2500 shares.

In the miscellaneous list, Alice was quiet and a little weak, selling from $3.25@$3. Bassick sold from $3.25@$3, with a business of 250 shares. Eureka Consolidated has been quite weak, under a small business, declining from $4.90@$2.65. The Green Mountain stocks were quiet and steady. Gold Stripe sold at 9c. Green Mountain sold at 79@77c., and Cherokee at 4c. Hall-Anderson records but one transaction, and that at $1.40. Homestake was moderately dealt in at steady prices, selling from $16.25@$16. Horn-Silver was irregular, with a small business, and sold from $6.63@$6.38@$6.75. Hukill declined from 8@6c., the business being small. Northern Belle records a fair business at very irregular prices; it sold from $7@$6.38@$7. Ontario was also irregular, under a small business, selling from $25.50@$24@$24.50. Robinson Consolidated records a fair business at irregular prices; it sold from 89@88@87c. Sierra Grande was quiet and weak, selling from $1.25@$1, with a business of 4700 shares.

Alta-Montana was very quiet at 4c. Bull-Domingo sold at 6c. Caledonia (B. H.) was quiet and steady at 75@80c. Central Arizona sold at 30c. under a small business. Decatur was active and steady, selling from 4@5c., the sales aggregating 22,200 shares. Harlem was quiet and steady, and sold at $1.40@$1.45. Lacrosse had a fair business at steady prices; it sold from 12@13c. Oriental & Miller records a small business and was steady, selling from 14@15c. Rappahanock sold from 8@7c. under a business of 8700 shares. Sonora Consolidated was very active and very irregular; it sold from 36@49@47c. South Hite sold at 15c.

The stockholders of the Harshaw Mining Company held a special meeting on Tuesday last, the 16th inst., at 62 Cedar street, this city, and decided to wind up the business of the company. The reason given for this action is the "petering" out of the mine.

The Iron Silver Mining Company has over $200,000 in its treasury, and will probably, at an early date, announce a dividend of $100,000. The company keeps $1,000,000 in reserve, and allows its profits to accumulate until they aggregate $200,000, when a dividend of $100,000 is distributed.

The Potosi Mining Company has levied an assessment of 25 cents per share. The Belle Isle and the North Belle Isle mining companies have each levied an assessment of 20 cents per share.

MEETINGS.

Bonanza King Consolidated Mining Company, No. 29 Wall Street, New York City. Meeting of stockholders, for the purpose of approving an agreement made and entered into on the 11th day of May, 1883, by and between the Trustees of the Bonanza King Consolidated Mining Company and the Trustees of the Trojan Consolidated Mining Company, to consolidate such companies into a single corporation, pursuant to chapter 960 of the Laws of the State of New York for the year 1867. June 16th, at two o'clock P.M.

Dunderberg Mining Company, Nos. 90 and 92 Broadway, Room 37, New York City. Annual meeting of stockholders and election of trustees, June 5th, at three o'clock P.M.

Golden Rule Mining Company, No. 115 Broadway, Room 126, New York City. Annual meeting of stockholders and election of trustees, May 25th, at three o'clock P.M.

Oro Cache Gold Mining Company, No. 1 State street, New York City. Meeting of stockholders, May 28th, at ten o'clock A.M.

DIVIDENDS.

The Contention Consolidated Mining Company, of Arizona, has declared its regular monthly dividend (No. 16) of twenty-five cents per share, payable May 28th, at the office of the Farmers' Loan and Trust Company, on all stock registered in New York. Transfer-books close May 18th.

The Homestake Gold Mining Company, of Dakota, has declared its fifty-seventh dividend of $50,000 (for April), payable at the office of the transfer-agents, Messrs. Lounsbery & Haggin, No. 15 Broad street, on May 25th. Transfers close May 19th. The total of the Homestake's dividends to date now reaches $1,112,500.

The Navajo Mining Company, of Nevada, has declared a dividend (No. 9) of twenty-five cents per share, payable May 14th.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
May	12....	$0.92⅞	$0.95	$0.92⅝	$0.95	2,450,000
	14....	.95⅝	.97⅝	.94⅛	.97⅜	2,324,000
	15....	.97⅝	1.03	.96¾	1.02⅛	4,415,000
	16....	1.02⅝	1.05	1.00½	1.01⅝	6,042,500
	17....	1.02¼	1.04⅝	1.00⅝	1.02⅛	5,147,000
	18....	1.03⅜	1.04¾	1.02¼	1.02⅛	3,068,000
Total sales.						23,446,500

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 17.

To say that the market for mining stocks is dull and inactive but feebly expresses the situation. There is so little doing in copper stocks that it is difficult to get reliable quotations from day to day, while the sales are almost entirely confined to two or three stocks, and those of the dividend-paying mines. At the morning Board to-day, there was not a transaction recorded, and the business of the week would hardly suffice to give one broker a good living out of his commissions. Calumet & Hecla is steady at $233@$234, with sales of less than 50 shares for the week. The advance in Quincy of last week was not maintained, the stock declining to $43 on small sales. Osceola sold at $21, same as last week. Franklin sold at $10⅛. Ridge sold at 65@75c.

In silver stocks, there is absolutely nothing doing. A few sales of Bonanza were made at $2@$2.⅛. Catalpa sold at 72½@75c., and a small lot at 70c. Harshaw, 50c.; and San Pedro, 45c.

At the Boston Mining and Stock Exchange, there is but little doing in the specialties dealt in. Empire is firmer at 22c. bid, but very little stock is offered, being held largely by a few parties interested. Massachusetts & New Mexico shows a little more firmness, with sales at 8c., while the bonds have advanced from $17@$24 on the report that the coupons due in June would be promptly paid.

3 P.M.—At the afternoon Board, Calumet & Hecla sold at $234. Catalpa broke from 72@65c., with sales after the Board at 62½c. We are informed that a dividend of 10c. per share will probably be declared, payable next month. Closing prices: Allouez, $2 asked. Atlantic, $10⅛ bid. Bonanza, $2@$2⅛. Antimony, $12@$15. Calumet & Hecla, $230@$233. Catalpa, 65c. asked. Crescent, 25c. bid. Franklin, $10 bid. Harshaw, $⅛@$⅝. Huron, $1⅛ bid. Osceola, $20 bid. Quincy, $4½ bid. San Pedro, 40@50c. Silver Islet, $4 asked. Sullivan, $1 bid.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. May 11.	May 12.	May 14.	May 15.	May 16.	May 17.
Albion	..	....	....	....	....	....
Alpha	1⅛	....	1⅛	1⅛	....	1⅛
Alta	.50	.50	.50	.60	.60	.70
Bechtel	..	....	....	....	....	....
Belcher	1	1	1	1	1	1
Belle Isle	11-32	11-32	.35	.35	.35	.30
Best & Belcher	3⅝	3¾	3⅝	3⅝	3¾	4
Bodie	1	13-16	.85	.80	.95	1⅛
Bullion	....	....	....	....	....	....
California	.20	¼	.20	.20	¼	....
Chollar	....	....	....	....	2⅛	2⅛
Con. Virginia	7-16	7-16	.45	.50	½	½
Crown Point	1¼	1⅜	1⅜	1⅜	1¼	1¼
Elko Cons	¼	¼	....	....	....	.20
Eureka Cons	5	....	4⅝	4½	4	3
Exchequer	¼	¼	.30	.35	.30	.35
Gould & Curry	2⅜	2½	2½	2½	2⅜	2⅜
Grand Prize	1	1	.90	1	.95	1
Hale & Norcross	3⅝	4	4	4	3⅞	4¼
Independence	....	....	.50	.50	.20	.30
Martin White	....	....	.35	.35	....	.30
Mexican	2¾	2¾	2¾	3	3	3⅜
Mono	....	....	....	....	....	....
Mount Diablo	2	....	....	2¾	2½	2¾
Navajo	2¼	2¼	2	2	2	2
Northern Belle	6¾	6⅞	6	6	6¼	6⅜
North Belle Isle	....	....	.25	....	....	....
Ophir	2	2	2	2⅛	2⅛	2⅛
Overman	....	....	....	....	....	....
Potosi	1¼	1¼	1¼	1¼	1¼	1¼
Savage	2	2⅛	2	2⅛	2⅛	2⅛
Scorpion	....	....	....	....	....	....
Sierra Nevada	4	4	4½	4½	4¾	6
Silver King	10⅛	....	....	....	10¼	10⅛
Tip-Top	....	....	.50	.45	.35	.40
Union Cons	3⅝	4	4⅛	4¼	4¼	5
Wales Cons	3-16	3-16	.25	....	....	....
Yellow Jacket	3⅛	3⅜	3⅜	3¾	3¾	4⅛

BULLION MARKET.

NEW YORK, Friday Evening, May 18.

The market has been nominal and stagnant abroad and here, owing to the very liberal sales of bills on India by the Council in London, meeting all the demands for exchange and preventing an advance in silver which would otherwise probably have occurred.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
May 12	50⅛	109½	May 16	50 1-16	109⅜
14	50⅛	109½	17.	50 1-16	109⅜
15	50 1-16	109⅜	18.	50 1-16	109⅜

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended May 18th, as compiled from various sources, amounted to $149,000, as against $157,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,985,713.58.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank lost £691,000 bullion, and the proportion of its reserve to its liabilities was reduced from 33 7-16 to 32⅜ per cent, against 42⅝ per cent at same date last year. The weekly statement of the Bank of France shows gains of 2,100,000 francs gold and 115,000 francs silver.

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Exports and Imports of Gold and Silver at New York.

Exports.

Week ended May 11th	$170,875
Corresponding week last year	3,675,184
Since January 1st, 1883	5,497,742
Corresponding period last year	21,129,297

Imports.

Week ended May 11th	$46,767
Corresponding week last year	11,963
Since January 1st, 1883	6,542,026
Corresponding period last year	1,516,849

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

Mines.	States.	Month of April.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$234,193
*Alta-Montana, G. L. S.	"		$10,625
*Belmont. G.	"		12,604
Bodie, G. S.	Cal	25,085	91,342
Bodie Tunnel, G.	"	10,470	45,319
*Bonanza King, G.	"	57,000	199,077
*Boston & Montana, G.	Mont.	18,741	72,318
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah		68,405
*Chrysolite, S. L.	Colo.	24,146	142,238
*Contention, S.	Ariz.		209,260
Crescent, G.	Cal.		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak.		120,231
*Derbec Blue Gravel, G. S.	Cal	16,041	31,844
*Father de Smet, G.	Dak.		101,389
*Frisco M. and S. Co., G. S. L.	Utah	16,366	$77,084
*Head Center and Tranquillity	Ariz.		4,593
*Hecla Cons., G. S.	Mont.		177,924
*Homestake, G.	Dak.		330,060
*Hope, S.	Mont.		20,574
Horn-Silver, S. L.	Utah	291,000	1,055,000
*Independence, G. S.	Nev.		26,943
*Kentuck, G. S.	"		6,137
*Lexington, S.	Mont.	96,317	421,204
*Little Pittsburg, S. L.	Colo.		19,577
*Marguerite, G.	Cal.		33,200
*Martin White, G. S.	Nev.		136,317
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev.	65,221	75,078
*Navajo, G. S.	"		211,980
Northern Belle, S.	"	75,700	343,015
*Ontario, S. L.	Utah	222,274	807,695
*Oxford, G.	N. S.	6,181	21,324
*Phœnix, G.	S. C.		†3,666
*Pinal Cons., S. L.	Ariz.		§49,810
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.	29.433	101,241
Standard, G.	Cal.	108,477	371,483
Star, S.	Nev.		27,095
*Stormont, S.	Utah	19,677	74,281
Syndicate, G.	Cal.	4,869	14,086
Tintic M. and M. Co.	Utah		7,632
*Tip Top, S.	Ariz.		‡22,983
*Tombstone, G. S.	"	53,071	‡246,230
Yellow Jacket, S.	Nev.	54,120	152,873
Total amount of shipments to date			$6,486,434

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, May 18.

Copper.—Lake copper is developing more and more strength. There is very little of it in second hands, and first hands decline to part with any. The lots which were constantly thrown on the market by manufacturers who had taken other fine kinds have all been disposed of. For brands recognized by consumers for uniformity and known to them so far as quality is concerned, of course this means increased firmness, and for Baltimore and Anchor we quote the range 14⅝@15⅝c.

On the other hand, we hear of sales as low as 14c.; and as these may be misunderstood both by consumers and by producers, it is necessary to state that in all transactions at such exceptionally low figures there are special circumstances. The copper is either low in quality or the brand is entirely unknown, so that only special inducements will move buyers. We quote good ordinary to choice brands 14⅝@15⅝c.

London cables a little better, £62 10s. f. o. b. for Chili Bars; and Best Selected, £67 10s.

The following are the latest English statistics for the first four months of the year:

		Jan. 1 to April 30. 1883. Tons.	1882. Tons.	1881. Tons.
Imports	Chili	14,035	12,013	10,782
	Other foreign	13,333	11,555	10,761
		27,368	23,568	21,543
Deliveries	Chili	12,261	14,781	13,697
	Other foreign	12,365	7,900	8,131
		24,626	22,681	21,828

Stocks in Europe and afloat from Chili and Australia were, on the 30th of April, 49,961 tons, against 47,053 on the 1st of January, 1883, and 50,598 on the 1st of January, 1882.

Ores and regulus were quoted, on the 1st inst., 12s. @12s. 6d. per unit.

Tin.—The market has rallied under the influence of small shipments from the Straits and a concentration of stocks here. Business has been fair at 21¼@22c. spot cash for Straits.

England cables at the close £96 5s.

Lead.—Beyond the sale of a number of small lots aggregating from 200 to 300 tons of Common and Refined at 4·40c., there is nothing special to report. The news of the burning of the Harrison Reduction-Works at Leadville is still too recent to have any effect upon the market. It will probably cause holders to be a little stiffer, but is not likely to influence buyers much.

From St. Louis, Messrs. John Wahl & Co. wire us to-day:

Our market is firm. Buyers seem anxious to purchase, but do not want to pay more than 4·12½c. for Refined. Sales for the week sum up over 300 tons of Refined lead at 4·12½@4·15c., and 130 tons of Hard lead at 4·12½@4·10c. Holders, anticipating better prices, have withdrawn from the market at present, and refuse to make sales for future delivery at present prices.

Messrs. Everett & Post, of Chicago, wire us as follows: Our market is very quiet. Transactions foot up to 400 tons at 4·15c. We close nominally at 4·15c., with 4⅛c. bid.

Spelter.—Spelter dull and without any features of interest. We quote 4·70@4·80c.

Antimony.—There is no change to report.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 18.

American Pig.—Although the officers of a number of companies are talking about blowing out their furnaces, they seem to be slow in making up their minds, and the conviction is gaining ground that they will need the stimulant of a further decline. It seems probable now that prices have not as yet reached bottom figures, and $18@$20 for Nos. 2 and 1 is quite freely talked of as a thing not in the distant future. Buyers, of course, under the circumstances are not rushing in to cover requirements. We hear of sales of a few thousand tons for immediate delivery. We quote $21@$22 for No. 1 Foundry, nominally with the market in buyers' favor; $19@$20 for No. 2; and $18@$19 for Gray Forge. Bessemer pig is dull at $21@$22, and Spiegeleisen, of which a sale of 3000 tons is reported, at $32.50 for 20 per cent material, is fairly active.

Scotch Pig.—The demoralization in the American pig market of course seriously reacts upon Scotch iron, which is now held above the former, and therefore attracts very little attention. The arrivals are small and freights are firm at 5s. There is no probability of their declining during June and July. Transactions are on a very limited scale. We quote, ex ship: Coltness, $24@$24.50; Glengarnock, $22@$22.50; Eglinton, $21@$21.50; and Summerlee, $24@24.25.

Steel Rails.—All the mills but one are now working quite steadily, and the majority of them appear to be supplied with work for from two to four months. The inquiry for small lots for early delivery is fair, but very little is placed. We quote nominally $38 at mill.

Old Rails.—Old material of all kinds moves off very slowly, and small lots are placed only by making concessions. We quote Ts $22@$22.50.

Scrap is dull and weaker. We quote nominally, $23.50@$24, though sales are made under special circumstances at lower figures.

Philadelphia. May 17.

The Eastern Pennsylvania iron trade is waiting for the disposition of the labor question in the West. Buying is restricted mainly to immediate, because of the uncertainties as to whether maximum production will be maintained. The consumptive requirements in the iron trade are large, but not sufficient to absorb the entire production. A heavy restriction has taken place already, in several important iron centers in the West, both in mills and furnaces. Inquiry is light and the tendency is strongly downward. The ore men have not yet yielded, and the furnace companies are in no frame of mind to close season contracts. The situation throughout Pennsylvania is unsatisfactory, but the troubles will soon be cleared up.

Pig-Iron.—Standard Foundry irons are held at $22 @$20, as usual, but a great deal of the iron sold is sold below these figures. Makers are endeavoring to sell for summer consumption, but buyers are not anxious to take any risks. Forge iron is in about the same shape. Furnace quotations run from $17 @$19, and a half a dozen large transactions were heard of at $18 for a good iron. A suspension in the West will indirectly affect this market, and hence consumers are waiting. Several furnaces have gone out of blast, and others will soon follow. There is no room for all the iron making, and there is no remedy but in suspension. Bessemer pig is not selling, and negotiations are off. Offers have been made at $21. Very little is done in foreign iron. One broker has succeeded in placing several hundred tons for summer delivery.

Muck Bars.—All the Muck Bar that was heard of this week sold at $34@$34.50. Production is a little above market requirements.

Blooms.—Sales of Blooms were made at $60 for Charcoal, although not best, and $50 is offered for Anthracite, and not taken.

Merchant Iron.—Merchant iron has hardened a little, and Best Refined is selling at 2·20@2·30c., but there is no difficulty in getting good iron at 2·15c. Some offers have been made at 2·10c. and may possibly be placed in country mills where the quality is not the very best. Four or five orders for ordinary iron for car use were placed this week in country mills in small lots at 2c. 1·90c. has been offered. The car-works are well supplied with orders, and the manufacturers supplying this demand look for steady work through the summer. Nails are strong and active. The assortments are broken up, and deliveries are made in car-load lots down to 10-keg lots. Bottom prices are $3, and outside mill prices $3.25. Stores are doing a good business supplying building demand

Plate and Tank Iron.—Prices are feverish, and large orders very exceptional. Tank is quoted at 2·40c.; Shell, 3¼c.; Flange, 4¼c.

Structural Iron.—The mills manage to keep well supplied with business at 2·40c. for Angles; 3¼c. for Tees; 3½c. for Beams and Channels.

Sheet-Iron manufacturers report demand of a retail character and card rates 3¾@4½c. A little improvement was noticed in galvanized iron for immediate delivery.

Steel Rails are in better demand at $38@$39. Several orders were placed this week, some for July deliveries, and large orders for September. Negotiations are in hand for delivery under $38.

Old Material is without any activity. Occasional lots move at $24. Inquiries for shipment are answered at $23.50. Scrap has been moving a little more freely in consequence of heavy concessions made. Sales of No. 1 are made at $26.

Pittsburg. May 16.

Notwithstanding the positive assurance given by manufacturers, there are a good many who believe that there will be a compromise before the first of June, and that production will be maintained all the time, which will necessitate a decline in the prices of finished and construction iron. As there are no evidences of the willinguess of the workmen to accept the reduction, it may be set down as a fact that there will be a strike. Manufacturers show their determination by refusing to take June orders. All have a moderate supply of iron, which, with care, will last several weeks.

A meeting was held last Friday, at which the wages

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 12.		May 14.		May 15.		May 16.		May 17.		May 18.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	3.25	3.15	....	....	....	....	....	....	3.00	....	....	....	300
Amie Con., Co.	.20	.18	.19	.17	....	....	.18	....	....	....	.18	....	6,700
Argenta, Ne.	....	....	1.15	....	....	....	1.15	....	....	....	....	....	600
Bar. & Walker, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bassick, Co.	8.25	....	....	....	....	....	8.00	....	....	....	8.00	....	250
Belle Isle, Ne.	....	....	....	....	....	....	....	....	....	....	.30	....	200
Bodie Cons., Ca.	1.05	....	....	....	....	....	....	....	.95	....	1.00	....	1,000
Breece, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer, Ca.	....	....	.60	.50	....	....	....	....	....	....	....	....	900
California, Ne.	.21	....	.23	....	....	....	.23	....	....	....	....	....	4,900
Cal. & Hecla, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Carbonate Hill	....	....	....	....	....	....	....	....	....	....	....	....	....
Caribou Con., Co.	.13	....	....	....	....	....	....	....	....	....	....	....	300
Chrysolite, Co.	1.10	....	1.10	....	1.10	....	1.10	....	1.10	....	....	....	1,700
Cons. Va., Ne.	.50	....	.49	....	.50	.49	.50	.49	.49	.48	.55	.52	11,520
Crown Point	....	....	....	....	....	....	....	....	....	....	....	....	....
Deadwood-Terra, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Eureka Cons., Ne.	4.90	....	....	....	4.20	4.00	4.00	....	3.90	3.50	2.90	2.65	2,025
Excelsior, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Father de Smet, Dk.	....	....	....	....	....	....	4.25	....	....	....	....	....	100
Findley, Ga.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Stripe, Ca.	....	....	....	....	....	....	.09	....	....	....	....	....	100
Gould & Curry, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Ne.	1.15	....	....	....	1.00	....	1.00	....	....	....	....	....	1,000
Great Eastern, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Green Mountain, Ca.	.79	....	....	....	.79	....	....	....	.79	.77	....	....	3,200
Hale & Norcross, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hall-Anderson, N. S.	....	....	....	....	....	....	1.40	....	....	....	....	....	200
Hibernia, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Homestake, Dk.	....	....	16.25	....	....	....	16 00	....	16.13	16.00	....	....	325
Horn-Silver, Ut.	6.63	....	....	....	6.63	....	6.88	....	6.75	....	....	....	725
Hukill, Co	....	....	....	....	.08	.07	....	....	.07	.06	....	....	900
Independence, Ne.	.56	....	....	....	....	....	....	....	.50	.46	.41	.40	1,500
Iron Silver, Co.	3.00	2.90	....	....	3.00	2.90	3.00	....	3 00	2.9	3.05	3.00	3,738
La Plata, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C. Co.	....	....	.64	....	.63	.60	.65	.62	.60	....	....	....	2,200
Little Chief, Co.	.52	....	.50	....	.51	.50	....	....	.51	.50	....	....	2,900
Little Pittsburg, Co.	.61	.60	.65	57	.65	....	.80	.70	.90	.79	.89	.87	5,98
Martin White, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Moose, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Ne.	....	....	2.40	....	2.20	2.10	2.10	....	2.15	2.00	2.00	....	2,375
Northern Belle, Ne.	7.00	6.75	7.00	6.50	6.50	6.38	6.63	....	7.00	6.50	....	....	1,720
North Belle Isle, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ontario, Ut.	25.50	25 00	24.00	....	24.75	....	24.50	....	....	....	....	....	925
Ophir, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Plumas, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Prussian, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Quicksilver Pref., Ca.	....	....	....	....	40.00	....	....	....	....	....	....	....	100
" Com., Ca.	....	....	8.13	7.75	....	....	....	....	....	....	....	....	125
Rising Sun, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson Cons., Co.	.89	.86	.89	.83	.86	.85	.85	....	.86	....	.87	.86	10,175
Savage, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Grande, N. M.	1.25	....	1 25	1.20	1.15	....	1.15	1.00	1.00	....	....	....	4,700
Sierra Nevada, Ne.	4.00	3.90	4.05	....	4.25	4.00	4.05	4 30	4.65	4.60	5.7	....	1,367
Silver King, Ar.	....	....	....	....	....	....	....	....	....	....	10.88	....	40
Spring Valley, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Ca.	....	....	6.50	....	....	....	....	....	6.25	6.00	6.50	6.00	447
Stormont, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tip Top, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Yellow Jacket	3.75	....	....	....	....	....	....	....	....	....	....	....	1 0
....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 12.		May 14.		May 15.		May 16.		May 17.		May 18		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.	....	....	....	....	....	....	....	....	....	....	....	....	....
Alta-Montana, c.	....	....	....	....	....	....	.04	....	....	....	....	....	200
Am. Flag, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Barcelona, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bear Creek	....	....	....	....	....	....	....	....	....	....	....	....	....
Central Con., c.	....	....	....	....	....	....	....	....	....	....	....	....	....
Belvidere	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & Belcher, c. s.	3.90	....	....	....	....	....	3.75	....	....	....	4.25	....	250
Big Pittsburg, s. l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bondholder	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradshaw, s.	....	.41	....	....	....	....	....	....	....	....	.35	....	800
Buckeye	....	....	....	....	....	....	....	....	....	....	....	....	....
" pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bull-Domingo, s.l.	....	....	....	....	....	....	.06	....	....	....	....	....	100
Bye and Bye.	....	....	....	....	....	....	....	....	....	....	....	....	....
Calaveras, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
C'lav'r's W. & M. Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal., S. H., c.	.75	....	.75	....	....	....	....	.80	....	....	....	....	200
Central Ariz'na, s.	....	....	.30	....	....	....	.30	....	....	....	....	....	500
Cherokee, c.	.04	....	....	....	....	....	....	....	....	....	....	....	300
Climax, Co.	.09	....	....	....	....	....	....	....	....	....	....	....	1,800
Cons. Imp'ri'l, c.s.	.08	....	....	....	....	....	....	....	....	....	....	....	1,600
Crowell, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dahlonega, c.	.02	....	....	....	....	....	....	....	....	....	....	....	100
Decatur	....	....	....	....	....	.04	....	.05	.04	.05	.04	.05	22,300
Dunderberg	....	....	....	....	....	....	....	....	....	....	....	....	....
Durango, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
Eastern Oregon	....	....	....	....	....	....	....	....	....	....	....	....	....
Elko Cons.	.20	....	....	....	....	....	....	....	....	....	.21	....	2,500
Enterprise	....	....	....	....	....	....	....	....	....	....	....	....	....
Fannie Barret	....	....	....	....	....	....	....	....	....	....	....	....	....
Globe Copper	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Placer, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
Goodshaw, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
Granville, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
Harlem M. & M. Co.	1.45	....	1.45	....	1.45	....	1.45	1.40	....	....	....	....	1,400
Hortense, s	....	....	....	....	....	....	....	....	....	....	....	....	....
Lacrosse, c	.18	.12	.13	....	.13	....	.13	....	.13	....	.13	....	6,500
Lucerne	....	....	....	....	....	....	....	....	....	....	....	....	....
Mariposa Prel. c.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., c	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, c. s.	2.75	....	....	....	2.85	....	3.00	....	....	....	3.00	....	600
Miner Boy	....	....	....	....	....	....	....	....	....	....	....	....	....
Mono	....	....	....	....	....	....	....	....	....	....	....	....	....
North Standard, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
N. Horn-Silv'r, s.l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ori'nt'l & Miller, s.	.14	....	....	....	.14	....	.15	.14	....	....	....	....	3,700
Quartz Creek.	....	....	....	....	....	....	....	....	....	....	....	....	....
Rappahannock, c.	.07	....	.08	.07	....	....	.08	....	....	....	.07	....	8,700
Red Elephant, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ruby, of Arizona.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cliff, s.	.18	....	....	....	....	....	....	....	....	....	.20	.18	2,500
Sonora Con.	.40	.36	.43	.40	.40	.39	.41	.39	.43	.42	.49	.45	98,500
South Bodie, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Bulwer, c.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Hite	....	....	....	....	....	....	.15	....	....	....	....	....	500
South Pacific.	....	....	....	....	....	....	....	....	....	....	.05	....	900
State Line, 1 & 4, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Nos. 2 & 3, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tunnel	.21	.20	.20	....	....	....	.20	....	.20	....	.21	.20	5,900
Taylor Plumas	....	....	....	....	....	....	....	....	....	....	....	....	....
Unadilla, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Cons, c. s.	4.05	....	4.00	....	4.00	....	....	....	....	....	5.13	4.50	730
Vandewater	....	....	....	....	....	....	....	....	....	....	....	....	....
Washington	....	....	....	....	....	....	....	....	....	....	....	....	....

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 75,280. Non-dividend shares sold, 162,470.

BOSTON MINING STOCKS.

	May 11.		May 12.		May 14.		May 15.		May 16.		May 17.		Sales.
	H.	L.	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.	....	....	2.00	....	....	....	....	....	2.00	....	....	....	150
Amie.	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic	....	....	....	....	....	....	10.75	....	....	....	....	....	10
Aztec.	....	....	....	....	....	....	.05	....	....	....	....	....	100
Bodie Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bonanza D.	2.13	....	2.13	....	2 1-16	....	2.13	2.00	2.00	....	....	....	695
Bowman Sil	.15	.13	.15	....	.15	.14	.15	....	.16	.15	....	....	18,041
Bruns. Ant.	12.00	....	....	....	....	....	....	....	....	....	....	....	10
Bulwer.	.60	....	....	....	....	....	....	....	....	....	....	....	200
California.	....	....	.21	....	....	....	.21	....	....	....	....	....	500
Cal. & Hec.	....	....	....	....	234	....	233	....	234	....	234	....	55
Catalpa.	.72½	.70	.75	....	.72½	.72	....	....	.73	....	.65	....	2,375
Central Ariz	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherryfield.	....	....	....	....	....	....	....	....	....	....	....	....	....
Co. Virginia	.51	....	....	....	.50	....	....	....	....	....	....	....	700
Copper F'lls	....	....	....	....	....	....	....	....	....	....	....	....	....
Copperop.	....	....	....	....	....	....	....	....	....	....	....	....	....
Crescent.	....	....	....	....	....	....	.25	....	....	....	....	....	500
"Cusl"	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur.	....	....	....	....	....	....	....	....	....	....	....	....	....
Deer Isle.	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	....	....	....	....	....	....	....	....	....	....	....	....	....
Douglas.	....	....	.80	....	....	....	....	....	....	....	....	....	100
Duncan.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin.	.28	.27	.27	....	....	....	.27	.24	....	....	....	....	800
Empire	....	....	....	....	....	....	.23	.22	.22	.20	....	....	620
Eureka Con.	....	....	....	....	4.88	....	....	....	....	....	....	....	25
Franklin.	....	....	....	....	....	....	....	....	.10¼	.10⅛	....	....	50
Hancock G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Harshaw.	....	....	....	....	.50	....	....	....	....	....	.56¼	....	100
Huron.	....	....	....	....	....	....	....	....	....	....	....	....	....
Independ'ce	....	....	....	....	....	....	....	....	....	....	....	....	....
Indian Q'n.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mammoth	....	....	....	....	....	....	....	....	....	....	....	....	....
Mass. & N.M.	.08	.07	.08	....	.08	.07	.08	....	.08	....	....	....	9,500
Milton.	....	....	....	....	....	....	....	....	....	....	....	....	....
Napa.	....	....	....	....	....	....	....	....	....	....	....	....	....
National.	....	....	....	....	....	....	....	....	....	....	....	....	....
North. Belle	....	....	....	....	....	....	6.50	....	....	....	....	....	50
Ontario	....	....	....	....	....	....	....	....	....	....	....	....	....
Osceola.	21.00	....	....	....	21.00	....	....	....	21.00	....	....	....	37
Penn-Breck.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pewabic	....	....	....	....	....	....	....	....	....	....	....	....	....
Pine Tree	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth	....	....	....	....	.18	....	.18	....	.19	....	....	....	1,200
Quincy.	44¾	43¾	44½	43½	43.0	....	43.00	....	43.00	....	....	....	329
Ridge.	.65	....	....	....	.75	....	....	....	....	....	....	....	400
Robinson.	....	....	....	....	....	....	....	....	....	....	....	....	....
San Pedro.	....	....	....	....	....	....	.50	....	.47½	.45	....	....	250
S'ra Nevada	....	....	....	....	....	....	....	....	....	....	....	....	....
S'ra Grande.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Islet.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver King.	....	....	....	....	....	....	....	....	....	....	....	....	....
Simpson Gd	....	....	....	....	....	....	....	....	....	....	....	....	....
So. Pacific.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard.	....	....	6.50	....	....	....	....	....	....	....	....	....	10
Sullivan	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tun.	.20	....	.20	....	.21	....	.21	....	.19	....	....	....	1,000
Sycamore.	....	....	....	....	....	....	....	....	....	....	....	....	....
Twin Lead.	.05	....	.05	....	....	....	....	....	....	....	....	....	2,500
Vizina	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

PHILADELPHIA MINING STOCKS.

	May 11.		May 12.		May 14.		May 15.		May 16.		May 17.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
Argent.	.17	....	.17	....	.17	....	.16	....	.17	....	....	....	20,000
Battle Mt.	....	....	.04	....	....	....	.03	....	....	....	.03	....	2,000
Black Sul.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bodie.	....	....	....	....	....	....	....	....	....	....	....	....	....
Buena.	....	....	.03	....	....	....	.03	....	.03	....	.02	....	20,000
California.	....	....	....	....	....	....	....	....	....	....	....	....	....
Calista.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite.	....	....	1.05	....	....	....	....	....	....	....	....	....	1,800
Cincinnati.	.09	....	.10	....	.12	....	.13	.11	.18	....	.12	....	14,625
Compromise.	....	....	....	....	....	....	....	....	....	....	....	....	....
Contention.	....	....	....	....	....	....	3.87½	....	....	....	....	....	1,500
Con. Virg.	.50	....	.52½	....	....	....	....	....	....	....	....	....	3,100
Dauntless.	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	.19	.18	.19	.18	.19	....	.19	....	.18	....	.18	....	6,600
Fairview.	....	....	....	....	....	....	....	....	....	....	....	....	....
Eureka.	.01	....	....	....	....	....	....	....	....	....	....	....	4,000
Girard.	.10	....	....	....	....	....	....	....	....	....	....	....	10,100
Golconda.	....	....	....	....	.10	....	.10	....	.10	.09	.10	.09	....
Governor.	.09	....	....	....	.09	....	.09	....	....	....	.09	.08	22,100
Grand Uni'n	....	....	.14	....	....	....	.20	....	.21	....	.23	.21	14,000
Gunnison.	1.12½	....	1.05	.97½	1.02½	.95	.85	.80	.87¼	.82½	.87½	....	9,200
Homestake.	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver.	6.75	....	....	....	....	....	....	....	....	....	....	....	300
Iowa Gulch.	.08	....	.07	....	.07	....	.07	....	....	....	.07	....	16,300
Iron Silver	2.87½	....	....	....	....	....	3.00	....	3.00	....	....	....	3,500
King Bul'on	.01	....	....	....	....	....	....	....	....	....	....	....	2,500
Ledger Con.	.02	....	....	....	....	....	....	....	....	....	....	....	5,000
Little Dia'd.	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Maud	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Pitts.	....	....	....	....	....	....	.06	.05	....	....	.06	....	1,700
L'g & D'y H	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....
Mt. Lincoln.	....	....	....	....	....	....	....	....	....	....	....	....	....
Navajo.	....	....	....	....	....	....	....	....	....	....	....	....	....
North'n B'l.	....	....	7.50	....	....	....	....	....	....	....	....	....	300
Orion.	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion Pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Palmetto E.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pembina.	....	....	....	....	....	....	....	....	....	....	....	....	....
Penn-Breck.	.13	.12	....	....	.15	....	....	....	....	....	.11	....	500
Permanent.	.02	....	.02	....	.11	....	.11	....	....	....	.09	....	7,500
Pizarro.	....	....	.01	....	....	....	....	....	.02	....	....	....	15,500
Pizarro Ex.	.02	....	.02	....	....	....	....	....	....	....	....	....	1,000
Potosi.	....	....	....	....	....	....	....	....	....	....	....	....	4,000
Rara Avis.	....	....	.32½	....	....	....	....	....	....	....	....	....	....
Rara Avis E.	.11	....	.11	....	.11	....	.12	.11	.11	....	.11	....	1,000
Record	....	....	....	....	....	....	....	....	....	....	....	....	18,800
Rico Pion'r.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson.	.90	....	....	....	....	....	.85	....	.85	....	....	....	4,800
San Pedro.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra G'nde	1.30	1.25	1.25	1.15	1.15	1.10	1.12½	1.05	1.05	1.00	1.05	1.02½	16,800
Sierra Nev.	....	....	....	....	3.93	....	....	....	4.25	....	....	....	1,100
Silver Cord.	1.67½	....	....	....	1.75	....	1.75	....	....	....	....	....	5,100
Silver King.	....	....	.02	....	....	....	....	....	....	....	....	....	250
Silv'r Plume	....	....	....	....	10.55	....	....	....	....	....	....	....	5,000
Sovereign.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sultana.	....	....	....	....	.04	....	.04	....	.04	....	....	....	5,000
Sutro Tun'l.	....	....	.20	....	....	....	....	....	....	....	....	....	600
Tombstone.	.75	....	.77½	....	.75	....	.77½	.75	.77½	....	....	....	3,500
Victor.	....	....	....	....	.02	....	.02	....	.02	....	.03	....	12,000
Yale Mt.	....	....	.05	....	....	....	....	....	....	....	....	....	1,000

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question was thoroughly discussed. Preparations are making to secure non-union men. The ore question remains unsettled; but in view of the probability of a suspension, furnace companies are not pushing negotiations. Lake Ore Foundry is selling at $22.50; Charcoal, $29; Mill iron; $17.75@$18.50. Large offers have been made, and negotiations are pending.

Stocks in consumers' hands are low. Muck Bars are $34.50@$35. Orders for Merchant Bars are coming forward freely. Assorted orders are filled at 2c., and customers are providing themselves against a scarcity Manufacturers of nails are refusing to book orders for future deliveries. Car-load lots are selling at $3, and jobbing lots at $3.15. Sheet-iron is in active demand, and requirements for galvanized are depleting stocks.

Cleveland. May 15.

The market for the last week has been quiet, although a fair amount of business is done in Foundry iron. There are still some off grades iron that are pushed, but most holders are willing to keep their metal unless ruling prices can be obtained. We quote:

No. 1 Bessemer	$22.00@$23.00
" 1 Foundry, all ore	21.00@ 22.00
" 1 Foundry, cinder mixture	20.00@ 21.00
" 1 Soft Foundry	20.00@ 21.50
" 1 Open Silvery	19.50@ 20.00
Mill irons	18.00@ 19.00
4 months f. o. b. cars furnaces.	
Nos. 1 and 2 Charcoal	$24.00@$26.00
" 3, 4, 5, and 6 Charcoal	25.00@ 26.50
Hanging Rock Charcoal	23.00@ 25.00
Strictly Cold-Blast Charcoal	28.50@ 30.00
4 months f. o. b. cars Cleveland.	
Bessemer ores	$7.00@ $8.00
Hematite ores	5.00@ 6.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 18.

Anthracite.

There is very little that is new to report in the anthracite coal trade, beyond the fact that the companies have decided to work half-time next week, full-time the following week, half-time the week ending June 9th, full time the week ending June 16th, and half-time for the four weeks following. This shows that the companies are decided to check over-production, though they do not seem to be able to agree upon the more decisive step of stopping work altogether for one or two full weeks.

Some buyers seem to look forward to a possible rise, and are getting more liberal in their purchases, and inquiry has been a little stimulated; but it would be idle to deny that the great body of purchasers is still absolutely indifferent, and until the low-priced coal has entirely disappeared from the market, which it has not yet, there is little hope for a change in their attitude.

Bituminous.

The last contracts have been closed and the market is dull and lifeless. The rumors of the cutting of rates on the Baltimore & Ohio Railroad are substantiated, and we hear of low prices at Baltimore. Buyers, learning of the low figures at which the large contracts have been placed, insist that they should at the utmost pay 15 to 20 cents more, and the anxiety notably of shippers of Cumberland coal via Baltimore to place tonnage gives them encouragement. We quote Clearfield alongside, $4@$4.25; and Cumberland, $4.10@$4.40, according to quality.

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended May 12th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	1,752	21,187	12,338
Coal for shipment at South Amboy	10,167	300,688	271,023
Coal for distribution	10,270	287,841	243,955
Coal for company's use	1,776	52,910	47,355
Total	23,965	662,626	574,671
Increase		87,955	
Decrease			

Comparative statement of the production of anthracite coal for the week ended May 12th and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	51,296	1,203,779	40,836	1,045,477
D. L. & W. RR. Co.	71,814	1,521,793	61,411	1,347,184
Penna. Coal Co.	17,587	415,869	21,719	357,372
L. V. RR. Co.	9,055	350,352	10,573	335,288
P. & N. Y. RR. Co.	3,566	66,928	3,039	64,172
C. RR. of N. J.	36,583	822,348	31,134	744,937
Penna. Canal Co.	16,214	64,697	10,713	71,905
North & West Br. RR.	5,502	174,664		
	211,617	4,620,430	179,425	3,966,305
Lehigh Region.				
L. V. RR. Co.	72,071	1,586,635	75,199	1,429,295
C. RR. of N. J.	34,546	748,387	37,052	672,377
S. H. & W. B. RR.	3,064	15,153		15,000
	109,681	2,350,175	112,251	2,116,672
Schuylkill Region.				
P. & R. RR. Co	107,437	2,203,513	110,565	2,015,162
Shamokin & Lykens Val.	26,127	452,462	25,473	370,574
	133,564	2,655,975	136,038	2,385,736
Sullivan Region.				
Sullivan Line & Sul. RR. Co.	1,160	21,219	1,038	18,257
Total	456,022	9,647,799	428,752	8,486,970
Increase		1,160,829		
Decrease				

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878 ..... 4,858,034 tons.
" " " " 1879 ..... 8,120,260 "
" " " " 1880 ..... 7,540,846 "
" " " " 1881 ..... 8,912,430 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 133,343 tons, as compared with the corresponding period in 1882.

The Production of Bituminous Coal for the week ended May 12th was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs	49,775	731,187
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,554	123,976
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	2,143	75,922
East Broad Top	485	19,634
Clearfield Region, Pa.		
Snow Shoe	4,694	92,333
Tyrone and Clearfield	47,655	990,316
Alleghany Region, Pa.		
Pennsylvania RR.	4,953	176,487
Pittsburg Region, Pa.		
West Penn RR.	8,190	176,731
Southwest Penn. RR.	1,877	44,482
Penn & Westmoreland gas-coal, Pa. RR	28,426	504,794
Pennsylvania RR.	2,720	183,28
Total	157,472	3,127,813

The Transportation of Coke over the Pennsylvania Railroad for the week ended May 12th and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	1,941	44,064
West Penn. RR.	2,584	38,385
Southwest Penn. RR	41,209	717,720
Penn. & Westmoreland Region, Pa. RR	4,495	88,832
Pittsburg, Penn. RR	39	313
Snow Shoe (Clearfield Region)	431	7,144
Total	50,699	896,458

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Newburg		3 95	3 90	3 95	4 05	4 15
Scranton at Hoboken	3 90	3 90	3 90	4 00	4 20	4 30
Lackawanna at Weehawk'n	3 90	3 90	3 90	4 00	4 20	4 35
Wilkes-Barre at P. Johnston	3 90	3 90	3 90	4 00	4 20	4 20
Plymouth R. A. at P. John.		4 15		4 30	4 75	4 50
LEHIGH COAL.						
Honey Brook at Port John.	5 00	4 25		4 25	4 20	4 2
Fulton at South Amboy	5 25	4 40		4 40	4 30	4 4
U. L. & Coun. R'g'e at Eliz'pt						
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash	4 85	4 85	4 50	4 10	4 35	4 10
Free-Burning White Ash		3 90	3 90	4 00	4 35	4 10
Schuylkill Red Ash				4 10	4 55	4 10
Shamokin				4 25	4 55	4 10
Lorberry				4 25	4 65	4 20
Lykens Valley (Brookside)			4 70	5 00	5 25	5 00
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 50	4 50		3 75	4 00	3 75
Free-Burning White Ash		3 55		3 65	4 00	3 75
Schuylkill Red Ash				3 75	4 20	3 75
Shamokin				3 90	4 20	3 85
Lorberry				3 90	4 30	3 85
Lykens Valley (Brookside)				4 65	4 85	4 65

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" " South Amboy	3.80@ 3.90
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" " South Amboy	3.90@ 4.20
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Baltimore	.50§		
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Bath, Me.	1.30	1.40	1.00
Beverly	1.30		
Boston, Mass.	1.25@1.35	1.40@1.50	1.00@1.05
Bristol	1.15	1.35	
Bridgeport, Conn.		1.30	.55
Brooklyn	.75§	1 25	
Cambridge, Mass.	1.30‡	1.50	1.05@1.10‡
Cambridgeport	1.30‡	1.50	1.05@1.10
Charleston, S. C.	.70	.75	
Charlestown	1.30	1.50	
Chelsea	1.30	1.40	1.05@1.10
City Point			
Com. Pt., Mass.	1.35	1.50	1.05@1.10
E. Boston	1.25@1.30	1.40	1.05@1.10
East Cambridge	1.25‡	1.50	1.05@1.10‡
E. Gr'nwich, R. I.	1.15	1.30	
Fall River	1.15	1.35	.80
Galveston		2.90	
Georgetown, D. C.	.60@.75		
Gloucester	1.35		
Hartford			
Hackensack			
Hudson	1.00§		
Lynn	1.40	1.75	
Marblehead		1.75	
Medford			
Millville, N. J.			
Milton			
Newark, N. J.			
New Bedford	1.20	1.35	.85
Newburyport		1.75	1.25
New Haven		1.30	.55
New London		1.30	.70
New-Berne		1.50	
Newport	1.25	1.60	.80
New York	.75§	1.25	.55
Norfolk, Va	.60@.65	.70	
Norwich		1.35	.70
Norwalk, Conn		1.35	.55
Pawtucket		1.35	
Philadelphia			
Portland	1.25@1.30	1.40	1.00
Portsmouth, Va.	.60@.65	.70	
Portsmouth, N. H.	1.40@1.30	1.50@1.60	
Providence	1.15	1.35	.70@.80
Quincy Point			
Richmond, Va.	.65@.70	1.00	
Rockland, Me.		1.50	
Rockport		1.50	
Roxbury, Mass.	1.25‡	1.50	
Saco	1.40*¶	1.75	1.05†
Sag Harbor			
Salem, Mass.	1.40	1.60	1.05
Saugus			
Savannah		1.00	
Somerset	1.15	1.35	.80@.85
Staten Island		1.25	
Trenton			
Troy	1.00§		
Wareham		1.65	
Washington	.60@.75		
Weymouth		1.60	
Williamsbg, N. Y.		1.25	
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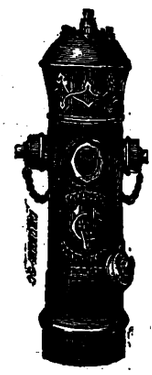


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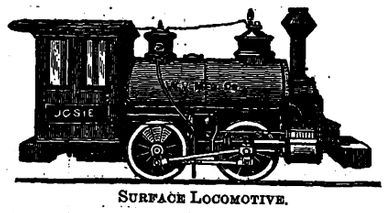


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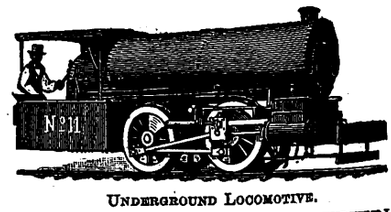
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LOWER California is enjoying a "rush," it being reported that extensive gold placer ore-deposits have been discovered.

MR. J. S. PHILLIPS, mining engineer and metallurgist, has changed his headquarters to 52 State street, this city.

THE Chicago National Exposition of Railway Appliances was opened on the 24th with appropriate ceremonies. Among those who spoke were the venerable HORATIO ALLEN, who brought over from England the "Stourbridge Lion," and JOSEPH WHITEHEAD, who was fireman on the "Stockton" in 1827.

IN spite of the steady decline in the price of lead in Europe, the Mechernich mine, of Germany, the greatest in the world, has again paid a good dividend to its shareholders. The production in 1882 was 25,054 metric tons of lead and 5108 kilograms of silver, yielding a gross profit of 2,256,726·89 marks, and leaving, after writing off 879,559·43 marks, a net profit of 1,380,050·16 marks, out of which a dividend of 13 per cent on a hare capital of 9,600,000 marks was paid.

THE annual convention of the American Society of Civil Engineers will be held at St. Paul and Minneapolis, Minn., beginning June 19th. The programme has not yet been fully worked out; but four sessions are arranged for, and a number of visits to points of interest as well as a banquet tendered by the citizens of St. Paul and Minneapolis are on the *tapis*. The society, in order to accommodate members visiting the Chicago Exposition of Railway Appliances, will establish a headquarters there during the week beginning June 11th.

THE coke trade is now going through the reaction which an enormous development in the production, on the one hand, and a rapid shrinking in the demand, on the other, have made inevitable. According to the data given in the Census Compendium, Pennsylvania produced, in the fiscal year 2,317,148 tons of coke from 4,360,110 tons of coal. In 1882, according to the returns collected by the Secretary of Internal Affairs of Pennsylvania, 10,063 ovens in that State yielded 3,216,543 tons of coke. Beginning, in 1882, with an active demand in the great Connellsville region, prices at the oven ranged between $1.70 and $1.75. In June of that year, it fell off to $1.40 to $1.50, and, in September, the price reached $1.15 to $1.25. Rallying after the settlement of the troubles in the iron trade, it moved along steadily till the close of the year at $1.30 to $1.35; but the beginning of the present year witnessed a sudden decline to $1.20 to $1.25, and the cutting of rates continued during the month, February opening with $1.15; and during the month, coke was obtainable by close buyers for $1 per ton on cars at oven. Transactions based on $1 to $1.10 were made during March, and the reduction of freights toward the close of April did not improve matters perceptibly. Cutting began again in May, and now sales as low as 90 cents are reported. The coke-makers are getting alarmed, and propose to take steps toward restriction and the scaling down of wages.

THE Cleveland meeting of the American Society of Mechanical Engineers will begin on Tuesday, June 12th, with a session at which the Civil Engineers' Club of Cleveland will be present. The second day will be devoted entirely to the reading of papers, among which the following have already been announced: History of the Winding and Pumping Engines of the Anthracite Regions; Balancing Vertical Engines; the Marine Engines of the Lakes, with a Device for getting them off their Dead-Centers, by J. F. HOLLOWAY; the Bower-Barff Process, by W. F. DURFEE; Ingot Cranes, by G. CURTIS; Spiral Springs, by OBERLIN SMITH; and Steamboat Pipe Fittings, by W. J. BALDWIN. The society will on Thursday visit the works of the Otis Iron and Steel Company, the Cleveland City Forge and Iron Company, the Union Screw Company, Brush Electric Light Company, Cleveland Rolling-Mill Company, Standard Oil Company, Warner & Swasey's, and Cleveland Malleable Iron Company.

This is the first time the society has ventured on its travels, all former meetings having been held in Eastern cities. We feel confindent that the society will not regret having followed the hearty and urgent invitation which came from the Western engineers, through Mr. J. F. HOLLOWAY, who we notice is chairman of the local committee. The programme is a tempting one, and will no doubt contribute largely toward increasing the field of utility of the youngest of the three great technical societies in the United States.

THE reports for the three great pyrites mines, the Rio Tinto and the Tharsis in Spain, and the San Domingos in Portugal, have been published The Rio Tinto, mining an ore which, as coming from the mine, yielded on an average 2·805 per cent by wet assay, sold 272,826 tons of pyrites, carrying an average of 2·448 per cent by dry assay, and made 9740 tons of metallic copper. The profit was £738,308, £477,183 being available for dividends. In its roasting-heaps, the company has from 40,000 to 50,000 tons of copper. The company has a tunnel 7546 feet long, connecting the northern and southern workings, and the width of the ore for the entire distance is estimated to average from 160 to 200 feet, the hight above the tunnel level being from 200 to 230 feet. Explorations 230 feet below that level have proved the deposit with a width of 300 feet at that depth. This enormous block of ground is estimated to contain net from twenty to thirty millions of ore above the tunnel level in the southern part of the property, and the workings are now in such shape that the production of ore can be increased to from 1,250,000 to 1,300,000 tons annually, equivalent to about 40,000 tons of copper.

The Mason & Barry, or San Domingos mines, in Portugal, with a capital of upward of £1,200,000, yielded a profit of £276,719; while the Tharsis, as already noted, wound up the year's business with profits aggregating £335,676, making the total for the three mines £1,089,578, or about $5,263,000.

It may be of interest to metallurgists to state that the Mason & Barry Company is building works at Raniham, Essex, to make trials with a mechanical roasting-furnace, "with a view to placing before the manufacturers in England and America the actual commercial results."

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A prospectus has been issued by this new company, organized under the laws of Georgia, which contains statements bearing upon the possibility of profitably manufacturing ferro-manganese in the South. With an abundant and cheap supply of ore, costing at the furnace not more than $5, and with access to fuel through the rapid extension of railroads into the coal-fields of Alabama, 75 miles from the ore-deposits, it is expected that works in Georgia will be able to supply at least a portion of the demand in this country. The chief promotor of the company is a gentleman who has had much experience in manufacturing ferro-manganese and spiegeleisen. At present, it is proposed to work three thousand tons of manganese ore, which will produce about twelve hundred tons of high-grade (from 60 to 70 per cent) ferro-manganese, the company leasing for the purpose of this work a first-class modern furnace supplied with all the adjuncts before mentioned. As there is no such furnace to be had for lease near the manganese ore-deposits, the company will be compelled to take one at a distance, and the cost of freight to it can be deducted in estimating what can be done later on. Such a furnace can be leased in a location to which the freight on the ore will be about five dollars per ton, making the ore delivered at the furnace cost ten dollars per ton. In that locality, coke costs from ten to ten and a half cents per bushel, so we estimate as follows for the experimental run of ferro-manganese produced:

2½ tons ore at $10	$25.00
150 bushels of coke at 10½ cents	15.75
1 ton limestone	1.00
Labor and superintendence	6.00
Lease of furnace	4.00
	$51.75

The present price of this article is, as before stated, $78 per ton. The company would then offer its product to the steel manufacturers at a much reduced price, as it could well afford to do, say at $65 per ton, bringing the cost of the unit of manganese under the price of the same unit in the shape of spiegeleisen.

THE BROOKLYN BRIDGE.

The opening to traffic this week, with much festivity, of Brooklyn's and New York's great engineering undertaking, the bridge, furnishes a fitting occasion for briefly reviewing its history and presenting a few data on the method of construction.

For years before the enterprise which has now been brought to a successful issue, the idea of uniting Brooklyn and New York by means of a tunnel or a bridge was repeatedly brought forward. In 1860, Mr. John A. Roebling, the builder of the Niagara and Cincinnati suspension bridges, was called upon to make an estimate of the cost of the bridge; but this first effort to organize a company and build the bridge failed, and it was not until the beginning of 1867 that an act was introduced incorporating the New York Bridge Company, which became a law on April 16th, 1867. Among other powers conferred, it authorized the cities of New York and Brooklyn to subscribe to the capital stock (which was fixed at $5,000,000, with power of increase) such amounts as two thirds of their common councils respectively should determine, and to issue bonds in payment of such subscriptions. Under these provisions, Brooklyn subscribed for $3,000,000 of stock, New York $1,500,000, while the remaining $500,000 was distributed among the incorporators. These latter constituted the first Board of Directors, and by them Senator Murphy was elected President; Mr. John H. Prentice, Treasurer; and Mr. Orestes P. Quintard, Secretary. On the 23d of May, 1867, the elder Roebling was employed as chief-engineer. His plans, submitted to the directors on the 1st of September following, fixed the cost of the bridge at $7,000,000, exclusive of the land required (an item itself amounting to $3,800,000), and the time of building at about five years. Modifications of these plans and changes and improvements of one kind and another have greatly added to these figures. In 1872, his son, Col. W. A. Roebling, having succeeded to his father's position as engineer-in-chief of this work, and the hight of the bridge having been reduced from 200 to the maximum hight of 135 feet, estimated the cost at $9,500,000. In 1873, when the estimated cost of the land was added, the total cost of the bridge was raised to $13,045,065, and in 1875 to $13,145,065. The act of 1875, however, provided that the interest on the bonds to be issued by the two cities should be paid by the trustees out of the money received by them, and this added $1.500,000 more to the cost. Then the structure was increased in strength over the original plans of the engineers, and that added considerably more to the cost. About $15,000,000 have been expended on the bridge now, and the total cost, when all improvements are made at the approaches and the arches are fitted up for warehouses, will not be much short of $16,000,000. The yearly cost of maintaining the bridge, including interest on the bonds, will be about $800,000.

In March, 1869, at the request of Mr. Roebling, a board of consulting engineers was convened to examine his plans and report upon their feasibility. Its members were Engineers Adams, McAlpine, Allen, Latrobe, Kirkwood, Steele, and Serrell, and the result of their inspection was an indorsement of all he had done. So much had been said about the obstruction to navigation which would be offered by the bridge that Congress directed a still further examination of the plans, and Secretary of War Rawlins appointed General Newton, General Wright, and Major King, three government engineers, for that purpose. They recommended an increase in the hight of the bridge of five feet, but otherwise gave the plans their approval. In accordance with this recommendation, changes were made in the proposed method of building the roadway, so that the span midway between the two towers is now 135 feet above high-water mark. At the same time, the bridge was widened from 80 to 85 feet. Mr. Roebling lived but a few months after the appointment of the government commission. In the summer of that year, while standing upon the rack of one of the slips of the Fulton ferry, directing the details of a survey, the shock of an incoming ferry-boat caused him to lose his balance, and one of his feet was terribly crushed between the heavy timbers that formed the rack. The injury resulted in lockjaw, from which he died sixteen days afterward. His son, Col. Washington A. Roebling, who had aided in drawing the original plans, was appointed his successor. The caisson disease made the son one of its victims within a twelvemonth. Although his physical health has been impaired to such an extent that he is a confirmed invalid, his mental faculties have retained their vigor, and during all these long years he has directed the work from an upper room in his residence on Columbia Hights, in Brooklyn.

The erection of the bridge proper began January 3d, 1870, when the work of preparing a place for the foundation of the Brooklyn tower was commenced by tearing out the spare slips of Fulton ferry. During the next four years, the history of the bridge was marred by complaints of fraud. Matters reached that point finally that an Investigating Committee of Fifty went to work upon the accounts and all the records of the directors. In the early part of 1873, they presented their report. This indicated very clearly that there had been laxity in the management, and that the interests of the two heaviest stockholders—the cities of New York and Brooklyn—had not been protected as they ought to have been. The pressure of public opinion was so great that Mr. Kingsley, on the 1st of June, 1873, felt constrained to resign his position as General Superintendent. The Legislature of the following year took the matter in hand, and passed a law investing the authorities of the two cities with power to go on and complete the structure, first extinguishing the title of the private stockholders by purchasing their shares in the new company and reimbursing them in full. Under the new order of things, the bridge became public property, Brooklyn paying for and owning 66⅔ per cent, and New York 33⅓ per cent.

A table of dimensions and of dates that will prove interesting in connection with this great bridge is the following:

Length of river span, 1595 feet 6 inches.
Length of each land span, 930 feet.
Full width of bridge flooring, 85 feet.
Hight of river span above water, 135 feet 6 inches.
Size of New York caisson, 172 by 102 feet.
Size of Brooklyn caisson, 168 by 102 feet.
Cubic yards of masonry in New York tower, 46,945.
Cubic yards of masonry in Brooklyn tower, 38,214.
Length of New York approach, 1562 feet 6 inches.
Length of Brooklyn approach, 971 feet.
Depth of New York foundations below high water, 78 feet 6 inches.
Depth of Brooklyn foundations below high water, 44 feet 6 inches.
Size of towers at high-water mark, 140 by 59 feet.
Size of towers at the top, 136 by 53 feet.
Total hight above high water, 271 feet 6 inches.
Hight of roadway at towers, 119 feet.
Hight of arches above roadway, 117 feet.
Hight of towers above roadway, 159 feet.
Width of openings through towers, 33 feet 9 inches.
Weight of each anchorage, 60,000 tons.
Size of anchorages at base, 129 by 119 feet.
Size of anchorages at top, 117 by 104 feet.
Their hight in front, 85 feet.
Their hight in rear, 80 feet.
Grade of roadway, 3¼ feet in 100.
Number of cables, 4.
Diameter of cables, 15¾ inches.
Length of each cable, 3578 feet 6 inches.
Miles of wrapping wire on each cable, 243 miles 943 feet.
Number of wires in each cable, 5282.
Number of suspenders from each cable, main span, 208.
Number of suspenders from each cable, land span, 86.
Number of post bands, each land span, one cable, 35.
Strength of a single suspender, 140,000 pounds.
Sustaining power of each cable, 12,000 tons.
Greatest weight on a single suspender, 20,000 pounds.
Greatest weight on a single cable, 3000 tons.
Number of overfloor stays, 432.
Total length of wire in each cable, 3515 miles.
Greatest length of cable wire run in one day, 88 3-5 miles.
First wire rope stretched over the river, August 14th, 1876.
River first crossed on a wire rope, August 25th, 1876.
Foot-bridge finished and crossed, February 9th, 1877.
First cable wire run over and regulated in the elevated position for strand making, May 29th, 1877.
Cable-making fairly commenced, June 11th, 1877.
Last cable wire run over, October 5th, 1878.

The first caisson was built for use on the Brooklyn side. It was 172 feet in length, 102 feet in width, and 22 feet in hight. Its top was 15 feet in thickness, being composed of layer after layer of solid yellow pine timbers, each a foot in thickness, crossing one another at right angles, and all bolted together in the most compact manner. The four sides of the caisson were 9 feet 6 inches in hight and 8 feet in thickness where they joined the top, and like the latter, were built of stanch timber bound together with similar heavy bolts. The sides tapered off in thickness, somewhat like the letter V, and at their bottom (corresponding to the point of the V) they were only about eight inches thick. An iron casting was bolted over this thin edge, in order to afford it strength and protection. The interior of this caisson was divided into six compartments by timber partitions two feet thick, strong and well braced. Through each partition were two openings high and broad enough to permit of the passage of a man with a wheelbarrow. All the inside joints of the caisson were well calked with oakum and pitched, to prevent the escape of air. A sheathing of tin was laid over the outside by the caisson to protect the timber from the attacks of sea-worms, and as a still further means of excluding water. Over this sheathing was a layer of three-inch planks saturated with creosote. Such were the precautions taken to insure an air-tight caisson and to guard against its decay. The spare ferry slip having been demolished, dredging to the depth of 18 feet was necessary. Into this berth the caisson was towed on the 2d of May, 1870, and the work of sinking it began. Around three sides of the berth was built a coffer-dam. The side next the water was similarly protected after the caisson had been floated into position. Derricks were erected, and, on the 15th of June, blocks of granite from the Maine quarries were

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hoisted upon the top of the caisson for facing, the bulk of the masonry being made of Kingston blue limestone. Under their weight, the caisson began to settle. When the weight upon the caisson was such that its iron-shod edges rested fairly on the river bottom, compressed air was turned into it, the water was expelled, and workmen went down underneath with pick, shovel, and wheelbarrow to commence excavation. Water-locks and Morris & Cummings's dredges were used to receive the material. An air-lock furnished the means of ingress and egress, and into this on the afternoon of May 10th, 1870, Colonel Roebling, Engineer Martin, and Master Mechanic Farrington entered. Groping their way into the subterranean chamber into which the air-lock opened, the three men spent twenty minutes in an examination, but were glad to beat a retreat at the end of that time, gasping for breath and half roasted by the intense heat. Water was turned in, the atmosphere of the chamber was cooled off, and, preparations having been completed, men were sent down to begin excavations in earnest on the 10th of July following.

Two memorable events occurred in the sinking of this caisson. One was a blow-out, caused by the neglect of the watchman inside the caisson. The compressed air made its escape and a torrent of water and mud belched out from beneath the sides. The muddy column rose to a great hight. The superincumbent weight upon the caisson at this time was about 17,000 tons. The result of this sudden withdrawal of the support of the compressed air was a settlement of the whole mass—caisson and masonry—ten inches, a crushing of the shoe in some places, and a settlement in the center of the roof of about four inches. These damages were repaired after a considerable expenditure of time, labor, and money. The fire that was discovered in the caisson on the 20th of December, 1870, was far more destructive. One of the laborers had carelessly placed his lighted candle near a joint in the roof. A fire was communicated to the interior of the timber work, which burned over a space 50 feet square. The first indication of its presence was the discovery of a charred hole the size of a man's fist near the joint where the candle had been carelessly placed. It was never known how long the fire had been silently eating its course through the timber. Carbonic-acid gas, water, and steam were turned into this hole in the hope of extinguishing it. Auger-holes bored upward into the roof revealed the fact that the fire was still at work. In his anxiety at this threatening danger, Colonel Roebling entered the caisson, where he remained for seven hours. He was partially paralyzed the next morning. The result of that night's labors in the caisson are seen in his shattered health to-day. Flooding the caisson with water was the last resort. In five and a half hours, the caisson was filled with water. Nearly three months were consumed in making repairs to the caisson. When the work of sinking to the requisite depth had been completed, the interior of the caisson was filled with hydraulic concrete, the whole hardening and affording as compact a foundation as bed-rock itself. Upon it was reared the Brooklyn tower, with its symmetrical gothic arches and its cap-stones, 271 feet 6 inches above high-water mark. The sinking of the New York caisson was doubly tedious and troublesome. Nearly twice the depth had to be reached, the air pressure was greater in consequence, and its effects more disastrous upon the workmen. The experience already gained was valuable. All danger of fire, for instance, was averted by having the caisson lined with boiler-iron. The cost of this was $20,000. The cost of the great fire in the Brooklyn caisson was exactly three fourths of that sum. The Brooklyn caisson rested upon its bed of rock March 11th, 1871, and the New York caisson in May, 1872, the sinking of the latter having required less than a year's work. The construction of the two towers above the water-line was simple enough after the caisson had been laid. The Brooklyn tower was completed in May, 1875, and the New York tower in July, 1876. The latter imposes a weight of 90,000 tons of masonry upon its timber foundations, against 70,000 tons in the Brooklyn tower.

Next to the towers in importance are the two anchorages, massive piles of stone weighing 60,000 tons each, and situated 930 feet from the bottom of each tower. Their purpose is two-fold. They not only hold the ends of the cables securely, but they also form a part of the approaches to the suspended floor of the bridge proper. To economize material and labor, they were built, not of solid masonry, but with arched passageways running through them lengthwise. Their dimensions are 132 feet in length, 119 feet in width, and 90 feet in hight. Gradually diminishing in bulk, at the top they are 117 feet in length, 104 feet in width, and 80 feet in hight at the land ends. Work was begun on the Brooklyn anchorage in February, 1873. At the bottom of an excavation which had been extended below tide level were laid three courses of yellow pine timber, each stick being 12 inches wide and 12 inches in thickness. Being laid in water sources, they will always be covered and saturated with water; and thus protected from atmospheric changes, they can never decay. Upon this flooring was erected the superstructure of limestone and granite. Deeply imbedded in this mass of masonry are the four anchor plates (one for each cable), immense iron castings with arms like a star, each plate weighing 23 tons. They measure 16½ by 17½ feet on the face and are 2½ feet thick at the center. Riveted to the anchor plates are the wrought-iron anchor bars, which are nothing more than the links in a chain of iron extending to the top, where they receive the ends of the bridge cables. A "shoe" is the connecting link between the anchor bars and the cables. Around this shoe are wound the wires which compose the cables. After the cables were laid, several layers of granite were placed in position above the shoes. Chambers were left in the masonry, however, to enable the engineers at any time to inspect the shoes and determine the condition of the wires. It is estimated that the anchorages will stand ten times the strain that can ever be brought to bear upon them. On the other hand, an estimate of the strength of the four cables satisfies the engineers that one of the anchorages could be suspended from them without causing them to break. The New York anchorage is similar to the Brooklyn anchorage. More difficulty was encountered in building it; for it is on made ground at an outskirt of the region known as "the Swamp." In excavating for its foundation, the tide-water soaked into the pit so rapidly that engines with a capacity for pumping 600 gallons a minute were employed in freeing the excavation of water. With much labor, a foundation of piles was laid, and upon this was erected the superstructure.

The elder Roebling's plans provided for iron approaches, in the form of trestle-work, resting on piers of masonry. The change in the plans has resulted in a more solid structure and in one of the finest viaducts of modern times. The New York approach particularly is admired for its symmetry and the magnificent curves of its arches. Between Chatham street to the anchorage—a distance of 1562 feet 6 inches—seven streets are crossed, all of them by stone arches, except Pearl and Cherry streets. Across Pearl street, at Franklin square, has been thrown a substantial iron bridge, to which, in due time, will probably extend stairs leading from the elevated station beneath. At the Chatham street end of the approach, an iron building is erecting, so planned as to receive, if it is ever desired to use it for this purpose, cars directly from the elevated railroad. The Brooklyn approach is 971 feet in length, beginning at Sands street. The grade to the anchorage is easy enough for the heaviest team, being only 2 feet 9 inches in every 100 feet. Prospect, Main, and York streets are each spanned with an iron bridge. A building of iron and glass, to be used for railroad purposes, is situated near the Sands street end of the approach.

When the towers and anchorages were completed, the work of spanning the river with the cables was begun. On the 14th of August, 1876, a wire rope, three quarters of an inch in diameter, was drawn up the water-front of the Brooklyn tower, passed over its top, and let down again on the opposite side, where its end was seized and carried over the houses to the anchorage. The other end of this rope was placed on a scow, and, at a time when there was no passing craft in the river, this was towed to the New York shore, the rope being paid out into the river just as an ocean cable is laid. Then the rope was drawn up over the tower and carried back to the New York anchorage and fastened. By means of powerful engines, this rope, nearly a mile in length, was stretched to the required degree of tension, and the first link of steel was laid between the two cities. A second rope was extended the same day, and their ends were united around driving-wheels. The endless rope thus formed served as a traveler to carry other ropes and wires across, running in cast-iron sheaves on the tops of the towers. As many journeys would have to be taken by the workmen on this traveler, Mr. E. F. Farrington, the master mechanic, decided to show his workmen how easily it was done and to inspire them with courage by an example. A boatswain's buggy, with ropes from its four corners fastened to an iron ring overhead, was rigged up and attached to the traveler. In this frail seat Mr. Farrington seated himself on the afternoon of August 25th, 1876. At a given signal, the drums were started, and the adventurous voyager began his trip from anchorage to anchorage, starting from the Brooklyn shore. He was whirled over the tops of the houses and the river with amazing rapidity. Workmen stood ready to assist him on the tops of the towers, and having reached the New York anchorage, he turned around and sped back again. Exactly twenty-two minutes had been occupied in making the journey. Another endless rope was stretched between the anchorages after this, and then a heavier wire rope, known as a carrier. By means of these, the three small cables for supporting the cradles, in which the work of building the main cables was to be carried on, were put across and secured in their places over the tops of the towers. Then came the foot-bridge from anchorage to anchorage over the tops of the towers, with wooden slats for its bottom and nothing but a steel wire on either side to serve as a hand-rail.

The laying of the cables fairly began June 11th, 1877, and the last wire was run over the river October 15th, 1878. Sheds had been put up on top of the Brooklyn anchorage, and all the machinery was placed there. Eight enormous drums were put up for each cable. On each, 10 miles of wire were wound, making 300 miles in all. The wire, which was made of steel and then galvanized, had been dipped in linseed-oil several times until it was well coated. No. 7 was used, the thickness being a little over one eighth of an inch. As it was wound on the drums, the end of one coil was fastened to that of the next by a steel ferrule, which had inside screw-threads to match those cut in the ends of the wire. At the ends of the cables, the wires had to pass shoes which were to be fastened to the anchor chains, and these were put above their places while the wire was run around them, and then they were lowered and made fast. The wire, with one end fast to the shore, was put over a sheave or wheel which was attached to the traveling rope, and it carried the turn of the wire across the river, making two strands. On the New York side, the turn of the wire was put over another shoe. Another sheave carried over two strands more, and so in each cable, wire after wire was carried across until each strand was completed. The sheaves were sent back empty to start anew. Each separate wire had to be regulated to its proper place by men on the tops of the towers and in cradles, the proper catenarian curve being kept after the first one was made right. For each strand 139 circuits of wire were run out, making 278 wires. The strand was then bound tightly every fifteen inches of its length, and formed a rope three inches in diameter. At the ends it passed around the shoe or eye-piece, which was fixed, as soon as the strand was done, in its place between the ends of two anchor bars, and held in place by a seven-inch bolt. It took about half an hour to lay and regulate each circuit of wire if no delay was caused. But great obstacles were met with in the force of the wind and in the unusual expansion caused by the sun's rays, and storms and cold weather caused many delays. All the wire was galvanized, and then it received five coats of oil, to prevent any rusting where the galvanizing might get off. These were the first cables ever made of galvanized steel wire. Each joint where the wires are screwed together, was also galvanized. The wire was run out to its place at a speed of 11 or 12 feet a second. On the top of the towers, the cable strands were laid in saddles, one to each cable. Iron rollers were placed in position near by, and over these the wires first passed before being laid in the saddle. Any strain on the cables causing them to deflect at one part makes them move in the saddles, while the rollers take up the strain and prevent any wrenching of the masonry of the tower. Each of the four cables having received its allotted 19 strands, the work of binding them together and wrapping them with wire into a compact cylindrical form was next undertaken. All the temporary wrappings were removed, so that the strands were no longer separate, their wires being brought loosely together. With clamps and squeezers and wooden mallets the one-eighth-inch wires were finally compressed together, and then securely bound in that position by the permanent wrapping of steel wire. Each cable was then painted with white lead and oil, and for miles they could be seen glistening in the sunlight of any fair day. Each cable was 15¾ inches in diameter, or nearly 50 inches around. A remarkable accident happened in connection with the running of the wire on the

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19th of June, 1878. One of the great strands broke loose from the New York anchorage, carrying with it the immense iron "shoe" and its ponderous attachments. The shoe left the anchorage with a "whiz," killing two men outright, and took a frightful leap of 900 feet over the tops of houses and streets to the foot of the tower. It rested there for only an instant. The weight of the quarter-mile of wire in the river span jerked it like lightning up the side of the tower, over its top and far into the river, where it quickly disappeared to the bottom. Three of the bridge workmen were seriously injured by this accident.

Following the completion of the cables came the fastening of the suspender bands to them at intervals of 7½ feet throughout their entire length from anchorage to anchorage. These bands were of wrought-iron five inches in width and five eighths of an inch in thickness. They were curved to fit round the cables, and the ends terminate in projections. The band was first heated until it could be opened far enough to go over the cable; and after they were in place, they were drawn together by a bolt which also held the suspender socket. When the bands were all in place, the suspender ropes were attached to them. These suspenders are steel ropes varying in length from 170 feet close to the towers to 3 feet in the middle of the central span. They are fastened by sockets to the suspender bands, and at the lower end is a stirrup-rod to hold the floor-beam in its place. The top of each suspender is fastened in the socket attached to the band by pins driven between the wires, and then the whole is filled with melted lead. The ends of the wires are turned over in riveting. Each suspender was tested to sustain 100 tons, and the extreme weight which will come upon each will be only 10 tons.

The suspension of the steel roadway from the suspenders was the closing piece of work in this great enterprise. Its weight when finally completed was 6740 tons. Some idea of the weight imposed upon the bridge can now be formed. The cables weigh 3460 tons, the suspenders 1180 tons, the timber flooring 2760 tons, and the steel rails for the car tracks 660 tons, making the total permanent weight of the bridge 14,680 tons. A load of 3100 tons can be placed upon it with perfect safety, but it is estimated that the maximum weight of moving passengers and vehicles which can be crowded on it is 1380 tons. In general terms, the roadway which has been thrown open to the public this week consists of a steel frame-work 85 feet in width suspended from the four cables by steel suspenders attached to steel floor beams seven and one half feet apart. Six longitudinal trusses divide the flooring into five parts. The two outer parts are for the use of vehicles. The two inner divisions are laid with steel rails and provided with endless wire ropes for hauling across the rapid transit cars. Between the two inner divisions and at some distance above them is the space devoted to foot passengers, 15 feet 7 inches in width, a promenade the most elevated and sightly that the world has ever seen. At the Brooklyn end is the machinery which will move the endless ropes and send the cars speeding across the bridge in five minutes' time. The cost of this system of rapid transit will be half a million dollars.

Although numerous accidents have occurred and many deaths have been noted among those employed on this wonderful bridge, it is recorded as a somewhat curious fact that no break has occurred in the engineering staff since the death of the elder Roebling. Associated with Colonel Roebling since the very beginning of the work were C. C. Martin, Col. W. H. Paine, Francis Collingwood, George W. McNulty, and S. R. Probasco, civil engineers, and E. F. Farrington, master mechanic. These gentlemen share with Colonel Roebling in no small degree the honor of its successful completion.

BESSEMER STEEL IN ITS CAST AND UNWROUGHT SHAPE.*

By W. D. Allen, Sheffield.

The rapidly extending use of steel in its simply cast condition, the growing certainty of its being in the near future used very extensively in this unwrought state, and the probability of its superseding cast-iron for thousands of important purposes, lead the writer to believe, that any facts bearing upon the question of steel casting can not fail to be of general interest. The Institute is already in possession of many facts, which have been brought before it at various times, relative to the progress made in casting Siemens-Martin, crucible, and other steels, and of the great success in this direction that has attended the operations at Terrenoire, and also of many valuable and scientific researches touching the properties, nature, and general characteristics of steel in its cast state, contributed by M. Pourcel and others. The writer, however, is not aware that any information has been before the Institute, relative to the progress which has been made in casting steel made by the Bessemer process.

Accounts have frequently been brought under your notice of the extraordinary producing powers of the Bessemer converter—how many blows could be got out in twenty-four hours, or how many thousands of tons could be turned out in a week. These achievements have generally received the attentive and approving ear of the meetings, and the writer feels assured this same courtesy will be accorded to him, although, when speaking of the Bessemer process, he makes quality and not quantity the chief consideration, and endeavors to show, when proper care and consideration are bestowed upon it, what an exceedingly valuable material this steel becomes in its simple cast condition, and how admirably adapted it is for the production of castings of various kinds.

The importance of this question can scarcely be overestimated. When we bear in mind the immense quantity of steel made by this process, and the large number of works throughout the country having it at their command, it will at once appear how desirable it is that such an immense source of supply should be made available to meet the large and ever-increasing demand for steel in its unwrought and simply cast condition. The writer feels strongly that Bessemer steel has not yet taken the important position it should hold as a certain and reliable material for castings, and the only object he has in committing himself to this paper is that of bringing before the Institute his experience in the production of steel castings, and of making more generally known what is doing in this material, in the hope that he may be able to impart some stimulus tending to promote the desired end.

* A paper read before the Iron and Steel Institute.

One grand application of Bessemer steel has of course been for rails. So marvelous has been its success in that direction, and so persistently as it been turned to that use, that there does sometimes appear to be a anger of this splendid material being neglected for other purposes, and ts use for rails becoming its ultimate destiny.

In the good old days of iron, any thing was thought good enough for a rail; and there is little doubt that the notorious application of Bessemer steel to this common purpose has tended to disparage it in general estimation for better things, and there are those who would still contend that its proper use is that of rails, and rails only. Such, however, is not the belief of those best acquainted with the material; nor is it the belief of the writer, who lays claim to having been the first person to work the process, both practically and commercially. Although he has done this on a considerable scale for twenty-four years, he has never yet made a rail, but, on the contrary has applied Bessemer steel to almost every other purpose to which steel could be or ever has been applied—from an intermediate crank-shaft to a cork-screw or a table knife; and in all these various applications he has always found Bessemer steel was in every way well adapted for the purpose. Hence it has fallen to his lot for many years past to make castings of it. Now, castings in Bessemer steel are not a novelty, for doubtless other users of the process have made castings. But so much has been done in that way at the works of Henry Bessemer & Co. that the writer ventures to speak with some authority upon the subject.

M. Pourcel, in his valuable paper on solid steel castings, read at Vienna, remarks: "Blow-holes, so to speak, remain a permanent order of the day in the proceedings of the Iron and Steel Institute." To this the writer thinks he may safely add, there is also a pretty general belief that a ladle of Bessemer steel is a seething boiling mass, quite unsuitable for making sound castings.

Now, when, in the face of all this, the writer has to affirm that sound castings, free of blow-holes, are daily made, in the ordinary course of business, from this material, he feels his statement will be received as rather a bold one. Such, nevertheless, is the fact, and it constitutes the chief feature intended to be brought before you by this paper. In ordinary practice, a ladle of Bessemer steel just out of the converter is no doubt in too lively a condition for making castings; but experience tells us that Bessemer steel is as amenable to the quieting and soothing influences of ferro-manganese, silicide of manganese, or silicide of iron, as steel made by any other process; and in order to bring a ladle of steel into a proper condition for running into castings, the agency of these alloys is to be resorted to. This fact was known and recognized at the works of Henry Bessemer & Co. more than twenty years ago, although at that date the making and offering for sale of ferro-manganese, silicide of manganese, etc., had not become a regular business, as it now has, and it was difficult to obtain these alloys with any degree of certainty and regularity. It was found, however, that a very siliceous pig, made at the Tow Low Works in Durham, was obtainable, which contained from 4 to 5 per cent of silicon, and this was used for many years; in fact, until the improved alloys were produced as ordinary articles of commerce. A small quantity of this siliceous Tow Low iron was added to the charge of spiegeleisen whenever it became desirable, for any special work in hand, to quiet the steel and insure greater soundness; and if the blow was not too hot, or was allowed to lie in the vessel a sufficient time to cool down, it was found to answer pretty well. The solidity of many articles exhibited by Sir Henry Bessemer at the Great Exhibition of 1862 was obtained in this way. Judicious and proper care should, however, be exercised in administering these alloys; for the fact should not be lost sight of, that in their use we are, after all, introducing impurities into the steel—impurities that become very deleterious when in excess, giving a harshness and a hardness to the metal, which tend to deprive it of that beautifully soft, ductile nature so characteristic of good Bessemer steel.

It therefore becomes important, when we do add these quieting agents, to use no more than is absolutely necessary for the purpose, and to see that we obtain the maximum amount of duty from a minimum quantity of the compounds. To insure this result, the agitator (already described by the writer before this Institute) should in all cases be used, as by its agency the small quantity of alloy is quickly and uniformly diffused throughout the ladle of steel, and its full potency obtained. The writer knows of no other means whereby this very important object can be thoroughly effected. In passing, the writer can not refrain from expressing regret that this agitator has not been brought more generally into use; in fact, he has not heard of a single instance of its adoption in this country, although it is, of course, free to all. He trusts, however, that it may have been used without his knowledge; and if so, he can only say that he shall be delighted to hear that such is the case. He can assure the members that the advantages of its use daily manifest themselves in his works, and he is quite sure that much of his success in obtaining sound castings is attributable to its use.

The use of silicon is not necessary in order to produce sound castings. At the works of Henry Bessemer & Co., the only quieting agent is ferro-manganese. A ladle of Bessemer steel judiciously alloyed with ferro-manganese (the ferro-manganese being thoroughly diffused throughout the mass by the aid of the agitator) will run dead and lie perfectly quiet, sinking in the molds like ordinary cast-iron, and a large dead head will always be necessary to feed the casting. In this way are cast cranks, side-cranks, cross-heads, cylinders, rollers, spur-wheels, and various other similar pieces of machinery, which, when finished bright over their whole surface, show neither blow-holes nor blemish of any kind. It is well known, however, that the Bessemer system, as at present generally arranged, is not adapted for making small ingots, that is, ingots under 5 or 6 cwt. each; and from the same causes, it is not adapted for making light castings. A mass of five tons of steel rapidly cooling and prone to set in the ladle does not admit of the delays incidental to running it into small quantities, and the crucible or the open-hearth processes, where the steel can be retained in the furnace until required for casting, have advantages over the Bessemer in this respect.

The success in making sound castings of Bessemer steel, claimed in this paper, is not simply an experimental success, but is a regular and daily practice; and to give one instance as an illustration of the regularity with which it is done, the writer may mention the fact that, during the last four years, amid a multiplicity of other things, he has made 486

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hydraulic cylinders of various sizes, as they have happened to be ordered, all of which have been tested up to two, three, and four tons per square inch, while he has never had the misfortune to have one fail in these tests, or to have one of all this number returned upon his hands, through having failed while in use.

And now as regards quality, admitting the ready and perfect practicability of casting Bessemer steel sound and free from blow-holes, there will hardly be a diversity of opinion as to the value and excellence of the material in that state: it is very strong, pure, and homogeneous in quality, and its soft and ductile nature renders it all that can be desired. It also tools beautifully, and some turnings that have come off castings that have never received a blow from the hammer are upon the table, and they serve to give a better notion of its beauty as a simply cast material than all that can be said on this point. The temper or hardness of the steel may of course be varied by the addition of more or less spiegeleisen; but it is rarely found necessary to deviate in this respect with the ordinary run of castings; for although not hard, the continuity of the material renders it exceedingly strong and durable.

The analysis of castings of ordinary quality may be fairly taken at—.

Carbon	·30 to ·40
Manganese	1·25
Silicon	trace.
Sulphur	·06
Phosphorus	·07

The feeling which has at all times so generally prevailed, that it was impossible to obtain this material sound and free from blow-holes—as if such were inherent to the process—has always been a blot upon the escutcheon of Bessemer steel; a blot, however, that the writer considers has always been painted in too deep a color, and which he now contends should be rubbed out altogether. This done, it will be found that there is no better material for castings than Bessemer steel.

RECENT PROGRESS IN THE METALLURGY OF NICKEL.

We have from time to time recorded the success of the efforts made abroad in the manufacture of pure nickel, and the progress made in securing new applications for it. As foreign experimenters have taken much pains to keep their aspirations and their results before the public, it has been the impression of all but a few who had special opportunity to inform themselves that the credit for the results achieved was due chiefly if not exclusively to those who have labored in this field in Germany and in France. It is the merit of Prof. W. P. Blake, of New Haven, to have come forward to correct that opinion; and while giving full credit for good work done by others, he has directed attention to the fact that Mr. Joseph Wharton, of Camden, N. J., was in reality the first to produce pure nickel in a malleable state and in considerable quantities. Professor Blake exhibited a remarkable series of specimens at the Boston Meeting of Mining Engineers; and from the paper read on that occasion, we take the following interesting data:

Inasmuch as nickel first became known commercially in the industrial arts in the form of an alloy, there were no special attempts to produce the metal in a state of extreme purity. The nickel-silver of commerce answered all the existing demands, and was of course much easier to make, and cheaper than the pure nickel. It found a large and rapidly extending consumption as a substitute for silver spoons and forks and for silverware generally, especially when the new art of electro-plating was developed by Spencer, Smee, and others. The nickel-silver was specially well adapted to receive and hold the deposit of silver, and it is to this day the most desirable alloy for plating.

The use of nickel alloy for small or subsidiary coins next made an increased demand for nickel. Tentative efforts were made by Dr. Feuchtwanger, in New York, in the year 1837, and he actually issued many one-cent and three-cent pieces, made of a nickel alloy, the exact composition of which he was careful not to state, but called it "Feuchtwanger's Composition." Switzerland began using nickel alloy coins in 1850; the United States in 1857, though sample coins, one-cent pieces, had been made by Prof. James C. Booth, at Philadelphia in 1853, the prepared alloy containing from 5 of nickel and 95 of copper, to as high as 30 of nickel and 70 of copper. The alloy adopted by law consisted of 12 of nickel and 88 of copper. The five-cent pieces now in circulation are made of an alloy of 25 parts of nickel and 75 parts of copper. In 1860, Belgium adopted an alloy of the same proportions, for small coins. Other countries have followed, until the use of nickel alloy for small coins may be said to be almost universal in the chief commercial countries. Up to June 30th, 1876, the United States had alone issued of the five-cent nickel to the extent of $6,716,129 in value. Another sudden demand for a larger supply of nickel sprang up when the art of depositing nickel by electricity was perfected. The many and increasing applications of this art need not be here enumerated. It is sufficient to state that, at the present time, they constitute a large part of the present consumption of the metal in this country, where the art may be said to have originated in a successful, practical form.

Nickel ore is more generally distributed throughout the mineral-bearing portions of the United States than is generally supposed. It is commonly associated with chrome ores from Canada to Maryland on the Atlantic side, and equally with the chrome ores of the Pacific slope, notably in Oregon. It is also a common associate of magnetic pyrites in the Archæan rocks, being found in Litchfield County, in Connecticut; in the Highlands of the Hudson, in New York and in New Jersey; and specially at Lancaster Gap, in Pennsylvania, where the chief supply of nickel has been obtained for the United States. This ore yields from 1¼ to 2 per cent of nickel, but is enriched by smelting at the mine into a matte containing 10 per cent or more of the metal. This locality was worked some thirty years ago by Prof. James C. Booth and others, of Philadelphia, and some nickel alloy was made. Some ten years later, Mr. Joseph Wharton purchased the works and established the industry at Camden, N. J., opposite Philadelphia, where it has since been carried forward.

A large portion of the metal produced at these works by Mr. Wharton has been used at the United States Mint for the subsidiary small coins, and a considerable amount has been exported. Since the development of nickeling by galvanism, a large part of the product has been put into the form of nickel salts and anodes.

But Mr. Wharton, not being content with the production of impure nickel, early began experimenting to determine whether nickel could not be produced in a pure and malleable condition, susceptible of being worked in nearly the same manner as iron, and of being applied in the manufacture of various objects, requiring strength of material and a material that can not be easily oxidized. One of his earliest experiments was to take the somewhat spongy mass got by reduction of the oxide of nickel, and, after heating it to full redness, work it under a steam-hammer into a bar.

In 1873, Mr. Wharton sent to the Vienna Exhibition a sample of nickel in the form of axles and axle-bearings, and at the Exhibition in Philadelphia in 1876, he exhibited a remarkable series of objects made of *wrought nickel*, such as bars, rods, a cube, a horse-shoe magnet, and magnetic needles of forged nickel. These did not excite the interest to which they were entitled as a remarkable advance in the working of this little-known metal. The exhibit did not cause much comment, and it was not specially described or reported upon, so far as I am aware, except by the judges who reported the exhibit to the Commission as worthy of an award in the following terms: "A fine collection of nickel ores from Lancaster County, Pa., with nickel-matte, metallic nickel in grains and cubes, and manufactured nickel, both cast and wrought; nickel magnets and magnetic needles, cast cobalt, electro-plating with nickel and cobalt, and salts and oxides of both these metals; the whole showing a remarkable degree of progress in their metallurgical treatment." *

Some of the same objects formed of wrought nickel were sent over to Paris two years later, and were exhibited in the American section in 1878. There, as in Philadelphia, they did not at first excite any surprise or receive any special attention. Very few persons realized what the objects really were, and that they were very different from *alloys* of nickel. In fact, very few chemists had ever seen *nickel*. Pure nickel was a rarity, a curiosity, just as samples of indium or thallium are to-day.

You can then, perhaps, imagine the incredulity of the expert chemists and metallurgists of Europe, when whole ingots and forged bars of metal and numerous finished articles of pure wrought nickel, without alloy, were offered for inspection. These articles not differing greatly in their appearance from the higher grades of nickel alloys, or from electro-nickel objects, they passed them without surprise. No previous exhibition had been so rich in exhibits of the use of nickel and in the products from them. The influx of the pure carbonated and oxidized ores from New Caledonia had greatly stimulated the nickel industry in Europe, and had improved the quality of the alloys of nickel. New companies had been formed to manufacture nickel-silver and to produce nickel from these superior ores, at a lower cost than had before been possible. Christofle, of Paris, had just erected extensive works at St. Denis, and had made a most brilliant display of his products in one of the main avenues of the Exposition. The Vivians, of Swansea, and other exhibitors, had large cases filled with beautiful objects of hollow and solid ware made of nickel-silver. Amid these various exhibits of striking *tours de force*, the modest little show-case from the United States with examples of manufactures of *pure wrought nickel, not alloy*, could hardly be expected to excite attention and win the golden award, which was most cheerfully accorded as soon as the fact was demonstrated by analysis that the objects were really of the pure metal. Some of the objects now shown were at that exhibition, and have retained their brilliant polish and luster unimpaired. These notable advances in the metallurgy of nickel, made with the lean and sulphureted ores of Lancaster Gap, prepared the way for greater advances.

Dr. Fleitmann, of Iserlohn, Westphalia, Prussia, has improved and cheapened the operation of refining the nickel and toughening it, and has reduced the liability to the presence of blow-holes in castings by adding to the molten charge, in the pot, when ready to pour, a very small quantity of magnesium. This is immediately decomposed, magnesia is formed, and graphite is separated. It would seem that the magnesium decomposes the occluded carbonic oxide, or reduces it to a minimum. The magnesium must be added with great care, and in small portions, as it unites explosively with the charge. It is stirred in. About one ounce of magnesium is sufficient for 60 pounds of nickel. From three quarters of an ounce to 54 pounds of metal have been used with success by Mr. Wharton. The nickel from the ore at Lancaster Gap seems not to require as much as the foreign metal. It is to be noted that complete malleability of nickel was obtained at Wharton's works in Camden, before Fleitmann's invention or process, but this last is more rapid and better than the old method. The metal so treated becomes remarkably tough and malleable, and may be rolled into sheets and drawn into wire. Cast plates can be successfully rolled. The cast plates, such as are made for anodes, after reheating, are rolled down to the desired thickness. It is found that it is a great improvement to the nickel anode plates to roll them down. They dissolve with greater uniformity in the bath. Nickel so treated with magnesium has been rolled into sheets as thin as paper. Expensive works for rolling the metal have been erected by Mr. Wharton at Camden. There is already a train of 40-inch rolls, 18 inches in diameter, with annealing-ovens and gas-furnaces and their adjuncts, and a 90 horse-power engine. At present, this mill, as well as the works for producing the metal, and the mine, also, are "shut down. The largest sheet yet rolled at Camden is 72 inches long and 24 inches wide, of pure nickel.

Dr. Fleitmann has also succeeded in welding sheet-nickel upon iron and upon steel plates, so as to coat them equally on each face with a layer of nickel. The quantity preferred by weight is $\frac{8}{10}$ iron and $\frac{2}{10}$ nickel, one tenth of nickel being placed on each surface. To secure union, the iron or steel must be perfectly flat and clean. A pile is made with outer facings of sheet-iron, to protect the nickel from scaling. When the whole is heated to the proper degree, it is passed through the rolls. The two metals become so firmly united that they may afterward be rolled down two or three together, or separately, to the thinness desired.

IN order to decrease the dimensions of fly-wheels, builders are beginning to cast lead into the rims.

* Reports and Awards, Group I., 640, p. 470.

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UTILIZATION OF BY-PRODUCTS IN THE MANUFACTURE OF COKE.—I.

Notwithstanding the fact that for many years the utilization of the tar and ammonia liquor has been a very important industry in gas manufacture, the gathering of these products in coke-making has only attracted attention during the past few years. Our columns have reflected the movement now going on abroad, and we propose in this series of articles to place on record the different systems thus far brought forward, together with the data of actual work accomplished. It is to be regretted that on the latter point the figures are as yet very meager. We shall discuss them after a presentation of the ovens used.

The Carvés System.—Beginning with the system longest in use and most thoroughly tried, we abstract the following from a paper read by Mr. H. Simon before the British Iron and Steel Institute in 1880:

Each oven is in the form of a long, high, narrow chamber of brickwork, and a number of these are built side by side, with partition-walls between them sufficiently thick to contain horizontal flues. Flues are also formed under the floor of each oven, and at one end of these is a small fire-place, consisting of a fire-grate and ash-pit with suitable door, the fire-door having fitted above it a nozzle, through which gas produced from the coking is admitted, to form a flame over some fuel burning on the grate. Only a very trifling amount of such fuel, consisting exclusively of the small refuse coke, is used here, its function being really more that of igniting the gas than that of giving off heat. These grates are not charged with fuel more than twice every twenty-four hours when in regular work.

The products of combustion pass from the fire-place along a flue under the oven floor to the end farthest from the fire. They return along another flue under the floor to the fire end; they then ascend by a flue in the partition-wall to the uppermost of several horizontal flues formed therein, and *descend* in a zigzag direction along these flues, finally passing into a horizontal channel leading to a chimney. Thus the coke-oven is heated not only at the bottom in the usual manner, but also evenly at the sides, and the coal with which it is charged becomes rapidly and completely coked. No air is allowed to enter the ovens, which, in reality, are closed vessels, with the exception of the openings for the escape of the volatile products.

Fig. 1.

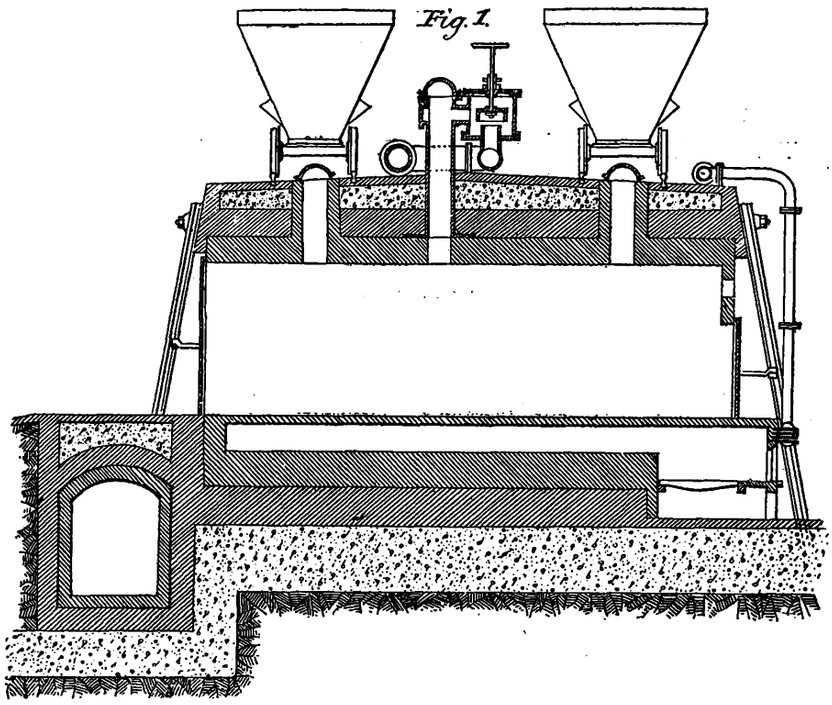
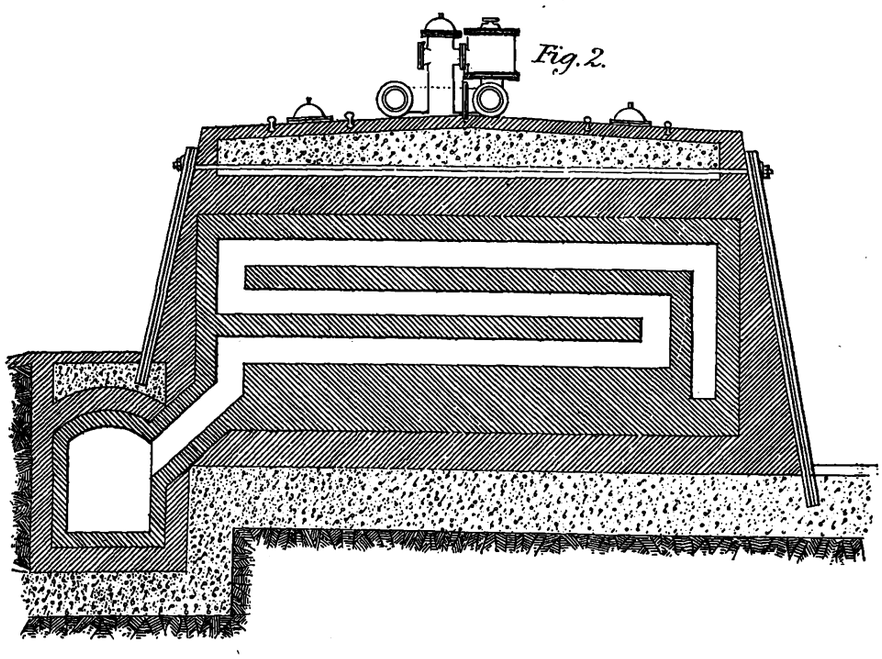


Fig. 2.



In the bee-hive and similar ovens, coking can not be carried on without a considerable quantity of air being admitted during a certain period, at least, of the process. Coking under such conditions, therefore, is carried on at the expense of the combustion of part of the coke made. In these ovens, no air is admitted, and no coal or coke is burnt; hence, there is a greater yield of coke, amounting up to say 75 per cent of the coal charged. At the same time, the coke produced must obviously be purer than that produced in the bee-hive class of oven; for the quantity of ashes and impurities existing in a given ton of coal will in this case be contained in a larger quantity of coke than in the case of coke made in the bee-hive oven.

The improved ovens are fed with coal by openings in the roof, over which coal-trucks are run on rails; and the coal is evenly distributed by rakes introduced at end openings provided with doors, faced with refractory material, which doors are closed and kept tightly luted while the oven is in operation. The feed-holes in the roof are also provided with covers. Through the middle of the roof rises a gas-pipe provided with an hydraulic valve, which closes the passage by a lip projecting down from it into an annular cavity surrounding its seating, in which it is immersed in a quantity of tar and ammoniacal liquor lodged there during previous distillations. The volatile products of the coal distillation rise by the gas-pipe, and are led through a range of pipes kept cool by external wetting, so that the tar and ammoniacal liquor become condensed and separated from the combustible gas.

The quantity of these by-products depends, of course, mostly on the nature of the coal used. The richer the coal is in bitumen or gas, the greater the value of the by-products. Much also depends on the proper conduct of the temperature at the different stages of the coking process; for it is quite possible to obtain even from the same coal different proportions, quantities, and qualities both of the coke and the by-products.

Practical experience must in each case determine what is best adapted to local requirements and circumstances.

The mode of the collection of the by-products is very much like that used in gas-works. The cooling-pipes are conveniently arranged in pyramidal form, surmounted by a water-pipe having numerous holes, so that a shower of water descending on the uppermost of the cooling-pipes and on the outermost is scattered over all their surfaces. The gas, when thus separated from the condensed materials, is further passed through scrubbers, or vessels containing coke moistened by the ammoniacal liquor, which, on being repeatedly used, becomes stronger and stronger until it reaches saturation, when it may be run off into reservoirs, to be treated in the ordinary way for the preparation of ammoniacal compounds, or sold in its crude state for the manufacture of soda. All valuable by-products having thus been withdrawn from the gas, it is led by pipes to the nozzles at the fire-places under the sole of the ovens, where it is burnt. It has been found that the extraction of gas from the ovens by artificial means (say a Beal's exhauster similar to those used in gas-works) is more regular, and therefore preferable to extraction by the natural draught of the chimney only, as the latter varies often according to wind and temperature. When a charge is nearly finished and ready to be taken from the oven, some trucks full of coal are placed ready on the rails going right along on the top of the ovens and over the charging-holes. The two end doors are then opened. The mass of coke, measuring about 30 feet long by 2 feet thick and 6 feet high, is pushed out at the back of the oven and on to the bank by means of a ram or piston, worked by a portable steam-engine running on rails in front. The ram can be brought opposite to each oven in turn. The coke is then quenched as usual.

The watering or quenching operation should be performed with care and judgment. On the one hand, the mass of incandescent coke should, as soon as it is out of the oven, be extinguished as quickly as possible, to avoid loss of coke by actual burning; and, on the other hand, care must be taken not unnecessarily to saturate the coke with water. The coke produced in such ovens, side by side with other systems and out of the same coal, is preferred by the blast-furnace managers. Similar experience has been communicated to me from the Ebbw Vale Company with regard to the coke from their Coppée ovens, which, as already mentioned, have very much the same shape and size

as these. Immediately after the discharge of an oven, the top openings are opened, the coal from trucks emptied into the hot oven and raked level; the doors and top openings are then closed again, and the process begun afresh. The operations of discharging and refilling, when well conducted, need not take more than from ten to fifteen minutes.

The Terrenoire Company, in France, originally introduced a modification of this process in the year 1867, and has since then, from time to time, increased the number of such ovens at its different works. Their proportions and construction generally have during these years undergone continued and considerable alteration and improvement. Experience has shown that a great deal depends upon the dimensions of the vertical sections of these ovens. At the outset they were made too wide and too low, and the density or hardness of the coke was, under such circumstances, not such as was desirable. From a width of 6 feet 6 inches, they have gradually come down, until at present they recommend about 2 feet only, and a hight of at least from 6 to 7 feet. It is interesting to notice the beneficial effect upon the hardness of the coke which the reduction in width has had.

M. Jouguet, the director of the Bessèges Works, belonging to the Terrenoire Company, has made for me the experiments specified in the following table:

TABLE SHOWING RESISTANCE TO CRUSHING OF SIX DIFFERENT KINDS OF COKE, EXPERIMENTED ON BY M. JOUGUET IN 1880, AT THE BESSEGES WORKS OF THE COMPAGNIE DE TERRENOIRE.

(Resistance per square centimeter in kilos.):

1.	Coke	from	Carvés	ovens	of	70	centimeters	width (27 9-16	inches)	66·46 kilos.
2.	"		"	"		66	"	" (26	")	79·72 "
3.	"		"	"		50	"	" (19 11-16	")	92·32 "
4.	"		Bee-hive	"		50	"	" (19 11-16	")	43·92 "
5.	"		Belgian	"		50	"	" (19 11-16	")	53·12 "
6.	"		Coppée	"		50	"	" (19 11-16	")	80·50 "

Nos. 1 to 3 show clearly that the hardness of the coke increases as the width of the oven (or the thickness of the layer of coal treated) decreases. This result is ascribed to the more intense heat to which the coal or coke is subjected by being, in narrow ovens, on an average nearer to the flues in the vertical walls of the ovens. It is indeed clear that, when a large quantity of coal is heated in an oven, a considerable time will elapse before it all can become heated to the same degree, and that during that time the process of coking will be carried on at different temperatures in different portions of the whole mass; and it seems equally clear that it is easier to obtain regular results with a thinner layer of coal, which can be more readily penetrated by the heat, and maintained at the desired temperature. Experience has shown that not only the density but also the yield of coke is benefited by this reduction in width. The greater vertical dimension of the Carvés oven, comparing it with the bee-hive, also has a favorable influence on the average density of the coke. The time required for each charge varies according to the description of coal and the dimensions of the ovens. In the ovens of 2 feet width, a charge is finished every forty-eight hours. In the ovens of 3 feet width, from sixty to seventy-two hours are required. The system secures the whole of the fixed carbon in the coal, say about 75 per cent; much less than this is got by the bee-hive ovens, from 55 to 65 per cent being generally considered a fair yield. Besides the utilization of by-products, the *heat* of the hot gases is in this system, as well as in others, still utilized to a considerable degree.

M. Jouguet states that at the Bessèges works steam is produced to the extent of about 45 pounds and of 4½ atmospheres pressure per hour and per ton of coal coked; and that under more favorable circumstances 59 pounds of steam should be obtained; that is to say, taking about 17¼ pounds of steam as necessary to produce one horse-power per hour, as at Bessèges, 1400 kilos (3080 pounds) of coal are carbonized per oven and per twenty-four hours. Each oven gives about 3¾ horse-power of motive power, and could be driven to give about 4⅝ horse-power. At Bessèges, all the machinery required in the manufacture of coke and its by-products is now driven by steam raised in this way, and there remains a large surplus, which is used in the blowing-engines for the Bessemer process, for lifting charges to furnaces, etc.

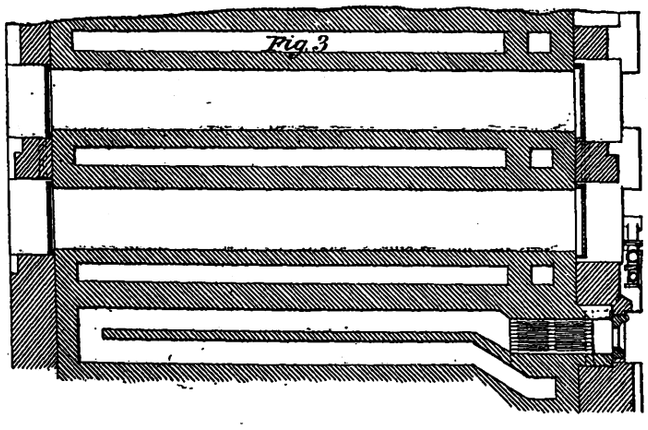
THE Delaware, Lackawanna & Western road has been opened for through traffic from New York to Buffalo. Officials of the company state that full schedule rates will be maintained. It is reported that the company will extend its Lackawanna & Bloomsburg Division from Northumberland, Pa., into the Clearfield region, and will also build a line between Wilkes-Barre and Scranton.

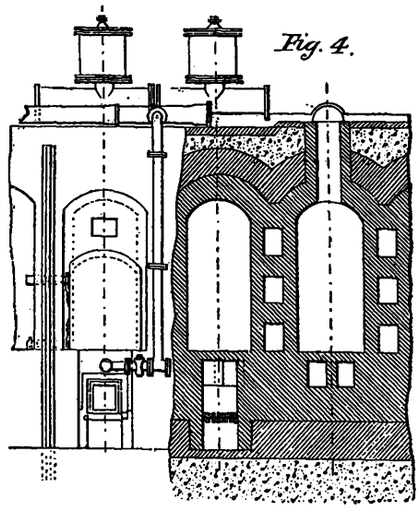
THE DEPHOSPHORIZATION OF PIG-IRON.

Under date of May 22d, the Patent-Office has granted Mr. James Henderson, of Bellefonte, Pa., a patent on the dephosphorization of pig-iron, from which we abstract the following:

The object of this invention is to free crude iron of phosphorus by an economical operation; and to this end the invention consists of a process comprising the following operations, namely, first, the decarbonization of the crude iron, in whole or in part, by the action of air upon it while in a liquid condition; second, the treatment of the partially or wholly decarbonized iron, while in the liquid or molten condition, with a calcareous reagent and an oxide of iron, as more fully herein set forth.

The crude iron to be treated is by preference melted in a cupola-furnace, such as is used for melting pig-iron in the manufacture of Bessemer steel. The melted iron is run into a Bessemer converter, which may be lined with the usual siliceous lining, commonly called "ganister." The air is blown into the melted metal in the converter in the usual manner practiced in the Bessemer process for decarbonizing the metal. The operation is continued by preference to the end of what is called the "third period" or "after the boil," at which time the carbon in the iron is reduced to about one per cent; but the operation may be continued to the "end of the blowing," when, practically, all of the carbon is removed. The decarbonized iron thus obtained is transferred to a ladle with a hole in the bottom, closed with a plug-stopper, and is permitted to run from the said hole into a spout which delivers it into the hearth of a reverberatory furnace, which is capable of being heated to the melting-point of wrought-iron, or higher. The kind of reverberatory furnace which I prefer to use for this purpose is a gas-furnace constructed with a revolving movable hearth which is capable of being revolved upon an upright axis when in the furnace, and of being applied to and removed therefrom, the fuel used in said furnace being preferably the gases evolved by the combustion of bituminous coal, which is burned by means of jets of heated air. The metal is heated in said furnace in contact with the basic reagents for a short period—say from ten to thirty minutes—when the lime is in the condition of fluor-spar, depending upon the smaller or larger portion of carbon remaining in the iron at the time of its introduction into the furnace; after which, a sufficient quantity of compounds of carbon, iron, and manganese—as spiegeleisen or ferro-manganese—is added to it for the purpose of recarbonizing the metal, as in practicing the Bessemer process. Then the metal is permitted to run from the furnace, and is cast into ingots in suitable molds.


Fig. 3.


Fig. 4.

The preferred mode of applying the reagents is to spread the compound of them upon the hearth of the furnace before the melted decarbonized metal is permitted to run into the furnace, and also to heat the compound until it becomes viscid; and I prefer that the hearth of the furnace should, previous to use, be lined with lime or other calcareous material, or with magnesia, or iron plates, as described in my English Patent No. 1051 of 1870, and in my United States Patent No. 106,365. By thus protecting the metal and the reagents from contact with silica, it is found that the work is accomplished better.

I prefer that the lime of the basic reagents shall be in the condition of fluor-spar, and that the oxide of iron shall be in the form of titaniferous iron ore, and that the relative proportions of the two shall be forty parts, by weight, of fluor-spar to one hundred parts, by weight, of titaniferous iron ore. The proportions of the reagents to be used may, however, be varied, and will depend upon the quantity of phosphorus present in the metal. If, for example, the phosphorus present is one per cent of the metal, the amount of fluor-spar and titaniferous iron ore required will be about three hundred-weight of the mixture of the two to one ton of steel; and if the phosphorus be present in less quantity, the quantity of the mixture of the reagents may be correspondingly reduced.

The reagents above described may be replaced by their substitutes. Thus, caustic lime or limestone may be substituted for fluor-spar weight for weight, and the titaniferous iron ore may be replaced by rich magnetic oxides or hematites as free from silica, sulphur, and phosphorus as possible. The use of an oxide of iron in conjunction with fluor-spar or its equivalent is deemed preferable to either fluor-spar or oxide of iron separately. When combined in use, the reaction will proceed more energetically, with a corresponding economy of time and saving in cost. The oxide of iron also protects the metal measurably from oxidation during the removal of the phosphorus.

The process above described is characterized by the dephosphorization of the iron after its decarbonization, and this is important, because if

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lime in the form of fluor-spar should be introduced into the metal while in the converter before decarbonization, the fluorine of the fluor-spar, by combining with a portion of the silicon of the iron, and carrying it off in vapor or in gas, would rob the metal of a substance (silicon) whose combustion by the blast is important for the purpose of keeping the melted metal at the requisite temperature, and the practical result would be the reduction of the temperature of the metal so low as to render the operation of casting it difficult. If, on the other hand, as above provided for, the metal be subjected to the action of the purifying reagent after the silicon has been consumed in the process of decarbonization, the temperature of the metal will not be reduced by the action of the purifying agent to any practical extent.

The additional heat applied to the melted metal in the reverberatory furnace during the treatment is advantageous. It obviates the risk of the metal becoming cooled by the too prolonged detention in the vessel in which it is treated, and also supplies the requisite heat to maintain the metal in a melted condition in case the heat which is inherent in it previous to treatment is not sufficient for that purpose.

It is understood that the operation of decarbonization, as carried on in a Bessemer converter, by means of injected jets of air, as above set forth, is attended with the desiliconizing of the metal, whereby the metal is substantially free from silicon, silicates, silicic acid, the presence of which would seriously interfere with the succeeding dephosphorizing operation.

What is claimed is—

1. The improvement in the art of manufacturing iron and steel, which consists in first decarbonizing the metal, while in a molten condition, by means of jets of air, and afterward treating the decarbonized metal, while free from contact with siliceous substances—such as the lining of the containing-vessel—with a calcareous reagent and oxide of iron, to remove the phosphorus.

2. The improvement in the art of manufacturing iron and steel, which consists in first decarbonizing the metal, while in a molten condition, by means of jets of air, and afterward treating the decarbonized metal with a calcareous reagent and oxide of iron, while the metal is maintained in in a liquid condition by the application of additional heat.

3. The improvement in the art of manufacturing iron and steel, which consists in first decarbonizing the metal, while in a molten condition, by means of jets of air, and afterward treating the decarbonized metal with a calcareous reagent and oxide of iron, to remove the phosphorus.

THE BASIC PROCESS AT STEELTON.

The *Bulletin* of the American Iron and Steel Association contains the following announcement in reference to the introduction of the basic process, the first news of which was published in the ENGINEERING AND MINING JOURNAL of May 5th:

The Pennsylvania Steel Company, having found it unnecessary to work its original Bessemer plant, on account of the large product of its new three-converter plant, determined to make a test of the basic process, and accordingly began two or three months ago to make such alterations in the old plant as would suffice to give the new process a practical test. The alterations consist principally of the change of a cupola into a calcining kiln for calcining the dolomite, arrangements for preparing the dolomite for use, and the molds requisite for putting the dolomite into place in the cupolas and converters. The preparations having been completed, a start was made on Monday, May 7th, 1883, and the first heat of basic steel ever made in this country was a decided success, the steel showing excellent physical tests, and was suitable for boiler plate, although not so low in phosphorus as other heats made later with a longer "overblow."

The dolomite was obtained from the extensive deposits at Chickies, Lancaster County, Pa., and the lime for the "additions" was from the immediate vicinity of the works. The pig-iron used was made at the Lochiel Furnace, under the supervision of the Pennsylvania Steel Company, of puddling-furnace cinder and South Mountain ores, and contained of manganese and phosphorus each about 2½ per cent, and of silicon about one per cent, being principally mottled in grade.

The process has continued regularly every day, and with very encouraging results. It may be expected that various difficulties and drawbacks will appear in time, as is usually the case in such experiments; but so far, the results have been very good. The steel has been subjected to very severe flanging and punching tests, and shows great fitness for many purposes, according to the carbonization obtained, in some respects excelling any former product at the works.

The Pennsylvania Steel Company is to be congratulated on this successful introduction of a process so important in its relations to our future history.

The editor of the *Bulletin* adds: Several specimens of the steel described above have been sent to the Philadelphia office of the Pennsylvania Steel Company, No. 208 South Fourth street, where we have had the pleasure of examining them. There are several bars, which have been broken, to exhibit in the fracture the characteristics of the steel. It presents a handsome appearance, fully equal to that of steel made by any other method. The label on one of the bars, which was taken from heat No. 1, states that the pig-iron from which this steel was made was smelted from one half puddling-furnace cinder and one half iron ore from South Mountain, Cumberland County, Pa.; the pig-iron contained 2½ per cent of phosphorus, 2½ per cent of manganese, and 1 per cent of silicon; the steel contained 0·04 per cent of phosphorus, 0·275 per cent of manganese, and 0·29 per cent of carbon. Some flat bars shown had been plunged in water when hot and then bent cold and hammered down flat without showing any fracture. But perhaps the finest sample on exhibition is a plate flanged hot, on which the flange is as perfect as if the material had been the best charcoal hammered plate iron. In other parts of the plate, holes were cold-punched without cracking the plate in the least, and in one case two holes were punched within one sixteenth of an inch of each other without cracking the intervening steel. These tests show very clearly the excellent quality of the basic steel made by the Pennsylvania Steel Company, and demonstrate that, so far as chemical and mechanical results are concerned, the basic process is a complete success.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

RECENT RULINGS OF THE GENERAL LAND-OFFICE.

Patents for Relocated Placer Claims.—"A" made application for sixty acres of placer ground in 1874; publication was duly made in June of the same year. Within the sixty days of publication, "B" filed a protest and adverse claim, basing it on priority of possession to about twenty acres. The courts rendered judgment in favor of adverse claimants. "B" subsequently abandoned the twenty acres, and afterward "C" relocated this abandoned portion. "D," the present applicant for patent, is now shown to be in possession of the entire sixty acres as originally applied for, having obtained his title by a chain of conveyances from the original locators, by sheriffs' deeds, and conveyances from the relocators of the abandoned portion. Now "D" proceeds under the application of "A" to obtain patent, and upon this statement of facts the Commissioner of the General Land-Office comments: "In the opinion of this office, this procedure of 'D' is irregular. His title to the twenty acres is through adverse interests and a relocation of property formally awarded to 'B.' Other persons may claim title also by virtue of a relocation, and the only way they could assert their rights would be under a new publication for that portion of the ground obtained by 'D' through the relocation of 'C,' and the filing by such persons of their adverse claim during the period thereof." In order to protect the rights of all parties, the commissioner is of the opinion that the entry of the present applicant "D" be canceled to the extent above mentioned, that is, for the twenty acres.

Fraudulent Coal Land Patents.—A patent for coal lands which a patentee obtains by falsely representing in his proofs that the same are agricultural in character is void, and will be canceled when the facts are properly brought before a court of competent jurisdiction. In all cases, however, the presumption is in favor of the regularity of the proceedings which led to the issuance of the patent, and the verity of the record can not be overcome by a mere statement "that at the time of location there was a vein of coal clearly observable cropping out on the surface." It is not the province of the General Land-Office to decide as to the validity of a patent in such a case.

Mining Claims in Unconfirmed Mexican Land Grants.—When the question was asked Whether a Surveyor-General would be authorized in surveying a mining claim within the boundaries of an unconfirmed Mexican grant, which grant had been reported to Congress for its action thereon, the reply was, after quoting the act of July 22d, 1854, and section 2319 of the Revised Statutes and the treaty of Guadalupe Hidalgo, that it has always been the policy of the General Land-Office to treat lands in this condition as reserved not only from sale but from exploration and location by mineral claimants.

Relocation of Abandoned Mining Claims.—When a mining claim is abandoned subsequent to publication and prior to entry and payment, a case would be presented in which the executive department would be compelled to take jurisdiction, because the law under that state of facts allows the abandoned land to be again located by any qualified person in the same manner as if no location of the same had been made, and makes no provision for the determination elsewhere of any question or controversy arising out of this class of conflicting claims.

Annual Improvements.—The fact that large expenditures have been at some prior period made upon a mining claim does not excuse the claimant from the necessity of complying with the law in making annual improvements or performing annual labor.

Appeals from Decisions of Local Offices.—When a mine claimant does not appeal from the decision of the local office adverse to him, the decision is not necessarily final. Where a party contestant, against whom a decision is rendered by the local officer, fails to appeal, the decision is regarded as final as to the facts, under the rules; but it is no violation of the rules in such cases for the Commissioner of the General Land-Office to set aside the decision of the local officers on account of conclusions reached under statutory provisions, such a course being pointed out and authorized by rule of practice No. 47, Subdivision 2.

A NEW PLAN OF UTILIZING BLAST-FURNACE SLAG.

Mr. A. D. Elbers, of Hoboken, N. J., who was prominently identified with the utilization of blast-furnace slag in the manufacture of mineral wool, has come forward recently with a plan for the conversion of mineral wool into silicates previously desulphurized, to be used in the manufacture of china cement, pigments, and absorbents. Mr. Elbers gives the following details in regard to his method, a patent for which has been applied for:

The suitable raw material is uni-silicate or neutral slag, the composition of which contains the usual percentage of sulphur in soluble compounds. The first and well-known operation is the reduction of the slag to a finely fibrous condition, by subjecting it, while in the fluid state, to jets of steam. While the steam divides the fiery mass into fibers, it also slightly reacts chemically on the sulphur compounds, whereby the fibers become predisposed to further reduction. The second operation is the roasting of the now fibrous and very voluminous slag, until no further evolution of sulphurous acid vapors takes place, whereby the opening of the fibers and the reuniting or fritting together of their constituents—freed from sulphur—is accomplished. The fibrous slag has been changed to a granular substance of purified composition; if the heat is increased after this change has taken place, the result will be a fused mass of desulphurized slag; and if too much heat is applied before desulphurization, the fibers will be re-melted into fused slag of the original composition.

A Hessian crucible is filled with the wool, and is then placed in the fresh-glowing coal fire of a stove or range, and allowed to remain there about an hour. It will then be found to contain, beginning at the bottom:

1st. Fused desulphurized slag, forming the crust of:
2d. A fritted porcelain-like mass, often spotted with iron oxides.
3d. A mass of whitish, soft silicate, containing some impurities.
4th. Greenish, sensibly sulphurous, partly opened silicates.
5th. A spongy, dark mass, in which the fibers are yet discernible.
6th. On top: nearly unchanged mineral wool.

By re-heating No. 4, No. 3 is obtained; Nos. 5 and 6 may be reduced in the same ratio; and if the heat is just sufficient, the whole charge may be

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converted in one heat to the most desirable condition, which for most purposes is that of the No. 3 specimen.

This desulphurized and easily friable silicate is finely pulverized, and after being purified by washing, is then ready for use in the arts, as slag-silicate of lime, alumina, and magnesia. Its color, according to Mr. Elbers, is white; if it has a darker shade, it may not have been thoroughly desulphurized, as the testing with acid will show. Mixed with water only, the silicate may be cast in molds, but it will scarcely be sufficiently plastic to be formed by hand, unless clay is added. The plasticity of the silicate may, however, be brought to a high degree after treatment with diluted sulphuric acid, and if the acid solution is not used to excess, it is presumable that its chemical action will be mainly confined to the formation of sulphate of lime and to the proportionate setting free of silica. For quick preparation, the silicate is sparingly moistened with a strong solution of four parts by weight of water to one part of acid, when the formation of sulphate of lime is readily noticed. After slight stirring and quick washing with more water, the latter is drawn off until the mixture becomes lusterless and apparently nearly dry. It is then ground for about a minute in a mortar, the luster reappears, the mass becomes viscid, like putty, and can then be formed and air-dried at ordinary temperature. If the mass contains unneutralized acid, is put away for weeks, then broken up, soaked in pure water and worked over, its plasticity and fineness have increased. The hard-fritted and the partly fused specimens (No. 1 and No. 2) are not easily attacked by acids, but after mixing in finely ground or sand-like condition, cementation will set in gradually and the mass will become very hard.

THE COPPER INDUSTRY OF FRANCE.

M. Paul Trasenter, the eminent physician of Liége, sends us the following table of the official statistics of the copper industry in France, it being, we believe, the first time that the data referred to have been gathered in so complete and comprehensive a form. It is unfortunate that the plan of collecting these statistics has been repeatedly changed; but M. Trasenter's notes bring order into the chaos. As for the ore mined, the figures include the French and Algerian mines. From 1861 to 1869, inclusive, the poor pyrites of Chessy and Saint-Bel in the department of the Rhine have been included; but they can not really be considered copper ores, and the third column shows that they were not worked for copper. The columns giving the imports of copper and iron unfortunately jumble both together; for later years, they appear to be the aggregate of imports of black copper and of ores. Until 1878, the figures for the production include the output of those works which produced manufactured copper from imported ingot. During the three years 1876 to 1878, the production of brass was not ascertained, and since 1879 the official French statistics only include the product of actual metallurgical operations; that is, the metals abstracted from ores and mattes received from Chili and other countries. With these explanations, the official statistics will be better understood:

	Production of French Mines.			Imports.		Products Worked.	
Year.	No. of workmen.	Ore mined. Tons.	Worked for copper. Tons.	Raw copper. Tons.	Ore. Tons.	Copper Tons.	Brass, etc. Tons.
	1.	2.	3.	4.	5.	6.	7.
1850	59	5,030	.....	6,670	.....	880	.....
1851	63	5,620	.....	8,150	.....	1,920	.....
1852	108	9,290	.....	8,770	.....	1,920	.....
1853	125	8,760	1,710	920	4,600	4,920	.....
1854	153	6,210	5,720	2,120	7,400	6,630	.....
1855	240	9,290	11,700	2,320	6,930	7,190	.....
1856	288	12,370	12,120	3,730	6,030	7,270	.....
1857	243	11,260	11,200	3,430	6,040	7,110	.....
1858	212	12,000	12,000	2,800	6,230	8,250	.....
1859	?	?	11,250	7,620	2,900	8,830	.....
1860	327	16,220	10,370	4,680	4,330	6,440	2,030
1861	664	46,540	14,300	6,430	5,540	7,070	4,340
1862	734	49,830	4,370	6,920	6,620	6,750	5,870
1863	777	70,870	12,020	8,788	7,180	7,680	7,080
1864	811	90,820	26,540	10,680	5,340	10,120	6,290
1865	731	70,910	15,485	16,900		9,950	8,260
1866	643	73,370	15,730	18,340		10,110	9,120
1867	768	75,500	15,930	19,340		4,880	15,130
1868	748	81,130	13,730	20,090		7,490	14,500
1869	745	92,520	15,730	25,670		9,500	12,340
1870	161	4,910	8,540	23,220		6,570	11,160
1871	211	6,750	11,590	28,430		7,470	13,650
1872	223	7,650	32	28,570		6,220	15,220
1873	200	2,500	.....	21,990		9,720	11,910
1874	571	6,930	934	30,520		11,260	11,700
1875	636	9,750	2,054	33,770		11,470	12,600
1876	980	13,620	5,900	15,980		6,640	.....
1877	....	12,200	5,000	16,070		7,110	.....
1878	448	7,490	4,820	17,140		8,400	.....
1879	...	7,030	.....	10,000		3,350	.....
1880	998	12,800	.....	11,370		3,300	.....
1881	900	16,750	.....	15,600		*3,395	.....

* And 730 tons matte.

M. Trasenter, by carefully going over the figures since 1869, has compiled the following estimate of the production of copper in France, including that from foreign mattes. The column for ores in 1880 and 1881 includes about 7000 tons of poor ores from the Alps Maritimes:

Year.	Production of ore, tons.	Production of copper, tons.
1869	490	1 500
1870	688	2,100
1871	1,492	2,720
1872	1,491	2,600
1873	2,432	2,140
1874	6,008	2,000
1875	8,698	2,300
1876	7,724	2,230
1877	6,306	2,330
1878	2,668	3,500
1879	548	3,350
1880	8,649	3,300
1881	8,170	3,395

DRIVEN-WELL PATENTS.

The Federal Court of Des Moines, Iowa, on the 19th inst., rendered an opinion on the question of the validity of Nelson W. Green's driven-well patent, a case that has been pending for some time. The court holds that there are two well-established instances of prior use of the principle involved in this patent, one of them being at Independence, Iowa, where a well was sunk in the early summer of 1861, and the other at Milwaukee, where a large number of them were put down as early as 1849, the patent to Green not having been issued till 1868, and the application of the principle not having been discovered and put into use by him until after the well at Independence was proved a success. The court holds that Colonel Green made no effort to prevent the use of his discovery by the public for about seven years, and it is upon this showing, more than the fact that the Iowa and Wisconsin wells antedated Colonel Green's discovery and application of the principle, that the patent is held void. The court also held that the issue was void for the reason that it set out a broader claim than was contained in the original patent. Over three hundred actions, principally against farmers, for damages, were pending in this court on this patent. Many more had confessed judgment and settled at heavy costs, and still others had paid the royalty exacted by the drive-well agents, who, a few years ago, swarmed over the Iowa prairies hunting up causes for action. So annoying had these persecutions become that a defensive alliance of farmers was formed, and many defended their premises with shot-guns against the incursions of drive-well agents, and in several instances mob law was threatened. The result was an appeal to the courts, with the result as announced. If sustained by the Supreme Court, the farmers of the Northwest will have gained a signal victory over a hitherto most exacting monopoly.

At the recent hearing in Iowa, Judge Nelson, of the United States Circuit Court of Minnesota, and Judge Love, of the United States Circuit Court for the Northern District of Iowa, sat with Judge Shiras. Judge Love concurred in Judge Shiras's decision and Judge Nelson dissented. The appeal will not bring these cases before the Supreme Court of the United States for the first time. When the hearing in Iowa began, an appeal taken by the farmers from a decision made by Judge Gresham, of Indiana (now Postmaster-General), was pending in Washington, the case being that of Wahl *against* Hine. Only eight of the Supreme Court justices sat at the hearing of that appeal. The court was equally divided, four justices being on one side and four on the other, so that the Supreme Court must try again. An appeal from the New Jersey District will probably be reached before the appeal which will go up from Iowa. In the mean time, the patentee's application for an injunction prohibiting the Indiana farmers from using their wells has been denied. The conclusions of fact found by Judge Shiras are these: That Colonel Green, in 1861, being then in command of the Seventy-sixth Regiment of New York Infantry, put his method of driving wells into public use, for the benefit of his regiment, thereby abandoning his invention to the public; and that his invention was in open and public use, with his knowledge and acquiescence, for more than four years before he applied for a patent thereon. In these four years the public acquired rights through the open and uninterrupted use of the discovery. Judge Shiras holds that it necessarily follows from these conclusions of fact that both the original and reissued letters patent are invalid and void.

A NEW FIRE-PROOF MATERIAL.

The *Manufacturer and Builder* prints the following: Our attention has lately been drawn, by reason of some quite remarkable tests of its efficiency, to a new and, in many respects, novel fire-proof material, adapted to a great variety of uses, which is manufactured by the Magneso-Calcite Fire-Proof Company, of Boston, Mass. The company takes its name from that which it has adopted to describe its fire-proof composition. From the nature of the materials which it proposes to use, and its methods of applying them, we are not surprised to learn that the company has succeeded in producing a fire-proof material of decided merit.

Of the varied uses and applications of a material, thoroughly fire-resistant and susceptible of being produced in any shapes or forms that may be desired, quite an article might be written. But it will suffice for our purpose here to enumerate simply some of the more prominent of these. The most obvious and pressing need of a material that shall be thoroughly fire-proof is for the lining of safes and similar receptacles of various sizes and shapes intended for the preservation of money, bonds, deeds, important documents, diamonds, jewelry, and other valuables. In addition to the foregoing, there is a wide field of utility open for a heat-resisting material that can be adapted to miscellaneous uses in rendering buildings more secure against fire. Among these uses may be mentioned the lining of floors, shutters, partitions, elevator shafts and hallways, boiler rooms in mills, factories, steamboats, etc., and similar uses too numerous to mention. And it goes without saying, as the French put it, that a fire-proof material that is not too expensive, that is susceptible of being produced in such shapes and forms as to be applicable to all these and other uses, and that will answer its intended purpose efficiently, is an eminently useful material. Such a material, accomplishing not only all these objects, but many others not enumerated above, cheaply and effectively, the manufacturers of the so-called "magneso-calcite fire-proof material" claim to produce, and in substantiation of their claim present a very convincing array of testimony.

We prefer in our references to the material, however, to base our remarks on the character of the material itself, preferring to let this tell its own story. The so-called magneso-calcite material is prepared by treating finely fibrous asbestos, slag-wool, or other fibrous and incombustible materials, by suitable methods of impregnation, either wet or dry, with a cementing substance composed of a mixture of lime and magnesia (whence its name), and a silicate of soda, or its equivalent, and then subjecting the material in suitable forms to more or less pressure. The resulting product is a combination of non-combustible materials, which, when ready for use, takes the form of a hard board of any desired size and thickness, both sides of

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which are covered with asbestos cloth. Any desired number of these boards are then joined together by a fire-proof cement of magneso-calcite and silicate, the whole forming both a heat-insulating and a fire-resisting body susceptible of the most diverse applications. As nothing but incombustible substances are employed as the basis of this product, the cementing material (magnesia and lime) being principally composed of the most refractory materials known to science, there can be no question that the product is thoroughly fire-resistant; and as these materials are at the same time excellent non-conductors of heat, the product must be to an eminent degree also an insulator of heat.

The company engaged in the manufacture of this product applies it to the construction of fire-proof receptacles of great variety, such as fire-proof safes and safety-boxes, express chests, bond, note, and jewelry cases, and the like, for which, in addition to economy of weight and space, it claims a very superior degree of protection. As an example, it specifies that one of its safes, standing 35 inches high and weighing only 650 pounds, corresponds in interior space with the ordinary cement-lined safe 45 inches high and weighing 1300 pounds.

In addition to the application of the material to the special branch of manufacture just mentioned, the company recommends, and is applying it, as a lining for vaults, shutters, partitions, elevator shafts, and hallways; for incasing boilers, fire-rooms in dwellings, stores, and steamboats; covering steam pipes, etc., for all of which uses its eminent fire-resisting and heat-insulating qualities, and its adaptalbiity to be readily produced in any desired or required form or shape, enable it to be used with advantage.

GEOLOGICAL NOMENCLATURE AND COLORING.

The following stratigraphical divisions have been provisionally adopted by the International Commission of the Geological Map of Europe. The colors placed against them are those proposed by the directors:

1. Gneiss and protogine. Bright rose-red.
2. Crystalline schists (mica-schists, talc and chlorite schists, amphibole schists, and foliated gneiss). Medium rose-red.
3. Phyllites (argillaceous schists, Urthon-schiefer). Pale rose-red.
4. Cambrian (all fossiliferous beds below the Llandeilo flags; primordial fauna, Taconic). Reddish gray.
5. Silurian, lower fauna (second of Barrande). Dark silk-green.
6. Silurian, upper fauna (third of Barrande). Light silk-green.
7. Devonian, lower. Dark green-brown.
8. Devonian, middle (limestone of the Eifel). Medium green-brown.
9. Devonian, upper. Light green-brown.
10. Carboniferous, lower (culm, mountain limestone, etc.). Blue-gray.
11. Carboniferous, upper (houllier, millstone-grit, etc.). Gray.
12. Permian (dyas), lower (Rothliegendes, etc.). Burnt sienna.
13. Permian (dyas), upper (Zechstein and equivalents). Sepia.
14. Trias, lower (grès bigarré). Dark violet.
15. Trias, middle (Muschelkalk). Medium violet.
16. Trias, upper (Keuper and equivalents). Light violet.

16'. *Rhetic*, provisionally (Hauptdolomit excluded).

17. Jurassic, lower (lias). Dark blue.
18. Jurassic, middle (Dogger, kellovien included). Medium blue.
19. Jurassic, upper (Malm with tithonic and Purbeck). Light blue.
20. Cretaceous, lower (Neocomien and Wealdian). Dark green.

20'. *Gault*, provisionally.

21. Cretaceous, upper (from the cenomanien). Light green.
22. Eocene (nummulitic, etc.). Orange-yellow.

22'. *Flysch*, provisionally.

23. Oligocene (with the aquitanien). Dark yellow.
24. Miocene (Mollasse). Medium yellow.
25. Pliocene. Light yellow.
26. Diluvium. Naples yellow.
27. Alluvium. White.

The subdivisions "Rhetic," "Gault," and "Flysch," whose affinities are doubtful, will be figured separately in the preparatory work, so that they can finally be joined either to the upper or lower formation, according to the decision reached by the commission of nomenclature.

MR. JOHN H. JONES, the official accountant, has published the following very interesting statement, showing the general distribution of anthracite coal in the year 1882:

	Tons.
To Pennsylvania, New York, and New Jersey	19,057,789
To New England States	5,064,775
To Western United States	2,213,107
To Southern States, including Delaware, Maryland, and the District of Columbia	1,168,730
To Pacific coast	49,065
To Dominion of Canada	616,875
To foreign ports	49,735
	29,120,076

It will be noted that as yet the Western business is comparatively unimportant, so far as the quantity shipped to that quarter is concerned. This year, however, we have every reason to believe will see a very notable increase; in fact, there must be, in order to keep the trade in other sections in a fair condition. It is questioned by many whether the East and South will take their regular quota due to the natural increase in consumption, roughly estimated at 5 per cent per annum, because the prospects for the iron trade and manufacturing generally are poor. The West will therefore have to take care of the tonnage thrown upon the market by the growing production, and upon the marketing of this surplus will depend to a considerable degree the future of the trade this year.

A SHAREHOLDER'S ANSWER TO A CALL.—The secretary of an Indian gold mine, having sent an imperative demand to a certain shareholder for the payment of a "call," received, says *St. Stephen's*, the following reply: "Dear Sir: I have your letter of this date, and note that your directors propose to proceed against me. Your prospectus stated that one of the objects of your company was to 'seek, win, and work gold in India and elsewhere.' Things not turning out well in India, your directors apparently consider it their duty to seek, win, and work gold 'elsewhere'—that is, out of me. I can assure you, however, that I am not in an auriferous vein; the only lode I possess is a load of debt, and as a gold mine I shall be a failure. Your prospectus estimated a yield of one ounce of gold per ton on thirty thousand tons of quartz crushed per annum—£10,500 sterling per annum. You may 'crush' me, but you will find that I will not yield nearly so much. My person (which, for the purposes of this calculation, may be considered quartz) weighs, roughly speaking, ten stone, and, if crushed immediately, I estimate that it would yield as under—Gold *nil*, silver 3s., copper 4½d.—total, 3s. 4½d. Deduct cost of crushing—say, £5 5s. Yours faithfully, ——."

FURNACE, MILL, AND FACTORY.

The stockholders of the Palmer, Mass., Wire Company have voted to increase the capital stock from $100,000 to $150,000, the original stockholders having the privilege to take the new at par. The company is overrun with orders, and the mill is busy night and day.

The Novelty Foundry Company, says the Youngstown (Ohio) *Register*, is the name of a new company which is engaged in perfecting an organization, and it is the intention to begin active operations the coming week. Among those engaged in the enterprise are Messrs. John Sampson, S. L. Clark, J. C. Brenneman, M. E. Rice, and F. W. Clark. The company is located on East Federal street, occupying property formerly held by Jones & Claypool. It proposes manufacturing all kinds of iron and brass castings, car-wheels, and coal-bank cars. Mr. M. E. Rice, a practical man of many years' experience, will be superintendent of the works.

On the 13th of June, the Gaylord Rolling-Mill at Portsmouth is to be sold at public sale. The Ashland (Ky.) *Independent* says that there is a movement on foot to procure its removal to that city, and it is among the probabilities that this will be done.

The Tod furnace, owned by the Brier Hill Iron and Coal Company, Ohio, which is relining, will be put in blast early in June, if the state of trade warrants it.

The sheet-iron department of the Ward mill, Ohio, at New Philadelphia, has been placed in operation. William E. Ward, of Niles, is manager of the new mill.

The Johnstown *Tribune* says: Mr. Frederick Krebs, Jr., Superintendent of the Gautier Steel-Works, has in his office a steel knot which will excite the admiration of the more intelligent and practical visitors at the Great Railroad Exposition, now opened at Chicago. The steel is round, and one inch and an eighth in diameter. To turn, twist, and tie it was no easy task. Mr. Benjamin Hinchman, one of Mr. Krebs's assistants, was given the work to do, and after some study he succeeded in rigging up a machine which took the rod and tied it into a very pretty knot, tightly drawn—the knot being seven or eight inches long and four or five inches through. This was a very severe test of the quality of the steel, but it stood it without the slightest crack appearing on its surface.

The *Bulletin* is informed that on the 17th of last month the Pennsylvania Steel Company's rail-mill made an unusually large run. During the twenty-four hours, 681 gross tons of 60-pound steel rails were rolled; and during twelve hours of the same day, 356 tons were rolled. The last turn of eight hours rolled 240 tons. The daily average for the week was over 614 tons. The average daily production of Bessemer steel ingots in the same week was 797 gross tons, while the largest twenty-four hours' run was 820 tons. One turn of twelve hours produced 458 tons of ingots.

The Dickson Manufacturing Company, of Scranton, has been awarded the contract to furnish the Calumet & Hecla Mining Company, of Lake Superior, Mich., with a steel boiler 90 inches in diameter, 36 feet in length, and to carry 150 pounds pressure. The total weight of this boiler will be 108,000 pounds, and the castings for it will weigh 10 tons. It will have 199 3-inch tubes. It is to be made of ¾-inch steel plate furnished by the mining company to the Dickson Manufacturing Company, after testing every plate prior to delivery. The boiler was designed by Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass.

The Pennsylvania Graphite Works, at Byer's Station, on the Pickering Valley Railroad, owned by the Messrs. Young, of Reading, which have been standing idle for several months, are to be put in operation again about the 1st of June. The company disposed of its works some time ago, and since then they have been in litigation. Matters have now been settled, and the works will soon be put in operation.

At San José, the sheriff sold the Guadalupe quicksilver mine on the 8th inst., to satisfy the judgment recently obtained by Flood *et al.*, executors of the last will of William O'Brien, deceased, in the Superior Court. Sixteen thousand shares of the capital stock brought 3-1000 of a cent per share. The first parcel of land, containing 1109·67 acres, brought $100,000. The second parcel, containing 1032 acres, brought $25,000. Total purchase-money, $125,048. Marie Coleman was the purchaser. The sheriff's costs and commissions amount to $1299.98.

The large "coke-pusher," building at Scott Foundry, Reading, for Robert H. Powel, Powelton, is nearly finished, and temporary shedding has been erected in the yard of the works, under which the machinery is being put together. The coke-pusher will be operated by two engines. A blowing-engine for the Powelton Furnace is also building at the Scott Works.

The Colliau Furnace Company, of Detroit, has now about 100 of its cupolas at work. They are now used by the Michigan Car-Wheel Company, of Detroit; the Pullman Car-Wheel Company, of Pullman, Ill., and a number of other establishments.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

A dispatch from Tombstone, dated May 21st, says: The Copper Prince Mining Company has closed its case against the Copper Queen in the District Court. The defense will occupy most of the present week. Experts Rolker and Blake, of New York, are on the case. Copper Prince miners began to work on Copper Queen ground Saturday night, in order to prove the dip of the ledge, but were ejected by force of arms.

A dispatch dated May 24th, says that in the case of the Copper Prince against the Copper Queen Mining Company the jury gave a verdict for the plaintiff. A stay of proceedings for sixty days has been granted, pending a motion for a new trial.

The Copper Queen product for May will probably be about 350 tons of copper.

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TOMBSTONE DISTRICT.

GIRARD.—Messrs. Disston and Lloyd, from Philadelphia, principal owners of this mine, are at Tombstone, preparing to start up work in the mine and mill again.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended May 12th shows: Ore crushed, 163·44 tons; average assay value of pulp, $36.66 per ton; of tailings, $4.65. West cross-cut, 1000 level, is 226 feet long. North drift from east cross-cut, same level, is 116 feet long. North drift, 800 level, is in 446 feet. Winze No. 5 is 16 feet deep, and the vein in the bottom is somewhat better concentrated than where the winze was started. North drift from winze No. 6, 672 level, is 135 feet long, and south drift from same winze, at the 640 level, is 100 feet long.

STANDARD.—An accident at the mill May 17th completely ruined the engine. It will take a month to replace the engine. The Standard-Bulwer Mill is running regularly on Standard ore. A later dispatch says that a temporary engine is to be placed in the Standard mill, and crushing will be resumed within a week. For the week ended May 23d, 1203 tons of ore were extracted. The vein in the 1000 level is 2¼ feet wide and looks well. The upper levels yield the usual quantity of ore. The Standard mill has resumed crushing.

CANADA.

PROVINCE OF MANITOBA.

BRITISH AMERICAN.—Miners are already engaged and are prepared to go to work as soon as navigation opens.

MANITOBA CONSOLIDATED.—Work is progressing favorably, but only a small force of men are at present employed.

RABBIT MOUNTAIN.—The stamp-mill will be in operation shortly. Operations at the mines are pushed vigorously.

NOVA SCOTIA.

OXFORD.—Mr. Frederick De Camp has been appointed general manager and superintendent of this company, whose properties are situated at East Chezzetcook. The company is now prospecting for another rich lode, of which there are indications in the locality of their present workings.

ONTARIO.

WALLB RIDGE.—Mr. William Coe, of Madoc, has purchased this hematite mine from the Bethlehem Iron Company.

COLORADO.

CLEAR CREEK COUNTY.

From the glowing reports received of the recent strike of carbonates on Lincoln Mountain, we learn that some of the ore is so rich in silver that pieces roasted in a camp-fire and allowed to cool were covered with fine silver globules. On the mountain, in places where trees had been blown down, large chunks of ore were exposed, which would weigh from three to forty pounds. In different places, it crops out of the ground two or three feet. About forty claims are taken up, all showing ore which seems to lie in strata, slanting with the surface of the mountain side. The elevation is about 9000 feet.

BLACK BEAR.—This tunnel has reached the depth of 170 feet. Mill-runs of this ore have been made, showing 600 ounces in silver, 1 ounce gold, and 4 per cent copper. There is now a pay-streak of 10 inches. It is the intention to continue the tunnel to 200 feet and then sink on the vein.

EAST HUKILL.—The mine has now reached 120 feet in depth, and shows a well-defined crevice 5 feet between walls, with a pay-streak of 16 inches. At a depth of 100 feet, levels are run east and west. Mill-runs of the ore give $70 in gold, $45 in silver, with 10 per cent in copper.

MAYFLOWER.—Draining the shaft has begun.

DOLORES COUNTY.

RICO REDUCTION COMPANY.—Repairs and improvements at the lixiviation works are making, and preparations for a season of increasing work are going on.

FREMONT COUNTY.

HUB.—Shipments have been made to Argo of ore which carried as high as seventy per cent copper and from forty to sixty ounces of silver to the ton. There is a large amount of ore now on the dump, and considerable will be shipped during the season. Machinery for the treatment of copper is understood to be on the way, and will be added to the plant of the Cañon City smelter. The mine is only eight miles from the Denver & Rio Grande Railroad and thirty-five miles from Cañon City.

LAND INVESTMENT, COAL AND OIL MINING COMPANY.—A report made to this company shows that the oil as taken from the well presents a uniform gravity of 30° Beaumé. Work on the well is rapidly pushed. The hole is enlarging to 8⅝ inches, and will be run to a depth of 1400 feet. The casing will be placed in position this week, and the tubing and pump next week. Pumping will be begun by the 25th, or at the latest by June.

GILPIN COUNTY.

GOMER.—Work has been resumed. Developments of the vein are made by drifting east from the main shaft at the depths of 60 and 100 feet.

RED CLOUD.—Preparations are making to start up this mine again.

ROLLINS.—The company will begin building a fifty-stamp mill very shortly. The mill will be connected with the Perigo and the company's other mines at Gold Dirt by a tramway three miles in length. The company thinks that the water-power there, available the year around, will more than compensate for the extra cost of transportation. There is ore enough in sight on the Perigo to run the new and the old mill for two years.

WYANDOTTE.—Parties are leasing on the Crawford County mine, the property of this company. Levels are driven both ways from the shaft and backstopes driven.

GUNNISON COUNTY.

MOFFATT SMELTER.—The proprietors are engaged in the construction of sufficient furnace capacity to handle all the ore that will be shipped to Gunnison. The owners say that if necessary they will double the capacity of the largest smelter in the State to accommodate the demands. By June 12th, this smelter will be in full blast. The Bartlett process of utilizing the fumes is used here.

OAKES.—This mine has been sold to Boston parties for $10,000. It is developed by a shaft eighty feet deep and a tunnel 360 feet long.

ROSE & REED.—Reports state that this concentrator will be running within two days.

LAKE COUNTY.

Late Leadville exchanges report the following:

The Hamburg, Lowland Chief, Grand Prize, Curran, and Chemung, all situated upon Breeze Hill, and adjoining the Highland Chief, have recently been consolidated. In the consolidation are Messrs. Tankersley, O'Connor, Billings, Beaudry, and Senator Plumb, of Kansas. This concentration of some of the most promising interests in or about the camp was the result probably of the litigation which has involved the owners for a long time, and which, of course, prevented them from proceeding with the development of their properties. The Hamburg and Curran both show an ordinary grade of mineral and are worked on a lease. The rest of the shafts are in a good contact, and machinery will be placed upon them at once, preparatory to an active campaign.

BROOKLAND.—The suit of the St. Bernard Mining Company against this company, for a temporary injunction, has been denied. Development-work has been resumed, and shipments will soon be commenced.

CLIMAX No. 6.—The lessees have opened up in two drifts in their uprise a body of iron about seven feet in thickness, which averages fifteen ounces in silver and from four to six per cent in lead. Above this iron are five feet of flint or carbonate, which is similar to that carrying the chlorides in the Dolphin and Lee. Both the iron and carbonate lie in the upper contact, between the wash and the porphyry, and are of the same nature as the iron in which the rich ore-bodies in the Montana shaft on the Climax have been found.

HARRISON REDUCTION-WORKS.—The rebuilding of the works, recently destroyed by fire, has been commenced. It is expected that the smelter will be in operation again within sixty days.

LITTLE CHIEF.—The central portion of the property has been leased. The royalty is said to be fifty-two per cent.

IRON SILVER.—Work on the Iron Hat, one of the properties of this company, which has lately been leased, has been commenced. The shaft is clearing up and getting in order. A body of ore eighteen inches thick, which carries sixty ounces silver and forty per cent lead, is exposed in the property.

SILVER CORD COMBINATION.—The report presented at the annual meeting shows the product and the operations of the company for the past year to have been as follows:

Tons of ore produced	34,873
Ounces of silver	561,057
Ounces of gold	3,216
Tons of lead	7,417
Total value of production	$1,009,187.06
Cost of mining	$308,673.75
Cost of smelting	329,406.98
Administration and handling	49,510.40
Total	$687,591.13
Gross profits	$321,595.93
From this amount deduct cost of improvements	14,346.95
Payment floating debt	4,377.23
Incidentals and purchase real estate	7,433 50
Payment outstanding bonds	169,625.00
Payment coupons on bonds	9,821.05
Total	$205,603.73
Cash in treasury April 1st	$115,992.20
Net profits for April	45,028.99
Balance on hand May 1st	$161,021.19
Dividend paid May 2d	90,000.00
Balance	$71,021.19

This shows a cash surplus now on hand of $71,021.19, besides the profits of the present month. The new opening in the mine, including drifts, levels, inclines, winzes, and uprises, shows a total of over 6100 feet. The following gentlemen were elected directors: J. B. Grant, T. S. Wood, B. Burchard, Charles T. Limberg, W. W. Weigley, Charles H. Gross, W. Mitchell McAllister, Robert C. Broadbent, and William A. Dripps.

STONEWALL JACKSON.—The face of the upper drift shows a body of chlorides and galena which has reached a maximum thickness of two feet. Contracts have been made with the Royal Gorge smelter, at Cañon City, and regular shipments will be made from now on. There are several large bodies of low-grade ore known to exist in the mine, and prospecting will be vigorously prosecuted.

SAGUACHE COUNTY.

ESPERANZA.—This mine, on Crystal Hill, is the first discovery of the district. The ore is a manganese, which carries large quantities of free gold. The vein is a fissure, from 12 to 15 feet wide, with side-walls of graphite and porphyry. The workings consist of a shaft 55 to 60 feet deep and an open cut at another place of 30 feet. The ore mill-runs from 5 to 20 ounces gold and from 20 to 100 ounces silver per ton. There are about fifty tons of ore sacked in the ore-houses awaiting shipment.

SUMMIT COUNTY.

COLORADO & NEW MEXICO.—This company has a claim on Mineral Hill, into which it has driven a tunnel 730 feet, and has struck a vein of very rich ore not over a foot in width, which assays high in silver.

GRAND VIEW.—This property, consisting of three claims, is developed by a 49-foot shaft. The ore assays 25 ounces silver and 73 per cent lead. These mines will be worked during the season, and ore will be shipped within a short time.

ROBINSON.—A reporter of the Leadville *Democrat* states that the mine is showing an improved condition. For the month of April, there were shipped ninety-two car-loads of ore. Considerable ore is mined from the seventh and eleventh levels and a small amount from the fifth. The ore from the bottom yielded over 35 ounces to the ton. The cost of transportation and treatment at Argo is $20.50 per ton. This yields, therefore, over mining, smelting, and hauling, from $12 to $15 per ton. The company receives thirty per cent of the smelter's returns, and Mr. Greer, the lessee, from the balance has to pay all expenses. The mine yielded a net profit last month of over $6000, and is now doing much better. Mr. Greer is experimenting by the dry process of concentration on these ores. He expects to ship during this month upward of 1000 tons of ore. The ore from the twelfth level down to the bottom of the lower levels is now all hoisted through the east shaft. The ore from the upper levels is taken out of the tunnel as heretofore. There are sixty-five men employed in the mine, and though there is considerable water coming into the mine, no trouble is anticipated or yet incurred in handling it. The new incline is rapidly driven, three shifts of eight hours each being employed. The incline progresses at the rate of two feet per day.

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DAKOTA.

The recent floods, caused by the rain-storm and the melting of the snow which had fallen a few days before, damaged much property in and around Deadwood. Several mills along Deadwood Gulch were destroyed, and the damage to the mines, it is stated by a dispatch, can not be repaired for several weeks. The Homestake mine has nine feet of water over it, and all the mines in the neighborhood of Deadwood are shut down. The Garden Gate and South Bend are washed out, and most of the bridges through the country have been swept away. The total loss is reported to be very large.

CALEDONIA.—The superintendent reports for the week ended May 6th: Ore produced, 1025 tons; bullion shipped, 838 ounces. Winze advanced 10 feet; total, 118 feet; looks more encouraging as depth is attained. The stopes are looking fine.

FATHER DE SMET.—The superintendent's report from May 1st to May 8th shows ore extracted from the first, second, and third levels to be 1900 tons. Ore milled, 1950 tons. North end tunnel advanced 6 feet. Tunnel in 890 feet. Golden Gate north header advanced 6 feet. Header in 100 feet.

The superintendent writes, under date of May 14th, as follows: Herewith express company's receipt for Bar No. 158 = 914 ounces gold, the result of run of mill for last half of April. In the beginning of April we began to work in open cuts, supposing the weather would be favorable for such work; but instead of fine weather, we have had more snow than for any month of the year, consequently we have been compelled to get ore from any point where it could be mined the easiest. Every thing about the mine and mill is running well, and we shall do better in May than we did in April. We have some very coarse screens coming from Chicago, which I want to use as soon as the weather is favorable for handling ore cheaply.

NEW YORK & PROVIDENCE.—This mining, milling, and smelting company, recently organized under the laws of the State of New York, with a capital of $200,000, has taken possession of some valuable mining property in the Black Hills, Pactola District. The company owns the May Queen, Black Hawk Nos. 1 and 2, Mammoth, and the Rob Roy. All these claims show up a large body of low-grade ore which can be milled at a profit.

MEXICO.

The Cusihuiriachic Mining Company has ordered of the Rankin, Brayton & Co., Pacific Iron-Works, San Francisco, a 60-inch Howell-White chloridizing furnace, to be delivered on the cars in twenty-one days from the date of order.

According to the Mexican *Financier*, the famous iron deposit in Durango, better known as the Iron Mountain, is about to be systematically worked by a strong American company. The syndicate is composed of Judge Helferstein, of New York, as president, with Governor Francisco Paricio, of Durango, Joseph Knotts, of Iowa, MacManus & Sons, of Chihuahua, and others as associates. It is purposed to erect machinery capable of an output of 300 tons per week, consisting of blast-furnaces, a complete foundry, etc. The mountain is situated a few miles from the city of Durango. An English company has been working a portion of the mountain, but in a limited and unsatisfactory way.

The work on La Estrella and Alta Gracia mines, Pachuca, is pushing. Prospects are reported bright. San Sebastian looks well. The lode is about 2½ yards wide, and the present run of metal assays about $5 to the ton.

BOSTON & MEXICO OIL COMPANY.—This company is the original or pioneer syndicate formed to work the oil-wells at Chapopote, near Tuxpam. The well is down 675 feet, and is progressing at the rate of eight feet daily.

GUADALUPE HACIENDA.—A report read at a recent meeting showed expenditures to date of $200,000.

ROSARIO.—The small steam-engine recently erected is rapidly draining the mine, revealing, as the water is lowered, rich metal, assaying $61 to the ton. The value of the property has rapidly risen.

SANTA GERTRUDIS.—This company, which is reported as about to sink a new perpendicular shaft, is sending its high-grade ore to England for reduction.

SANTA RITA.—A large pump has been put on this mine, to drain it of the heavy accumulation of water. This mine, in the time of the Spaniards, was constantly worked and yielded rich returns, and great expectations are raised that the unwatering will reveal a bonanza.

SENORA CONSOLIDATED MILL AND MINING COMPANY.—From a statement recently published, we take the following: This company was incorporated in 1880, under the laws of the State of New York. Its object was to acquire the titles to four mines situated in Northern Sonora, Mexico, in the Altar District, at the base of the Sombretillo Mountains, about 120 miles south from Tucson, Ariz., and about ten miles from the dividing line between Mexico and Arizona. These mines consist of the Puertesitos, Barrenos, Cumbre, and El Tio. Each mine represents a full mining claim of 2660 feet in length by 666 feet in width. The Puertesitos, Barrenos, Cumbre, and El Tio mines were obtained with perfect title, the boundaries being set up by government officers, and possession given by the official under the laws of Mexico in whom is vested this power. The titles to these mines are therefore perfect. Owing to the death of Mr. Milton S. Latham, the president and principal stockholder of the company, some fifteen months ago, the mines have been badly managed, and work has been suspended for the past year. The difficulties which have heretofore been a ban and impediment to the successful carrying on of the business of the Sonora Consolidated Mill and Mining Company have at last been removed, and the officers of the company present the gratifying intelligence to the stockholders that Mr. Dudley Hoyt, the well-known mining superintendent, has been employed to take charge of the company's property, and is now on his way to the mines to start the mills and proceed to place the mines on a paying basis. Mr. Hoyt has received instructions to make a full report on the mines and what the probabilities are for the future, and publish the same for the benefit of all the stockholders. An official telegram from him, dated May 16th, says that he has examined the company's mines in Sonora. The property is valuable, the ore high grade, and a large amount in sight.

MICHIGAN.

Following is a statement of the iron shipments from the ports of Escanaba, Marquette, and L'Anse from the opening of navigation to Wednesday, May 16th, 1883:

MARQUETTE RANGE.

Mines.	Tons.	Mines.	Tons.
Barnum	1,102	Pittsburg & Lake Superior	1,043
Cambria	1,826	Lake Superior	1,347
Cleveland	509		
Cleveland hematite	2,171	Total	11,054
Jackson	2,466		

MENOMINEE RANGE.

Chapin	13,649	Quinnesec	2,200
Commonwealth	1,868	Vulcan	4,044
Cyclops	1,143	Great Western	1,068
Florence	1,103	Paint River	546
Hewitt	929	Union	144
Ludington	7,486		
Metropolitan	4,947	Total	44,951
Norway	4,441		
Perkins	1,365	Grand total	56,005

MONTANA.

BELL.—Extensive operations will be commenced as soon as the new shaft is connected with the old workings and ore can be hoisted in sufficient quantity to supply both furnaces at the smelter. Among other important improvements which will greatly facilitate the handling of ore, is a tramway running under the calcining furnace, connecting with an elevator and elevated tramway, by which the cars can be filled with ore from the furnaces and transported directly to the blast-furnaces. The calcining furnaces have been doing some extraordinary work during the past week, each furnace averaging ten and a half tons of ore per day, which was calcined down to less than five per cent sulphur. Twenty-one tons of ore are run through the single blast-furnace each day, which produces a daily matte output of about ten tons. At the mine, work on the new three-compartment shaft is steadily progressing. At the depth of 400 feet, a cross-cut will be run to a point beneath the old workings, with which connection will be made by an uprise. It is expected that this connection will be made within the next thirty days, when stoping will be commenced on the high-grade west vein, and from 40 to 60 tons per day hoisted, to supply both blasts of the smelter, the output of which will then be increased to from 20 to 30 tons of matte per day.

GRANITE MOUNTAIN.—One thousand tons of No. 1 ore have been shipped to St. Louis for reduction. The product of the mine is an ordinary sulphuret ore, containing some ruby and antimonial silver. It is stated by one of the owners that it is cheaper to ship to St. Louis than to Butte.

NEVADA.

The Pawling (N. Y.) Smelting and Mining Company is now erecting at Battle Mountain, Nev., a ten-ton galena plant from the Pacific Iron-Works, Rankin, Brayton & Co., San Francisco. This will open a new era for that portion of Nevada, as it has long been in need of proper reduction facilities. The whole business is under the charge of Mr. Frank Green, an old-time miner, who has had an extended experience.

ALBION.—According to the Eureka *Sentinel*, the tributers are taking out some good ore at the head of the cave. They have a vein about three feet wide, and and are working in open ground. On the fissure-drift, where a streak of ore was cut, ten feet of a winze has developed a three-foot vein still widening in depth, having maintained the width of three feet after the first foot sunk. This ore is of good grade. At the head of a cave to the north of the east uprise, a vein of good ore has been found by tributers. This also is opening out, and shows quantity and strength, and gives promise of continuing in exploration, this being new ground and on the line of the fissure. Under the June chamber, a drift has been run, developing a cave in which ore of good grade and quantity is found, and appearing to make as it pitches in depth.

ALEXANDER.—The company has men fitting up one of the hoisting-works. Operations at the mine will be resumed shortly.

BERRYMANN TUNNEL.—Work continues at this tunnel, Silverado Mountains, satisfactorily. Good progress is made.

EUREKA TUNNEL.—The engine shaft has reached a depth of 119 feet. At 105 feet it connects with the No. 3 drift on the first level. The No. 2 winze is connected with the South Addison chamber at the bottom. This chamber is 12 feet high, 16 feet wide, and 20 feet long. The ore is striking northerly. Four feet of this ore are very rich. Progress is made in uprising on the North Addison ore-body, which is also looking well. The carbonate seam is not looking as well as it did, yet the ore output has not decreased on account of this. In fact, since the connections mentioned above were made, the output has increased, and expenses have been lessened.

GOLDEN RULE.—Progress is made on this tunnel and the prospects are improving rapidly. A few days ago, a vein of quartz six inches thick was cut through.

OLD CHAMPION.—This mine, on Alhambra Hill, has been twice relocated, and will now be worked again. A tunnel will be started and run on the contact of the limestone and trachyte, from which a cross-cut will be driven in under the old workings upon the ledge. There is some good ore in sight.

NEW MEXICO.

The machinery for a four-stack smelter to be built by Gustave Billing has arrived and will be at once placed in position at Socorro. Mr. Billing is the owner of the Kelly mine, which contains a large body of carbonates.

A dispatch dated Santa Fé, May 22d, says that an armed mob of sixty men attacked the principal mine of the San Pedro and Cañon del Agua Company, in Santa Fé County, and drove off thirty men who were working the mine. The mine has been in litigation some time, and legal action will be taken to gain possession of it.

The new owners of the Cooney mine, in the Mogollon Mountains have, ordered of the Pacific Iron-Works, Rankin, Brayton & Co., San Francisco, a complete ten-stamp silver mill, which will be erected without delay, to work the rich ores of that property.

UTAH.

BEAVER COUNTY.

Reports from various mines show that the Stalwart, formerly the Ivanhoe, of the Garden City Company's group, has a fine showing of rich horn-silver at a depth of 180 feet. The Kanairah, in South Camp, Star District, over 200 feet perpendicular, has a fine showing of first-class smelting ores. The Monmouth and St. Mary's, two of the oldest claims in Star District, have developed large bodies of free smelting ores. The Dykes & Morehouse, in West Camp, has also a good showing of heavy silver-lead ores of a high grade, at a depth of 200 feet. The Creedmoor, South Camp, has a four-foot vein of rich galena ore. In North Star, the Lake Superior shows a very large body of copper ore, which runs from 20 to 60 per cent copper, and contains from 20 to 150 ounces silver per ton. This is at a depth of nearly 200 feet perpendicular. Star District also contains a number of claims which have immense deposits of low-grade silver-lead ores, which will run from 14 to 22 ounces silver, and from 12 to 25 per cent lead per ton. These ores can be hauled to Milford for $2 per ton or less, where plenty of water can be had for concentrating purposes. Machinery now at the latter place is lying idle that can be used for such purposes.

WASHINGTON COUNTY—SILVER REEF.

The mining industry, which is the creative feature with us, writes the Silver Reef correspondent of the Salt Lake *Tribune*, looks decidedly encouraging for the future. Some of the properties which have lain idle for a year or more have resumed, or are about to resume operations, and there is no doubt but that the latter half of the year will witness more mines in operation and more men employed in the district than at any time during the past three years.

WYOMING.

BULLION.—This mine, situated in Sweetwater County, has been sold in Salt Lake City to San Francisco parties for $60,000. The ledge has been stripped 150 feet in length and eighty feet wide, exposing a large body of free-milling gold ore, which assays favorably. A shaft thirty-two feet deep in the ore has a drift at the bottom extending thirty-six feet north, and the heading is still in ore. A sixty-stamp mill will be at once erected on the property by the purchasers.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, May 25.

The mining market has been quite active this week, and stronger prices have prevailed for the better class of stocks. The Comstocks show quite an improvement both in price and in dealings, closing strong to-day. Sonora Consolidated continues to be the most active stock on the market, and the reported transactions have been enormous. Another "short interest" has been developed in it, and this has sent the stock up to a strong figure. A summary of the market is given below. The total number of mining shares sold at all the Exchanges for the week aggregates 326,346, as against 237,700 last week.

The Comstock shares have been active and strong. California sold from 22@30c., with a business of 4500 shares. Consolidated Virginia has had a fair business at strong prices; it sold from 52@66@61c. Sierra Nevada was also strong, selling from $5.38@$6.63. Union Consolidated shows quite an improvement in price, under a fair business; it sold from $4.60@$6.50. Mexican was quiet and steady at $3.15@$3.50. Gould & Curry sold at $3@$3.25 under a small business. Hale & Norcross had a small business at strong prices; it sold from $4.50@$5.25. Best & Belcher sold at $4.50. Yellow Jacket was quiet at $4.25@$4. Sutro Tunnel was active and steady, selling from 20@22c., with a business of 18,400 shares. Consolidated Imperial sold at 10c., assessment paid, and at 4c., assessment unpaid.

The Leadville stocks were quiet and steady. Amie sold to the extent of 29,500 shares at 15@18c. Chrysolite was quiet and steady at $1.10@$1.15. Iron Silver had a fair business at steady prices; it sold from $3.10@$3. Leadville was strong under small transactions, and sold from 48@60c. Little Pittsburg was irregular at 85@75@80c. under a small business. Climax sold at 9c.

The Bodie stocks were also quiet and steady. Bodie had a small business at steady prices, selling from $1.20@$1.15. Standard was moderately dealt in and was a little strong; it sold from $6@$6.38. Bulwer sold at 50c. to-day.

The Tuscarora stocks have been a little weak under small transactions. Argenta sold from $1.20@$1.10, with a business of 300 shares. Belle Isle was quiet and steady at 25c. Navajo had a fair business and was weak; it sold from $1.95@$1.70. North Belle Isle sold at 23c., with one transaction. Independence sold at 32c. Elko Consolidated was quiet and steady, selling from 24@20c., assessment paid, and at 8c., assessment unpaid.

In the miscellaneous list, Alice was quiet and steady at $3. Bassick sold from $8.25@$8.13 under a small business. Eureka Consolidated was steady at $3@$3.25. Father de Smet sold from $4.50@$4.10. Green Mountain was quiet and weak at 81@75c. Rising Sun sold at 3c., and Cherokee at 3c. Homestake records a small business, and was a little weak; it sold from $16.25@$15.63. Horn-Silver had a fair business at irregular prices; it sold from $6.75@6.25@$6.63. Hukill sold at 7c. under a small business. Northern Belle was quiet and weak, selling from $6.75@$6. Robinson Consolidated had a small business at irregular prices; it sold from 86@81@83c. Sierra Grande has gained strength, under a moderate business, and has sold from $1.10@$1.45@$1.30.

Bradshaw was quiet at 33c. Central Arizona sold from 30@25c., under a business of 200 shares. Decatur was active and steady, selling from 5@6c. Eastern Oregon sold at 28c. Harlem had a small business and was strong, selling from $1.40@$1.55. Hortense sold at 12c. Lacrosse was moderately dealt in and was steady; it sold from 9@13@12c. Oriental & Miller records a small business at 15c. Rappahannock sold at 8@7c. Sonora Consolidated was very actively dealt in at strong prices; it sold from 47@70c., the transactions amounting to 182,214 shares. South Hite sold at 15c., and South Pacific at 6@7c.

Dispatches to the representatives of the Copper Prince report that this company has won its suit against the Copper Queen Company. The latter has made a motion for a new trial.

MEETINGS.

Amygdaloid Mining Company, office M. H. Hoffman, No. 629 Walnut street, Room 7, Philadelphia, Pa. Annual meeting of stockholders and election of trustees, June 6th, at twelve o'clock M.

Empire Copper Company, office M. H. Hoffman, No. 629 Walnut street, Room 7, Philadelphia, Pa. Annual meeting of stockholders and election of trustees, June 1st, at twelve o'clock M.

Old Dominion Copper Mining Company, No. 72 Broadway, New York City. The postponed annual meeting of stockholders, June 29th, at twelve o'clock M.

Philadelphia & Boston Mining Company, office M. H. Hoffman, 629 Walnut street, Room 7, Philadelphia, Pa. Annual meeting of stockholders and election of trustees, June 1st, at twelve o'clock M.

Quincy Mining Company, No. 4 Exchange Court, New York City. Annual meeting of stockholders and election of trustees, June 6th, at twelve o'clock M.

Sonora Consolidated Mill and Mining Company, No. 40 Broadway, Room 46, New York City. A meeting at which a full report of the financial condition of the company and the plans for the future will be discussed, May 29th, at one o'clock P.M.

Union Consolidated Mining Company, Astor House, New York City. Annual meeting of stockholders and election of trustees, June 4th, at twelve o'clock M.

Union Copper, Land and Mining Company, No. 3 Merchants' Exchange, State street, Boston, Mass. Meeting of stockholders, May 29th, at three o'clock P.M.

DIVIDENDS.

The Catalpa Mining Company has declared a dividend of ten cents per share, payable to stockholders of record June 1st.

The Charleston Mining and Manufacturing Company of South Carolina announces a quarterly dividend of two dollars and fifty cents per share, payable June 1st, at the office of the company, No. 132 Walnut street, Philadelphia, Pa.

The Crescent Mining Company, of Utah, has declared a dividend of ten cents per share, payable May 20th.

The Gem Mining Company, of Colorado, has declared a dividend (No. 14) of two per cent on its capital stock, payable to stockholders of record May 28th.

The Glen Mining Company, of Colorado, has declared a dividend (No. 7) of one per cent on its capital stock, payable to stockholders of record May 28th.

The Granite Silver Mining Company, of Colorado, has declared a dividend (No. 5) of one per cent on its capital stock, payable to stockholders of record May 28th.

The Iron Silver Mining Company, of Colorado, has declared dividend No. 11 of twenty cents per share, or $100,000, payable June 15th. The total amount of dividends to date, $1,100,000.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
May	19....	$1.03⅛	$1.03¼	$1.02⅝	$1.02⅝	1,230,000
	21....	1.03	1.03⅝	1.02½	1.03⅝	1,844,000
	22....	1.03⅝	1.04⅛	1.03½	1.03⅝	1,615,000
	23....	1.03¼	1.03¼	1.00⅝	1.00⅝	1,482,000
	24....	1.00⅞	1.03¼	1.00¾	1.03¼	1,694,000
	25....	1.03⅝	1.04⅛	1.02½	1.03⅝	1,520,000
Total sales.						9,385,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 24.

There is no improvement to note in regard to the market for copper stocks. The sales of the past week have been few and far between, and prices are barely sustained. Lake ingot copper is quite firm at about 16 cents; but, unless an advance from this point is made, we do not anticipate any activity in the market. The sales of Calumet & Hecla have ranged from $234@$232½, the latter being to-day's price. Very little stock has changed hands, and there is no pressure to sell, holders generally being well contented with the liberal dividends which come along quarterly. Quincy is dull, but steady in price at $43, with a few shares sold at $43½. Osceola dropped to $20 on a sale of 150 shares; but small lots sold at $21. Pewabic declined from $5 (May 10th) to $3, which is, however, bid for it. The above comprises all the stocks dealt in during the week, and affords but little margin for comment.

In silver stocks, the principal feature was the spurt in Sullivan, of Maine, which advanced from $1¼@$2⅛, with a reaction to $1 1-16, closing, however, to day, with sales at $1⅛. The advance is attributed to the report of the discovery of a new and rich orebody, and also to the fact that shipments of ore to England are to be commenced at once, they having received and accepted an offer of $18 per ton net for the ore on hand, which is reported as 50 or 60 cargoes now on the dump. We give the rumor as we hear it; but we confess to but little faith in its truthfulness. It looks to us more like a stock operation, as we understand the stock is largely held by a few parties, who would be glad to dispose of their holdings to the public. Catalpa declined in the early dealings to 62½c., and advanced to 70c. The company has declared a dividend of 10 cents per share, payable June 15th. Crescent sold at 30c. Bonanza, 2 1-16c. San Pedro declined to 40c.

At the Mining Exchange, a fair amount of transactions is reported. Bowman Silver seems to be the most active stock at present, and steadily gains in price, advancing from 15@19c. Massachusetts & New Mexicois steady at 7@8c. Empire, firm at 22c. Massachusetts & New Mexico 6s advanced to $28.

3 P.M.—The market was as dull as ever this afternoon, without change of prices. Sullivan sold at $1⅞. Calumet & Hecla, $232½. Harshaw, 50c. Closing prices: Silver stocks: Catalpa, 67½@70c. Crescent, 25c. bid. Harshaw, $⅛@$⅝. Sullivan, $1¾@$1⅞. Silvet Islet, $3@$4. San Pedro, 35@40c. Copper stocks: Calumet & Hecla, $232@$232¼ asked. Franklin, $10 bid, $17 asked. Huron, $1⅝ asked. Osceola, $21 bid. Pewabic, $3 bid, $4 asked. Quincy, $44 bid, $45 asked.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. May 18.	May 19.	May 21.	May 22.	May 23.	May 24.
Albion	....	....	....	....	....	....
Alpha	1⅝	1⅝	1¾	1¾	1⅞	2
Alta	.60	.60	.60	.65	.65	.75
Bechtel	....	....	....	....	....	....
Belcher	1	1⅛	1⅛	1⅛	1⅛	1⅛
Belle Isle	.25	.30	....	.25	....	.20
Best & Belcher	4	4⅛	4¼	4⅛	4	4¾
Bodie	1⅛	1	1⅛	1	1⅛	1⅛
Bullion	....	....	....	....	....	....
California	.25	.25	.25	.25	.25	.30
Challar	2¾	2¾	3	3¼	3⅛	3¾
Con. Virginia	.50	.50	.55	.60	.55	.60
Crown Point	1¼	1⅜	1⅛	1¾	1⅛	1⅝
Elko Cons	....	....	....	....	.20	.25
Eureka Cons	2¾	2⅝	....	3	3	3
Exchequer	.35	.35	.35⅝	.40	.40	.40
Gould & Curry	2½	2¾	3	3	3	3¾
Grand Prize	.85	.90	.90	1	1	.70
Hale & Norcross	4¾	5	6⅞	6¾	6⅞	8
Independence	.35	.35	....	.30	.25	.30
Martin White	....	.30	....	.30	.30	....
Mexican	3¼	3¼	3½	4	3⅝	3⅞
Mono	....	....	....	....	....	....
Mount Diablo	....	....	....	....	....	....
Navajo	2	2	2	2	1⅞	1¾
Northern Belle	6⅛	....	6⅛	6	5⅞	6
North Belle Isle	.25	.20	.25	....	....	....
Ophir	2¼	2¼	2⅜	2¾	2⅝	2¾
Overman	....	....	....	....	....	....
Potosi	1¼	1⅜	1⅜	1¾	1¼	1⅜
Savage	2¼	2⅜	2⅜	2¼	2⅜	2⅞
Scorpion	....	....	....	....	....	....
Sierra Nevada	5⅝	5⅝	5⅝	6½	6½	6⅞
Silver King	....	10½	....	....	....	10⅝
Tip-Top	.40	....	....	....	....	....
Union Cons	4¾	4⅞	5⅝	6⅝	6¼	6¼
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3¾	4	4¼	4⅛	4¼	4⅝

The following are the financial balances of the various mining companies on May 1st:

CASH ON HAND.

Alta	$12,912.45	Gould & Curry	$21,414.79
Argenta	6,632.75	Hale & Norcross	31,800.64
Albion Con	651.53	Melones Con.	67,964.45
Andes	6,791.00	Mono	4,119.35
Bodie Con	24,281.31	†Mexican	46,851.55
Bechtel	1,613.64	Jackson	1,085.85
Bulwer	9,621.08	Ophir	11,833.71
Booker	416.63	Occidental	6,680.09
Benton Con	3,987.41	Sierra Nevada	10,436.13
Best & Belcher	601.99	Summit	1,717.34
*Belcher	11,479.00	Silver Hill	3,024 64
Crown Point	21,489.67	Scorpion	754.24
Challenge Con	3,187.03	Savage	33,720.93
Con. Virginia	52,824.34	Standard	121,392.28
California	31,405.33	Tioga	957.95
Day	5,519.85	Utah	3,941.77
Double Standard	49.30	Union	16,491.19

INDEBTEDNESS.

‡Albion Con	....	Lady Washington	$1,690.16
Con. Imperial	$1,281.44	Martin White	6,041.90
Grand Prize	7,187.84	McClinton	130.10

* Due Sutro Tunnel, $10,920.
† Bullion on hand, assay value $3939.23.
‡ Exact amount not yet known; approximates from $260,000 to $275,000.

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BULLION MARKET.

NEW YORK, Friday Evening, May 25.

The London market has shown a little more strength the past week, and this, with a higher sterling rate, has advanced the price here ; but the week closes without any special indications.

DATE.	London	N. Y.	DATE.	London	N. Y.
	Pence.	Cents.		Pence.	Cents.
May 19	50 1-16	109⅝	May 23	50⅛	109⅝
21	50 1-16	109⅛	24.	50⅛	109⅝
22	50 1-16	109⅝	25.	50⅛	109⅝

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended May 25th, as compiled from various sources, amounted to $133,000, as against $149,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,118,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended May 19th	$48,395
Corresponding week last year	4,675,000
Since January 1st, 1883	5,546,137
Corresponding period last year	25,804,297

Imports.

Week ended May 19th	$110,382
Corresponding week last year	112,600
Since January 1st, 1883	6,652,408
Corresponding period last year	1,629,532

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible ; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy ; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of April.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	$86,226	$320,419
*Alta-Montana, G. L. S.	"	.....	§10,625
*Belmont.	"	5,171	17,775
Bodie, G. S.	Cal.	25,085	91,342
Bodie Tunnel, G.	"	10,470	45,319
*Bonanza King, G.	"	57,000	199,077
*Boston & Montana, G.	Mont.	18,741	72,318
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah.	24,249	92,654
*Chrysolite, S. L.	Colo.	24,146	142,238
*Contention, S.	Ariz.	.....	209,260
Crescent, G.	Cal.	.....	13,000
*Custer, G. S.	Idaho.	.....	43,572
*Deadwood-Terra, G.	Dak.	.....	120,231
*Derbec Blue Gravel, G. S.	Cal.	10,041	31,844
*Father de Smet, G.	Dak.	20,596	127,985
*Frisco M. and S. Co., G. S. L.	Utah.	16,366	§77,084
*Head Center Cons.	Ariz.	6,865	6,865
*Head Center and Tranquillity	Ariz.	13,893	18,486
*Hecla Cons., G. S.	Mont.	§57,060	234,984
*Homestake, G.	Dak.	.....	330,060
*Hope, S.	Mont.	.....	20,574
Horn-Silver, S. L.	Utah.	291,000	1,055,000
*Independence, G. S.	Nev.	7,779	34,722
*Kentuck, G. S.	"	2,100	8,237
*Lexington, S.	Mont.	96,317	421,204
*Little Pittsburg, S. L.	Colo.	3,296	22,873
*Marguerite, G.	Cal.	.....	33,200
*Martin White, G. S.	Nev.	.....	136,317
*Moulton, G. S.	Mont.	.....	123,288
Mount Diablo	Nev.	65,221	75,078
*Navajo, G. S.	"	69,646	281,626
*North Belle Isle	"	1,953	1,953
Northern Belle, S.	"	75,700	343,015
*Ontario, S. L.	Utah.	222,274	807,695
*Oxford, G.	N. S.	6,181	21,324
*Phœnix, G.	S. C.	.....	13,666
*Pinal Cons., S. L.	Ariz.	37,388	137,860
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	29 433	101,241
Standard, G.	Cal.	108,477	371,483
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah.	19,677	74,281
Syndicate, G.	Cal.	4,869	14,086
Tintic M. and M. Co.	Utah.	.....	7,632
*Tip Top, S.	Ariz.	.....	‡22,983
*Tombstone, G. S.	"	53,071	‡246,230
Yellow Jacket, S.	Nev.	54,120	152,873
Total amount of shipments to date			$6,879,318

* Official. † Net value. ‡ Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £273,000 bullion on balance, and the proportion of its reserve to its liabilities was raised from 32⅜ to 35⅛ per cent, against 42 7-16 per cent at this date last year. May 23d, the bank gained £19,000 bullion on balance. The weekly statement of the Bank of France shows gains of 3,300,000 francs gold, and 1,775,000 francs silver.

METALS.

NEW YORK, Friday Evening, May 25.

Copper.—To-day the first arrival of copper from the Lake are reported. As yet the quantities are small, and are probably sold. There is very little offering, and the market continues quite firm at 16c., though little is done at that figure. It appears that consumers are again beginning to turn their attention to other brands, and those of standard quality are firmly held. Outside brands are a little better, cheap lots having disappeared. We quote 14¼@15½c. for the range.

London cables a little lower, £62 f. o. b. for Chili Bars and £68 f. o. b. for Best Selected. Mail advices indicate that the reports of shipments of furnace material and ores from this side were made use of by bears to a considerable extent. The following statement of March imports and exports of copper and ores, etc., will prove of interest :

IMPORTS.

	March		9 months	
Quantities.	1883.	1882.	1883.	1882.
Ores ton	2,348	2,566	19,986	3,099
Pig and old, lbs.	14,794	29,613	273,596	643,078
Quantities.	EXPORTS.			
Ore, tons	318	10	2,561	659
Pig, etc, lbs	1,059,139	685	3,245,324	2,288,796
Values.				
Ore	$84,929	$550	$414,880	$50,485
Pig, etc	155,171	145	531,746	377,184

According to the Board of Trade returns, the imports and exports of copper for the first four months were :

	Jan. 1 to April 30.		
	1883.	1882.	1881.
Imports :	Tons.	Tons.	Tons.
Pure in pyrites	5,951	5,650	4,753
" precipitate	7,261	5,253	7,193
" ore	4,036	3,862	3,434
" regulus	2,830	2,910	1,216
Bars, cakes, etc.	1,667	10,136	9,594
	31,745	27,811	26,190
Exports :			
Raw (English)	5,954	3,308	5,694
Sheets	5,472	4,730	4,485
Yellow metal at 60 per cent	3,670	3,343	2,935
Brass at 70 per cent	1,066	999	988
	16,162	12,470	14,102
Foreign	3,072	3,915	3,099
	19,234	16,385	17,201

Lead.—Beyond the sale of about 400 tons of Common lead in lots at 4·40c., we have heard of no business, and the market continues dull, especially so for Refined lead.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day :

There is no change of any description in our market. Business has been quiet and of a limited character, with quotations at 4·12½@4·15c. for Refined and 4·12½c. for Chemical lead.

From Chicago, Messrs. Everett & Post, telegraph us : There has been no change in the condition of our market. Sales aggregate 300 tons of Common and Refined, on the basis of 4·15@4·17c. here.

It is necessary to add to the above dispatches of our correspondents that railroad freights have been cut and are now 28 cents from Chicago, and 30 cents per 100 pounds from St. Louis.

Tin.—This metal has been weaker, with spot Straits quoted at 21·50c. Australian, 21·50@21¾c. ; and Billiton at 22c. London cables £96 at the close.

Spelter.—This metal continues dull, but tolerably firm, at 4·70@4·75c. here for Common Western.

Antimony.—We have no change to note.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 25.

The following are the British Board of Trade returns of exports to the United States for the first four months of the current year :

	1882.	1883.
Pig-iron	154,951	86,927
Old iron for re-manufacture	40,972	17,936
Steel unwrought	66,706	15,305
Tin plates	64,976	65,239
Hoops and sheets	8,874	8,885
Bar, angle, bolt, and rod	10,081	4,692
Railroad iron of all kinds	89,965	21,098

American Pig.—Yesterday and to-day there have been many rumors that the Allentown Iron Company has failed. So far as we can learn, the facts in the case are the following : A few days since, the directors of the Allentown Iron Company called a meeting of its shareholders, and placed before them a proposal to raise additional capital—$1,000,000, it is said. This did not meet with any favor, and the principal bondholder, Mr. J. Welsh, of Philadelphia, decided to foreclose and wind up the concern. We understand that the furnace property will be offered for sale. The company has been losing money steadily, and its plant, so far as the furnaces at the Allentown Iron-Works are concerned, is so antiquated that it can not compete, and can make money only when the demand exceeds the capacity of the other furnaces of the district. Four of the furnaces were built in 1846, 1853, and 1854, and are small. The only modern furnace, 17-foot bosh and 60 feet high, was put up in 1874. It is the only one likely to survive. It is likely that the furnaces will blow out at an early date, and as there is little stock of pig on hand, the closing out of the Allentown Company is likely to have rather a good effect.

The market continues dull. The Thomas Iron Company reports sales of 1000 tons of Nos. 1 and 2 Foundry at $20 and $22 respectively. There is still talk of a further decline, and ordinary brands are selling below $22 and $20. We quote $21@$22 for No. 1, and $19@$20 for No. 2. A sale of 3000 tons of Gray Forge at Hoboken at $19.25 is reported, but other sales have been made at much lower figures. We quote $17.50@$19 at tidewater. Nothing is doing in Bessemer pig, which is quoted $21@$22 at tidewater. Spiegeleisen is moving steadily at $31.50 @$32.50, for 20 per cent material.

Scotch Pig.—Business is dull. The arrivals are light, aggregating 800 tons, of which only a portion was sold to arrive. Freights continue firm, while the foreign markets are dull and a little lower. We quote, ex ship : Coltness, $24@$24.50 ; Glengarnock, $22@$22.50 ; Eglinton, $21@$21.50 ; Langloan, $23.50@$24 ; and Summerlee, $24@$24.50.

Steel Rails.—The Eastern mills are all well supplied with orders till the fall, and some of them are declining orders. Inquiries, chiefly for small lots, are quite numerous, and can be placed at $28 at mill.

Old Rails.—There is very little business to report. The market is dull and weak, with Ts nominally quoted $22.50@$23.

Scrap is very flat, No. 1 being quoted ex ship at $23.50@$24, with little demand.

Philadelphia. May 25.

Pig-Iron.—To-day's quotations for pig-iron are as follows: Standard No. 1, $22 ; No. 2, $20 ; Forge, $19@$20. The week's business has been trifling. Most of the foundry iron sold has been at 50 cents below these quotations. A great deal of ordinary Foundry has been offered, and unusual concessions have been made, but buyers decline to accept. Founders are short of stocks, and, notwithstanding low prices and concessions, decline to purchase except for present needs. This policy helps to maintain a large apparent surplus on the market. Buyers are apprehensive.

The Western situation is unimproved. Extremely low prices for pig-iron prevail there, and the effect is felt in the East. Forge iron is selling in a small way, at prices ranging from $17.50@$18.50, but the highest limits are very hard to reach. Car-load lots were bought this week under $18 at furnace. The standard makes seem to be held pretty firmly, but some buyers have even obtained concessions from quoted rates. Very little will be done until after June 1st in anticipating requirements, as the trade has not yet given up the hope of a compromise of some sort. Should affairs not take a favorable turn by that time, a good many furnaces, the number of which has been variously estimated, will blow out ; in fact, there is no other remedy for the situation.

Furnace Irons.—Very little business has been heard of in furnace irons. A small trade in Scotch has been kept up, and prices have declined 50 cents within a few days. English is dull. Bessemer would sell at $21.

Merchant Iron.—The local iron trade is without any special points. Manufacturers are taking in a good many orders, sufficient to cover present output, at 2·20c., and stores report a moderate demand in small lots at 2·25@2·30c. The purchase of iron is controlled

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 19.		May 21.		May 22.		May 23.		May 24.		May 25.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.							3.00		3.00		.19	.17	200
Amie Con., Co.	.18	.15	.16				.18	.16					29,500
Argenta, Ne.	1.20	1.10											300
Bar. & Walker, Ut.													
Bassick, Co.	8.25						8.25	8.13					400
Belle Isle, Ne.									.25		.25		300
Bodie Cons., Ca.									1.20	1.15	1.15		720
Breece, Co.													
Bulwer, Ca.											.50		300
California, Ne.	.22				.26	.23	.25		.27	.25	.30		4,500
Cal. & Hecla, Mich.													
Carbonate Hill.													
Caribou Con., Co.													
Chrysolite, Co.	1.10				1.15	1.10	1.15	1.10	1.15	1.10			4,100
Cons. Va., Ne.	.53	.52	.56	.55	.66	.62	.65	.62	.61	.58			5,330
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.	3.00		3.25										150
Excelsior, Ca.													
Father de Smet, Dk.					4.50						4.25	4.10	275
Findley, Ga.							.04						3,300
Gold Stripe, Ca.													
Gould & Curry, Ne.			3.00				3.25						200
Grand Prize, Ne.													
Great Eastern, Dk.	.02				.02								5,100
Green Mountain, Ca.					.81				.75		.75		500
Hale & Norcross, Ne.	4.50		5.25										400
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.	16.25	16.00	15.63										225
Horn-Silver, Ut.	6.50		6.75	6.50	6.50	6.25	6.50	6.25			6.75	6.63	1,650
Hukill, Co.	.07				.07								1,050
Independence, Ne.									.32				100
Iron Silver, Co.	3.05	3.00	3.10	3.00	3.10		3.05	3.00	3.00		3.00		5,400
La Plata, Co.													
Leadville C., Co.					.50	.48	.60		.60				652
Little Chief, Co.											.47		500
Little Pittsburg, Co.	.85								.75		.80		400
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	1.95	1.85	1.80	1.75	1.75	1.70	1.85	1.75	1.80	1.70			5,700
Northern Belle, Ne.			6.75	6.50					6.00				200
North Belle Isle, Ne.									.23				100
Ontario, Ut.	21.00												200
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.									8.00				100
Rising Sun, Ca.			.09										100
Robinson Cons., Co.	.86	.85	.84	.81	.81		.83	.82	.83				7,500
Savage, Ne.													
Sierra Grande, N. M.	1.10				1.10				1.45	1.40	1.35	1.30	1,700
Sierra Nevada, Ne.	6.00		5.38		6.00	5.75	6.63	6.38					915
Silver King, Ar.									10.38				10
Spring Valley, Ca.													
Standard, Ca.	6.13	6.00	6.00		6.00		6.25	6.13	6.38	6.25			535
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket			4.25				4.00						200

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 19.		May 21.		May 22.		May 23.		May 24.		May 25.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.													
Albion.								.40					100
Alta.								.60					100
Alta-Montana, G.													
Am. Flag, s.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & Bicher, G. S.					4.50								100
Big Pittsburg, S. L.													
Bondholder													
Bradshaw, S.								.38					200
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye.													
Calaveras, G.													
C'lav'r's W. & M. Co.													
Cal., S. H., G.													
Central Ariz'na, S.													200
Cherokee, G.								.03					500
Climax, Co.	.09												400
Cons. Imp'r'l, G. S.								.04				.10	.04	3,000
Crowell, G.													
Dahlonega, G.													
Decatur			.05		.06	.05				.06		.06		17,700
Dunderberg													
Durango, G.												.06		200
Eastern Oregon				.28										100
Elko Cons.				.24	.21	.23	.22					.20	.06	5,300
Enterprise.														
Fannie Barret														
Globe Copper.														
Gold Placer, G.														
Goodshaw, G.														
Granville, G.														
Harlem M. & M. Co.	1.45										1.45	1.55	1.40	1,000
Hortense, S.				.12										200
Lacrosse, G.	.13	.09	.13		.13	.12	.13					.13	.12	4,900
Lucerne.														
Mariposa Pref., G.														
" Com., G.														
Mexican, G. S.	3.25	3.15						3.50						250
Miner Boy														
Mono														
North Standard, G.														
N. Horn-Silv'r, S. L.														
Ori'nt'l & Miller, S.	.15											.15		2,500
Quartz Creek.														
Rappahannock, G.				.08	.07									1,800
Red Elephant, S.														
Ruby, of Arizona.														
Silver Cliff, S.														
Sonora Con.	.52	.47	.56	.52	.62	.55	.65	.61	.65	.61	.70	.63	182,214
South Bodie, G.														
South Bulwer, G.														
South Hite.				.15										100
South Pacific.				.06		.06						.07	.06	3,000
State Line, 1 & 4, S.														
" Nos. 2 & 3, S.														
Sutro Tunnel.	.20		.20		.21	.10	.21	.20	.21		.22	.21	18,400
Taylor Plumas														
Unadilla, S.														
Union Cons., G. S.	4.60		4.60		5.25	5.13	6.25	6.00	6.50				1,270

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 82,812. Non-dividend shares sold, 243,534.

BOSTON MINING STOCKS.

	May 18.		May 19.		May 21.		May 22.		May 23.		May 24.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.													
Amie.													
Atlantic													
Aztec.													
Bodie Con.													
Bonanza D.	2.06¼		2.13				2.13		2.25	2.13	2.13		600
Bowman Sil	.16		.16		.17	.16	.17	.16	.19	.18	.19		16,200
Bruns. Ant.													
Bulwer.													
California.					.20								200
Cal. & Hec.	234	233			233	232			233		232½		37
Catalpa.	.65	.60	.70		.72½	.70	.70	.67½	.70	.67½	.70		5,625
Central Ariz													
Cherryfield.													
Co. Virginia			.51				.55						1,000
Copper F'lls													
Copperop.													
Crescent.	.30				.30								450
"Cusi"							1.63						200
Decatur.													
Deer Isle.													
Denver City													
Douglas.							.87½		.95				150
Duncan.													
Dunkin.													
Empire	.23								.22		.22		400
Eureka Con.	3.65												50
Franklin.	10.13												12
Hancock G.													
Harshaw.											.50		25
Huron.													
Independ'ce													
Indian Q'n.											1.30		100
Mammoth													
Mass. & N.M.	.08				.08		.08		.08		.07		7,400
Milton.													
Napa.													
National.													
North. Belle													
Ontario					24.00		6.63						25
Osceola.	21.00		20.00		21.00				21.00				15
Penn-Breck.													188
Pewabic.	4.00						3.00						75
Pine Tree.													
Plymouth.	.17								.16		.16		1,900
Quincy.	43.00				43.50				43.50				80
Ridge.													
Robinson.													
San Pedro.					.41				.40		.42		800
Sra Nevada	4.65												100
Sra Grande													
Silver Islet.													
Silver King.			11.00										15
Simpson Gd													
So. Pacific.									.06				200
Standard.											6.13		20
Sullivan					2.13	1.50	1.75	1.63	1.88	1.70	1.88		5,760
Sutro Tun.			.20				.21		.20		.21		1,100
Sycamore.													
Twin Lead.	.05								.06	.05	.08	.06	6,800
Vizina													

PHILADELPHIA MINING STOCKS.

	May 18.		May 19.		May 21.		May 22.		May 23.		May 24.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
Argent.			.16				.17		.16				1,400
Battle Mt.			.03										2,500
Black Sul.													
Bodie.													
Buena.	.02				.02				.02				3,000
California.													
Calista.													
Chrysolite.	1.10				1.10						1.15		3,200
Cincinnati.	.12		.12		.12								5,000
Comprom'e.			.24		.25		.24				.22		20,200
Contention.			3.75										400
Con. Virg.			.50										100
Dauntless.					.01								2,000
Del Monte.	.03												500
Denver City			.17		.16				.15				5,200
Eureka.													
Girard.	.09		.09		.09		.08		.09		.08		16,200
Golconda.													
Governor.	.09	.08	.09	.08					.08		.07		10,275
Grand Un'n	.21		.20				.16						9,000
Gunnison.	.90		.92½		.90		.92¼	.90	.92¼		.90		7,600
Homestake.													
Horn Silver.													
Iowa Gulch.	.07		.06		.07				.07	.06	.08		25,050
Iron Silver.	2.95	2.90					3.05		3.10		3.05		3,350
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud								.05					4,350
Little Pitts.					.85								500
L'g & D'y H													
Montana													
Mt. Sheridan									.04				1,000
Navajo.											1.80		750
North'n B'l.													
Orion.			.04				.05						1,600
Orion Pref.													
Palmetto E.							.01				.01		5,200
Pembina.							.15						400
Penn-Breck.	.11		.11		.12		.12	.11					8,300
Permanent.							.08	.02	.02		.08		4,500
Pizarro.													
Pizarro Ex.			.02								.03		5,300
Potosi.													
Rara Avis.	.35		.35		.37½		.37½		.40	.37½	.40		2,900
Rara Avis E.	.12		.12		.12		.13	.12	.18	.12	.13		49,400
Record													
Rico Pion'r.													
Robinson.			.85		.85		.85						7,000
San Pedro.													
Sierra G'nde	1.05	1.02½	1.05		1.05	1.02½	1.05		1.27½	1.05	1.50	1.35	24,500
Sierra Nev.							5.38						500
Silver Cord.			1.85		1.80								800
Silver King.													
Silv'r Plume													
Sovereign.													
Standard.													
Sultana.					.04		.01	.03			.04		1,000
Sutro Tun'l.	.20										.21		400
Tombstone.									.75		.75		200
Victor.			.02						.02				4,000
Yale Mt.											.04		1,000

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to a great extent by the opinions of the respective buyers as to the summer supply. Some few large consumers have placed requirements for sixty days; others are buying from two to four weeks ahead. There is, in general, a little more business going on.

Nails.—Nail-makers have sold for June and July deliveries in some cases. The retail trade is good, and small lots are going at from $3.15@$3.25. Large lots, up to car-load lots, are selling as low as $3. Stocks are moderate and prices well maintained.

In *Construction Iron*, very little that has not been said heretofore is to be added. Large orders are hard to get, and in the little business of that character that is on the market prices are badly demoralized. Angle iron is quoted nominally at 2·40c. Inferior iron has been sold at 2·25c. Channels and Beams, combination prices, 3·50c., less 12½ per cent. Plate iron can not be sold outside of small lots at 2·40c. Sheet and Flange unchanged.

Steel Rails are in active request. Two or three large orders have been placed at $38. A fair amount of business in a small way is coming to hand at $39@$41, according to weight of sections. Old material is without activity. Small shipments are offered at $23@$27. Scrap is weak at $23@$26.

Pittsburg. May 24.

Pig-Iron.—The situation in this city has changed for the worse, weak holders of pig-iron have taken fright, and large offers have been made at very low prices. Consumers decline to purchase beyond immediate requirements. Red-short and neutral iron have been offered at $17@$18; foundry iron, at $19@$21. A sale took place on Tuesday of a portion of the Marshall iron, and it is believed that all of the immense stock of 60,000 tons will find its way into the market in the course of a few months. The effect will be disastrous, especially if the anticipated strike should take place. Stocks are already very large, and nothing but a very general closing down will prevent further weakness; buyers of finished iron have taken alarm, and are endeavoring to cover future requirements at present rates, namely, 2c. For several days past, a large amount of business has come to hand. Consumers have been running very bare of stock since winter. Nails continue active and firm at $3@$3.25. Inquiries are in hand for summer deliveries. Bessemer pig is offered at $21.50. Discounts on gas and steam-pipe, 70 and 5; on boiler tubes, 55 and 5. On large orders there are heavier discounts. Oil-well casings, 50c. per foot. Tubing, 16c.

Merchant Steel is weak and dull. Consumers are carrying very light stocks. Steel rails are firm at $39@$40. Mills in this section are well supplied with business. Rail fastenings are 2·60c. for spikes; 2c. for splice bars; hexagon nuts, 3·35c.

Prices for Old Rails have declined from $26@$22.50; occasional transactions, 50 cents under. Crop ends are offered at 25c., but better prices are looked for. The general situation is favorable to manufacturing interests. Mail and telegraphic advices from Western iron centers show large supplies and moderate demand. A number of mills will probably continue in operation during the summer with non-union labor. At the present time, retail requirements are large. Steel for agricultural implements is in large supply, and buyers are waiting for a further decline. Steel mills at this point continue to work to full capacity, and will probably continue to do so through the summer.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 25.

Anthracite.

The trade has improved a little since our last, inquiries for season delivery becoming more numerous, and spot lots of stove coal are realizing better prices. On the whole, however, the situation continues to be exceedingly discouraging to middle-men, who often cut off their commission in order to retain their trade, while individual operators are shading prices a little more than usual, although the companies appear to be doing little in that way. It is urged that the latter have more than ever reasons to stand together firmly. The Western trade has fairly begun, though scarcity of vessels at Buffalo temporarily checks the movement.

Mr. John H. Jones, official accountant, has just published the following statement of the anthracite coal tonnage for March:

	April, 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	578,518	2,055,060	1,778,745	I. 276,915
Lehigh Valley RR	*493,517	1,835,543	1,577,836	I. 257,708
Central RR. of N. J.	413,796	1,364,669	1,150,899	I. 213,771
Del., Lack. & W. RR.	392,778	1,410,798	1,222,952	I. 187,845
Del. & Hud. Canal Co.	†267,163	977,549	879,728	I. 97,821
Penna. RR.	219,792	735,688	627,685	I. 108,003
Penna. Coal Co.	119,991	418,888	368,363	I. 50,525
N. Y., L. E. & W. RR.	26,155	102,126	70,507	I. 31,659
Total	2,514,710	8,900,961	7,676,715	I. 1,224,247

* This amount includes the production of the mines of the State Line and Sullivan RR. Co., amounting to 5352 tons.

† In addition there were 39,615 tons transported from mines by D. & H. C. Co., during April, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, April 30th, 1883, was 719,232 tons; on March 31st, 1883, 598,192 tons; increase, 121,040 tons.

Bituminous.

The trade is dull, and there is considerable talk of low offerings of coal. Rumors of low prices of Cumberland at Baltimore and of Clearfield at Philadelphia are numerous, and we have every reason to believe are not entirely without foundation. Current business is small, and strong efforts are made for what there is of it. There is a strike of the coal-heavers at Georgetown and a scarcity of vessels. It is stated, however, that there is an understanding among the shippers that no more than $1.50 will be paid to Boston. We quote Clearfield alongside at $4@$4.25; and Cumberland, $4.10@$4.35, according to quality.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended May 19th and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	101,767	1,305,546	81,678	1,127,125
D. L. & W. RR. Co.	108,665	1,630,458	96,488	1,443,673
Penna. Coal Co.	33,015	448,885	33,113	390,481
L. V. RR. Co.	45,880	396,232	44,401	379,689
P. & N. Y. RR. Co.	5,185	72,113	5,488	69,630
C. RR. of N. J.	52,853	875,232	52,330	797,267
Penna. Canal Co.	15,292	79,989	14,008	85,013
North & West Br. RR.	7,493	182,157	.....	.....
	370,180	4,990,612	327,506	4,293,808
Lehigh Region.				
L. V. RR. Co.	131,915	1,718,550	133,362	1,562,659
C. RR. of N. J.	52,092	800,479	45,713	718,090
S. H. & W. B. RR.	1,418	16,571	.....	15,000
	185,425	2,535,600	179,075	2,295,747
Schuylkill Region.				
P. & R. RR. Co.	177,409	2,380,922	158,408	2,173,570
Shamokin & Lykens Val.	30,557	483,020	25,858	396,432
	207,966	2,863,942	184,266	2,570,002
Sullivan Region.				
St Line & Sul. RR. Co.	1,369	22,588	790	19,047
Total	764,940	10,412,742	691,637	9,178,604
Increase	.....	1,234,138	.....	.....
Decrease	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878.....5,121,427 tons
" " " " 1879.....8,632,714 "
" " " " 1880.....7,939,037 "
" " " " 1881.....9,322,027 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 167,384 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended May 19th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	4,638	25,825	15,324
Coal for shipment at South Amboy	17,906	318,593	290,170
Coal for distribution	13,864	301,705	262,006
Coal for company's use	2,477	55,386	50,299
Total	38,885	701,509	617,808
Increase	.....	83,701	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended May 19th was as follows:
Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	53,655	784,841
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,421	130,397
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,367	79,289
East Broad Top	443	20,977
Clearfield Region, Pa.		
Snow Shoe	4,323	96,059
Tyrone and Clearfield	58,525	1,057,838
Alleghany Region, Pa.		
Pennsylvania RR.	7,087	183,574
Pittsburg Region, Pa.		
West Penn RR.	4,854	181,586
Southwest Penn. RR.	2,423	46,571
Penn & Westmoreland gas-coal, Pa. RR	24,262	528,990
Pennsylvania RR.	1,503	184,787
Total	166,803	3,294,615

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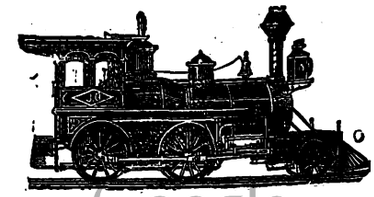
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MR. ROBERT HUNT, for so many years Keeper of the Mining Records of Great Britain, has retired from the office which his long and intelligent services had made so efficient and reliable.

NICE is to have an international exhibition this year, to embrace manufactures, fine arts, and agriculture. We notice that in the different sections formed mining, metallurgy, engineering, chemistry, and electricity have an important part. We understand from Mr. LEONARD F. BECKWITH, of this city, who is president of the American committee, that the exhibition will open on the 1st of December, and close on the 1st of May, 1884, the latest date at which applications for admission will be received being fixed at July 15th.

THE substitution of rolls for stamps is gaining ground. As yet, the number of mills built in accordance with the new system is small, but it is a fact pointing to a rapid increase in the future that some of the most eminent designers of silver mills advocate rolls, some of them in spite of an earlier prejudice against them. The subject is one that until now has been discussed only in a narrower circle, but, unless we much mistake the "signs of the times," is bound at an early date to be forcibly brought to the attention of all mill-men. We trust that the movement, when it does gain in force and popularity, will not slip from the control of those who have closely studied the subject, as failures due to incompetent designs and applications would prejudice a cause which is certainly destined to effect much good.

THE conviction that an attempt would be made by the other Western iron manufacturers to localize the pending strike in the Pittsburg District proper, is given as the reason for the step taken by the Western Iron Association in abandoning its demand for a scaling-down of wages 10 per cent. To say that this action is a surprise to the trade, is expressing its feeling mildly. Full or even partial work by the majority of the mills during the summer means a glut of finished iron under which prices must sag down to a low level. It is difficult to see how any but the most favorably located works are going to do more than cover the cost of production, while the weaker mills will have to stop. Experience has proved over and over again that they will not do so until growing losses leave them no alternative. There is little hope that any agreement can be reached as to restriction, when the manufacturers can not even hold together in trying to enforce a reduction of wages corresponding to the decline in prices. A cure is possible only by the heroic means of cutting prices down to the lowest limit at once. The plan has worked quite well so far in the Eastern foundry pig trade. It has convinced those who wavered and hoped against hope, and has cleared the situation. In the finished iron trade, matters are in a similar state. There are not orders enough for all, and the sooner the weaker element is crowded into idleness the better for all concerned.

THE FUTURE OF COPPER.

The letter of our correspondent from Lake Superior, which we print elsewhere, deals frankly with a question which is now uppermost in the minds of all copper producers. Nothing can be gained by closing their eyes to the fact that production will be enormous this year, if it goes on at the present pace. Our correspondent, who has the best facilities for watching developments in his own district, does not look forward to a decrease in the output this year, but is of the opinion that we must expect an increase. Much, of course, depends upon what the Calumet & Hecla will do; but it seems to us that the only question is, whether or not the managers of this extraordinary mine see fit to keep their income at the present high rate by an increase in the output corresponding to the falling off in receipts by reason of the falling off in the price. With the recent additions to their plant, they will probably find no trouble in so doing. Turning from the Lake to the Western mines, a recent close investigation of their working capacity this year enables us to state that they will certainly do better than they did last year, so far as production is concerned. Arizona is good for at least twenty million pounds this year; and Montana, which last year made 9,500,000 pounds, is now turning out copper at the rate of 18,000,000 pounds per year from its smelting-works, not counting the ore which is shipped directly to England. Of the copper run into furnace products in the Butte District, fully 15,000,000 or 16,000,000 pounds will go abroad. Besides this, fully 10,000,000 pounds of Lake and 1,000,000 pounds of Arizona ingot and black copper are contracted for shipment, so that the foreign markets will take from us fully 26,000,000 pounds of copper in ingot and matte, and an unknown quantity, reported to be 6000 tons, of rich ore from the Anaconda, of Butte, which will swell the total to at least 30,000,000 pounds. This, it is true, reduces the supply here of the estimated production of 105,000,000 by 26,000,000, or to 79,000,000 pounds, to which must be added the very problematical stock. The latter is apt to seem bewilderingly large to the uninitiated; but it must be remembered that it means the whole product of the Lake District during the entire period that navigation is closed. The excess of the stock of Lake of one year over the other is really only the amount which is chargeable as surplus.

The questions which now face producers are, How much more copper must we send away? and who is to ship it? On the former point, it is impossible to make any thing but very rough guesses. It depends primarily upon how our home trade is going to develop. If the present dullness continues, it must be heavy, and it would be idle to deny that the prospects rather point in that direction. Prices of manufactured goods, it is true, are much "cut up," but it is too well known that low figures do not tempt buyers when trade is as dull as it is now. That they will ultimately lead to a very important increase in the number and variety of the uses of the metal, can not be denied, but such an expansion of the field of any article is necessarily slow. It may be therefore assumed that during the last half of the present year more ingot copper will have to go; and we come to the second point, Who is going to ship it? We believe that Arizona will have to contribute to a much greater extent than hitherto. Montana ships almost all of its product, being specially favored by the silver contents of its mattes. The Lake

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producers have a market here that may be, and is, considerably encroached upon, notably by the best brands of Arizona copper, which is skillfully used by consumers as a lever to pull down the quotations of Lake. But there is a considerable quantity of Arizona copper which will not do for that purpose. It is excellent material, no doubt, but it can not be forced into the hands of a set of consumers who have been spoiled by the long use of metal of unrivaled quality. Abroad it would rank high, here it does not, and the surplus of it which our market will not take must go abroad. The poorer grades of Arizona copper must seek the English market, to which it has good access from Gulf ports directly. This may not be a pleasant prospect; but the facts render it probable, and the sooner producers understand this, the better for all concerned. How the English markets will bear up under such an additional load remains to be seen. Stocks there are low, comparatively speaking, and the drop in the prices during the past six months will force weak producers in all parts of the world to stop.

THE IRON SILVER MINE.

When mining investments are so generally declining, and mining as a legitimate industry is made to bear the blame of the failures and losses due to insane gambling and incompetent or dishonest management, it is refreshing to turn to examples which show what good mines are doing when prudently and honestly managed. The Ontario, the Homestake, and the Horn-Silver are familiar examples; but as an illustration not only of what a good mine can do when well managed, but of the effect of management upon the profits of a mine, the Iron Silver, of Leadville, Colo., is an extremely instructive example.

The Iron Silver mine, owned at that time by Messrs. STEVENS & LEITER, began shipping ore to St. Louis in 1876, under rates of freight which made it impossible to ship any thing of lower grade than 100 ounces. The mine, under the management of Mr. STEVENS, was very profitable, and in 1879 or 1880 had already paid about $400,000 in dividends, had paid for its improvements, and had about $170,000 in bank when the present company was incorporated, and the control in March, 1880, passed into the hands of Mr. GEORGE D. ROBERTS and his friends, and the management was placed by them in the hands of Mr. W. S. KEYES, then also managing the Chrysolite.

Under this management, in one year—until about April, 1881—the property paid no dividends, but expended the $170,000 surplus and ran in debt $30,000, and the mine was said to be exhausted.

Mr. STEVENS was then again placed in charge, and immediately cut down the extravagant expenditures that were ruining the company, paid off the debt, accumulated a reserve fund of $100,000, and began to pay dividends, which were continued as follows:

1881. May 2	$100,000	1881. Dec. 20	$100,000
June 8	100,000	1882. March	100,000
Aug. 15	100,000	June	100,000
Oct. 15	100,000		

In March, 1882, Mr. STEVENS was left out of the board and management, but in June, 1882, again resumed control, having bought out MR. LEITER'S large interest. At that time, it was stated that the mine would pay but one dividend more. The following record shows how far this gloomy prediction was from being realized:

1882. October	$100,000	1883. March	$100.000
December	100,000	June	100,000

Total dividends declared since the company was organized, $1,100,000 (previous to that, the mine had paid $400,000). And the company has in the treasury nearly enough for another dividend, besides the $100,000 reserve, which it always maintains. The mine is said to have reserves of ore "in sight" of about $2,000,000 market value, and the dumps are estimated to yield 8000 or 10,000 tons of ore of the present average value.

During ten months of 1882, the output of the mine was about 60,000 tons, which brought about $18 a ton, that left a net profit of between $6 and $7 a ton, after deducting operating expenses, real-estate purchases, law expenses, etc.

Under the present administration, the stock of this company has never been "speculative;" but, by the mere force of dividends, it has gradually crept up from about $1.60 to over $3 per share; and as the product of the mine and the net earnings are increasing, the present price will probably be exceeded.

The Iron Silver is a "low-grade" mine, and it is only the great reductions which have been secured in transportation rates and furnace charges that have made its immense supplies of low-grade ore available. The ore is also highly valued as a flux for drier ores, and commands a very high market price as compared with its intrinsic value.

The record of this mine and of its management is a highly creditable one, and may be studied with benefit by those who condemn mining for the shortcomings of extravagant or dishonest management, or who look upon all mining as merely gambling. This stock is paying the great majority of its present holders from 30 to 50 per cent per annum on their investment, has repaid them in dividends more than their original investment, and would net them to-day at market price nearly twice what they paid for it.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Plaster of Paris and Gypsum Works.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: How much are ground gypsum, as a fertilizer, and *first-class* plaster of Paris, worth per barrel, and is the market for the two articles comparatively active, especially in the Southern and Southwestern States? What machinery is necessary, and what is the cost of the same (say at St. Louis) to start operations? Will $10,000 be enough actual capital to get in working order, supposing the site to be very advantageous; plenty of water and timber on the property, the bed being from 10 to 20 feet thick, and lying horizontally? Underlying the gypsum, or immediately below it, are three feet of sandstone; then four feet of potter's clay; then six feet of white sand highly fit for making glass. How much is the sand worth per barrel, and what is the demand, provided it proves a first-class article? By an early reply, you will greatly oblige a constant reader of the JOURNAL. W. F. R.

JEANESVILLE, PA., May 23.

Not being familiar with details of the subjects to which our correspondent refers, we submit his questions to those of our readers who may be able to aid him.—EDITOR E. AND M. J.

A Suggestion to Miners of Pyrites.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The letter of J. D., Jr., in your issue of the 5th inst., is likely to bring to the attention of acid manufacturers some very plain facts that have lain dormant during the past fourteen years. (Pyrites-kilns were erected and worked in this city about the year 1869.)

With the example set before us by the great majority of manufacturers in Europe, is it not inexplicable that during all these years some few of our own plants have not been adapted to the utilization of pyrites, with the attending profits as shown? May there not be some few errors of omission or commission in the easily flowing sentences, the startling tables, or some optical delusion in the careful drawings of "some other fellows' kilns"? We fail to catch the familiar odor that lingers constantly about the plant; but no doubt the "weekly return-sheet" will contain the usual clause, namely, "In cinders and unaccounted for, 7 per cent"! and the air will still look blue, and the pyrites miner, rolling in luxurious ease, will explain away satisfactorily the differences between analysis and working results.

This subject of changing established sulphur-burning plant for pyrites-kilns, with attendant difference in production of acid per cubic foot of chamber-space, is a matter of too serious import to be accepted without the most careful inquiry, and under the guidance of those disinterested in every respect. What is really needed at this time is a comparison of values of the pyrites found in this country, tabulated in such form as to be of service to those progressive manufacturers who have already spent much time and some money in looking up the subject. If, for instance, J. D., Jr., with his intimate knowledge of the various pyrites deposits, would invite the several owners of the mines to send full details of location, tide-water shipping-points, character of ores, gangue, percentage of sulphur, iron, copper, etc., and arrange such information for publication, in his usual forcible diction, he would confer a great favor on the community, and lay the manufacturers under still further obligations, already great, by reason of his able articles. Very truly, W. H. A.

We feel convinced that our correspondent, J. D., Jr., who is at present traveling in Mexico, will be happy to follow out the above suggestion, and we shall be much pleased to place in his hands, upon his return, any documents, samples, etc., relating to the pyrites mines in this country, sent to us to be transmitted to him. We join our correspondent W. H. A. in his appeal for information, and trust that the responses will be such as to warrant the publication of a detailed article by J. D., Jr.—EDITOR E. AND M. J.

American Pyrites for Sulphuric Acid Manufacture.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I regret to say that Mr. H. J. Davis, of the Rowe pyrites mine, in your issue of May 19th makes some statements which can not remain uncontradicted. He denies my statement about the presence of a trace of arsenic in the Rowe pyrites. I made it on the authority of the chemist of the Cochrane Chemical Company, of this city, and I repeat that his careful examination of the Rowe ore gave traces of arsenic therein. He now adds that a recent test of acid made therefrom does not show even this trace.

The same is doubtless true of the Milan ore. For a long time, no trace of arsenic was noticed, as ordinary methods would not show it. Finally, the most delicate tests were applied and a mere trace was shown, "so small as to be utterly insignificant," as Mr. Attwood reported. It is a matter of congratulation that our American pyrites are evidently free from arsenic, as the fact removes the last barrier to their entire substitution for brimstone.

As to the presence of zinc in pyrites, my authority is Lunge, whose tables show that the German pyrites contained 6 per cent; the French, 2 per cent; the Belgian, 5 per cent; the Irish, 3½ per cent; the Swedish, 2½ per cent; and the Norwegian, 2 per cent. His volumes contain numerous incidental references to the presence of zinc in pyrites; and I submit that his authority is sufficient to bear out my casual reference to the point.

Thirdly, Mr. Davis objects to my statement that J. D. "points out a defect in the otherwise excellent ore from Rowe, namely, its softness." I did not pretend to quote his words, but to give their substance. J. D. stated, "It is granular in structure, and therefore in breaking makes a larger quantity of smalls than a more compact ore." If this is not an

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exact equivalent of my phrase, "its softness," I fail to see the difference. To be more explicit, I will say that the Rowe ore crumbles under the process of breaking it into pieces fit for the kiln, so as to make an amount of fines variously estimated at from 15 to 20 per cent. I have seen carloads of it wherein no lump would remain after dropping it from the hand to the ground. It was all of the form of coarse gravel. The later deliveries are somewhat firmer; but deliveries recently, which I have seen, were still making 20 per cent of fines under the hammer. Moreover, this softness is disagreeably shown in the kilns by the clinkers formed therein, as I have seen them, both in the kilns and in the cinders drawn therefrom.

As I wrote you in the first place, I do not wish to depreciate other mines; but certain facts are beyond dispute. The Virginia pyrites, it seems, can be used only in shelf-burners; the Milan pyrites is the highest grade of ore to burn in ordinary kilns, as it never runs to scars, allows of a perfect draught, and makes the minimum of fines. The Rowe ore is between the two, and its use will oblige the acid-maker to have both kinds of burners in daily use.

In fact, I am ready to contract to ship No. 1 pyrites of from 48 per cent to 50 per cent sulphur, crushed to a uniform size ready for the kiln, and without any fines. When Mr. Davis can do the same, the buyer can put us on an equality.

The question of economy in burning these gravelly ores or fines in mechanical burners will doubtless be investigated by large manufacturers of acid. But it must be remembered that, if one intends now to put up a plant, he will have a great advantage in putting up ordinary kilns. Not only is the first cost much less, but he can buy and use all the foreign ores, as well as the hard pyrites like the Milan. The great Spanish mines really rule the market, and by building a plant suitable to burn their ores, the acid-maker is not dependent on any one or two American mines.

Respectfully yours, W. H. WHITMORE,
BOSTON, May 26. Treas. Milan Mining Co.

THE FUTURE OF COPPER.

Special Correspondence of the Engineering and Mining Journal.

The profitableness of mining copper, as of all other producing industries, depends upon the cost of production and the relative attitude assumed by supply and demand. If demand be the pressing mendicant, prices may run into excessive profits; but if supply be the pressing mendicant, prices are invariably at sea. In the first case, the only antidote is to limit demand, and in the second case to cut abruptly short the supply. In many industries, these antidotes are easily applied; but in respect to copper, either of them is easier prescribed than compounded, and in the present state of metallurgic statistics each is practically impossible. It is practically impossible to curtail demand, even if prices do run high; nor is it posible to curtail the supply, except by the smaller and more unprofitable companies going to the wall, when once the price lies prone and helpless. When, for example, the railroad boom of 1880 created a voracious demand for ingot for locomotive purposes and the like, it did not one whit take the edge off this appetite when copper sprang from 17 to 20 cents, making an increase of cost to consumers, over contracts of equal volume in 1879, of over two millions of money. Not only was there an active demand for our Lake brands, the output of which for this year 1880 eclipsed by nearly 7,000,000 pounds that of 1879, but the tide of our export trade shifted suddenly from 13,400,000 pounds in 1879 to less than one fortieth of that amount, while our import trade was increased from one million to nine and a half million pounds. And, on the other hand, no effort was made in 1878 to restrict the supply, although quotations for ingot fell off two cents per pound from the previous year, so that the increase of 2,600,000 pounds of lake copper netted something like half a million dollars less than the product of 1877. Our export trade for the same year, 1878, though increased by two million pounds, brought far less returns than the exports of 1879, although it ought in fairness to be said that at least a million and a half of the discrepancy was owing to the falling off in the foreign demand for American cartridges. This paragraph is written to furnish a key to the situation now existing, as we find ingot hanging fire at 16 cents, with markets any thing but buoyant, and twenty million pounds of refined copper awaiting shipment on the 1st of May at the smelting-docks of Portage Lake.

Although there can be no doubt that a combination of circumstances sometimes, somewhere, arises which will bring these conflicting interests to an equilibrium, for the nonce, at least, it must be acknowledged that the economic axiom, that demand regulates supply, finds in American copper mining an important modification. For while the market is undoubtedly glutted beyond all hopes of a speedy recovery, the mines are bracing themselves for eclipsing by excessive odds the records of past production. It may be rejoined that the ports of Europe swing open as those of America close on our producers; but the question whether we are prepared to undertake the mining of copper on an export basis is one which American capitalists have never yet undertaken, and it is quite likely are little prepared at present to study by the method of experiment. Up to this time, the great bulk of our ingot has found its way into the shops and foundries of American manufacturers, as will be seen by the following table:

Year.	Pounds produced.	Pounds export.
1877	39,000,000	11,500,000
1878	41,000,000	13,000,000
1879	43,000,000	13,400,000
1880	49,000,000	326,000
1881	54,000,000	7,000,000
1882	57,500,000	3,000,000

This table does not include the products obtained from Western ores, which would increase the supply for 1881 by 18,000,000 pounds, while the statistics of the Treasury Department point to only one million pounds as the total export; and an increase in 1882 to over 32,000,000 pounds, while the same authority quotes the exports of ore, matte, etc., at about 3,000,000 pounds. This would make the total product for 1882 to be 90,000,000 pounds, with the total exports only 6,000,000 pounds. We see in these figures that up to this time producers of copper have had their eyes on home and not foreign buyers. That so little copper found its way beyond seas is strong inferential proof, moreover, that a tremendous expansion has occurred in home demand, a matter which we find borne out by the facts. But yet a glance at the figures which illustrate the excessive growth of copper production will show the careful student and speculator that our American markets can not longer stand the tension of such burdens as are heaped upon them by the ambitious operators of the mines. And so we are confronted by a new question: Are we ready to try by experiment the problem of shifting the battle from home to foreign fields, where we come into competition with the pauper labor of Spanish-speaking people and the inexhaustible beds of Chili, Africa, Portugal, Spain, and Australia?

It is hardly probable that the general mining superintendent anticipated the drop in ingot which occurred in the middle of March, although a select few prophesied it from the time statistics from Boston and London first began to come to the surface at the beginning of the year 1883, which opened with lake and Western mines preparing to swell the total product of mineral altogether beyond precedent. We were certainly quite ready to do our part in the lodes of the Upper Peninsula. The Conglomerate was fast coming into shape to take its place among the first producers of Keneenaw; the Wolverine, which excited such a ripple of excitement during the early part of last summer, was nearly ready to set its well-equipped mill in operation; the battery of stamps at the Centennial were crushing out considerable mineral; a number of the old Ontonagon mines were reopening; and the Huron and other smaller Portage Lake mines were arranging for increased facilities for hoisting and treating their rock. The report of Mr. White, of the Quincy Company, for 1882, showed that the resources of that property opened up ready for stoping were fully equal to those of 1881, which was no less true of the Osceola and Franklin. There was every prospect that each of the dividend-paying mines would outdo its past record, excepting, perhaps, the veteran Central; but this mine, I am told this week, is showing much more stamp-rock in the bottom levels, though of the credibility of my information I am not just now sanguine. The Franklin was prepared to enter upon the most prosperous year of its history, and could it have found a market for its copper on hand, at ruling prices at the close of 1882, would have commenced the present year with the payment of a handsome dividend. The grim logic of events has exploded this pretty bubble, however, until a readjustment of the conflicting forces of the industry which now disturb its peace. The underground appearance of the mine is as promising as at any time in its history, and the product for April exceeded by thirty-six thousand tons the record of the same month in 1882. Michigan copper stocks, as a rule, are listed on their intrinsic merits; but the Franklin presents the anomalous front of very valuable property languishing among the weaker properties of this district. This state of affairs was owing, primarily, I fancy, to the old quarrel in its administrative circles, and, at present, to "hard times," coupled with memories of this imbroglio. Advices from the Montana and Arizona people exhibited them in readiness for "rushing things" also.

The first quarter of the year is over, and the prophecy concerning increased products is vindicated by the results. Almost all of the mines present figures in excess of last year. The published figures of the larger mines speak for themselves. The new Peninsula Mining Company comes to the front with an output varying from fifty to sixty tons of mineral monthly. The management of this property asserts that the returns meet expenses and more. It does not look for great results at present, nor even the best results, but will push steadily on until the capacity of the property has been gauged, when it will be equipped for extensive operations. The Conglomerate is still spending money freely and opening reserves for stoping as soon as the mill at Lac la Belle is ready for use. The Philadelphia people can rely that, under the superintendency of Mr. Alexander P. Thomas, all improvements will be the most substantial, even if they are not the most economical. The Wolverine arrangements for development of its well-charged lode are very complete, and, barring the one difficulty of water supply for milling purposes, which may or may not prove serious, the mine may now be said to be under headway. Your correspondent has it on quite credible though, in this instance, not authoritative testimony, that the Phœnix is again showing more and better stamp-rock, and that the Copper Falls is rushing its mill with more productive ground than at the close of the winter months. These last two, however, must not, because of this statement, be taken for more than they are worth, and are here referred to for the sole purpose of showing that all along the line the prospects of an increase in the output of our Michigan mines are unmistakable, provided, of course, prices are such that the mines can keep their noses above water. It ought here to be said that the old Kearsarge, adjoining the Wolverine, has been unwatered, and that explorations are going on under the direction, I am told, of Mr. John Daniell, superintendent of the Osceola and Tamarack mines. Copper has already been found in a percentage sufficient to warrant somewhat elaborate work, and although at present writing it does not exhibit so flattering an output as its neighbor, shafts will be sunk and a systematic development of the property begin. I have not space at present to take up in detail the Western mines. It may be safely said that, if the native and ore mines continue as they started out, the production of 1883 will exceed that of 1882 by little if any less than fifteen million pounds.

But here the question again arises, What is to be done with this tremendous amount of copper which is finding its way to the Eastern markets? That this is a significant question for our public-spirited capitalists who are engaged in the legitimate development of our mineral resources, is apparent from the first. We shall be helped in one way in studying the future of copper mining in Michigan and the West by giving heed to the following series of figures; while your correspondent does not profess for them infallibility, he is certain they are at least sufficiently reliable to be made the unmistakable basis of future operations. While it may be doubted if the home consumption of copper reached the enormous total of 55 million pounds for 1881, it is by no means likely

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that it exceeded this sum, and it is safe to use this as the starting-point of our calculations. We have:

Lake brands, 1881	54,000,000	pounds.
Western " "	18,000,000	"
Left over from 1880	12,000,000	"
Total supply for 1881	84,000,000	"
Domestic consumption, 1881	55,000,000	pounds.
Export, 1881	8,000,000	"
	63,000,000	"
Carried over to 1882	21,000,000	"
Lake brands, 1882	57,000,000	pounds.
Western " "	32,500,000	"
Carried over from 1881	21,000,000	"
Total supply for 1882	111,000,000	"
Domestic consumption, 1882	63,000,000	pounds.
Exports, 1882	6,000,000	"
	69,000,000	"
Carried over to 1883	42,000,000	"
Total production, 1882	90,000,000	pounds.
Increase, 1883	15,000,000	"
Total production, 1883	105,000,000	"
Carried over from 1882	42,000,000	"
Total supply for 1883	147,000,000	"
Domestic consumption, 1883	72,000,000	"
Remainder	75,000,000	"

The only "imaginary quantity" in these figures is the amount of domestic consumption, and here your correspondent believes that any error is in favor of the miner, that is, the amount of consumption may have been magnified by a good part of a diameter. That the domestic consumption for 1883 should equal 72,000,000 pounds, will require the most prosperous activity among locomotive builders and electric light companies, as well as among the minor industries into which the use of copper enters.

That the figures presented in the preceding paragraph are formidable and pregnant with an eloquent if not ominous meaning to our generous speculators who have patiently paid the assessments levied upon them for the continuance of operations in lodes moderately charged with mineral, is true; but that there is an escape possible from the dilemma is possibly also true. Certainly none of our capitalists now thinks that domestic consumption has an appetite voracious enough to swallow the enormous product which, if things continue after the old order, must henceforth flow into the reservoir of the general market. Such a thing is impossible. Nor is there any prospect that any new industry, or the revival of any old one, will start up in the near future and demand the full record of our production. That also is impossible. To "bank" the output of the mines in hopes of a future outlet, at old-fashioned prices, in American avenues of trade, would only be to heap up wrath against a day of wrath. If we are going to produce, we must sell in order to have wherewithal to maintain production; and if production is to be maintained at its present volume, the gates must be lifted which open into foreign seas. What effect this new departure will have on American mining is food for digestion at another meal.

SPECULAR.

MINING AT TOMBSTONE, ARIZONA.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The mining outlook for this camp is brighter this spring than it has been for a year past. There are fewer mourners around the saloons; the cow-boys and "rustlers" have sought more congenial regions, and pistol practice in the street has become comparatively rare. New buildings are going up on all sides, and the burnt district is to be immediately rebuilt.

This revival of industry and confidence is based largely upon the general promise of successful mining below the water-level upon the great vein of the Contention and Grand Central Hill. This problem has been debated for more than a year past, and there has been great doubt, and there still is with some, whether the ore, which above water is free-milling, will pay a profit to work when in its unoxidized condition below the water.

The Grand Central Company was the first to take the risk of the attempt to lower the water which stands in quantity just below the 600-foot level. A long trial of the pumps showed that this is no slight undertaking. The water flowed in almost as fast as it could be pumped out. To all appearance, it would seem to be a large body of water, filling cavernous spaces, tank-like, over an extended area. A few feet were gained, but the capacity of the Grand Central pumps was obviously insufficient. The Contention Company, holding the adjoining mine, has just now decided to assist in the effort to control the water, and Mr. White, one of the largest owners, has gone to San Francisco to order pumps and machinery of the largest size and capacity.

This event has helped more than any other to brighten the prospects of the camp; for all concur in the belief that the owners of these leading mines would not make such great outlays without good reason.

But, in addition to the mining, Tombstone offers many advantages as a place of residence. It is high and salubrious, free from the miasms of the valley of the San Pedro, and has a bountiful supply of pure granite mountain water, brought in iron pipes from the Huachucha Mountains, twenty miles away. The market is well supplied with fruits and vegetables from Sonora and California, while the gulf at Guaymas affords an abundance of oysters and fish.

Many of the outside claims are now producing small quantities of ore, which before were not worked, but held for sale at high figures.

On the Bob Ingersoll, the incline is pushed steadily downward into the Blue Monday claim, and will soon intersect the West Side lode. The ore in the bottom is found to be fully equal to, or better than, the ores taken out higher up. The Contact claim is said to look better than ever.

COPPER MINE LITIGATION.

An event of considerable interest and importance in mining jurisprudence is the suit of the Copper Prince Mining Company, of New York, *vs.* the Copper Queen Mining Company, of the same place. It is claimed by the Copper Prince people that they have a vein with its apex on the Prince claim; while the Copper Queen people claim that, if the ore-body in controversy is a vein, its apex is clearly within the lines of the Copper Queen claim. An extensive examination of the ground in dispute has been made by the experts on both sides, and numerous very interesting maps and sections have been drawn to illustrate and explain the points at issue and the position and formation of the ore. The trial of the case began on the 17th, and will probably not be closed before the 25th.

THE WAY UP CLAIM.

The celebrated case of the Tombstone Mill and Mining Company has not yet been decided on the appeal. Since the decision in favor of the Way Up, a year ago, the case has been carried to the Supreme Court of the territory, and has been argued; but no decision has been rendered, and the Way Up lies unworked, waiting the slow operation of the law.

TOMBSTONE MILL AND MINING COMPANY.

The operations of this company for the past year, ended April 1st, 1883, have recently been given in detail in the annual report to the stockholders, which you probably have seen and perhaps reprinted in part. From this document it apppears that the aggregate extraction from the two claims—the Good Enough and the Tough Nut—has been nearly 67,000 tons of ore, and that all the known ore-bodies have been exhausted. In consequence, work has been stopped on these claims and transferred chiefly to the nearly vertical veins which cross the claim in a general northerly and southerly direction, nearly parallel with the Contention and Grand Central lodes.

WEST SIDE LODE.

The most prominent of these veins at present is the West Side, which can be traced for at least 1300 feet, and is opened by a series of shafts for a distance of 1200 feet, and to a depth of 300 feet. Ore is found for most of the distance along this vein, and averages about 40 ounces in silver and half an ounce in gold. The ore-bodies are from two to ten feet, and it is said eighteen feet thick, but the vein in some places is very thin. It promises a large and continued supply of good milling ore.

Some work has been done on other and parallel veins with promising results.

The same company, under the direction of Professor Church, has engaged in smelting. At the time of the stoppage of the dividends, it was found that the company was some $400,000 in debt. The immense accumulation of tailings was relied on to cover this debt, and, according to the last report of the company, it seems probable that in time this debt, now in the form of six per cent bonds, to the extent of $361,000, will be extinguished.

It is claimed that the preliminary trials to work these tailings by smelting have been successful. The tailings are first concentrated, and the concentrates, with the addition of slimes, are molded into bricks and mixed in the charge with an ore of manganese as a flux. This manganese is obtained in quantity in the camp, and carries about ten per cent of silica and 25 ounces of silver. This ore constitutes about one half of the smelting charge, and costs to extract at the rate of $10.13 per ton. In twelve months, 1480 tons of concentrates were obtained from 10,417 tons of tailings, a ratio of about 1 to 7.

GOLD IN LOWER CALIFORNIA.

The latest excitement here is the reported discovery of a new El Dorado in Lower California, opposite Guaymas. So far as yet known, the gold placers are within a district 40 miles long by 20 miles wide. Companies are forming here and in Guaymas to go to these diggings, and every available craft at Guaymas is brought into service. The great drawback is probably want of water, not only for washing out the gold, but for drinking purposes. The mountains are known as Sierra Gigantea, and rise to over 5000 feet above the gulf.

GLÜCK AUF.

TOMBSTONE, ARIZ., May, 1883.

EXPERIMENTS IN THE KOEPE WINDING SYSTEM.

We have had occasion repeatedly to refer to the Koepe winding system, in which hoisting-drums are dispensed with, the rope being carried around a simple pulley to the sheaves, a cage being attached to each end, and the bottom of both being connected with a tail-rope. The weight of the rope is thus completely balanced, and the hoisting-engine has only to perform the steady, uniform work of lifting the load. This system is gaining ground rapidly in continental and English collieries, and merits a close study on the part of engineers in this country, especially where high speed is aimed at. The work of investigation will be much aided by the results of a series of experiments carried out by Herr Baumann, of Kohlscheid, Germany, recently printed in the *Zeitschrift für Berg-, Hütten- und Salinen-Wesen*. It is evident that hoisting is possible only when the friction caused by the loads on the two ends of the rope is greater than the weight of the net load to be lifted carried on one of the cages. With P equal to the weight of half of the total length of the rope plus the empty cage and cars, and Q equal to the weight P plus the load to be raised, we have the following equation, in which u denotes the amount of friction:

$$Q - P = u\,(Q + P) \text{ or}$$

$$u = \frac{Q - P}{Q + P}$$

In using the Koepe system, there must be no danger of the rope sliding on the sheave, even when the rope has been covered with grease. The friction must be great enough to cause the stoppage of sliding as soon as the force applied to bring it about ceases to act. In Herr Baumann's experiments, the sheave was kept from turning. The scale-pans at both ends of the rope were first uniformly loaded, and then constant additions were made to the weight in one of them until motion imparted to it was maintained.

In the first series, giving the friction of wire rope on oak wood, a drum was employed which had been in actual use for a number of years. New and old steel and iron ropes were tried. In running the ropes on leather the latter was placed flat and on edge, and with the experiments relating to wire rope and cast-iron, the rope was dripping with oil, and in one series the load was allowed to remain for periods varying between 24

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hours and 144 hours. In all, as will be seen, 866 experiments were made. The following is a recapitulation of the results:

Diameter of wire rope. Millimeters.	Material of rope.	Diameter of sheave. Meters.	Material.	No. of experiments.	Mean of $u=$
18	Steel, old.	2·2	Oak.	14	0·303
16	"	4·4	"	79	0·258
18	"	4·4	"	66	0·215
20	Iron, new.	4·4	"	21	0·280
20	Iron, old.	4·4	"	80	0·246
32	"	4·4	"	32	0·197
Average, rope on oak					0·242
16	Steel, old.	3·2	Leather, flat.	37	0·277
18	"	3·2	"	46	0·244
20	Iron, new.	3·2	"	52	0·253
20	Iron, old.	3·2	"	20	0·230
32	"	3·2	"	52	0·234
Average, rope on leather					0·248
16	Steel, old.	3·2	Leather on edge.	19	0·281
18	"	3·2	"	14	0·287
20	Iron, new.	3·2	"	15	0·269
20	Iron, old.	3·2	"	24	0·228
32	"	3·2	"	17	0·248
Average, rope on leather, on edge					0·256
15	Iron, old.	1·6	Cast-iron.	99	0·227
21	"	1·6	"	50	0·259
26	Steel. old.	1·6	"	129	0·182
Average, rope on cast-iron					0·203

As was to be expected, the friction of the ropes is smallest on cast-iron, greater on wood, and greatest on leather. It appears that it is somewhat smaller in the case of steel ropes than of iron ropes, and u grows smaller as the diameter of the ropes and the load increase. This is probably due to the fact that thinner ropes are pressed into closer contact with the body they rest on, and that with smaller loads the stiffness of the wire ropes has a great influence. When the experiments were made in rapid sucession, the friction declined, while it increased after oiling and after pauses. This is attributed to the heating of the oil by sliding.

Herr Baumann has entered into a mathematical discussion of the method of determining the greatest actual net load which may be carried under given circumstances, and also the minimum weight of the rope in order to be able to hoist without danger. We must refer to the original for the details of these calculations, and will in the following merely give the results. Assuming the dead load to be D, consisting of the weight of the cage and the cars, and L the live load, being either net quantity of rock hoisted or the weight of the men in the cage, then the depth at which it is possible to begin to apply the Koepe system, when the rope grasps only one half the circumference of the sheave is as follows, for different ratios in the proportion of live to dead load.

For Wire Rope on Cast-Iron Sheaves.

$\frac{D}{L}$	Steel Rope. Factor of safety 10.	Iron Rope. Factor of safety 8.	Iron Rope. Factor of safety 10.
2	192 meters.	128 meters.	96 meters.
1·9	224 "	150 "	112 "
1·8	256 "	169 "	128 "
1·7	288 "	192 "	144 "
1·6	320 "	214 "	160 "
1·5	353 "	235 "	176 "

For Wire Rope Running on Oak.

$\frac{D}{L}$	Steel Rope. Factor of safety 10.	Iron Rope. Factor of safety 8.	Iron Rope. Factor of safety 10.
1·8	23 meters.	15 meters.	12 meters.
1·7	63 "	42 "	32 "
1·6	104 "	69 "	52 "
1·5	144 "	96 "	72 "

By using guide-rollers, the rope can be made to grasp a greater proportion of the circumference of the sheave, and hoisting is safe then at much smaller depths. Making it, for instance, so that the angle formed by the center and the two points where the rope leaves the sheave is 225 degrees, the following figures are obtained:

$\frac{D}{L}$	Steel Rope. Factor of safety 10	Iron Rope. Factor of safety 8.	Iron Rope. Factor of safety 10.
1·8	32 meters.	21 meters.	16 meters.
1·7	72 "	48 "	36 "
1·6	112 "	75 "	56 "
1·5	152 "	102 "	76 "

In well-constructed hoisting plants, the ratio between dead and live load is rarely more than 1·5, and, as the figures above show, even for so low a ratio it is possible to use the Koepe system without danger of sliding. The use of flat ropes is particularly recommended, and by attaching the cage by a clutch, no trouble is experienced in making the necessary changes for hoisting from different levels.

THE RAILROAD EXPOSITION AT CHICAGO.

Special Correspondence of the Engineering and Mining Journal.

The National Exposition of Railway Appliances opened at Chicago on the 24th of May, and will continue until the 23d of June. The building, under which are amassed many thousand exhibits, covers several acres of ground, every inch of available space having been assigned. At this writing, the Exhibition is fairly under way, some delay being caused by the multiplicity of exhibits and the natural commotion of a large undertaking. The management deserves credit for the general excellence and ability evinced in the Exhibition as a whole. It has been no small labor to accumulate such an unique exhibition of railroad appliances. The Exhibition affords to the mechanic subjects for study which will enable him to trace minutely the course of development which has brought the modern railroad to its present degree of perfection. The impress of inventive genius is seen on all sides, and although it would seem almost impossible to improve upon the character of the present established features, the restless men who lead progress are now at work to supplant steam by utilizing the electric fluid as a motive power. The best results do not seem beyond reach, as exemplified in the half-mile electric railroad now in operation at this Exhibition.

It would fill more space than your JOURNAL commands in one issue, to dwell upon the separate exhibits, which embrace every conceivable adjunct known in operating a railroad, to say nothing of those recently brought before the notice of visitors and not yet utilized. It is doubtful whether a similar exhibition could be collected, at least in the present generation, as the resources of many countries have been drawn upon to contribute to the success of this one. That it is now assured, can be testified to by any intelligent observer. While the Exhibition is a matter of general interest to your readers, it may not be out of place to give a partial list of those exhibits representing matters to which the ENGINEERING AND MINING JOURNAL gives frequent and prominent attention.

The National Tube-Works has a very fine exhibit, a feature of which is the obelisk in the center of its space, upon which are fastened gauges, injectors, etc. The display of tubings of this concern is large and assorted. In cables, ropes, wires, etc., we may refer to the T. V. Allis Manufacturing Company, of Trenton, N. J.: George B. Carpenter & Co., Chicago; Harrison Wire Company, St. Louis; Roebling Sons, Trenton, N. J.; and Upson, Walton & Co. Cleveland, Ohio. In engines, there are the Ames Company; Southwark Foundry and Machine Company, Philadelphia; and the Westinghouse Machine Company, Pittsburg. The Bullock Manufacturing Company, of Chicago, is prominently represented by its engines, and supplies the Brush electric light. The Brown Hoisting and Conveying Company, of Cleveland; W. Chisholm & Sons, Cleveland, shovels, spades, etc.; Thomas H. Dallett & Co., Philadelphia, drills; Exhaust Ventilator Company, of Chicago, fans; Harrington & King, Chicago, Perforating Company; Huyett & Smith, Detroit, fans and blowers; Penfield Block Company, Lockport, N. Y., trucks, pulleys, etc.; W. H. Rickey, Cincinnati, hoisting machinery; David Bell, Buffalo, steam-hammers; Buffalo Forge Company, blowers and exhausts; Cleveland Steam-Gauge Company, forges and blowers.

Pumps and Water-Supply Machinery are exhibited by American Well Works, Aurora, Ill.; Blakeslee Manufacturing Company, Du Quoin, Ill.; Burkhardt's, G. J., Sons, cedar-tank, Philadelphia; Cammeyer & Sayer, hot-air engines, Chicago; Cameron, A. S., steam pumps, New York; Cloud Manufacturing Company, Detroit, Mich.; Delamater Iron-Works, New York; Davidson Steam Pump Company, New York; Deane Steam Pump Company, Holyoke, Mass.; Egelhoff Manufacturing Company, wind-mills, Milwaukee, Wis.; Gordon & Maxwell Company, Hamilton, O.; Hooker & Colville Steam Pump Company, St. Louis, Mo.; McCoy & Sanders, hydraulic tools, New York; Manning, Maxwell & Moore, New York; Nye & Palmer, Chicago; Poage, John N., water column, etc., Cincinnati, O.; Rodgers Iron Manufacturing Company, fire-pumps, Muskegon, Mich.; Reed, H. W., cypress tank, Waycross, Ga.; United States Wind-Engine and Pump Company, Batavia, Ill.; Van Duzen & Tift, siphons, Cincinnati, O.; Wells, F. C., steam pumping-engine, Chicago; Wilbraham Brothers, blower, Philadelphia; Worthington, H. R., hydraulic machinery, New York; Watertown Steam Engine Company, Watertown, New York.

Steam-Engine Supplies.—American Tube Works, injectors, etc., Boston; Allison, W. C., welded flues, Philadelphia; Ashton Valve Company, valves, Boston; Beaumont, R., stop-valve, Kankakee, Ill.; Butman Furnace Company, grates, flues, etc., Cleveland, Ohio; Baragwanath, William, steam-jacket heater, Chicago; Boston Belting Company, packing, hose, etc., Boston; Carpenter, G. B. & Co., asbestos, packing, etc., Chicago; Clow, James B. & Son, engine trimmings, etc., Chicago; Chalmers-Spence Company, covering for boilers, New York; Curtis Regulator Company, pressure regulator, Boston; Chicago Metallic Packing Company, Chicago; Detroit Lubricator Company, light feed-cups, Detroit; Elmira Steam-Engine Company, automatic lubricators, Elmira, N. Y.; Hotchkiss, J. F., boiler-cleaner, New York; Goodell, H. C., boiler covering, Chicago; Hawley, F. W., valve, Rochester, N. Y.; Ferris, J. H., socket wrench, Chicago; Kester, R. L., rod-packing, Philadelphia; Kunkle, E. B., lock-up valve, Fort Wayne, Ind.; Lonergan, J. E., cups, lubricators, Philadelphia; Marsh, James, gauges and test-pumps, Chicago; Merriam, T. & J., pipe covering, Milwaukee, Wis.; Manning, Maxwell & Moore, gauges, etc., New York; Magoon Heater Company Muskegon, Mich.; Nathan & Dreyfus, injectors, valves, etc., New York; National Tube-Works, Boston; Newcomb, W. W., link rest, Bradfordsville, Ky.; Purves, Thomas C., gauge, boiler-cleaner, Chicago; Parks, N. C., lubricating pad, New York; Reaser, W. J., slide-valves, Madison, Wis.; Richardson, F. W., valve motion model, Troy, N. Y.; Ryan, J. J. & Co., bearings, brasses, etc., Chicago; Riley, J. M., boiler covering, Troy, N. Y.; Sargent, Greenleaf & Brooks, pipes, ventilators, etc., Chicago; Schutte & Goehring, injectors, condensers, etc., Philadelphia; Shields & Brown, pipe and boiler covering, Chicago; Shelley, G., grate, Wilkes-Barre, Pa.; United States Metallic Packing Company, Philadelphia; Winona Machinery Company, cylinder packings, bearings, Winona, Minn.

Scales.—Borden, Selleck & Co., Chicago; Chicago Scale Company, Chicago; Fairbanks, Morse & Co., Chicago.

Many other exhibits are not yet in shape, but will be duly noticed in another letter.

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UTILIZATION OF BY-PRODUCTS IN THE MANUFACTURE OF COKE.—II.

The Otto System.—The firm of Dr. Otto & Co., of Dahlhausen an der Ruhr, Germany, has paid considerable attention to the construction of coke furnaces, and has recently brought forward a number of modifications of a general design, the main points of which may be noted from the accompanying illustrations, Figs. 1 and 2.

The gases formed in coking are exhausted from the furnace through the pipes *E, E*, they being the only openings provided for their escape. Below the coking ovens proper are two flues, one below the other, and the vertical flues in the side-walls open alternately into the upper and lower horizontal flues, being designated in the illustration *O V* and *U V* respectively. Every one of the upper horizontal flues *O S* in the battery is provided with one or a number of injectors or burners *J*. The gases produced in coking are drawn off through *E* and taken to the apparatus where the tar and ammonia are condensed. After being deprived of these valuable products, the gases are forced back through the pipe *R*, and through the tuyeres *r* are conducted into the upper horizontal flue, where they are mixed with cold or preheated air, special provision being made to provide for lighting the gas. This horizontal flue is therefore the combustion-chamber. The hot products of the combustion flow through the openings *O O* upward through the flues in the side-walls, returning through the flues *U V* to the lowest horizontal flue *U S*, which connects with the main chimney flue.

Both the Carvés and Otto systems, it will be seen, are modifications of the Coppée oven, against which there is considerable opposition, both in this country and in England.

The Aitken System.—Mr. Henry Aitken, of Falkirk, uses a furnace which is very similar to the ordinary bee-hive oven, and was, we believe, the first to deal with the subject in England. Mr. Aitken provides three flues *G*, Fig. 4, in the bottom of the oven, about 4 inches square, and covered with tiles having perforations about ¼ inch in diameter on top and 1 inch in diameter on the under side. These three flues meet in one near the door, and into this flue the pipe *H* is inserted, which is connected with the condensers through which the gases are drawn by means of an exhauster. Mr. Aitken proposes to force the gases coming from the condensing plant into the ovens through the pipes *F*.

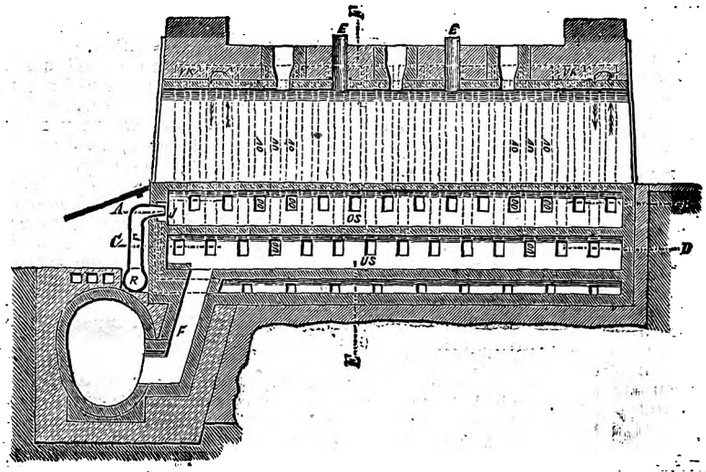


Fig. 1.

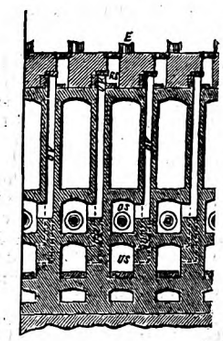


Fig. 2.

THE SPELTER PRODUCTION OF EUROPE.

In a sketch of the history of spelter, Herr C. von Ernst, of Vienna, has collected the following statistics of the production of spelter in Europe, which shows the growth of that industry. The unit is the metric ton:

	1858.	1881.
Silesia	38,000	67,547
Rhenish Provinces and Westphalia	15,400	32,520
Belgium, Vieille Montagne	27,000	49,600
Other Belgian works	9,500	44,211
England	7,500	15,186
France	500	10,445
Spain	1,500	7,032
Austria	1,050	4,230
Russia	1,500	4,300
Total	101,950	205,071

THE BAKER HORSE-POWER HOIST.—The one great obstacle to the first development of a mining claim has been the lack of cheap yet practical and effective machinery. The old-fashioned horse whim—always clumsy and uncertain—has done service from the first; but in these progressive days, this, like other crude appliances, is being laid aside and more convenient and reliable devices applied. Baker's mining horse-power hoist, says the *Rocky Mountain Review*, seems to meet all requirements, and is rapidly superseding all other devices of the kind. Large numbers are already in use in various parts of the country, with the most satisfactory results. The following are claimed as some of its advantages by the builders, the Pacific Iron-Works of San Francisco and Chicago: It is made entirely of iron, and is therefore very durable and not affected by climatic changes; no piece weighs more than 250 pounds, thus admitting of its being packed on mules to otherwise inaccessible localities; the hoisting-drum is under the complete control of the man at the shaft, and is capable of carrying 500 feet of five-eighths steel rope; a pulley may be placed upon the end of the drum in such a way that a pump can be run continuously without interfering with the hoist; at the ordinary speed of a horse, a thousand-pound bucket of ore can be raised at the rate of 120 feet per minute; the cost of erection is light, as two men in half a day are able to put it in place ready to work

A COMPARISON OF THE WORKING OF A BLAST-FURNACE WITH BLAST VARYING IN TEMPERATURE FROM 990° FAHR. TO 1414° FAHR.*

By Mr. W. Hawdon, Middlesborough.

The question of the advantage gained by working a blast-furnace with blast at a high temperature over that at a lower temperature has for some time past been much discussed; so much so, that the subject is considered by many quite threshed out; extreme high temperatures are considered the saviour of the pig-iron manufacturer in these days of keen competition, and that without such he will be left behind in the race. Only a few months ago, we heard of 5 cwt. of coke per ton of iron being saved by the application of brick regenerative stoves, producing, of course, high heats; while one of the oldest of the Cleveland smelters, in his inaugural address as President of the Cleveland Institution of Engineers, gave it as his opinion last year that, with a temperature of blast beyond 1000 Fahr., no further economy in fuel would result. So various have been the statements of the effect produced on particular furnaces, and so startling the saving of coke said to have been made in many instances when brick-heating stoves (which are the only means at the present day of obtaining a very high temperature of blast) were applied to these furnaces, that unless the varying circumstances of each particular case came under personal observation, it has been difficult for any one satisfactorily to account for the very much better order of things which prevailed under the new *régime*. The reduction of silicon into the pig-iron has always been a scare with many founders and forge managers when high heats are used in the reduction of pig-iron from the ore, and this demands refutation if the success of high heats is to be accomplished. The fact has been that in many cases before the application of the higher heats the furnaces have been relined, and stoves capable of securing a high temperature of blast have replaced those capable of producing a temperature of only from 500° to 700° Fahr. The effect of increased temperature on small furnaces, particularly under such improved conditions, has been a marked improvement and economy in the working of the furnace. It is my intention to give the experience which I have gained in the case of large furnaces, and with a blast already heated up to 1000° Fahr., by further raising the temperature to somewhat over 1400° Fahr. Part of the plant of the Newport Iron-Works of B. Samuelson & Co., Middlesborough, is composed of a separate and complete plant of three blast-furnaces, Nos. 6, 7, 8. Owing to circumstances, the center one (No. 7.) was blown out in October, 1861, and as it had been in blast since June, 1870, the stoves, which were of the ordinary lean-to U-pipe type, were necessarily much worn, and would require extensive repairs to put them in thorough working order. The writer visited several works where brick heating-stoves of the Cowper and Whitwell types were applied and high heats used, with the view of obtaining comparative information as to the saving effected thereby. Information freely given led to the expectation that the saving of from ½ to 1 cwt. of coke per ton of pig-iron would be effected by raising the temperature of the blast from 950° or 1000° to 1450° or 1500°, when applied to such furnaces as the one now specially under consideration, and that from 50 tons to 70 tons per week more pig-iron would be made. It was decided to pull down the old pipe stoves and put up brick regenerative stoves. These of the Cowper type were adopted, and I would just observe in passing, that it is not intended by any remarks here made to put forward the superiority of any one type of brick stoves over another, but merely to indicate the description of stove used. The furnace has not been blown in yet, and the new stoves were therefore available for work at an adjoining furnace. This opportunity has been made use of by the writer to note observations and obtain particulars in connection with the working of this furnace when using blast heated in the U-pipe stoves to a temperature of 990° Fahr., and in the brick stoves to 1414° Fahr. Blast at the higher temperature was turned on a few hours after the lower was cut off, so that we have an accurate comparison of the results obtained under the two conditions. The "Cowper" stoves, being built for No. 7 furnace, were placed at some distance from No. 8, so that the blast had to pass through a tube 4 feet 8¼ inches diameter and 67½ feet longer than is necessary if working the furnace for which the stoves were erected. This tube is lined with 14-inch fire-brick, and the loss of heat, taken by the thermometer on a calm day, was found to be 43° Fahr., in consequence of this extra tubing. The furnace in question (No. 8) was blown in February, 1872, and had therefore been in blast

*Read before the British Iron and Steel Institute.

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for ten years—not a bad life for a furnace. But being in good condition, and in a thorough state of repair, the comparison does not suffer thereby. The furnace is 85 feet high from hearth to platform level, and has a bosh 27 feet diameter, which is built at an angle of 66½ degrees, or an inclination of 1 in 2·6. When the furnace was blown in, the well was 9 feet diameter. The tuyeres used are 5½ inches diameter at the nose, but the muzzles of the "belly pipes," which project into the tuyeres to within 8 inches of the nose, have been varied somewhat, according to the temperature of the blast, as hereafter stated. The cubical capacity of the furnace is 29,410 feet, reckoning to within 2 feet 6 inches of the under side of the bell, which is 13 feet diameter. The material used is Cleveland ironstone and limestone and coke from Durham. The coke is low in fixed carbon, having, according to analysis, only 88·8 per cent. This is probably accounted for by the fact that in process of manufacture the coal is only forty-two hours in coking, giving a yield of 67·75 per cent of coke. Were this coke manufactured under the ordinary long-hour system, whereby about 89½ or 90 per cent fixed carbon is obtained, the weight of coke used in smelting the iron would be proportionately lower. This should be borne in mind if comparison is made with the duty done by other cokes. The plan here adopted for comparison of the work done with different temperatures of blasts has been to tabulate the make of the furnace and yield of materials per ton of iron over periods of some weeks, giving the temperatures of the blast and the gas during each period. Calculating from an analysis of the gas, we obtain some check on the recorded yields given, and we are also enabled to give a comparison of the work done by the furnace under the varied conditions by comparing the sum of the heat units contributed from the two sources of supply—coke and blast—and which are the variable elements under consideration, together with the temperature of the escaping gases. These yields of the material used have been obtained by carefully weighing the barrows as they pass up to the furnace-lift. The yields for the seven weeks ended November 18th, 1882, were as follows, the average temperature of blast over this period being 990° Fahr., and the furnace working with the U-pipe stoves:

		Per Ton of Iron Made.				
Pig-iron made per week.	Quality.	Coke.	Limestone.	Calcined ironstone.	Purple ore.	Silicon in No. 3 pig-iron.
400 tons.	3·23	23·8	11·5	47·2	0·36	2·4 p. ct.

The small amount of purple ore, containing 64 per cent of iron, was used for "damping" the bells. The pressure of blast was 4½ pounds per square inch at the engine-house, and 4½ pounds at the tuyeres, of which there are five, the muzzles of four being 4¼ inches diameter, and one over the tapping-hole 3¾ inches diameter = 67·76 square inches area. The furnace was now connected with the brick stoves, which had been previously thoroughly dried. But as it was thought advisable at first not to press them, we worked with a moderate temperature only. The mean temperature over the next four weeks ended December 16th, 1882, was 1168° Fahr., the tuyere area and blast pressure being the same as before. The following were the yields for this period:

		Per Ton of Iron Made.				
Pig-iron made per week.	Quality.	Coke.	Limestone.	Calcined ironstone.	Purple ore.	Silicon in No. 3 pig-iron.
409 tons.	3·36	23·21	11·5	47·4	0·36	2·6 p. ct.

The coke, it will be observed, is reduced by 0·59 cwt. per ton of iron, while there is a slight increase in make; and as the silicon had somewhat increased, ¼ cwt. per ton of limestone was added to the charge. The diameter of the tuyere muzzles was now increased to 4¼ inches. The mean temperature over the two weeks ended January 27th, 1883, was 1295°. The following are the yields for this period:

		Per Ton of Iron Made.				
Pig-iron made per week.	Quality.	Coke.	Limestone.	Calcined ironstone.	Purple ore.	Silicon in No. 3 pig-iron.
449 tons.	3·35	23·02	12·12	47·4	0·36	2·5 p. ct.

Here it will be observed the make increased considerably, and there was a further small diminution in the coke per ton of iron, although the burden of limestone had been somewhat increased. The diameter of the tuyere muzzles was again increased to 5½ inches, and the mean temperature of the blast over seven weeks ended March 17th, 1883, was 1328° Fahr. The following are the yields:

		Per Ton of Iron Made.				
Pig-iron made per week.	Quality.	Coke.	Limestone.	Calcined ironstone.	Purple ore.	Silicon in No. 3 pig-iron.
461 tons.	3·14	22·8	12·16	47·25	0·35	2·6 p. ct.

A larger make, a somewhat better quality, and a farther saving of 21 cwts. of coke will be here noted. The iron at this time was dry and "rich" in appearance, an evidence of too much heat. The burden was therefore increased, with the following result, over the two weeks ended March 31st, 1883:

		Per Ton of Iron Made.				
Pig-iron made per week.	Quality.	Coke.	Limestone.	Calcined ironstone.	Purple ore.	Silicon in No. 3 pig-iron.
458 tons.	3·02	22·3	12·2	47·02	0·35	2·6 p. ct.

The temperature over this period was 1400° Fahr. The make was smaller than in the preceding period; but on account of short stoppages for repairs of the furnace, the working time of the furnace was shorter.

(TO BE CONTINUED.)

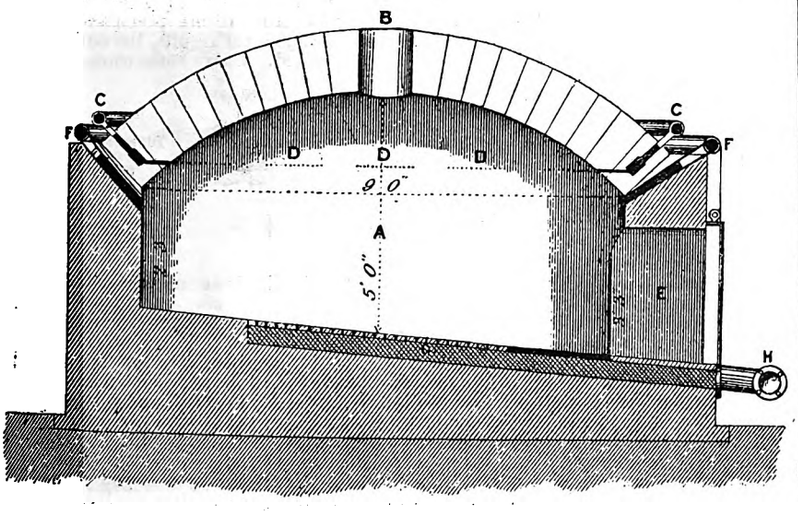


Fig. 3.

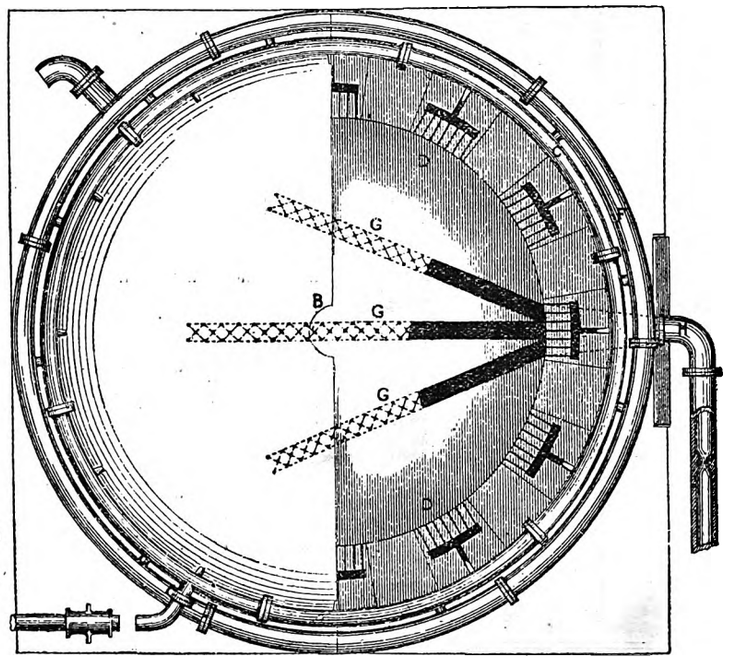


Fig. 4.

THE PRAT AND LAROCHE NICKEL EXTRACTION PROCESS.

MM. Jean P. Prat and Jules P. Laroche, of Bordeaux, have brought forward a process for the extraction of nickel from its ores which merits attention. They add the nickel ore, in a powdered form, to a bath of concentrated sulphuric acid, with a density of from 56 to 66 degrees Baumé, and agitate the mixture. A gradual heating of it takes place after two or three minutes, and it soon begins to thicken. A rapid and powerful reaction sets in, the temperature increases, and in half an hour the mixture assumes a greenish tinge and solidifies. The product, which contains the metals in soluble form, is leached in boiling water. To the solution thus obtained is added oxalic acid, and by prolonged boiling the sulphate of nickel is converted into oxalate, which is precipitated in the form of an insoluble paste. These well-known reactions are not claimed as part of their invention by Prat and Laroche, the features of their process being the treatment of the oxalate of nickel. They regenerate the oxalic acid by adding caustic soda to the precipitate and heating the mixture, thus producing oxide of nickel and oxalate of soda, from which the oxalic acid may be obtained by any of the well-known methods.

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THE DETERMINATION OF MANGANESE IN SPIEGEL.*

By G. C. Stone, New Jersey Zinc and Iron Company, Newark, N. J.

In common with many members of the Institute, I was much interested in Mr. Kent's paper on Manganese Determinations in Steel,† read at the Virginia meeting. Having recently had an opportunity to collect a similar series of results for spiegel, I venture to offer them to the Institute, hoping that they may also prove of interest.

Sample No. 1 was taken at our works, where the spiegel was made. A portion of this sample was sent to one of our customers, whose chemist, A, obtained results different from mine. Portions of this sample were afterward sent to chemists C, D, and H. Sample No. 2 was prepared by A and myself with great care, and distributed to chemists C, D, E, F, G, H, I, and J. The results obtained are as follows:

SAMPLE No. 1.

Chemist.	No.	Manganese found.	Method used.
A	1	14·66	Acetate, bromine, and phosphate (average).
B	2	15·15	" and phosphate.
B	3	15·30	
B	4	15·11	Potassium chlorate and oxalic acid.
B	5	15·24	
C	6	14·92	Acetate and phosphate.
C	7	15·00	" " "
C	8	15·05	" bromine, and carbonate.
C	9	15·49	" " " "
D	10	15·05	
D	11	15·06	Volumetric method.
H	12	13·83	
H	13	13·98	

SAMPLE No. 2

Chemist.	No.	Manganese found.	Method used.
A	1	12·92	Acetate, bromine, and phosphate.
A	2	12·96	
B	3	13·38	" " " "
B	4	13·44	
B	5	13·53	" and phosphate.
B	6	13·68	
B	7	13·50	Potassium chlorate and phosphate.
B	8	13·58	
C	9	13·52	" " " oxalic acid.
C	10	13·68	
D	11	14·18	Acetate, bromine, and carbonate.
D	12	14·56	" " " "
E	13	13·46	" " " phosphate (average).
F	14	14·41	" " " ammonia.
G	15	14·47	" and bromine.
H	16	12·60	Potassium chlorate and oxalic acid.
H	17	12·72	" " " "
H	18	12·86	
I	19	12·20	" " "
I	20	12·44	
I	21	12·92	" " " "
I	22	13·05	
I	23	12·81	Same method, zinc added.
I	24	12·91	" " lime added.
I	25	10·36	" " alumina added.
J	26	12·95	Potassium chlorate and oxalic acid.

A few words as to the chemists and their methods.

A is a steel-works chemist of large experience. His method is as follows: Dissolve 0·5 gr. in hydrochloric and nitric acids, evaporate to dryness, take up with hydrochloric acid, filter; nearly neutralize by sodium carbonate, add a little acetic acid and sodium acetate, boil, filter, re-dissolve, and re-precipitate, evaporate the filtrates to small bulk, and precipitate by bromine, filter, wash, re-dissolve in hydrochloric acid (if any iron is present, nearly neutralize by ammonia, and precipitate with acetate of soda), and precipitate the manganese as phosphate, and wash thoroughly with hot water. A's results, whenever I have had an opportunity for comparison, have been lower than those of most other chemists. I think the reason is probably that he uses an insufficient amount of acetic acid when he precipitates the basic acetates, and by neutralizing the filtrate with ammonia he also loses manganese.

B is myself. Results 2 and 3, in sample I., and 5 and 6, in sample II., were obtained as follows: Dissolve 1 gram in nitric and sulphuric acids, evaporate till fumes of sulphuric acid are given off, dilute to 500 c.c., and take 200 c.c. (equal to 0·4 gr.) for each determination, add sodium carbonate until a decided precipitate forms, then 30 c.c. acetic acid (1·047 sp. gr.) and 7 or 8 grams of sodium acetate, dilute to 300 or 400 c.c., and boil gently about twenty minutes, filter boiling, and wash with very hot water, containing 3 or 4 grams of sodium acetate to the liter. Working in this way, I have never found any manganese in the precipitate, and very rarely any iron in the filtrate. Evaporate the filtrate and washings to about 200 c.c. (if any iron separates, filter it out), make acid with hydrochloric acid, and precipitate as phosphate as usual. A determination can be made in 7 or 8 hours. Results 3 and 4 in sample II. were made by precipitating basic acetates twice as above, then by bromine, and weighing as phosphate. Results 7 and 8, in No. II., were by Ford's method.‡ Results 4 and 5, in No. I., were by a modification of Williams's volumetric method.§

C is my assistant. His results, 6, 7, and 8, in No. I., were obtained by the acetate and phosphate method, as I use it. No. 9, in I., was by D's method. Nos. 9 and 10, in II., were by the modification of Williams's method, which I used.

D is a commercial chemist of considerable experience. Of results 10 and 11, in No. I., he writes: "Precipitated as basic acetate three times, separated the manganese by bromine and precipitated finally by sodium carbonate, washed by decantation, boiling after each addition of water until the washings gave no reaction with coralline. Results 11 and 12, in No. II., were obtained by precipitating as basic acetate twice, and separating the manganese as before. The analyses were made in a hurry, and the precipitates washed on the filter."

He was not entirely satisfied with the results, but considered 14·18 per cent the nearest to the truth.

E is a firm of commercial chemists, who have had an exceptionally large experience in spiegel analysis. They precipitate basic acetates, separate by bromine, and precipitate as phosphate. I do not know the exact details.

F is a commercial chemist. He used Troilius's bromine and ammonia method.* The results I think are high.

G is a commercial chemist. He used either Eggertz's or D's method, I am not sure which. His results are also apparently high.

H is an assistant in a prominent technical school. Sample II. was sent to him twice with different marks. His method, as I shall endeavor to show, is defective, and invariably gives low results; it is as follows: Solution in hydrochloric acid, boiling with large excess of nitric acid until all the hydrochloric acid is driven off, precipitation while boiling by potassium chlorate, solution of the manganese oxide in oxalic and sulphuric acids, and titration, with potassium permanganate, of the oxalic acid undecomposed. The oxalic acid is standardized by iron wire.

I is an assistant in the same technical school. He used the same method. 19 and 20 were his first determinations; 21 and 22 repeated "with great care." He also tried the method on manganese ores with results that compared more favorably with other methods. Thinking this might be due to the presence of some constituent of the ore, he repeated the determinations, adding zinc, lime, and alumina to the spiegel analysis; the results are given at 23, 24, and 25.

J is a chemist on the State Board of Health. He used Williams's method.

The acetate and phosphate method is, I think, the most reliable; all but one of the chemists on the list who use it agreeing well. It is hardly necessary to precipitate the manganese by bromine before precipitating as phosphate; for while it always gives slightly lower results, the difference is so small that it may safely be disregarded. I give some comparative results:

Sample No.	Manganese precipitated by bromine first.	Phosphate direct.	Difference.
39	17·02	17·10	0·08
76	13·38	13·53	0·15
76.	13·44	13·65	0·21
312	18·51	18·68	0·17
313	11·79	11·99	0·20
313	11·79	12·02	0·23

If there is ever any necessity for precipitating by bromine, it should be in our spiegel. As our ores contain considerable zinc, we use a very heavy lime charge, and the furnace-working is such as to favor the reduction of the alkaline earths.

The methods in which the manganese is precipitated as hydrate or basic carbonate usually give high results, owing to the obstinate manner in which the precipitate retains alkalies, although by washing by decantation, and boiling the precipitate each time with a large amount of water, it can be removed; but this takes too much time for a busy laboratory. D tells me that, although you may wash the precipitate on the filter until the washings give no reaction with coralline, yet if you then boil the precipitate up with water, it will give a strong alkaline reaction.†

Needing a rapid and tolerably accurate method for determining manganese in spiegel, I tried Williams's method as promising better than any that I knew of. On making comparison analyses by it and the acetate and phosphate method, I found that it gave me only about ninety per cent of the manganese, the difference being always proportional to the amount of manganese. The method is based on the supposition that manganese is precipitated by potassium chlorate from a nitric acid solution entirely as MnO_2. It occurred to me that this might not be correct; on trying it, I found it was not. To test it, I precipitated 0·5 gr. of a spiegel, in which I had previously determined the manganese by Ford's method, by potassium chlorate, and added the precipitate to a fresh solution of iron wire, made as is usual for standardizing permanganate, and, after dissolving, determined the excess of unoxidized iron by permanganate which had just been standardized by the same iron wire dissolved in the same manner. The results were as follows:

	No. 1.	No. 2.
Manganese found by Ford's method	0·0675	0·0679
Iron that would be oxidized if the precipitate were MnO_2	0·1374	0·1382
Iron actually oxidized	0·1117	0·1119

This result would give very nearly the formula 10MnO ,MnO. I then tried standardizing the oxalic acid solution by a spiegel which had been repeatedly analyzed by different chemists, and obtained excellent results.

The method of analysis finally adopted is as follows: Dissolve 0·5 gr. of spiegel in 40 c.c. nitric acid (1·42 sp. gr.) by boiling, add gradually an excess of potassium chlorate, cool, filter through asbestos (using a filter pump), and wash three or four times with water. The precipitate will still contain some iron, but it does not interfere. Add the precipitate and asbestos to an excess of standard oxalic acid (8 to 8·5 grams to one liter), add sulphuric acid, and heat till dissolved, titrate the excess of oxalic acid by permanganate (about 3 grams to the liter). The following are the results of *all* the test analyses I have made; most of the determinations are the averages of duplicate or triplicate analyses which agreed. A large number of the analyses were made by Mr.

* Read at the Boston Meeting of the American Institute of Mining Engineers.
† Transactions, Vol. X., p. 101.
‡ Transactions, Vol. IX., p. 397.
§ Transactions, Vol. X., p. 100.

* Transactions, Vol. X., p. 173.
† A chemist who used D's method (not one in the list) told me he always considered it safe to deduct one half per cent from his results, and could not be sure of their being nearer than three quarters of a per cent to the truth.

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F. Sands (chemist C in the list), who has also done much of the work to test the composition of the precipitate by potassium chlorate:

Sample No.	Acetate and phosphate.	Volumetric.	Difference.
59	9·50	9·50	0·00
83	12·28	12·17	−0·11
76	13·60	13·60	0·00
69	14·80	14·97	+0·17
4	15·23	15·17	−0·06
112	15·35	15·49	+0·14
170	16·94	16·79	−0·15
39	17·06	17·03	−0·03
167	17·56	17·62	+0·06
164	18·02	18·06	+0·04
169	18·26	18·32	+0·06
138	18·30	18·19	−0·11
81	18·35	18·67	+0·01
199	18·89	18·79	−0·10
67	20·71	20·74	+0·03
264	67·80	68·00	+0·20

My results, 4 and 5 in No. I., and C's results, 9 and 10 in No. II., were by this method.

I think the reason Mr. Williams found his results so satisfactory was, that he used steel containing about half of one per cent of manganese for all his analyses. With such a small amount present, of course the loss of one tenth of it (0·05 per cent) would make comparatively little difference.

I have some of the sample No. II. left, and shall be happy to send some of it to any member who would like to try it.

ANALYSES OF PRODUCER GAS.

In describing his methods for analyzing furnace gases, Mr. Magnus Troilius, of the Midvale Steel Company, gives the following figures as the results of analyses of producer gases. The producer used by Messrs. Hoopes & Townsend was designed by Mr. Ferdinand Philips, the mechanical engineer of that firm. Anthracite coal was used. The first analysis was made of gas from a producer into which blast was forced by means of a fan, while the others were worked by means of a steam injector. The figures are very instructive. The Midvale gas was made with bituminous coal:

	Hoopes & Townsend—Philips Producer.						Midvale—Siemens Producer.		
	No. 1a. Fan-blast. Hot-working producer.	No. 1b. Steam-blast. Cold-working producer.	No. 2a. Steam-blast. Just before cleaning producer. Bad coal.	No. 2b. Steam-blast. Bad coal.	No. 3a. Steam-blast. Normal running.	No. 3b. Taken 10 minutes after sample 3a, with air shut off as far as possible, and only steam let on.	Sample taken just after cooling down fires with water from below.	Sample taken just before cooling fires with water.	Sample taken just after cooling down fires with water from below.
Carbonic acid, CO_2	3·9	8·7	9·3	7·5	8·0	6·1	5·7	1·5	5·9
Ethylene, C_2H_4	.....	.....	.....	.....	.....	.....	·9	.....	.....
Carbonic oxide, CO	27·3	20·0	16·5	16.0	15·5	22·3	15·4	23·6	17·7
Hydrogen, H	.....	8·7	8·6	15·3	14·9	28·7	8·3	6·0	9·8
Marsh-gas, CH_4	1·4	1·2	2·7	1·9	.....	1·0	3·8	3·0	2·4
Nitrogen (difference) N	67·4	61·4	62·9	59·3	61·6	41·9	65·9	65·9	64·2
Calories per 100 liters at 0° and 760 mm	93,966	97,184	99,074	111,474	92,620	164,164	116,753	114,939	103,843
Flame-temperature	1619°	1658°	1575°	1706°	1613°	1846°	1656°	1761°	1642°

MINE HAULAGE.

Mr. Thomas K. Adams, of Wheeler, Mercer County, Pa., Inspector of the Third Bituminous District of Pennsylvania, has collected a number of data from the superintendents of the mines in his district, bearing upon the question of the haulage of coal from the mines to the railroad tipples. He has requested information on the following points: The number of mules employed in their respective mines; number of tons hauled in ten hours; cost per ton for haulage for the different powers employed; the first cost of the different powers; maintenance of the same; distance the coal has to be hauled, and weight of coal in each mine-wagon, etc. Only eleven of the superintendents responded, nine of them being from Clearfield and Jefferson counties, one from Elk County, and the other from Clarion County. The data given below on mule haulage are taken for ten mines employing one hundred and fifty-seven mules, and having an average production of about seven hundred and nine tons per day. Three tests with locomotives are given, and with an endless and a tail-rope one each. Some of the mine managers reporting employ both mule and machinery for hauling purposes in the same mine, thus enabling them to judge more accurately of the efficiency and economy of the respective powers used:

Haulage by Mule-Power.

Average number of mules per mine	15·7
" " tons per mine daily	709
" " tons per mule per ten hours daily	45
" distance hauled for round trip per mule, feet	5347
" cost for haulage per ton	4·08c.
" first cost per mule	$171.50
" cost of feed and stable attendance per mule per year	$142.50
" weight of coal hauled in mine-cars, each, pounds	3649

Haulage by Locomotive, Endless Rope, and Tail Rope.

	Locomotive.	Endless rope.	Tail rope.
Average tonnage per day	807	900	1,000
" distances, round trip, feet	5,343	6,500	4,400
" cost of haulage, per ton	1c.	0·8c.	0·8c.
" cost of repairs for power per year	$150	$200	$150
" first cost of power used	$4,200	$4,000	$2,000
" weight of coal hauled in cars, each, pounds	4,160	3,000	4,480

It will be noticed by the above tabulated reports that one mule hauls forty-five tons of coal per day of ten hours, a distance of over one mile, at a cost per ton of $4\frac{1}{8}$ cents. This is certainly a very favorable showing for mule haulage, but is a better average than could be accomplished if the whole number of mines in the district were taken into consideration.

Out of the ten reports received on mule power, only two are given outside of Clearfield and Jefferson counties, thereby making the tabular reports more applicable to them than to any of the other counties. In these two counties, the coal-seam is much higher, roads drier, more favorable grades, and mine-wagons hold double the quantity of coal than the others. Mr. Adams has made an estimate on all the mines of the district, and does not think that one mule can haul more than thirty-three tons of coal in ten hours, and at an expense of about five and a half cents per ton, and over main and cross-entry roads laid with from fourteen to sixteen pounds T iron, and well kept.

Mr. Robertson, of the Dagus mines, Elk County, in his report, states that they have employed twenty-eight mules per day for the last six months. Mines running twenty-two days per month, with an average daily (nine hours) production of nine hundred and sixty tons, or thirty-four and two sevenths tons per mule, hauling the coal a distance of six thousand four hundred feet for the round trip. The load of coal in mine-cars is about twelve hundred weight. The road is laid with fourteen and sixteen pounds T iron, and well kept. Cost of drivers' (twenty-nine) wages alone is five and one quarter cents per ton. One locomotive, it will be seen by the averaged reports, does work nearly equal to eighteen mules. However, at the Sterling mine, No. 1, one locomotive does work equal to thirty-three mules, for nearly equal distances, with locomotive hauling against slight grade with loaded cars, while the mules have a grade in favor of loaded cars. The locomotive hauls from this mine daily eleven hundred tons of coal, a distance of six thousand three hundred and thirty-six feet for the round trip. The average first cost of locomotive is $4200, and average cost for repairs yearly $150. The average first cost of eighteen mules is $3274; average cost yearly for feed and stable attendance for eighteen mules alone, $2565. When the mines are not running, no expense is attached to the locomotive, except interest on investment; while the mules have to be fed whether they work or not; also, interest on them goes on. A larger percentage on mules, for depreciation and being killed, etc., must be allowed than on the locomotive.

Mr. Campbell, of the Sterling mines, Clearfield County, states: "We lose, by accident alone, fifteen per cent of our mule power, and nearly five per cent by the increasing of their age, yearly." This is rather above the average, however, as Mr. Campbell's mines have some heavy grades, and, by reason of this, his mules are more liable to be injured. There is some expense with locomotive not connected with mule hauling—such as making hauling roads larger, laying them with heavier rails, extra expense to keep them in repair, and keeping up separate means of ventilation. However, there are about three cents per ton saved by it, making allowance for these extras. These extras made necessary by the locomotive are avoided by using the endless-rope and tail-rope systems of haulage, and by adopting such means of haulage greater safety is given to the workingmen.

At the Franklin mine, Mr. Findley, superintendent, used the locomotive in the mine for about seven years, but has now withdrawn it, and hauls the coal by means of endless rope, retaining the locomotive outside and utilizing it as the power to drive the endless rope. It is giving better results than by the employment of locomotive alone. This power shows a production of nine hundred tons daily, hauling a distance of six thousand five hundred feet for the round trip, at a cost of eight tenths of one cent per ton; while the tail-rope system only shows a production of one thousand tons per day; distance of round trip, four thousand four hundred feet; cost per ton, eight tenths of one cent. But this is not near the efficiency of the tail-rope system. With the same machinery as employed in this test, over two thousand tons could be hauled for such a distance, had they adequate facilities in and about the mine to put more coal on side-track, and for tipping the coal outside. The endless or tail-rope systems ought at once to supersede locomotives and mules as a means of hauling coal from the mines. The longer the distance that machinery has to haul, in comparison with mules, the greater economy by its use. The best results obtained from mule-power are at the Rochester mine, Clearfield County; and from locomotive, at the Sterling mines, Clearfield County.

FURNACE, MILL, AND FACTORY.

The Porter Iron Roofing Company, of Cincinnati, O., manufacturer of sheet-iron roofing, has issued a new circular, giving a brief illustrated description of the chief features of this roofing, and a long series of testimonials from all parts of the country.

American diamond drills are doing good work on the Panama Canal.

The Chicago Steam-Engine Works are building several coal-hoisting machines for parties in Illinois, a quantity of stone-sawing machinery, one 150 horse-power engine for a brick-yard, and are also fitting up a macaroni factory with engine, boiler, presses, and other machinery.

Hinckley, Spiers & Hayes, proprietors of the Fulton Foundry, San Francisco, Cal., have erected a new molding-shop, 60 by 150 feet, which allows them to add their present molding-shop, which is 50 by 100, to their machine-shop, and gives them an area of 40,000 square feet. Lathes, drills, etc., will soon be placed in position. Some 300 hands are employed.

Mr. A. Aller, agent of the Pratt check-valve, of this city, has issued a reduced price-list.

The mechanical puddler in the works of the Phœnix Iron Company, Phœnixville, is reported to be working very satisfactorily.

The Steubenville Iron Company, with a capital of $150,000, has been incorporated. The company has purchased the plant of Sharpe, Daniels & Co., at Alikenna, O., including the valuable deposits of coal near the works.

The Watt Mining Car-Wheel Company, Barnesville, O., has just completed

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another addition of 20 by 40 feet to its works, in which it has placed a trip-hammer and some other labor-saving machinery. It is working full-time on its specialty, self-oiling mine car-wheels and mine cars.

The Champlain Iron Company has purchased the machinery and patterns of the Ely Foundry Company, at Northfield, Vt., to be added to the stock at Champlain.

Two Corliss engines of 250 horse-power each are building at Providence, R. I., for a company of Chinese capitalists. They are to be used in a cotton mill.

A new addition, 237 by 40 feet and four stories high, is about to be made to the Pratt & Whitney Company's Works at Hartford, Conn.

An effort is making to dissolve the Iron City Forging Company, Pittsburg, an organization formed last February by John H. Bryce, H. A. Jones, John E. Morrison, and Samuel K. Duff. The latter gentleman was to have a two-thirds interest in the firm, in consideration of transferring to the company his two-thirds interest in a patent grate-bar. The matter was never consummated, and now the company wants to dissolve.

By satisfactory arrangement, the Cuyahoga Falls, Ohio, wire-mill property passes into the hands of Selah Reeve.

The Brier Hill Iron and Coal Company, Ohio, has leased the Ella furnace, at West Middlesex, Ohio, and is now engaged in operating it.

George J. Atkins and Frank L. Clark have sold their entire interest in the Forest City Iron-Works, at Cleveland, to Samuel J. Atkins, of Youngstown, and William Clark, of Pittsburg.

At the annual meeting of the E. T. Barnum Wire and Iron-Works, of Detroit, the following officers and directors were elected: E. T. Barnum, President and General Manager; Philo Parsons, Vice-President; F. H. Leavenworth, Secretary; Directors: E. T. Barnum, David Whitney, Jr., Philo Parsons, F. H. Leavenworth, Charles Parsons, of St. Louis.

There is building at the Marine Engine-Works, Chicago, one of a set of power-presses for working steel while too hot to work in the dies of a hammer or roll. The machine is intended to work up to 400 atmospheres, and will take the place of an hydraulic press. It is designed by Major E. B. Meatyard, of Geneva Lake, Wis.

The prospects are, that the blast-furnace on the lake shore at the north end of the city of Fond du Lac will be started up this season. The furnace was put in nine years ago by C. J. L. Meyer, and has never been operated. The buildings are of stone and very expensive; in fact, much more so than is at all necessary for the purpose. The facilities of this city for obtaining ore and for shipping the iron can not be questioned, and moreover, it lies on the direct route from the iron region to the great mills where the iron is worked up. A large number of men will necessarily be employed when the works start.

GENERAL MINING NEWS.

ARIZONA.

BRADSHAW.—At the annual meeting held in New York recently, the following directors were elected: Mr. J. S. Moore, Mr. Howard C. Dickinson, Mr. Clinton O. Field, Mr. Nathan J. Newwitter, and Mr. E. D. Barnes. The report presented shows that the debts due on the mill, as well as all other just claims, have been fully satisfied. "The company's property is entirely out of debt, and there is still a balance in the treasury." Several applications have been made to the management to buy the mill; but it would, under present circumstances, be very unwise to entertain such an offer, as the ore on hand and the prospect of getting more of it, will in itself warrant the retention of the mill and the property. Proposals for milling custom ore have also been made; but as the company is entirely out of debt and has no pressing wants, it is deemed advisable not to entertain any offers of that kind, unless they are clearly advantageous and remunerative to the company. Every effort will be made to develop the resources of the mine.

COCHISE COUNTY—TOMBSTONE DISTRICT.

The *Epitaph* says that the general work of the camp progresses steadily and energetically; those mines which have not reached water-level are doing their utmost to reach that point, as it is now a foregone conclusion that the developments beneath this level are likely to be productive of better ore than has been found above.

GILA COUNTY—GLOBE DISTRICT.

OLD DOMINION.—We understand that experiments are making at the smelting-works of this company to replace coke by the use of petroleum as a fuel in the water-jacket furnaces.

GRAHAM COUNTY.

A large body of hematite iron ore has been discovered two miles above Clifton, in the hills bordering on the Frisco River, and close to the wagon-road leading to Oro. Development-work has been begun on this property. The mine, which is a vast deposit of iron ore, has been called the Manganese. The cap-rock is lime, a strata of slag intervening between it and the ore. A cut 10 by 20 feet has been opened up, uncovering a well-defined ledge of iron ore, which shows 50 per cent of iron. It is proposed to go down twenty feet farther on the vein, and then run a tunnel into the hill on the ledge. Several tons of ore from this claim have been delivered to the Arizona smelters the past week, and it is stated that it works very satisfactorily for flux.

YAVAPAI COUNTY—PECK DISTRICT.

BLACK WARRIOR.—The Prescott and Tucson papers report the sale of the Tuscumbia mine and mill and the Tuscarora mine to the Black Warrior Mining Company, of New York, owners of the Black Warrior mine. The Tuscumbia and Tuscarora properties have good records as producers of high-grade ore. The mill is a dry-crusher, with a White-Howell roasting-furnace, and is of recent construction, embodying the latest improvements. During a recent run on a mixture of Warrior and Tuscumbia ores, notably high results were obtained, proving both the excellence of the mill and the advantage of mixing the ores. The Gus Springs water-right is included in the purchase. The union of these properties under one ownership is viewed in a very favorable light. It is expected that the mill will be started immediately, large reserves of rich ruby and brittle silver ores being available in the Black Warrior mine. The mill will hereafter be known as the Black Warrior, and the bullion be so stamped and consigned to the company in New York.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended May 19th shows: Ore crushed, 181·44 tons; average assay value of pulp, $44.68 per ton; of tailings, $6.24. West cross-cut, 1000 level, is 230 feet long, and is in very hard rock. North drift from east cross-cut, same level, is 142 feet long. The vein is now somewhat wider than the drift, and the east wall will be followed. North drift, 800 level, is in 466 feet. Winze No. 5 is 22 feet deep; the vein is narrow. North drift from winze No. 6, 677 level, is 147 feet long. South drift from same winze, at the 640 level, is 161 feet long. Some very good ore is going to the mill from this drift.

STANDARD CONSOLIDATED.—The official report for the week ended May 19th shows: Ore extracted and shipped to mills, 1203 tons. North drift, No. 1, 1000 level, is in 120 feet, and shows the vein a foot wide. South drift No. 2 is 55 feet long; the vein is 2½ feet wide and looks well. North drift No. 2 is in 45 feet; vein one foot wide. Uprise from south drift, 700 level, is up 79 feet, where the vein is 2½ feet wide. West cross-cut from north drift is 241 feet long, and is in hard blasting rock. North drift No. 1, 500 level, is in 699 feet, where the vein is 10 feet wide. South drift No. 1 from west cross-cut No. 1 is 76 feet long, and shows 2½ feet of vein. South drift No. 2, 385 level, is 535 feet long; vein 5 feet wide. Uprise No. 1 from this drift is up 207 feet; vein 8 feet wide. North drift No. 3 is 143 feet long and the vein 7 feet wide. The stopes continue to look well.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—Eight stamps have been kept running; but after this, the company will run sixteen stamps until it is seen what developments may be made in the mine.

GREEN MOUNTAIN.—When the ledge was struck, the tunnel was continued on about forty feet beyond it, in order to make certain that it was the ore-body sought, and not a mere stringer. The result having been found satisfactory, a drift was then started along on the hanging-wall of the ledge; this is now in about 130 feet. Where the ledge was struck, it was found of the same width as in the stopes of the old workings, 400 feet above; as was expected, the ore did not prospect worth much, and for this reason the drift was continued alongside of, rather than in, the ledge; the latter being soft, would have required heavy timbering all the way, while in the hanging-wall the ground is solid and no timbering is needed. At short intervals apart, as the drift progresses, the ledge is cut into and the ore prospected; almost at any hour good pay may be found; there is a very confident assurance that a body of good ore will be cut into about 200 feet ahead of the present face of the drift.

CANADA.

PROVINCE OF NOVA SCOTIA.

OXFORD.—We are informed that this mine is doing well. The result of the run of the ten stamps last week was $3000. The Grey lode was struck last week, and from partial developments thus far is promising.

COLORADO.

CHAFFEE COUNTY.

MADONNA.—The reports from this company's property show favorable prospects. One of the peculiarities of this property is, that the ore is free smelting. The main tunnel has been run to a depth of 750 feet. Levels have been carried to an aggregate length of 800 feet, with shafts, stopes, and winzes, which in all can be safely put down at 500 feet. In the past month, a new tunnel has been started to cut the ore-body at a depth of 150 feet below former drifts. This work has been advanced to a length of 100 feet into the claim. The ore varies in value from 5 to 60 ounces in silver, and from 40 to 70 per cent lead. Assays have been had which show 1100 ounces in silver to the ton, yet these are not claimed as the representative average values. According to calculations made, there are at the very lowest possible figure 20,000 tons of ore in sight. At the present time, 50 tons per day can be taken out, and no doubt the output will be increased much beyond this figure when the railroad has been completed.

CLEAR CREEK COUNTY.

DIAMOND TUNNEL.—Ore filled with gray copper has been found in No. 5 lode west.

MOLINE.—The tunnel is producing large quantities of ore, and the mill is almost ready for work. The tramway is also rapidly nearing completion.

PAY ROCK.—The machinery at the mill is running satisfactorily.

WINDSOR.—The developments consist of a 70-foot tunnel on the vein which runs up and down the mountain. The breast shows from eight to ten inches of solid iron ore, assaying six and seven tenths ounces gold and seven ounces in silver. Depth at breast, thirty-five feet, and gaining faster all the time.

DOLORES COUNTY.

Mr. Linwood O. Towne, of Rico, sends us the following under date of May 25th:

GRAND VIEW.—Mr. Thompson Dean, president of the company, has been on from New York, and some important changes and additions will soon be made. The mines are producing regularly and well, and the smelter, under change of metallurgist from Mr. H. J. Hardess to Mr. Leon Eggers, has been running as usual.

LEILA DAVIS.—New shaft-house, ore-bins, etc., have just been completed, and work will be vigorously pushed by its owners, the Pasadena Mining Company, of St. Louis, under the efficient superintendence of its president, Mr. Watkins.

NEUMAN GROUP.—The present lease of this group is nearly up, and the intention of its owners for the future is not known. A large quantity of ore, milling nearly $500 per ton, has been regularly shipped by the leaser to the Grand View smelter from the Swansea, one of the group.

SANTA CLARA.—The reduction-works of this company are steadily running, producing gold and silver bullion.

SOUTH PARK.—This mine has within a few days changed hands; work has been progressing for some time and ore shipped to smelter.

STEVENS.—The first shipment of this mine for the season to the smelter has just been made, the ore milling over $170 per ton.

SILVERADO.—An important strike has been made on this company's property, fifteen miles below here on the Johnny Bull trail at West Dolores. The vein is two feet wide at a depth of only ten feet from the surface and assays 16 ounces of silver and 72 per cent of copper.

GILPIN COUNTY.

BOBTAIL.—Seventy-five stamps of this company's mill are kept running steadily, fifty of which are running on ore from the workings of the Bobtail tunnel, and twenty-five on ore from the Iron mine, in Russell District.

CALIFORNIA.—Sinking has been resumed on this mine, on Quartz Hill, and will be continued until a depth of 1500 feet has been attained. Plats have been cut at the 1400-foot station, and levels east and west are driving.

CYCLOPS.—The following development-work has been done since the organization of the company in November last: Main shaft sunk 135 feet, giving a present depth of 445 feet; winzes have been sunk covering 238 feet of ground; levels driven, 740 feet. Two plats have also been cut out, and 70 fathoms of ground back-stoped. The output of ore in the removal of the ground and in doing development-work has paid all expenses of the company to date. The company has in view sinking the main shaft to a depth of 800 feet.

SARATOGA.—The company will begin cleaning out the main shaft below the tunnel level. The tunnel level east cuts the shaft 120 feet deep.

GUNNISON COUNTY.

FOREST QUEEN.—The new working-shaft is now down sixty feet. It must be sunk fifty feet more before connection with the tunnel-level below will be made. It is said that sampling-works will be erected.

HINSDALE COUNTY.

HUDSON.—The shaft has now obtained a depth of 100 feet, and the vein has been cross-cut twice, once to a depth of 46 feet, and again on the lower level where the body of ore is now cross-cut. The breast is in solid mineral of the same character as that found in the first cross-cut, a copper ore, carrying lead, silver, and gold. This new level shows a richer and better ore. There are now about fifty car-loads of rich ore on the dump and in the ore-house ready for shipment.

LAKE COUNTY.

Late Leadville exchanges contain the following:

ADLAIDE.—It is stated that this property is to lease.

ARKANSAS VALLEY SMELTING COMPANY.—Four large furnaces are in blast.

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The fifth furnace, which was relined some time ago, will be blown in again, when the smelter will be running at its full capacity. Owing to the amount of silica in the majority of ores, and the low percentage of lead, charges are made with a minimum percentage of lead, and the amount of ore reduced daily is estimated not to exceed two hundred tons. As a result, the bullion is of very fair grade —averaging about three hundred ounces of silver to the ton.

CARBONATE HILL.—The Yankee Doodle—the property of this company—continues showing considerable ore in sight. The product of this mine has now continued steadily at 300 or 400 tons a month for over a year, and more than $100,000 above all expenses have been realized from ore sales within that time. Since then, a great many improvements have also been made in the property, both on the surface and in the way of opening more through avenues for working the mine and extracting the ore. The main incline, which has been constructed within the past twelve months, has attained a total length of 1100 feet, and is still carried forward. The incline shows good work; is excellently timbered and laid with T rails. At the head of the incline is the hoisting plant, procured within the past few months, and which has the capacity of hoisting a loaded car of ore at the rate of 900 feet a minute.

COLONEL SELLERS.—This property, situated on the south side of Iron Hill, has been shipping for some weeks past. The mine is another one of the properties that have penetrated the ore-bodies below the water-level on the Iron Hill contact, and its yield consists of sulphides of iron, lead, silver, and zinc. Fortunately, the mineral is sufficiently high-grade to meet the additional charge of smelting, increased in consequence of the refractory character of the ore, and at the same time leave a handsome profit. Considerable ore has already been taken out, and, from all that can be learned, the mine is now self-sustaining, notwithstanding the many disadvantages under which it is laboring. A stope has been opened thirty feet in hight, all in ore, and levels have been driven east, west, and north, showing fine mineral, and promising to develop very extended reserves.

IRON SILVER.—The managers, who have always shown considerable enterprise in prospecting and experimental exploration-work, conceived the idea, some time ago, of prospecting the fault crevice west of the outcrop of their mineral belt. About two months ago, arrangements were completed for beginning this work, and a location selected south of the south incline building of the Iron Silver mine, near the line of the Silver Cord property. An incline was started, following the fault crevice at a pitch of about seventy-five degrees to the west, which, up to the present time, has attained a depth of seventy feet. The crevice averages about three feet in width, occasionally widening out and again contracting, and disclosing segregated and broken masses of ore. Just now, the crevice is contracted until but little mineral is left; but on an average sufficient ore has so far been secured to defray all the expenses incurred in carrying on the work. The incline will be continued to a still greater depth.

LA PLATA.—At a meeting of the La Plata Mining and Smelting Company, in London, Mr. William Abbott stated that the debt of the company, incurred in continuing dividends, amounted to £38,000 on January 1st, and had been reduced since to £25,000. The following resolution was passed: That this meeting, having heard the statements laid before them by the committee of shareholders, approves of the formation of an English limited company, with a capital of £400,000, in 400,000 shares of £1 each, and strongly urge the shareholders in the existing American company to forthwith exchange their shares in that company for two £1 shares in the English company, and that the committee be authorized to take the necessary steps to form the said company accordingly, and issue the shares thereof in exchange for shares of the American company.

LEADVILLE CONSOLIDATED.—Mr. O. H. Harker has retired from the management, and Mr. John T. Elkins has been appointed to the position.

MANVILLE SMELTING COMPANY.—This company, recently organized in Leadville, has leased the Elgin Smelting-Works for one year.

MIKE & STARR.—Quite recently, a body of ore was opened on the 426-foot level, and since then development has been continued, until at present the mine shows quite a well-defined chute of pay-ore about fifty feet in width, having a nearly north and south trend. The mineral is a sulphide of lead, copper, and silver, ranging in value from five to forty dollars per ton above smelting charges. The ore is bedded on a metamorphosed limestone, with a cap of porphyry, differing but slightly from the inclosing rock of the ore-chutes on Iron and Carbonate hills generally. The ore-chute has been opened for nearly one hundred feet along its course, showing an average width of fifty feet and a thickness ranging from six to fourteen feet.

TABOR MILL.—This stamp-mill has been destroyed by fire.

SUMMIT COUNTY.

ROBINSON.—The engine on the trial concentrator has been started up. Mechanically it works to perfection, and so far as can be judged at the present time, the dry method is a success. If it so proves after further experiments, concentrators having a capacity of 150 tons per day will be erected immediately. The ore-body below the twelfth level continues to increase in grade; but its thickness at present is unknown, as the bottom of the incline is in ore and no winze has been sunk to ascertain its extent. A large force of men is employed in the mine and development-work is progressing rapidly.

DAKOTA.

A dispatch from Deadwood says that the late floods were very disastrous to mining interests. All the mills were compelled to shut down, owing to water in the mines, the impassable condition of the ore-roads, and wash-outs on the wood railroads. The only mills now in operation are the Homestake 80-stamp, the Highland, Deadwood, and De Smet. It is expected that the repairs of the railroads will be completed shortly, and that the principal idle mills will start up within the next few days. The loss to the mining interest is estimated at $200,000; the loss to the country at more than half a million dollars.

FATHER DE SMET.—The report of the superintendent, from May 15th to May 22d, shows ore extracted from first, second, and third levels, 1000 tons. Ore milled, 1100 tons. From the 18th to the 21st of May, partial suspension of mill working, in consequence of high water. Golden Gate north header advanced 6 feet. Header in 111 feet.

GEORGIA.

CHESTATEE.—The cut is now seventy feet deep, and progress into the hill slow.

COLUMBIA.—The mill will soon be running on ore from the late purchase.

GARNET.—Development-work is rapidly pushed. When it is fully equipped, it is expected that mining and milling will be done at a cost of less than twenty cents per ton.

SINGLETON.—The new water-power mill on the Lockhart property is running regularly on ore from the stopes, and all indications seem favorable.

IDAHO.

MOONLIGHT.—Work has begun at this mine.

SMOKY BULLION.—A report states that this mine has been sold to some Pennsylvania gentlemen for $25,000. A company incorporated under the laws of the State of New York has been organized, with a capital of $200,000. Operations will be begun at once.

MAINE.

The Bangor *Mining Journal* says that many of the companies are preparing for active work during the coming season. Extensive and satisfactory operations are carried on at the Douglass, Stewart, Blue Hill, Cape Rosier, Manhattan, Sullivan, Milton, Mascot, Milan, and the Winslow tin mines, and also at several other localities in the State; while arrangements are perfecting for an early resumption of work at the Cherryfield, Gouldsboro', Hercules, and several of the Blue Hill mines. The mines now worked are showing as favorable indications.

MEXICO.

ALMADA AND TERITO.—This mine yielded a profit of £2380 in 1882. Mr. Clemes, the manager, estimates the profit for the first three months of the present year at £3150.

Marble similar to what is generally known as the Puebla onyx has been discovered in the State of Chihuahua. A company is already organizing to work the quarries.

CANDELARIA.—The operators are systematically opening this mine. All through the mine are large bodies of rich ores running from $500 to $1500 of silver per ton, and on the completion to the vein of the lower tunnel, now running, a block of vein-matter will be laid open. With this tunnel completed, it is estimated that the ores can be mined and put in mill for less than $5 per ton, or at a total cost for treating not exceeding $17 a ton. The owner of the mine has spent during the last six months $42,000 in preparatory work. The mine is sufficiently open to permit a daily extraction of 100 tons of ore.

ROSARIO.—The engine working to unwater the mine has drained to a depth of about 225 feet, leaving about 45 feet more of water to take out. Some recent assays of ores ran $120 to the ton. This mine had been for many years unworked until the advent of the present company, which, encouraged by the reports of its former richness, proceeded to unwater the property. As the water has been lowered, rich vein-matter has been revealed.

SANTA EULALIA.—Two hundred men are employed erecting hoisting-works, stamp-mills, etc.

ZIMAPAN COPPER MINING COMPANY.—The one furnace now operating gives entire satisfaction, and three more will at once be erected.

MONTANA.

MADISON COUNTY.

The district known as Tidal Wave, situated in the range of mountains bordering the Jefferson and Ruby rivers, says the Virginia City *Madisonian*, is one of the most promising of the quartz-mining sections of this county, and the developments made and in progress, together with the favorable prospects which it has of being supplied at an early day with works for the reduction its ores, give it prominence as the nucleus of an important mining camp.

DRUM LUMMON.—*Money*, an English newspaper, sharply attacks those who floated off this mine, which was incorporated as the Montana Company. The owner, Mr. Thomas Cruse, was to receive £125,000 in all, part of which has been already paid, while the vendors, the Joint Stock Association, in which it appears Baron Albert Grant is interested, were to get £175,000.

SUMMIT VALLEY DISTRICT—SILVER BOW COUNTY.

ANACONDA.—The site for the proposed smelter has now been definitely decided upon. The works will be built on the north side of Warm Springs Creek, facing south. On the opposite side of the creek, the new town, to be named Copperopolis, is to be located by the company. The work of constructing the smelter will begin at once.

BELL.—One of the largest runs ever made at this smelter has been recorded. Over 50 tons of material were dumped into the furnace, of which 36 tons were ore. The matte output of the smelter averages about ten tons per day, assaying 50 per cent copper and from 50 to 75 ounces in silver. The ore supply on hand is yet abundant, and will in all likelihood last until the extraction of ore from the mine is begun from the new workings. The shaft is now 300 feet deep, and the 300-foot station will be put in and another cross-cut started to the ledge. Sinking will then be continued to the 400-foot station, and the main ledge will again be cross-cut and fully explored.

MARIA.—This prospect is about a mile north of the Alice. The developments consist of several shafts sunk to water-level and drifts running east and west on the vein at different places. The main shaft, in which work is now prosecuted, is 50 feet deep, and the level extends 30 feet each way from the bottom. In each drift, the ledge shows a uniform width of seven or eight feet, of which rather more than one half is pay-ore, two feet of it assaying from 70 to 100 ounces in silver. Only a small force is employed at present, but regular ore-shipments are made to the mills.

POSER.—In a cross-cut run from the 100-foot shaft recently sunk, an important strike has been made. It is stated that the assays so far made average $3.

NEVADA.

ALBION.—On May 19th, the personal property of this company was sold at the mine for $23,277. The Eureka *Sentinel* says that the actual value of the property sold is estimated at $70,000. The coal sold for barely more than half what it is worth. The mine will be sold under execution June 1st, and will doubtless pass into the hands of the Nevada Bank, the heaviest creditor.

EUREKA CONSOLIDATED.—Another furnace has been started at the reduction-works. The bins at the works are filled at present with Eureka Consolidated and tribute ores. In starting up another furnace, the hope is to get the mass of this ore out of the way, in anticipation of increased shipments from the Eureka tunnel in a few days, upon the completion of the new shaft, through which it is calculated ore will begin to be hoisted shortly. It is understood, also, that arrangements will be completed within a very short time by which ore will be allowed to be shipped for reduction from the Albion. The tributers in this mine are reported to be doing very well in their pitches, from which, and from other parts of the mine generally, it is believed ore enough can be shipped to help out materially in keeping one furnace at work. It is probable that enough custom ores will be shipped to the works to keep the additional furnace running for some time.

UTAH.

SUMMIT COUNTY.

APEX.—Work is going on at the top of the ore-chute, and may open up a large ore-body in the belt of the ore zone.

CRESCENT.—The ore at the upper workings is low-grade, and as depth on the vein is attained, it grows richer, bringing the average well up.

WASHINGTON COUNTY—SILVER REEF.

STORMONT.—The superintendent reports an exceedingly rich strike at the foot of winze No. 23. Fifty-four inches of vein assayed as follows: 15 inches, $193.27 per ton; 15 inches, $5.33 per ton; 12 inches, $52.16 per ton; 12 inches, $26.71 per ton. He also reports that the uprise in fifth north level has cut a favorable-looking streak of petrifactions, showing that the vein is overhead, as expected, and that he shall continue the uprise far enough to prospect both veins. A telegram received at the New York office of the company on Saturday says: Winze still shows good ore. Prospects for next month good.

VIRGINIA.

Work at the pyrites mines at Tolersville has begun, and everything will be ready to ship pyrites by the 20th inst.

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. May 27. H.	May 27. L.	May 28. H.	May 28. L.	May 29. H.	May 29. L.	May 30. H.	May 30. L.	May 31. H.	May 31. L.	June 1. H.	June 1. L.	Sales.	
1	Advance M & M. Co.																						
2	Albion, s. L.	Nevada	$15,000,000	150,000	$100	$547,500	March	1883	.50														S. F.
3	Allouez, C.	Michigan	2,000,000	80,000	25	200,000	January	1883															B.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50														S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	2,112,090	April	1883	.25														S. F.
6	Alta-Montana, G.S.L.	Montana	5,000,000	500,000	10									.04						.04		1,100	
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25					.05								500	
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*																	
9	Battle Creek																						
10	Bear Creek	California	300,000	300,000	1																		
11	Beauce																						
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10														S. F.
13	Best & Belcher, G. S.	Nevada	10,080,000	10,080	100	1,396,190	May	1883	.50														S. F.
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																	
15	Black Jack, G.	California		250,000	100,000	2½																	
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	
17	Bonanza King, G. S.	California	1,000,000	10,000	100	*																	
18	Bondholder	Colorado	500,000	200,000	2½				.25														
19	Boston Con., G.	California	10,000,000	100,000	100	95,000	October	1882															
20	Boulder Con.	Colorado																					
21	Bradshaw, S.	Arizona	2,250,000	225,000	10																		
22	Buckeye	Colorado	2,000,000	400,000	5	*																	
23	" preferred	Colorado				*																	
24	Bull-Domingo, S. L.	Colorado	10,000,000	200,000	50	*																	
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,767,000	May	1883	.20														S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	
27	Calaveras, G.	California	500,000	500,000	1	*																	
28	Cal. W'r's & M. Co., G.	California																					
29	Caledonia, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15														
30	Catskill, S.	Nevada	1,500,000	300,000	5																		
31	Central Arizona, S.	Arizona	10,000,000	100,000	100															.30		200	B.
32	Chapparal	California																					
33	Cherokee, G.	California	1,500,000	150,000	10									.03								1,100	
34	Chollar, S.	Nevada	11,200,000	112,000	100	521,000	March	1883	.50														S. F.
35	Climax																						
36	Colorado Central, S.	Colorado	3,000,000	300,000	10																		
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50																		
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05		.15	.12	.12		.16	.14			.14		.13	7,300	
39	Con. Pacific, G.	California	6,000,000	60,000	100	150,000	March	1883	.15														
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*																	B.
41	Crowell, G.	North Car.	500,000	500,000	1																		
42	Dahlonega, G.	Georgia	250,000	250,000	1	*								.04								3,100	
43	Dardanelles, G.	California	1,000,000	100,000	10																		
44	Decatur										.08	.06	.08	.07	.07					.07		14,900	
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*									.25							100	
46	Durango, G.	Colorado	500,000	500,000	1	*														.07		8,300	
47	Eastern Oregon																						
48	Elko Con., S.	Nevada					April	1883	.15		.20	.19										300	
49	Empire, S.	Utah	10,000,000	100,000	100																		B.
50	Enterprise	Colorado																					
51	Exchequer	Nevada	10,000,000	100,000	100	630,000	January	1882	.3														
52	Fannie Barret, S.	Colorado																					
53	Globe Copper	Arizona																					
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*																	
55	Goodshaw, G.	California	10,000,000	100,000	100	200,000	October	1882	.10														
56	Granville, G.	North Car.	300,000	300,000	1	*																	
57	Harlem M. & M. Co, G.	California																		1.40		300	B.
58	Harshaw, S.	Arizona	10,000,000	100,000	100																		
59	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20														
60	Hortense, S.	Colorado	2,000,000	200,000	10						.10									.10		1,100	
61	Julia, G. S.	Nevada	11,000,000	110,000	100	1,405,000	April	1883	.10														
62	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15														
63	Lacrosse, G.	Colorado	1,000,000	100,000	10	*									.13							300	
64	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														
65	Lucerne, S.	Colorado	5,000,000	500,000	10	*																	
66	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881															
67	" common, G.	California	10,000,000	100,000	100	1,975,000	February	1883	.25														
68	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20														
69	Mayflower, S.	Colorado	10,000,000	100,000	100	*																	
70	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,269,000	February	1883	1.00		4.10				5.00				5.50			260	S. F.
71	Michoacan Synd.	Mexico																					
72	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																	
73	Miller	Nevada	5,000,000	200,000	25																		
74	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20														S. F.
75	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																	
76	Moulton, G. S.	Montana	10,000,000	400,000	25	*																	
77	Nevada Syndicate																						
78	North Standard, G	California	10,000,000	100,000	100	20,000	November	1881	.10		.15				.2							200	
79	North Horn-Sil., S. L	Utah		400,000																			
80	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00														S. F.
81	Old Dominion, C.	Arizona	3,000,000	300,000	10	*																	
82	Oriental	Nevada	2,000,000	200,000	10																		
83	Oriental & Miller, S.	Nevada	10,000,000	400,000	25						.20	.16	.17		.24	.18			.21	.20	.20	32,800	
84	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25														S. F.
85	Potosi	Nevada	10,200,000	112,000	100	556,040	May	1883	.25														S. F.
86	Quartz Creek				100																		
87	Rappahannock, G.	Virginia		250,000		*									.07				.07		.09	.08	4,000	
88	Red Elephant, S.	Colorado	500,000	500,000	1	*					.07											1,150	
89	Retort M. & M. Co.	Colorado			10																		
90	San Pedro, G. S. L.	New Mex.		400,000																			
91	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*					.17				.19							400	B., P.
92	Silver Islet	Canada	1,000,000	40,000	25																		
93	Sonora Con.	Mexico									.70	.65	.68	.65	.66	.64			.65	.60	.60	.42	45,100	
94	South Bodie, G.	California		100,000		100,000	March	1882	.15														
95	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25														
96	South Hite	California	10,000,000	100,000	100		January	1883	.05										.18			100	
97	South Pacific	California			5														.07		.07	12,400	
98	State Line, No. 1, S.	Nevada	200,000	200,000	1						.08	.07	.08		.07				.07				B.
99	" No. 2, S.	Nevada	5,000,000	200,000	25																		
100	" No. 3, S.	Nevada	5,000,000	200,000	25																		
101	" No. 4, S.	Nevada	5,000,000	200,000	25																		
102	" Nos. 1 and 4, S.	Nevada			25										.04	.03			.04		.05	.03	32,700	
103	" Nos. 2 and 3, S.	Nevada											.04		.07	.05			.06		.07		4,800	
104	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25														
105	Sutro Tunnel	Nevada		2,000,000		*					.38	.22	.28	.23	.34	.28			.32	.29	.30	.26	149,605	B.
106	Taylor-Plumas	California			10																		B., P.
107	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10														
108	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														
109	Unadilla, S.	Colorado	50,000,000	500,000	100	*														.04		500	
110	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,620,000	May	1883	.50		7.75		7.75		12.00	10.25						719	
111	Utah, S.	Nevada	2,000,000	20,000	100	1,400,000	May	1883	1.00														S. F.
112	Vandewater	Nevada	20,000,000	200,000	100	*																	
113	Washington	Arizona	2,000,000	200,000	10																		
114	Whalen Copper	Nevada	2,500,000	100,000	25																		
115	Wide West																						
116	Willshire	California	250,000	50,000	5	*																	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F., San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 318,234. Total shares sold, 355,048.

active and irregular; it sold from 22@38@26c., with a business of 149,605 shares.

The Leadville stocks were very quiet, and prices were steady. Amie Consolidated was quiet and irregular at 18@21@19c. Chrysolite had a small business, and was steady; it sold at $1.10@$1.15. Hibernia sold at 4c. Iron Silver was moderately dealt in at steady prices; it sold from $3.05@$3.10. Little Chief was very quiet at 50c. Little Pittsburg had a small business at steady prices, selling from 78@80c.

The Bodie stocks were almost neglected. Bodie Consolidated sold at $1.15, with a transaction of 100 shares. Standard was quiet and a little weak, selling from $6.75@$6.13. North Standard had a small business at steady prices, selling from 15@20c.

The Tuscarora stocks were very quiet. Argenta sold at 90c. Navajo had a fair business and was weak; it sold from $1.80@$1.35@$1.45, the transactions amounting to 4200 shares. Elko Consolidated was quiet and steady at 20@19c.

In the miscellaneous list, Alice was quiet and strong at $3.25. Bassick sold at $7.50, with one small transaction. Caribou Consolidated was quiet and steady at 13@14c. Eureka Consolidated sold to the extent of 600 shares at $3.25. The Green Mountain stocks were very quiet at steady prices. Gold Stripe sold at 8c. Rising Sun sold at 4c., and Cherokee at 3c. Homestake was quiet and strong, selling from $15@$16. Horn-Silver records a small business, at prices a little weak; it sold from $6.75@$6.50

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Hukill sold at 8c. Northern Belle, under a small business, was steady at $6.50. Ontario was moderately dealt in, and was strong; it sold from $25@$26, the transactions amounting to 490 shares. Robinson Consolidated has been quiet and irregular, selling from 89@79c. @82c. Sierra Grande was very quiet, selling to the extent of but 200 shares at $1.15. Silver King was quiet at $10⅝.

Alta-Montana was moderately dealt in at 4c. American Flag records a small business, and sold at 5c. Central Arizona sold at 30c., with one transaction. Decatur had a fair business at irregular prices; it sold from 6@8@7c. Dunderberg sold at 25c. Harlem was very quiet and sold at $1.40. Hortense, with a small business, sold at 10c. Lacrosse was quiet and steady at 13c. Oriental & Miller had a very active business at very irregular prices; it sold from 16@24@20c. Rappahannock sold at 7@9c., with a fair business. Silver Cliff was quiet and steady at 17@19c. Sonora Consolidated had an active business and has been very weak; it sold from 70@42c., the business aggregating 45,100 shares. South Pacific was active and steady, selling at 8@7c. The State Line stocks were active and steady; Nos. 1 & 4 sold from 3@5c., and Nos. 2 & 3 from 4@7c.

PIPE LINE CERTIFICATES.

The petroleum market has been very strong this week, and very active. This strength is not due to good news from the oil regions, but to a strong bull syndicate that has been manipulating the market. In fact, instead of a dearth of oil, the United Pipe Lines report up to May 27th an increase in visible supply of 110,908 barrels for the month. The monthly oil report, however, shows that during the month 226 wells were completed, with a daily production of 3908 barrels. This, as compared with April, shows an increase of thirty-one in the number of wells, but a decrease of 1,080 barrels in the production. There are now 381 rigs up and wells drilling, against 403 at the corresponding time last month.

News from the oil regions has not been abundant. On Saturday last, it was reported that the Anchor Company's well No. 6 struck the third sand and was a good producer of about 300 barrels. Since Tuesday, the news received has been of a more bearish character. Grandin No. 8 is estimated to be equal to 100 barrels a day. The Stewart well No. 2, east of the Cooper tract, opened with 240 barrels flowing in the first seventeen hours, the position of the well indicating an extension of the new producing territory. Welsh No. 2 also came in and made 580 barrels the first twenty-four hours, but has declined since to about 400 barrels per day. The Balltown production, 16 wells, is 1699 barrels. Other bearish facts may be given, such as an important decline in charters and an increase in stock on hand. These facts would intimate that the strong prices for oil now ruling are purely fictitious, and lower prices may soon be looked for.

A committee appointed by the New York Mining Stock and National Petroleum Exchange to nominate officers to serve the ensuing year has reported the following ticket:

President, C. O. Morris; Treasurer, John Stanton; Chairman, A. W. Peters; Secretary, J. B. Sweeney; Assistant-Secretary, R. H. Gallagher. Governing Committee, to serve one year—C. G. Falls and Julius Johnes; to serve three years—G. F. Mann, G. B. Satterlee, A. Peckham, S. V. White, J. S. Stanton, L. V. De Forest, F. F. Beals, C. L. Parker, and J. Mulhaney. Trustees Gratuity Fund—R. H. Bonnell, S. V. White, and H. H. Truman. Mr. A. Peckham having declined to serve, Mr. R. M. Shaw was nominated to fill the vacancy.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
May	26	$1.03¼	$1.06⅝	$1.03⅛	$1.06⅝	1,519,000
	28	1.08	1.09⅛	1.06½	1.08¼	2,706,000
	29	1.08⅝	1.12¼	1.07½	1.11⅛	2,472,000
	30	...	...	...	...	...
	31	1.10¾	1.20	1.10¾	1.19⅞	3,697,000
June	1	1.21½	1.24⅝	1.18⅝	1.19¼	4,495,000
Total sales						14,889,000

MEETINGS.

Bunker Hill Mining Company, Office E. E. Read, Jr., No. 227 Federal street, Camden, N. J. Annual meeting of stockholders, June 5th, at twelve o'clock M.

Canada Consolidated Gold Mining Company, No. 24 Cliff street, New York City. Special meeting of stockholders June 11th, at half-past ten o'clock A.M. Matters of the greatest interest will be brought before the stockholders, and it is hoped that all who possibly can will attend, and those who can not are requested to send their proxies to some one who can represent them in person.

Dunderberg Mining Company, No. 92 Broadway, New York City. Annual meeting of stockholders and election of trustees, June 5th, at three o'clock P.M.

Exchange Silver and Milling Company, No. 48 Broad street, Room 8, New York City. Meeting of stockholders, June 4th, at a quarter past two o'clock P.M.

Silver State Consolidated Mining Company, No. 115 Broadway, Room 113, New York City. Annual meeting of stockholders and election of trustees, June 21st, at twelve o'clock M.

Spanish Hill Mining Company, No. 65 Broadway, New York City. Annual meeting of stockholders and election of trustees, June 5th, at one o'clock P.M.

Sulphur Mines Company, of Virginia, office of Charles M. Fry, No. 48 Wall street, New York City. Meeting of stockholders and election of trustees, June 7th, at twelve o'clock M.

Vermont Copper Company, No. 115 Broadway, New York City. Meeting of stockholders, June 14th.

Victoria Copper Developing Company, No. 36 West 14th street, New York City. Annual meeting of stockholders, June 5th, at three o'clock P.M.

DIVIDENDS.

The Castle Creek Mining Company, of Idaho, has declared its regular monthly dividend of three per cent, payable June 16th.

The Holyoke Mining Company, of Idaho, has declared its usual dividend of two per cent, payable June 20th.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF MAY, AND FROM JANUARY 1ST, 1883.

Name of Company.	Location of mines.	Paid during month of May.	Since January 1, 1883.
Atlantic, C.	Mich.	...	$80,000
Bassick, S.	Colo.	...	100,000
Black Bear, G.	Cal.	$6,000	6,000
Boston & Montana, G.	Mont.	...	10,000
Bulwer Consolidated, G.	Cal.	...	20,000
California, G.	Colo.	7,500	7,500
Calumet & Hecla, C.	Mich.	500,000	1,000,000
Carbonate Hill, S.	Colo.	10,000	40,000
Castle Creek, G.	Idaho.	3,000	15,000
Catalpa, S.	Colo.	30,000	30,000
Central, C.	Mich.	...	60,000
Christy, S. L.	Utah.	...	6,000
Contention, S.	Ariz.	62,500	312,500
Con. Gold M. Co. of Ga.	Ga.	4,000	20,000
Copper Queen, C.	Ariz.	...	250,000
Cosmopolitan.	Utah.	...	50,000
Deadwood-Terra, G.	Dak.	...	20,000
Father de Smet, G.	"	...	60,000
Gem, S.	Colo.	2,500	7,500
Glen, S.	"	1,000	3,000
Granite, S.	"	1,250	3,750
Hecla, S.	Mont.	15,000	75,000
Holyoke, G.	Idaho.	4,000	20,000
Homestake, G.	Dak.	50,000	250,000
Hope, S. C. L.	Mont.	...	12,000
Horn-Silver, S. L.	Utah.	300,000	600,000
Idaho, G.	Cal.	...	31,000
Indian Spring Drift.	"	...	1,000
Iron Silver, S. L.	Colo.	...	100,000
Jocuistita, S.	Mexico	50,000	100,000
Kentuck, S.	Nev.	3,000	15,000
Leadville Consolidated, S.	Colo.	20,00	40,000
Navajo, G. S.	Nev.	25,000	125,000
Northern Belle, S.	"	...	...
Ontario, S. L.	Utah.	...	75,000
Osceola Consolidated, C.	Mich.	...	50,000
Oxford, G.	N. S.	...	10,000
Prussian, S. L.	Colo.	...	15,000
Quincy, C.	Mich.	...	240,000
Richmond, S. L.	Nev.	67,500	202,500
San Francisco, C.	Cal.	...	2,500
Shoshone, G.	Idaho.	...	6,000
Sierra Buttes, G.	Cal.	30,625	30,625
Sierra Grande, S.	New Mex.	...	400,000
Silver King, S.	Ariz.	25,000	125,000
Smuggler, S.	Colo.	...	9,000
Standard Cons., G.	Cal.	25,000	125,000
Total Wreck.	Ariz.	50,000	50,000
True Fissure, G. S. L.	Utah.	...	37,500
United Gregory, G.	Colo.	...	12,000
		1,292,875	$4,860,375

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 31.

There is no activity in the market for copper stocks, and the sales of the past week have been smaller than ever. There is, however, a firmer tone, and prices are a shade higher, but there is no life to the market; no disposition to buy and but little to sell; in fact, orders either way are scarce, the public generally not being in a speculative mood. Ingot copper is steady, and a slight advance in this respect would tend materially to improve the market for the shares of the producing mines, and impart a little impulse to speculation. Calumet & Hecla advanced from $232½@$234 on sales of seven shares each on three alternate days of the week. Quincy improved from $43½@$45, but subsequently sold at $44½, and a small lot at $44, seller 60. Osceola also advanced from $21@$21½, on small sales. The rest of the list was entirely neglected, not a sale recorded for the week in any of the speculative or non-dividend-paying mines.

In silver stocks, the principal dealings have been in Sullivan, to which we referred last week. The sales this week have aggregated about 3000 shares at an advance from $1⅛@$2¼, closing sale being at $2⅛. We are told that much higher prices may be looked for in this stock. Catalpa, steady but dull at 65@67½c. The mine is looking well, and the prospect for continued dividends encouraging. Crescent sold at 30c. San Pedro declined from 40@35c.

At the Mining Exchange, there is no special feature of interest, and prices of the stocks dealt in are not materially changed.

3 P.M.—The market this afternoon shows no improvement, but prices are steady. Bonanza Development sold at $2½. San Pedro, 40c. Franklin, $10 bid, $10¼ asked. Quincy, $43 bid, none offered. Pewabic, $3@$4. Silver Islet, $4 bid. Sullivan, offered at $2¼, no bid. Catalpa, 55c. bid, ex dividend 10c. Crescent, 25@30c. Harshaw, $½ bid.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

Name of Company.	Closing Quotations. May 25.	May 26.	May 28.	May 29.	May 30.	May 31.
Albion	...	...	...	...	...	...
Alpha	3	...	2⅜	4¼	...	3⅛
Alta	.90	.80	1.25	.80	...	.80
Bechtel	...	...	...	...	...	...
Belcher	1⅝	1¾	2¼	1⅞	...	1⅛
Belle Isle	.25	...	...	.15	...	...
Best & Belcher	5¼	4¾	6⅜	5½	...	5½
Bodie	1⅛	...	1	1	...	1⅛
Bullion	...	...	...	...	...	...
California	.40	.35	.50	.55	...	.40
Challar	4⅛	3⅝	13⅛	4⅛	...	4¼
Con. Virginia	.70	.70	1	.95	...	.75
Crown Point	1⅝	1¾	2¼	2⅛	...	1¾
Elko Cons	.20	...	.20	.25	...	.25
Eureka Cons	3¼	...	3½	3½	...	3½
Exchequer	.45	...	.70	.60	...	.45
Gould & Curry	4⅛	3⅝	4⅛	4¼	...	4
Grand Prize	.60	...	.60	.50	...	.45
Hale & Norcross	9⅝	8¼	8⅞	8	...	8⅝
Independence	.35	...	...	.35	...	...
Martin White	.30	...	.30	.25	...	.30
Mexican	4¼	4	5½	5½	...	5
Mono	...	...	...	...	...	...
Mount Diablo	...	...	...	...	...	...
Navajo	1¾	...	1½	1½	...	1½
Northern Belle	6⅛	...	...	6⅛	...	6¼
North Belle Isle	...	...	...	...	...	.20
Ophir	3⅛	3	4¼	4⅛	...	3¾
Overman	...	...	...	...	...	...
Potosi	2	1¾	2	1⅞	...	1¾
Savage	3¼	3	3⅜	3	...	3⅛
Scorpion	...	...	...	...	...	...
Sierra Nevada	7	6¾	8⅛	7⅞	...	6⅜
Silver King	...	...	...	10⅞	...	10⅝
Tip-Top	...	...	...	.25	...	.35
Union Cons	6¾	6⅞	10¼	8⅞	...	7¾
Wales Cons	...	...	...	...	...	...
Yellow Jacket	4¾	4⅝	5⅝	4¾	...	4¾

BULLION MARKET.

NEW YORK, Friday Evening, June 1.

The market is somewhat firmer abroad without quotable change, and "sterling" is higher here—making, for the present at least, a feeling of more confidence.

Date.	London Pence.	N. Y. Cents.	Date.	London Pence.	N. Y. Cents.
May 26	50⅛	109⅝	May 30	50⅛	Holiday.
28	50⅛	109⅝	31.	50⅛	109¾
29	50⅛	109⅝	June 1.	50⅛	109¾

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table

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BOSTON MINING STOCKS.

	May 25.		May 26.		May 28.		May 29.		May 30.		May 31.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amie	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Atlantic	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con	1.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Bonanza D	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.50	.....	200
Bowman Sil	.19	.....	.19	.....	.....	.....	.20	.18	.....	.....	.....	.....	3,300
Bruns. Ant	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California	.....	.....	232½	.....	.....	.....	.55	.....	.....	.....	.....	.....	500
Cal. & Hec	.....	.....	.....	.....	.....	.....	233	.....	.....	.....	234	.....	21
Catalpa	.70	.65	.69	.67½	.....	.....	.....	.....	.....	.....	.67½	.65	2,750
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherryfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Co. Virginia	.....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....	300
Copper F'lls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copperop	.....	.....	.30	.....	.30	.....	.25	.....	.....	.....	.....	.....	625
Crescent	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
"Cusi"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deer Isle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas	1.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Duncan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin	.....	.....	.....	.....	.....	.....	.29	.28	.....	.....	.....	.....	600
Empire	.....	.....	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	500
Eureka Con	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin	10.25	10.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90
Hancock G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harshaw	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independ'ce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Q'n	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth	.05	.....	.05	.....	.....	.....	.05	.....	.....	.....	.....	.....	13,200
Mass. & N.M.	.08	.....	.08	.07	.....	.....	.08	.07	.....	.....	.....	.....	7,500
Milton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Belle	6.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25
Ontario	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola	.....	.....	.....	.....	21.00	.....	21.00	.....	.....	.....	21.50	.....	38
Penn-Breck	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewabic	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pine Tree	.16	.....	.19	.....	.....	.....	.20	.....	.....	.....	.....	.....	2,800
Plymouth	.17	.....	.....	.....	.....	.....	.17	.....	.....	.....	.....	.....	400
Quincy	.....	.....	45.00	.....	.....	.....	44.50	.....	.....	.....	.....	.....	103
Ridge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Pedro	.35	.....	.35	.....	.....	.....	.....	.....	.....	.....	.40	.....	700
S'ra Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S'ra Grande	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Isle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver King	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simpson Gd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
So. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan	2.13	1.88	2.13	2.00	2.25	2.13	2.38	.....	.....	.....	2.13	.....	3,722
Sutro Tun	.22	.....	.23	.....	.....	.....	.30	.....	.....	.....	.....	.....	1,300
Sycamore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead	.09	.....	.11	.10	.....	.....	.12	.....	.....	.....	.....	.....	12,500
Vizina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	May 25.		May 26.		May 28.		May 29.		May 30.		May 31.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
Amer. Cons.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.01	.....	1,000
Argent	.....	.....	.17	.16	.16	.....	.....	.....	.....	.....	.17	.16	6,700
Battle Mt	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Bodie	.....	.....	.....	.....	.....	.....	1.15	.....	.....	.....	.....	.....	175
Buena	.02	.....	.01	.....	.....	.....	.01	.....	.....	.....	.....	.....	9,200
California	.....	.....	.30	.....	.45	.....	.45	.....	.....	.....	.55	.....	4,575
Calista	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite	.....	.....	.....	.....	1.15	.....	1.10	.....	.....	.....	1.15	.....	1,200
Cincinnati	.13	.....	.....	.....	.....	.....	.12	.....	.....	.....	.12	.....	2,500
Comprom'e	.....	.....	.23	.....	.22	.....	.21	.....	.....	.....	.22	.20	15,700
Contention	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virg	.....	.....	.....	.....	.75	.....	.....	.....	.....	.....	.95	.....	1,600
Dauntless	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del Monte	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.16	.....	.15	.....	.....	.....	.....	.....	.17	.15	8,700
Eureka	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.25	.....	125
Girard	.09	.....	.....	.....	.10	.....	.....	.....	.....	.....	.10	.....	2,600
Golconda	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Governor	.....	.....	.07	.....	.07	.....	.....	.....	.....	.....	.....	.....	800
Grand Uni'n	.16	.....	.....	.....	.16	.....	.....	.....	.....	.....	.18	.....	6,500
Gunnison	.85	.....	.90	.....	.82½	.80	.82½	.....	.....	.....	.77½	.65	1,900
Homestake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horn Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch	.08	.....	.....	.....	.08	.....	.08	.07	.....	.....	.08	.....	13,600
Iron Silver	.....	.....	3.00	.....	3.05	.....	3.10	.....	.....	.....	3.10	3.05	4,125
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd	.....	.....	.09	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Little Maud	.05	.....	.05	.....	.05	.....	.06	.....	.....	.....	.....	.....	33,600
Little Pitts	.....	.....	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,900
L'g & D'y H	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana	.....	.....	.....	.....	.....	.....	.06	.05	.....	.....	.06	.....	897
Mt. Sheridan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo	.....	.....	.....	.....	.....	.....	1.75	.....	.....	.....	1.45	.....	1,350
North'n B'l	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion	.....	.....	.....	.....	.....	.....	.04	.....	.....	.....	.....	.....	100
Orion Pref	.....	.....	.....	.....	.....	.....	.06	.....	.....	.....	.....	.....	200
Palmetto E	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina	.13	.....	.....	.....	.13	.....	.....	.....	.....	.....	.13	.....	1,500
Penn-Breck	.12	.11	.12	.....	.12	.11	.12	.11	.....	.....	.10	.....	18,200
Permanent	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.....	.....	6,000
Pizarro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro Ex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potosi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rara Avis	.40	.....	.45	.....	.47½	.....	.47½	.....	.....	.....	.....	.....	3,400
Rara Avis E	.13	.....	.15	.14	.14	.12	.13	.....	.....	.....	.13	.....	23,500
Record	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rico Pion'r	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson	.....	.....	.....	.....	.65	.....	.60	.....	.....	.....	.82½	.....	3,400
Savage	.....	.....	.....	.....	.....	.....	4.00	.....	.....	.....	.....	.....	300
Sierra G'nde	1.35	1.25	1.10	1.05	1.17½	1.12½	1.20	1.15	.....	.....	1.30	1.25	16,000
Sierra Nev	.....	.....	.....	.....	7.25	.....	7.20	.....	.....	.....	9.25	.....	340
Silver Cord	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver King	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silv'r Plume	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con	.65	.....	.70	.....	.65	.....	.....	.....	.....	.....	.....	.....	3,300
Standard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sultana	.04	.....	.04	.....	.04	.....	.04	.....	.....	.....	.04	.....	7,800
Sutro Tun'l	.....	.....	.....	.....	.....	.....	.30	.....	.....	.....	.32½	.....	200
Tombstone	.75	.....	.75	.....	.....	.....	.75	.....	.....	.....	.77½	.....	3,600
Victor	.....	.....	.02	.....	.02	.....	.....	.....	.....	.....	.02	.....	5,600
Yale Mt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of April.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	$86,226	$320,419
*Alta-Montana, G. L. S.	"	.....	§10,625
*Belmont	"	5,171	17,775
Bodie, G. S.	Cal.	25,085	91,342
Bodie Tunnel, G.	"	10,470	45,319
*Bonanza King, G.	"	57,000	199,077
*Boston & Montana, G.	Mont.	18,741	72,318
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah	24,249	92,654
*Chrysolite, S. L.	Colo.	24,146	142,238
*Contention, S.	Ariz.	83,754	293,014
Crescent, G.	Cal.	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak.	.....	120,231
*Derbec Blue Gravel, G. S.	Cal.	10,041	31,844
*Father de Smet, G.	Dak.	20,596	127,985
*Frisco M. and S. Co., G. S. L.	Utah.	16,366	§77,084
*Head Center Cons.	Ariz.	6,865	6,865
*Head Center and Tranquillity	Ariz.	13,893	18,486
*Hecla Cons., G. S.	Mont.	§57,060	234,984
*Homestake, G.	Dak.	.....	330,060
*Hope, S.	Mont.	.....	20,574
Horn-Silver, S. L.	Utah	291,000	1,055,000
*Independence, G. S.	Nev.	7,779	34,722
*Kentuck, G. S.	"	2,100	8,237
*Lexington, S.	Mont.	96,317	421,204
*Little Pittsburg, S. L.	Colo.	3,296	22,873
*Marguerite, G.	Cal.	.....	33,200
*Martin White, G. S.	Nev.	.....	136,317
*Moulton, G. S.	Mont.	.....	123,288
Mount Diablo	Nev.	65,221	75,078
*Navajo, G. S.	"	69,646	281,626
*North Belle Isle	"	1,953	1,953
Northern Belle, S.	"	75,700	343,015
*Ontario, S. L.	Utah	222,274	807,695
*Oxford, G.	N. S.	6,181	21,324
*Phœnix, G.	S. C.	.....	†3,666
*Pinal Cons., S. L.	Ariz.	37,388	137,860
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	29,433	101,241
Standard, G.	Cal.	108,477	371,483
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah.	19,677	74,281
Syndicate, G.	Cal.	4,869	14,086
Tintic M. and M. Co.	Utah.	.....	7,692
*Tip Top, S.	Ariz.	.....	†22,983
*Tombstone, G. S.	"	53,071	†246,230
Yellow Jacket, S.	Nev.	54,120	152,873
Total amount of shipments to date			$6,963,072

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended June 1st, as compiled from various sources, amounted to $117,000, as against $133,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,235,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended May 26th	$145,774
Corresponding week last year	2,850,551
Since January 1st, 1883	5,691,911
Corresponding period last year	28,654,148

Imports.

Week ended May 26th	$36,525
Corresponding week last year	84,695
Since January 1st, 1883	6,688,933
Corresponding period last year	1,714,227

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £367,000 bullion, but the proportion of reserve to its liabilities was raised only ⅛ per cent, to 35¼, against 40 11-16 per cent at this date last year. May 31st, the bank made a further gain of £104,000 bullion on balance. The weekly statement of the Bank of France shows a loss of 3,425,000 francs in gold, and a gain of 107,500 francs in silver.

METALS.

NEW YORK, Friday Evening, June 1.

Copper.—Current business is small, but there is an undertone of interest that gives promise of early development. Bids have been made for Lake copper for export, the figure named being 15⅝c., but as yet no sale has been consummated. At the same time, we hear that negotiations are pending for the sale, for export, of a large stock of copper from an Arizona mine. The views expressed in our editorial columns thus find confirmation, although at the moment of writing we were not aware that matters had assumed their present shape.

The only transaction worthy of note is the sale of a 100,000-pound lot of Lake at 15⅞c., which, it is presumed, comes from a mine. This is supposed to indicate that some of the smaller Lake companies are acting independently, and are beginning to force sales, so that a falling off of prices is not among the impossibilities, unless the position of Lake is strengthened by export. We quote Lake copper 15⅞@16c., and other brands, 14½@15⅝c.

Ores are quoted 12@12s. 6d. per unit, in England.

Tin.—This metal has been dull and has weakened. The Banca sale in Holland went off at 58 guilders, which is about the parity of London, which quotes by cable to-day £94 15s. We quote for round lots of Straits tin 21½c., and Australian 21¾@21⅞c. asked.

Lead.—Very little has been done, sales aggregating only 400 tons of various brands Refined and Common at 4·40@4·45c., which we quote. The best bids for 600 tons of Germania spot and to arrive were 4·32½c., which was delivered, the parties at headquarters in San Francisco asking 4·50c.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is firm. It has shown remarkable activity since our last advices. Sales for the week sum up over 500 tons of Chemical lead at 4·12½c. We quote Refined lead at 4·15@4·18c.

From Chicago, Messrs. Everett & Post send the following dispatch:

Our market is quiet but firm at 4·15@4·17c. Sales aggregate 300 tons during the week of Common and Refined.

Spelter.—This metal is dull and weaker, ordinary Domestic selling in small quantities at 4·60@4·65c. Silesian has sold at prices equivalent to 5c., but we quote the same at 5@5⅛c.

Antimony.—Antimony is lower; we quote 9⅝@9¾c. for Hallett's and 10⅝@10¾c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 1.

American Pig.—The market is dull and weaker, and we hear that Allentown foundry is offering iron at $20. We have no sales of any importance to record, and quote ordinary to choice foundry brands, No. 1, $21@$22; and No 2, $19@$20, nominally, with the market strongly in buyers' favor. Forge iron in the East will probably suffer under the continuance of work in the Western mills. We quote $17.50@$19. Bessemer pig

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is quiet at $21@$22, at tidewater, while Spiegeleisen, 20 per cent, is quoted $31@$32.

Scotch Pig.—There is absolutely no change in Scotch iron. Transactions are on a limited scale, in very small lots exclusively, so that our quotations must be considered nominal. We quote: Coltness, ex ship, $24@$24.50; Glengarnock, $22@$22.50; Eglinton, $21; Langloan, $23.50@$24; and Summerlee, $24. Warrants are cabled 46s. 10d.

Rails.—The mills are well supplied with orders, though it is generally understood that the business was secured by making concessions. Now, however, $38 at mill is the ruling quotation.

Old Rails.—There is nothing of interest to report. Business is dull and quotations remain nominally $22.50@$23 for Ts.

Scrap.—Dealers are generally so well supplied that they are entirely indifferent. Most of them are unable to market their stock at any thing like remunerative figures, and Scrap is therefore neglected at $23.50@$24 for No. 1.

Philadelphia. June 1.

Enough furnaces have gone out of blast during the past ten days, and will go out of blast during the next ten days, to impart the needed improvement to the crude iron industry. Pig-iron makers hold on to the last hour, and a great many were suddenly seized with the conviction that a suspension was immediately necessary. There will be a sufficient demand to absorb the production of those that still remain in blast. The stocks are large, but it is likely that large consumers will take advantage of the extremely low rates at which these stocks can be secured, and purchase for several months' requirements. Ordinary quotations, delivered, are: $18@$19 for Forge, $19@$20 for No. 2, and $21@$22 for No. 1 Foundry. During the past week, some extraordinary concessions have been made and offers presented. Forge iron has been bought at $17 at furnace, and, it is said, at a little less, though this is not authenticated. No. 2 Foundry is moving downward, and some buyers expect to purchase under $19. Foundry iron is moving between $20 and $21 for some brands. There is a general unrest among holders, and each one is in a hurry to get out. It is probable, in the opinion of some far-seeing iron men, that, as soon as the present panicky feeling is past, the price of pig-iron will settle down to a little above cost limits. The prospect of a Western strike has weakened crude iron and improved finished iron. There have been attempts to sell Bessemer for summer shipment, but makers are not disposed to make necessary concessions.

Merchant Iron is in better condition than at any time since the opening of the year. Orders for Refined are taken at 2·20c.; small orders, 2·25c. Stores are selling at card rates, chiefly. Some buyers have covered 60 days' requirements. Nearly all buyers are purchasing more than they have been. Inquiries are also more frequent, and there is generally a better feeling pervading trade circles. Country mills are getting better prices, especially for common iron, the business of which they seem to be able to monopolize. Orders for a few hundred tons for early and summer delivery have been placed at prices in and around 2c. Concessions are not easy to get. There is more confidence among manufacturers. Skelp iron has been moving in large lots at about 2·20c. The upward tendency in nails is developing, and some jobbing lots were sold at $3.20. Makers are less disposed to sell for future delivery, and in large lots, as they think it better to husband their stocks and take advantage of improving demand. Inquiries are crowding along and the outlook is more encouraging than it has been.

A few good orders for *Wrought Pipes* were booked, and boiler tubes are in fair request Quotations are unchanged, although, for the orders reported, concessions were made. Galvanized iron has been quiet for several weeks, but two or three large orders were placed. Card rates are unchanged. Buyers are purchasing more freely, and for later deliveries. Stocks are very low in consumers' hands, and, as prices will not weaken, they are looking out for supplies.

Boiler Plate has been wanted in larger lots than usual. Common Plate iron is selling at $2·40c.; Shell nominally at 3¼c.; Flange, 4¼c.; Fire-box, 5¼c. Manufacturers are not adhering to these figures except in retail lots. Nothing is done in a large way, although, after the first of July, it is probable that some business that has been held back for the earthquake in prices, will be placed.

Structural Iron.—Manufacturers of shape iron have been doing a retail business for several weeks, but a few inquiries for large lots have finally been received, which, if placed, will make business better for the summer. There are sufficient requirements, but buyers have been hesitating for a long time. Angles are 2·40c.; Beams and Channels, 3½c.; Tees, 3¼c. Some makes of iron have been selling from two to three tenths below these figures, but it is doubtful whether they will stand Pennsylvania Railroad tests. A good deal of bridge building has been brought to light, and negotiations are now in hand for it.

Bessemer mills have secured orders for between 20,000 and 30,000 tons of steel rails at $38@$39; and if pending negotiations are closed, June business will compare very favorably with former months. Summer orders are coming along at about $39@$39.50, and occasional sales of light sections are made $2@$3 higher. Old rails and scrap are unusually dull, and negotiations have been hanging fire a long time without result.

Pittsburg. May 31.

The last week of work for probably three or four months finds the iron trade artificially active, and buyers anxiously covering pressing requirements for from thirty to sixty days. Manufacturers have all along refused to depart one iota from the programme marked out at their meeting, and are to-day as confident and as resolute as at the start. They have supplies of iron on hand which will allow them to meet actual requirements of th ir customers, and there are indications that in some portions of the West, some mills will be started in a few weeks with non union labor.

The efforts of holders of pig-iron to sell meet with no success. Forge is an absolute drug, and offers of $17 to day found no buyers. The restriction of output is progressing, and will be continued until the accumulation of stocks has been absorbed. Trifling lots of foundry are moving for near-by requirements, but the tendency is decidedly downward. Bessemer iron is in moderate demand to meet Bessemer mill requirements. Muck Bars are quiet at $34.50@$35. Consumers of manufactured iron have pretty well supplied themselves, either by actual delivery, or by contracts for future delivery, at 2@2·10c.

The fact that there is enough merchant bar in stock to supply pressing wants, is giving tone to the market, and preventing any panicky demonstration on the part of buyers. Nails continue in good demand. Stocks are light and the tendency of prices is upward. Steel rail orders have been placed within a few days at $39.50. Old rails are quoted at $22 offered, and $22.50 asked. Scrap is without change.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 1.

Anthracite.

The slight symptoms of an improvement noticed in recent issues have again disappeared, and the market presents the features of extreme dullness. Buyers can not be induced to take a hopeful view of the future, and there is talk, probably with a view to stimulate the wavering, of putting up tolls all around on the first of July. The reports from the manufacturing interests throughout the East are discouraging, and while this demand is only a comparatively small factor, its falling off has the effect of making local dealers cautious. The avoidance of the strike in the Western iron mills dispels any hopes of increased business to the Eastern mills and gives prospect of a lively competition. Altogether, the outlook is not a very promising one at present, and interest therefore centers more and more upon developments in the West. The companies operating in that market should do their utmost to stimulate buying by low prices, because, after all, anthracite coal there is a luxury which is indulged in only when business is prosperous.

The Western Association met in this city this week. No change was made in the prices, and only points relating to the sales were discussed.

Bituminous.

The only current business is that of transient steamers, the manufacturing demand being low. There are rumors of low prices both at Georgetown and at Baltimore. We quote Clearfield, alongside, $4.10@$4.30; and Cumberland, $4.20@$4.35, according to quality.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended May 26th and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co..	49,201	1,354,746	41,644	1,168,768
D. L. & W. RR. Co.	89,147	1,719,606	76,893	1,520,566
Penna. Coal Co.....	22.375	471,259	21,543	412,024
L. V. RR. Co.....	8,738	404,970	17,009	396,698
P. & N. Y. RR. Co..	2,803	74,916	2,536	72,198
C. RR. of N. J	50,978	926,210	.....	797,267
Penna. Canal Co....	13,148	93,137	14,001	99,914
North & West Br. RR.....	5,864	188,021	.....	.....
	242,254	5,232,865	173,626	4,467,433
Lehigh Region.				
L. V. RR. Co.....	63,847	1,782,397	54,509	1,617,166
C. RR. of N. J.....	48,549	849,028	.....	718,090
S. H. & W. B. RR..	2,064	18,635	.....	15,000
	114,460	2,650,060	54,509	2,350,256
Schuylkill Region.				
P. & R. RR. Co.....	101,461	2,482,383	91,215	2,264,785
Shamokin & Lykens Val.....	23,817	506,837	21,185	417,617
	125,278	2,989,220	112,400	2,682,402
Sullivan Region.				
St Line&Sul. RR. Co.	1,158	23,746	947	19,994
Total	483,150	10,895,891	341,482	9,520,085
Increase.....	.....	1,375,806	.....	.....
Decrease	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878 ..... 7,696,479 tons
" " " " 1879 ..... 5,325,681 "
" " " " 1880 ..... 9,299,850 "
" " " " 1881 ..... 9,693,057 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 198,751 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended May 26th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	2,566	28,391	17,666
Coal for shipment at South Amboy.....	10,786	329,379	302,999
Coal for distribution.....	12,095	313,80	273,767
Coal for company's use	2,722	58,109	53,007
Total.....	28,169	729,679	647,439
Increase...	.....	82,240	.....
Decrease.....	.....	.....	.....

The Production of Bituminous Coal for the week ended May 26th was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs..... 52,582		837,424
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	4,645	135,042
Broad Top Region, Pa.		
Huntingdon & Broad Top RR....	3,329	82,617
East Broad Top.....	645	20,722
Clearfield Region, Pa.		
Snow Shoe.....	4,050	100,709
Tyrone and Clearfield..... 48,881		1,106,719
Alleghany Region, Pa.		
Pennsylvania RR..	8,262	191,836
Pittsburg Region, Pa.		
West Penn RR.....	12,299	193,885
Southwest Penn. RR.....	1,322	47,893
Penn & Westmoreland gas-coal, Pa. RR	28,152	557,178
Pennsylvania RR.....	8,899	193,686
Total.... 173,076		3,467,711

Horsford's Acid Phosphate.

Beware of Imitations.

Imitations and counterfeits have again appeared. Be sure that the word "HORSFORD'S" is on the wrapper. None are genuine without it.

THE MONTOUR IRON & STEEL COMPANY.



WORKS AT DANVILLE, PA.

PIG-IRON, T AND STREET RAILS.



AIR-FURNACE AND CUPOLA CASTINGS,

Bar-Iron, Mine-Car Wheels, Axles and Breaker Machinery.

W. E. C. COXE, President, Reading, Pa. F. P. HOWE, Supt., Danville, Pa. S. W INGERSOLL, Treasurer, 208 South Fourth St., Philadelphia.

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THE enormous speculative dealings in wheat, cotton, and petroleum are attracting considerable attention and unfavorable comment. These paper transactions have assumed a volume that is absurd. The selling and buying, nominally, of nearly 350 million barrels of oil, 3 million bales of cotton, and 175 million bushels of wheat forcibly demonstrates the extent to which the gambling mania has taken hold of the public.

THE first installment of our report of the Roanoke Meeting appears in another column, a large part of it being the publication in full of President HUNT'S inaugural address, an able effort, which will be found to present a vigorous discussion of the means which engineers possess to meet the exigencies of the present period of depression. Some of Mr. HUNT'S suggestions will commend themselves to the consideration of manufacturers, notably his remarks on the labor problem, which is now so profoundly agitating the minds of all.

IN the course of a rambling paper, by Mr. W. S. SUTHERLAND, read before the Iron and Steel Institute, and an animated though equally aimless discussion, evidences appear that our British friends are beginning to devote some attention, in a mild way, to water-gas. For years, the English technical public has bestowed upon the new fuel that good-natured indifference which springs from a conviction of great superiority. Few have condescended to listen. There appears to be considerable confusion in the minds of British metallurgists on the subject, and the only fact of any real importance brought forward and sufficiently indorsed to be received without reserve is, that water-gas has done good work in connection with the welding of wrought-iron.

THE proposed meeting of the manufacturers of coke in the Connellsville District proved a failure, because the representation was not great enough to make the deliberations of such an assembly carry any weight. The rapid decline of prices is the result of a struggle the outcome of which leaves but little doubt. The market will not take all the coke, and it has become the question who is to stop producing. There are two classes of coke-producers, those having "drift" mines and those having "shaft" mines. The former are undoubtedly in the majority of instances fully capable of placing their product on the market at a lower price, and are "squeezing" their less fortunate competitors, who will not long be able to meet 85 cents per ton, on cars at oven, a price which must entail a positive loss of from 8 to 18 cents per ton. The latter are in favor of restricting the output, to strengthen the market and get at least a small share of the trade, while the drift men are not anxious to make concessions while they are in a position to dictate.

RECENT advices from England indicate that the basic process is making exceedingly rapid progress in Europe. During the six months ended with the close of March, 279,400 tons of basic steel had been produced by seventeen firms; one of them in England, one in Belgium, one in Russia, two in France, three in Austria, and nine in Germany, their output being:

	Tons.
England	57,911
France	5,962
Belgium	12,786
Germany	152,479
Austria	37,476
Russia	12,786

These figures, of course, are insignificant as contrasted with the duty of the acid plants in the United States, though they do not compare unfavorably with the work of the majority of mills working side by side with them in Europe. The only establishment actually working on a good scale is the Eston works at Middlesborough.

A PRELIMINARY summary of the report of Mr. BURCHARD, Director of the Mint, on the production of the precious metals, has been published, the figures presented being the following:

	Gold.	Silver.
Alaska	$150,000	.....
Arizona	1,065,000	$7,500,000
California	16,800,000	845,000
Colorado	3,360,000	16,500,000
Dakota	3,300,000	175,000
Georgia	250,000	.....
Idaho	1,500,000	2,000,000
Montana	2,550,000	4,370,000
Nevada	2,000,000	6,750,000
New Mexico	150,000	1,800,000
North Carolina	190,000	25,000
Oregon	830,000	35,000
South Carolina	25,000	.....
Utah	190,000	6,800,000
Virginia	15,000	.....
Washington Territory	120,000	.....
Wyoming Territory	5,000	.....
Total	$32,500,000	$46,800,000

This shows a decline of $2,200,000 in the production of gold and an increase of $3,800,000 in that of silver, a favorable showing, considering the many circumstances which have told against the prosperity of the mining industries.

PIG-IRON in the East appears to be approaching "bed-rock," to judge from the fact that furnaces are blowing out rapidly, and the iron ore miners have reached prices so low that no material reduction is probable. The forced restriction will tell on values as soon as surplus stocks in the hands of the weaker producers have been marketed. Many months have now passed by, and hardly any of the season contracts for foundry iron generally made in spring have been closed. Consumers have been buying strictly from hand to mouth, taking one-hundred ton lots at a time, and their stock of raw material must be exceedingly light. In regard to the manufactured goods which our foundries produce, the situation is not quite so favorable, and it may take some time before the surplus is worked off. On the other hand, we are approaching that period of the year when the demand is liveliest, and the work of distribution will soon begin. We can not help believing that the worst has passed. The process of getting down to the present more healthy condition has been a painful one, and much unjust and indiscriminating criticism has been heaped upon the shoulders of those who have led in the movement. The policy adopted has, however, undoubtedly been the

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most judicious. It has placed the business on a sounder basis, and has contributed much toward bringing about a more speedy return to better times.

YEARS ago, in their eagerness to tap from the earth its hidden treasures of oil, drillers generally expressed disgust when nothing but gas rewarded their efforts. Later, some enterprising men began to turn their attention to this great source of caloric, and, one by one, a number of iron and glass manufactories in Pennsylvania carried the gas into their mills. They have not made much bluster over what they were doing, and have quietly pocketed the increased profits which their saving of fuel, due to the use of gas, has given them. Of late, however, the subject is attracting considerable attention in a quiet way, and recent developments indicate that the territory which may possibly be able to draw upon the new source of fuel supply is much greater than is generally believed. Gas-wells have been opened and are utilized as far west as Detroit and as far south as West Virginia, and Pittsburg is now getting excited over the extension of the business of the Murraysville well in Westmoreland County. Pipes have been laid down to a number of glass and iron-works in the eastern part of the great Smoky City, and a rapid extension of the field of the gaseous fuel is looked forward to. The belief is expressed by men whose opinion is worthy of much consideration, that the number of localities capable of being supplied with gaseous fuel in the States of New York, Pennsylvania, Ohio, West Virginia, and Michigan is much larger than the majority have any conception of, and the permanency of the flow of some of the older wells gives rise to the hope that it is a reliable fuel supply. Its cheapness and cleanliness are, of course, matters which are beyond all doubt. There are indications that during the present year a considerable number of companies will form to sink wells, and a "boom" is looked forward to that may bring forth the usual crop of unsound enterprises.

THE ROANOKE MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

The nucleus of the town of Roanoke was a small village known as Big Lick, situated at a point where a salt-lick originally attracted the wild animals of the vicinity. About this gradually grew up a village of ten or fifteen houses, with a small hotel and store. In 1881, the population was about 600. The building of the Shenandoah Valley Railroad to a connection with the Norfolk & Western, forming a great through route between the North and South, opened a new era in the economic history of the district. The town of Roanoke rapidly increased, until now it boasts of a population of nearly 5000, with about 600 houses, a new and comfortable hotel, and numerous industrial establishments. It is situated in the midst of a highly cultivated region, immediately at the junction of the Norfolk & Western and Shenandoah Valley railroads.

It was at this point that the American Institute of Mining Engineers decided to hold its regular summer meeting. The ride through the Shenandoah Valley is full of interest, and the scenery is grand and picturesque. The railroad first reaches the Shenandoah River at Riverton; thence it follows its general course for 120 miles. It then crosses a divide 1785 feet above tide between the Shenandoah and James river waters, and it follows the tributaries of the James River and the James itself to Buchanan, a distance of 50 miles or more; it then ascends another divide between the waters of the James and Roanoke rivers, and thence by the tributaries of the Roanoke to its junction with the Norfolk & Western, being for the entire distance in what is commonly known as the Valley of Virginia. During the late war, this valley was the scene of active military operations, and the railroad line passes through or near the battle-fields of Antietam, Shepherdstown, Winchester, Cedar Hill, Cross Keys, and Port Republic. The route abounds in points of interest, not only to the traveler seeking simply the picturesque and the beautiful, but also to the geologist, the mining engineer, and the iron-master; for the railroad follows closely the great Primordial ore-belt along the western flank of the Blue Ridge, which at many points has shown large and valuable deposits of rich iron ore.

It was expected, therefore, that this meeting of the Institute at Roanoke would prove very attractive. Already at least 125 members—many of them accompanied by ladies—have arrived, and others are still expected.

THE FIRST SESSION.

The first session of the Institute was held in the Roanoke Hotel, on Monday evening, June 4th. Addresses of welcome were made by Mayor Cocke, on behalf of the municipal authorities, and by Mr. I. B. Austin and Major Griffin, on behalf of the citizens. The words of greeting were specially cordial, and they were happily responded to by Mr. R. W. Hunt, the President of the Institute. The President then read his inaugural address, which was very favorably received.

THE PRESIDENT'S INAUGURAL ADDRESS.

Upon assuming the duties of the high position to which you have elected me, I beg to thank you most sincerely for the honor conferred. To be the presiding officer of your society is a gratifying distinction; but entering upon that office as the successor of the able gentlemen who have preceded me renders me diffident as to the results of the ensuing term. But believing your hearts, rather than your cooler judgments, were consulted in making your selection, I, in self-defense, now rely upon them for forbearing criticisms where weak, and warm support where strong and right. Connected as most of us are with the active industries of the country, we are called upon to encounter, not only engineering problems, but commercial ones as well. In fact, the two are so intimately associated, the success of one is the triumph of both. For while engineering difficulties may be overcome, if the result is not a commercial success, the world refuses to grant praise, and certainly withholds substantial rewards. I presume never since the organization of this Institute has the metallurgical engineer been called upon to meet a more embarrassing condition of affairs than at the present time. We have been through panics, through periods of depresssion and times of inflation; but just now, owing to the legislative status, an entirely new element enters into the problem.

After the warm words of graceful welcome to which we have just listened, with the certainty of having displayed to us, during the next few days of our visit to their store-house of nature's treasures, such boundless mineral and agricultural wealth, made available by intelligent enterprise and industry, it is next to impossible to realize the existence of aught but untrammeled prosperity. Eight years ago, the President of this Institute, in his address at the Cleveland meeting, presented as he so well could, and in his clearest, most forcible manner, the necessity for a general adoption of better methods, more economical machinery and saving appliances in all branches of manufacture. His warning words were uttered at a time when the business outlook was much the same as now. During the years which have lapsed since then, many steps have been taken in the right direction. But a period of great prosperity, at least of great activity, came upon us. Nature's refreshing rains and glowing sunshine made our fertile plains rich with golden harvests. Thousands from foreign shores came to us, seeking new homes in our God-blessed land. There has been work for all, plenty for all, demand for every thing. The result was a feverish state of drive. Did the blast-furnace have a daily output of sixty tons, alter the lines—put up new stoves—another engine—force it—blow it—better still, build another and bigger one—produce two hundred tons per day! The Bessemer works were designed for and expected to make fifteen hundred tons of ingots per week. Put on three sets of hands, let the week of production begin on Sunday afternoon; the week of labor never end; and then, not be content with a weekly yield of three thousand tons. This has been the hot-blooded life of the past few years; but following it, have we not sometimes neglected true economy? If not, then well. But whether yes or no, the time is now here when we must have cheapness of production as well as quantity. I take it, no matter what may be our views on the subject of protection, the supreme duty of every engineer is to aim at placing our industries entirely independent of the whole subject. An easy statement to make—not so easy of accomplishment. But our duty remains the same. How can it be done? Most emphatically not by placing American labor on the same basis as foreign; not by employing women and children to perform the work not of men alone, but that of beasts of burden; not by giving our workers hovels instead of homes; not by depriving them of wholesome diet; not by rendering education and advancement all but impossible; not by breaking down the barriers of morality; not by making the united efforts of a skilled man, his equally skilled wife and daughter, capable of yielding but $5.13 per week! I am proud to believe the reduction of labor to this point would require a plant for the construction of which the average engineering mind is incapable. Unfortunately, when pinching times afflict us, when the necessities of curtailment of costs arise, we at once attack the wages problem as the certain and only way of salvation. That point of reduction of cost is so easily reached. Understand me; I do not mean that labor should not bear its share of depression, as it certainly always will of prosperity. But if we would give deeper thought, and not permit the human proclivity for hitting some other body satisfy us, we should make greater and more lasting savings. You may make a heavy reduction in wages, and save but a small amount per ton of product; and when times change, the reduction must be restored. But save a few per cent of loss in the processes of manufacture, and your aggregate is the same, and that reduction in cost remains permanent. By the difference between an unintelligent, careless, and indifferent use of the non-producing supplies in one engine and its train of rolls and a conscientious effort at economy, an actual saving of one hundred dollars per month has been possible. This is not a fortune; but if you have say forty engines and thirteen trains of rolls, it merits respectful consideration. Better let that master mechanic's wages remain at a fair standard and have him save for you, than to take from him and let another lose for you. Hence, I argue that the first duty is seeking after better methods, then a rigid and economical administration, and *then* a revision of the whole labor question. I think my statements as to not favoring a descent to the level of foreign labor have been sufficiently strong; but at the same time, I claim that the relative pay of our workers is not properly balanced. The machinists, the pattern-makers, the carpenters, the mechanics of America have to serve an apprenticeship of from three to four years, receiving during that time not more than enough to pay their board. After learning their trades, they can not hope for, in fact are satisfied with earning from two dollars and twenty-five cents to three dollars per day, the latter being for exceptionally skillful workmen, two dollars and fifty cents per day being about the average. Should these men develop sufficient talent, they may become foremen, at say $100 per month. Their employment demands physical skill, patient toil, frequently fearless exposure to physical danger, and a certain amount of intellectual education. The greater the latter, the more certain is the possessor of constant employment and success. From the daily wages stated, it of course follows that the yearly earnings are moderate. Nevertheless, in all manufacturing communities of this country, you will find that the mechanics are, as a rule, the men who have acquired homesteads, who live with the most comfort, and whose children are prepared for a higher plane than that occupied by their parents. It certainly seem unjust that, as opposed to such a class of workers, other men without intellectual education, with trades that, with scarcely an exception, if sufficient physical strength is possessed, can be acquired in less than a year, should control a rate of pay from one and a half to three times as great. The young man in the machine-shop cheerfully devotes his time, while learning his trade, for a compensation of some three dollars per week. His fellow in the rolling-mill, if over eighteen years of age, must receive from a dollar and a half to two dollars per day, or he will remain in idleness. To my mind, true justice demands that the wages of the skilled mechanic should be the basis in comparison with which the rate of all other labor should be determined. But to reach the sought-for plane, to place the manufacturers of this country in a position to compete in the open markets of the world, to render the question of tariff entirely one of revenue, one more

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thing is absolutely necessary: We must have cheap raw materials. No matter how much engineering skill is exercised, no matter how economical the administration, no matter how low the rewards of labor, unless the coal, the ore, the pig metal, are obtained at a far lower price than we now know, our market must be limited to our own domain, and the foreign importer must be handicapped by an impost; or else our furnaces must remain cold, our mills idle, and the mines of either my own New York or those of hospitable Virginia lie undeveloped.

To give us this cheap material, other than labor must be content with smaller returns. If the ore property is acquired for say fifty thousand dollars, the company formed to develop it must not have a capital of a million, and each stockholder expect at least ten per cent on his watered investment. I fully appreciate that this is not likely to be received with favor; but if the demand is for steel rails at about twenty-five dollars per ton, to meet it the manufacturers must have pig-iron at the English price of say from twelve to thirteen dollars. Then, with the American converter, averaging 42,705 tons, against 20,920 for the English, and 15,001 tons for the French per year, there need be no fear but the American product can compete in any market, and at the same time pay labor as American labor should be rewarded. It has been demonstrated that freight can be carried over our railroads, and profits made, at a rate per mile that a few years ago seemed impossible. Our country is one of long distances. The various raw materials are generally far apart, or else the market is distant. Hence railroad engineers and managers have already contributed their share toward solving a problem which, view it as you may, is one of at least not easy solution. The bounden Christian duty of every one, in whatever sphere he may be placed, is to properly administer the talents given unto him. The seeking after the best methods in all things is imperative on all. But have we not cause to be proud of the development of our country, and reasonably well satisfied with the results? Coming, as we distant members of this Institute do, to partake of the hospitality and witness the Aladdin-like achievements of our hosts of this section of Virginia, are we not inclined to conclude that the system which has rendered such things possible is fit to live? If so, then, gentlemen, we must resort to political as well as engineering methods.

The advisability of such a policy has been recognized by at least one association of capitalists. The furnaces and mills located on the Hudson River, while possessing many advantages of location, have been handicapped by high-priced fuel. This must ever remain—and in the struggle of the survival of the fittest, there could be but one other element to offset this disadvantage. If cheap and good ore could be obtained, the distance from the coal-fields would be more than neutralized. To Mr. James A. Burden, of Troy, belongs the credit of a methodical investigation, rewarded by complete success, which promises to make the Hudson Valley one of the most favorable points for the production of cheap and good iron in the United States. The gentlemen associated with Mr. Burden in the possession of the Hudson River ore property, and also the Chateaugay property, believe that their true interests point toward a large output at a small profit. Fortunately, the mixture of the Chateaugay and Hudson River ores in about equal proportions furnishes an easy working burden, and yields good foundry, mill, and Bessemer irons.

Taking Troy as a point at which these ores may be brought together and smelted in properly constructed furnaces, costs can be figured about as follows:

1 ton of Chateaugay 1 ton of Hudson River	$6.50
1¼ tons of coal	5.00
Limestone	.50
Ore, tools, etc	.50
Labor	1.50
Repairs, etc	1.00
	$15.00

If Mr. Burden's policy is adhered to, it would seem as though hope still exists for some of us.

Papers were afterward read by Mr. A. S. McCreath on the Iron Ores of the Valley of Virginia, which we print in this issue, and Capt. C. R. Boyd on the Ores of Cripple Creek, Virginia.

On Tuesday morning, a visit was made to Lynchburg, on a special train, provided by the courtesy of the Norfolk & Western Railroad. Here the Lynchburg blast-furnace was visited.

THE LYNCHBURG BLAST-FURNACE.

The stack is 60 by 12 feet 6 inches. It has four tuyeres with 4½-inch nozzle. The blowing-engine has a steam cylinder 20 inches in diameter, with four-foot stroke, and a blowing-cylinder 60 inches in diameter, with four-foot stroke. The engine was built by the proprietors of the furnace, Messrs. Carter & Stevenson. The ores used are chiefly brown hematites, mined along the line of the Richmond & Alleghany Railroad. They yield an average of about 47 per cent metallic iron. The fuel used is Connellsville coke. The furnace produces 35 tons daily of soft foundry iron.

THE RIVERVILLE IRON MINES.

A visit was then made to the iron mines on the James River near Riverville, a special train having been kindly furnished by the Richmond & Alleghany Railroad. The mines visited are located at a point about two miles from Riverville, and twenty-four miles northeast of Lynchburg. The ore is of the specular variety, and may yield from 45 to 50 per cent metallic iron, with the phosphorus sufficiently low to make it suitable for Bessemer pig-iron.

At Riverville, an excellent collation was provided by the citizens of Lynchburg, whose guests we were for the day. After the wants of the inner man had been satisfied, a few speeches were made, cordially welcoming the members of the Institute. Numerous points of interest were afterward visited in Lynchburg, notably the Chamber of Commerce, where a fine exhibit of different kinds of minerals was displayed. We returned to Roanoke in the evening, too late for a second session, which had been arranged to be held at Lynchburg, but which was unavoidably omitted.

To-morrow (Wednesday) will be spent visiting points of interest around Roanoke, including the new furnace of the Crozer Steel and Iron Company, the Roanoke Machine-Works, and several iron ore deposits in the immediate neighborhood, which will be fully described hereafter.

ROANOKE, VA., June 5, 1883.

THE RAILROAD EXHIBITION AT CHICAGO.

Special Correspondence of the Engineering and Mining Journal.

The Exhibition is now thoroughly under way, and is attracting attention of a character to meet the most sanguine expectations of its managers. The time having been extended until the evening of the 5th in which to complete exhibits, there has been considerable activity among exhibitors to make the best display possible. In variety and character of exhibits there is every thing to be seen which is of interest, not only to the railroad man, but to many who are engaged in kindred and allied mechanical pursuits, The visitor may profitably pass two or three days in the exhibition building, and then depart without having done full justice to the many novel details of railroad construction now brought forward. The attendance has not yet developed much of a railroad character. Next week will, however, witness a large influx of this class, who will express no little praise at the novelty of concentrating under one roof so much in which they are specially concerned.

It may afford your readers some satisfaction to learn who among the numerous exhibitors are enterprising to the extent of meeting the best attention. Among locomotive-makers, first and foremost in its display, I may allude to the Brooks Company, of Dunkirk, N. Y., which has four of its engines in the Annex that attract marked attention. The Philadelphia & Reading Coal and Iron Company has a handsome engine, No. 372, of its own make, possessing special features. The engine is said to accomplish work not in the reach of many of its kind, and boasts of very high records. Other manufacturers have their engines on exhibit, which in all make a most creditable appearance in this line. The Brown Hoisting and Conveying Machine Company, of Cleveland, Ohio, has on exhibit its machine on a tramway, which enables it from time to time to practically illustrate its workings to the visitors who admire its simplicity in the execution of its work. Creaser, Adams & Co., of Chicago, have a large booth located in the center of the building, in which are displayed the various fixtures adapted to railroads, mines, etc. Fairbanks, Morse & Co. have an immense tank supplied with water by an Eclipse wind-mill, one of the prominent features of the exhibit. That live house of St. Louis, M. M. Buck & Co., has a handsome exhibit of heavy railroad and engineer's supplies, and Keuffel & Esser, of New York, are prominent by the fine character of their engineering instruments and supplies; they display a full line of such articles as enter into the wants of engineers, among which are many specialties controlled by them.

In minerals, ores, and the like, there is a very fair display from the Lake Superior and Northern country. The success of the electrical railroad may now be considered assured.

A COMPARISON OF THE WORKING OF A BLAST-FURNACE WITH BLAST VARYING IN TEMPERATURE FROM 990° FAHR. TO 1414° FAHR.*

By W. Hawdon, Middlesborough.

(*Concluded from page* 317.)

In order to ascertain if the temperature of the escaping gases was affected by the increased temperature of the blasts, tests were made over a period of twelve hours, and taken every fifteen minutes or thereabouts. The temperature of the escaping gases varies so much over any given period that a test taken at random, or even over a couple of hours, is very misleading. The time of lowest temperature is, of course, when a large amount of material has been charged into the furnace. This, in the course of ordinary working, is as low as 323°, and gradually increases during the time that charging operations are suspended. The results of trials taken throughout the day, October 31st, 1882, when the average temperature of the escaping gases was 490° Fahr., show that the average temperature of blast was 1065° Fahr. As the rise in temperature is gradual after charging has ceased, the trials were not so frequently made, but that is allowed for in taking the average temperature.

The temperature of the gases was taken in a similar manner over twelve hours on other occasions, showing:

	No. 1.	No. 2.
Average temperature of gas	468° Fahr.	448° Fahr.
Average temperature of blast	1139° Fahr.	1493° Fahr.

From this it would appear that the temperature of the escaping gases decreases with the decrease of fuel, although this decrease of fuel is compensated for by an increase of blast temperature.

The volume of the escaping gases is smallest when the higher temperatures of blast are used, since, when this is the case, the amount of fuel consumed is smallest, and consequently the amount of air blown in to consume this fuel is smallest. The weight of gas per ton of iron we find to be 133·3 cwts., when the blast is 1376° Fahr.

The volume of the escaping gases is largest when the blast temperature is low, since, when this is the case, the amount of fuel consumed is larger, and consequently the amount of air blown in to consume this fuel is also larger. The weight of gas per ton of iron we find to be 140·8 cwts. when the blast is 990° Fahr.

In both cases, the gases, in passing up the furnace, pass through the column of material, namely, coke, mine, and limestone, which is charged at the top of the furnace.

The materials, in passing down the furnace, absorb practically the same amount of heat in both cases. But since the volume of the escaping gases in one case is less than the volume in the other, the temperature of the gases when they are leaving the furnace will be lower when the volume is small than when it is greater, granting, at the same time, that the furnace is of sufficiently large capacity to allow of absorption with the quicker driving—that is, when the gases are passing off more rapidly.

In order to ascertain how much of the iron-stone remained uncalcined after it had passed through the calcining-kilns, samples were taken in bulk in the following manner: Three shovelfuls of mine were taken from each of the six openings of the kilns, and the whole thoroughly mixed. This operation was repeated at each kiln. About one quarter of the mine from each kiln was taken for sample and thoroughly mixed together. This was crushed in a mortar-mill, and a sample taken to the

* Read before the British Iron and Steel Institute.

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laboratory. An average of five such samples of calcined stone, as determined by Mr. Stead—to whom I am indebted for the analyses given in this paper—gave the result:

	Per cent.	Cwts. per ton.	Oxygen.	Carbon.
Fe_2O_3	49·38	24·01	7·20	....
FeO	4·72	2·30	0·51	...
CO_2	2·98	1·45	1·06	0·39
Loss by calcination	3·11	1·51	....	....
SO_3	0·66	0·32	0·19	....
	....	....	8·96	0·39

This gives metallic iron = 38·13 per cent.

The CO_2, of course, passes off at the top of the furnace, and affects the calculation in computing the weight of carbon which passes down to the tuyeres. It is therefore necessary, in computing the value of the gases, to make the allowance for this uncalcined stone.

The unburnt stone is chiefly found in the center of the large lumps, and although the stone may appear almost perfectly calcined, yet in the best-constructed kilns from 2 to 3 per cent is generally found to be the further loss when a sample taken from the kilns is submitted to perfect calcination in a muffler. Samples were taken from the kilns at two other works in Middlesborough, when the stone was well burnt, and gave a further loss of 1·8 and 2·8 per cent respectively.

The practical work accomplished in this furnace by increasing the temperature of the blast from 990° Fahr. to 1414° Fahr. has been a saving of 1¼ cwt. of coke per ton of iron, and an increase in make of 60 tons per week, with a better quality of iron by nearly one fourth of a grade, and that, too, without any increased reduction of silicon into the iron, though it would appear that rather more limestone is required when the higher heats are used.

It becomes now an easy matter to calculate whether it is worth while pulling down old pipe-stoves at any particular stage of wear and tear, and replacing them with the effective brick-heating stove of the Cowper, Whitwell, or similar type.

A very important item in connection with the working of brick regenerative stoves in place of the ordinary U-pipe stove appears to have escaped general observation. I refer to the amount of gas required to heat the blast by this method.

The pipe-stoves in use at the Newport Iron-Works are of modern construction, and may be taken as among the best of the kind. There are nine to each furnace, eight of which are at work while one is off for cleaning purposes. Each stove has twelve pipes, with a heating surface of 100·48 square feet per pipe = 1205·76 square feet per stove, giving $8 \times 1205{\cdot}76 = 9646$ square feet of heating surface per furnace.

The cubical contents of each stove = 1781 feet. That of the pipes in each stove = 320 cubic feet, which, deducted from the former, gives 1461 cubic feet in each stove to be filled with the gases in combustion. This gives $8 \times 1461 = 11{,}688$ cubic feet per furnace. Therefore the proportion of heating surface of the pipes is to the cubical capacity of the stove as 9646 square feet heating surface : 11,688 cubic feet capacity of stoves, or as 1 : 1·21.

Now in the Cooper stoves, which are at work at this furnace, one working the blast while the other is heated with the gas, there are 42,860 square feet of available heating surface per stove.

The cubical capacity of each stove is	18,610 cubic feet.
That of the brick is	8,406 "
Difference	10,204 "

Therefore the proportion of heating surface is to the cubical area as 42,857 square feet : 10,204 cubic feet, or as 4·2 is to 1, as against 1 : 1·21 in the other case, showing a great economy of space to be filled by gas under combustion in the brick stove. And moreover, the outside surface of the brick stoves is much less than that of the pipe-stoves, giving thereby less surface for radiation. In the pipe-stove, there is not a sufficient length of time, nor is the surface of the pipes of sufficient area to allow of the complete absorption of heat from the burning gases. But the gas which is ignited at the bottom passes rapidly and directly through the stove and out of the chimney at the top, where it escapes at the high temperature of 1240° Fahr.; while with a well-designed brick stove, the gas has a long way to travel, a large surface of bricks to pass over, travels at a much slower rate than is the case in the pipe-stove, and consequently the heat is so thoroughly absorbed by the bricks that the gases escape into the chimney at a temperature (from the Newport stoves) of 250° Fahr.

The escaping gases analyze as follows:

	From the pipe-stoves.	From the Cowper stove.
N	74·24 per cent.	74·75 per cent.
CO_2	24·30 "	24·15 "
CO	Nil "	Nil "
O	1·46 "	1·10 "
H	Nil "	Nil "
	100·00	100·00

Showing in both cases very little excess of air.

In order to ascertain the amount of gas passing through the various flues to the stoves, boilers, etc., readings were taken by Swan's tube anemometer, with the result that the sum of the amounts passing down the gas tubes from the two furnaces in blast showed only an excess of 3·6 per cent over the sum of the amount passing into the various stoves and boilers, thus showing comparative accuracy in the readings. The anemometer showed exactly the same amount of gas passing down the gas tube from each furnace.

The pipe-stoves at work on the No. 6 furnace are identical with those formerly at work on No. 8. One of them was off for repairs, and one cleaning, leaving seven at work.

Taking the sum of the amounts of gas passing down the two gas tubes as unity—they being the source of supply—we have—

To the Cowper stoves	14·9 per cent.
To the seven pipe-stoves	23·4 "
Through the gas-flue to the boilers	61·7 "
	100·0

Now we find that the gas per ton of iron passing from No. 8 furnace = 133·3 cwts., the anemometer reading being taken at the same time, giving at the rate of 266·6 cwts. per ton passing from the two furnaces as our gas supply. The sum of the two amounts = at the rate of 266·6 cwts. gas per ton of iron to each of the set of stoves which respectively supply one furnace; but in the case of the boilers, the number of tons is at the same time doubled, the steam supply from the boilers being to both furnaces, the make at the two furnaces being nearly the same.

This gives us—

	Cwts. gas per ton of iron.
To the Cowper stoves	39·63
To the seven pipe-stoves	62·25
Through the gas main to boilers	164·12+2
	266 cwts.

Taking first the Cowper's stove. From the gas analysis, 27·34 per cent is CO = 11·71 C. This per cent of 39·63 cwts. = 4·64 cwts. carbon. Hence we have developed:

	Cwts. heat units.
(CO to CO_2) $4{\cdot}64 \times 5600$	= 25,984
Hydrogen	= 1,056
Sensible heat of gas, $39{\cdot}63 \times 102° \text{ C} \times {\cdot}24$	970
	28,010

We have carried out heat units from—

		Heat units.
Blast ($746° + 42°$ loss from stove to tuyere)	= $788° \text{ C} \times 98{\cdot}17 \times {\cdot}237$	18,333
From waste gases	39·63 cwts.	
Add weight of air required to consume 4·64 cwts. C from CO to CO_2 and 0·03 cwt. H, and due to 1·1 per cent excess of O in waste gas	29·24 "	
	68·87 "	
$68{\cdot}87 \times 140° \times {\cdot}24$		2,313
Leaving for radiation		7,364
Total		28,010

Take now the pipe-stoves: 11·7 per cent of 62·25 cwts. = 7·28 cwts. carbon. This develops (CO to CO_2)—

	Heat units.
$7{\cdot}28 \times 5600$	40,768
Hydrogen	1,700
Sensible heat in gas, $62{\cdot}25 \times 102 \times {\cdot}24$	1,523
	43,991

We have passing out—

	Heat units.
Blast, 531° C × 105 cwts. × 237	13,960
Waste gases ($62{\cdot}25 + 49{\cdot}9 = 112{\cdot}15$ cwts. × 671° × 24)	18,061
Leaving for radiation	11,970
	43,991

In this latter case, 105 cwts. of blast is taken as used, as is the case with the lower temperature of blast.

The difference ($62{\cdot}25 - 39{\cdot}63$) = 22·62 cwts. gas per ton of iron, represents the amount of gas saved by using the brick stove in preference to the pipe-stove, and might, with proper application, be used for calcining the iron-stone, where that is necessary, or for other purposes.

Now 22·62 cwts. is 16·9 per cent of 133·3 cwts.; or, in other words, the saving effected by heating the gas in the brick stoves is equal to 16·9 per cent of the whole of the gas given off from the furnace. Of this 26·3 per cent is CO = 6 cwts. CO per ton of iron, which, when burnt to CO_2, gives $2{\cdot}57 \text{ C} \times 5600 = 14{,}393$ cwts. heat units.

The calorific power of the small coal used in the Cleveland District for calcining purposes may be taken at 7000; so that if this heat were applied to calcine the iron-stone, it would represent $\frac{14{,}392}{7000} = 2$ cwts. (about) of small coal per ton of iron made. At the Newport Works, we use 2¼ cwts small coal to calcine the iron-stone required to make one ton of iron. At some works with high kilns, as small an amount as two cwts. is required. A certain amount of this, doubtless, passes off burnt to only the first degree, or CO. Therefore, we find that the saving in gas by using the brick stove is about the quantity requisite to calcine the iron-stone for use in the furnace. The ordinary type of calcining kilns is without doubt unfitted for this mode of firing; but it does not appear unlikely that kilns can easily be adapted for the purpose. A great advantage is found in using the brick stoves during the prevalence of high winds, owing to the better draught of the chimney, when, as every furnace manager knows, it is impossible to maintain the heats with the ordinary type of U-pipe stove. We may therefore congratulate the inventors of brick regenerative stoves on having introduced an improved mode of heating the air, though the advantage, when compared with the cast-iron pipe-stoves, where the services they render give such fair results as from 1050° to 1100° Fahr. of blast temperature, is not, according to our experience, equal to that which has in some instances been claimed for them. As an instance of the saving effected, we will take the No. 8 furnace at Newport Works; the Cowper stoves are built of best Wortley fire-bricks, and the whole workmanship is of the best quality. They cost £2200 each = £4440 per furnace, without the foundations, which were already in; and the chimney, which is large enough to drive stoves for three furnaces, cost £270.

	Per year.
Interest and depreciation on the Cowper stoves at 15 per cent	£700 0 0
Interest and depreciation on the pipe-stoves at 15 per cent	495 0 0
Difference	£205 0 0
Saving in coke, as in the Newport case, 1⅛ cwt. per ton = 11¼d. One fourth better grade in quality = 3d. per ton. Total saving, 14¼d. per ton. On 400 tons per week, say, 20,600 tons per year	£1,223 2 6
Deduct	205 0 0
Total saving per annum in favor of the brick stoves	£1,018 2 6

There remains, in addition, the saving of gas, which, if properly applied, is no inconsiderable item, and the profit—when such a desirable result is accomplished—on the extra make.

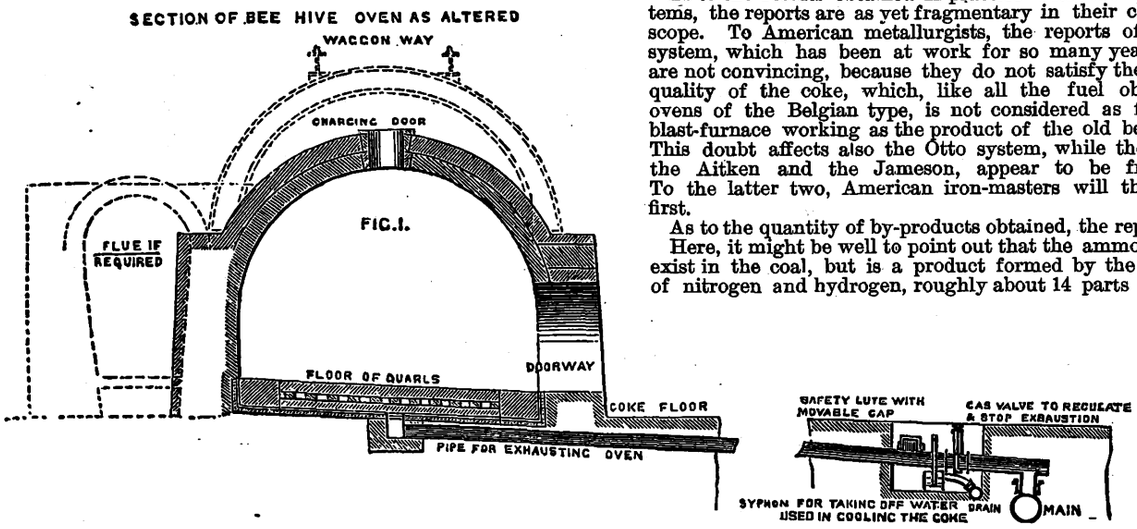
AT a recent meeting of the Engineers' Club of Philadelphia, Percival Roberts, Jr., exhibited a turning from a cast-steel roll. The dimensions of the roll, which was cast from open-hearth steel, were about 30 inches by 5 feet 6 inches. The turning is 4 inches wide by 12 inches long, 1¼ inch thick, showing the roll to have been very homogeneous for cast-steel.

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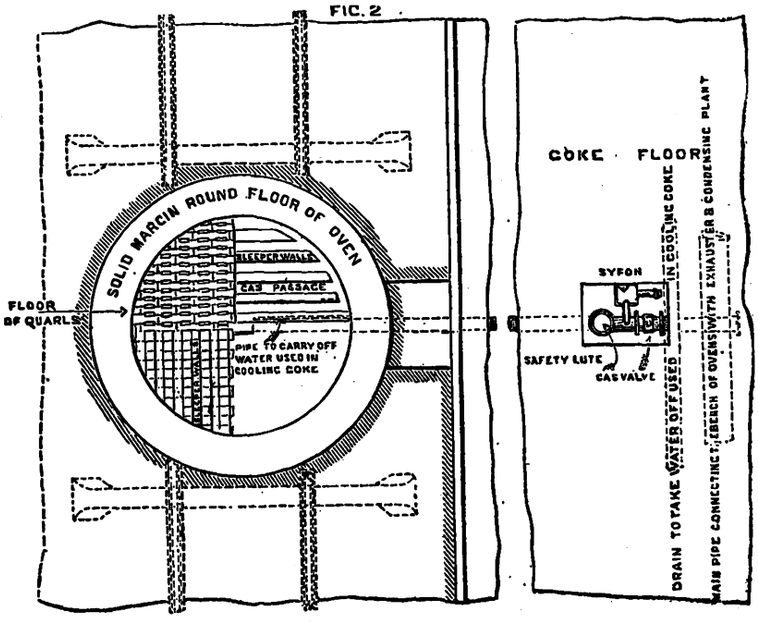
UTILIZATION OF BY-PRODUCTS IN THE MANUFACTURE OF COKE.—III.

The Jameson System.—The latest claimant for attention in the recovery of the volatile products in coking is J. Jameson, who also attempts only a modification of the ordinary bee-hive oven, and whose particular aim appears to be to keep the coking process precisely the same as in the old plan. Mr. Jameson rejects the use of the fuel-gas remaining after the tarry and ammoniacal products have been condensed, on the ground that the heat which can be generated by the burning of this waste gas, being previously cooled, is not sufficiently high, compared with that obtainable by burning a part of the carbon of the charge. He says also that the portion of the coke formed at a low heat in a comparatively cool fresh-charged oven is inferior in quality to that produced at a higher heat at a later stage of the coking.

Figs. 1 and 2 show a sectional elevation and plan of the Jameson oven,



from which it will be seen that, in place of being solid, the floor is perforated by numerous holes formed in fire-clay quarls, a suction-pipe of cast-iron being inserted so as to communicate with the openings. It is important to have a secure and tight foundation, in order to avoid drawing air and vapor from the surrounding ground; and this is accomplished by placing a double layer of bricks set in hard pitch at such depth below the actual floor as not to be exposed to undue heat. In building new ovens, it is also considered advisable to lay one or two damp courses of slate and tar, such as are used in house building, over the whole surface of the foundation. The oven is charged as usual; and when well ignited, a slight exhaustion is applied at the bottom through the pipe previously referred to, so as to remove a portion of the nascent products of distillation, instead of allowing them to pass up through the ignited portion of the charge. The suction should be equivalent to about 200 cubic feet of gas per hour per ton of coal in operation, but must, however, vary somewhat with the quality of the coal, some coal being more rich in gas than others. The amount of suction capable of being applied should be about three inches of water; good results have been got with about half an inch; but for resistance in the scrubber and a margin for seals, the power available should not be restricted to that in the first instance. The suction, beginning as soon as the oven is well ignited at the top, should be continued for at least sixty hours for a five-ton oven, although the charge may before that time be ignited throughout, there being still a yield of oil apparently re-distilled from the oven bottom. It is considered best to employ for suction such apparatus as a Root blower, or an exhauster of the Beale pattern, the delivery of which will vary nearly as the speed, as there is, of course, one rate of suction most favorable with each kind of oven and species of coal operated upon, and this should be secured as nearly as possible.



The temperature of the gas as it leaves the ovens averages about 180 degrees Fahr.; and as, in order to obtain the best results, it is important to condense as much as possible, it is recommended that very efficient cooling surface should be provided. If cold water is available at moderate cost, it is of value, especially in extracting the last traces of the more volatile products, bearing in mind that, contrary to the usage of gas-works, it is in this process desirable to take from the gas as much condensible matter as possible. By tapping the condenser at different hights, a certain separation of light and heavy oils may be obtained, which is valuable when dealing with large quantities. Probably the best method of obtaining the separation is by the process of fractional distillation now worked by Messrs. H. L. Pattinson & Co., at Felling, by which liquors of five or six different specific gravities can be automatically run into separate receiving-vessels. This process simply consists in providing discharge-lutes at so many places in the condensing-pipes, the more easily condensible constituents being run out of those nearest to the ovens, and the more volatile parts at a later period when the temperature has been still further lowered. Finally, the gas is passed through a dry scrubber, and may then be used for heating purposes, for working gas-engines, or for illuminating in connection with burners, such as the Lewis & Clamond, in which light is obtained by the incandescence of platinum or some other artificial medium instead of from the carbon contained in the gas. In some cases, the residual gas might be of greater value for concentrating the ammonia-water, which, on first condensation at the ovens, is large in quantity, and therefore costly to transport.

As to the results obtained in practice with the different systems, the reports are as yet fragmentary in their character and scope. To American metallurgists, the reports of the Carvès system, which has been at work for so many years in France, are not convincing, because they do not satisfy them as to the quality of the coke, which, like all the fuel obtained from ovens of the Belgian type, is not considered as favorable for blast-furnace working as the product of the old bee-hive oven. This doubt affects also the Otto system, while the two others, the Aitken and the Jameson, appear to be free from it. To the latter two, American iron-masters will therefore turn first.

As to the quantity of by-products obtained, the reports vary.

Here, it might be well to point out that the ammonia does not exist in the coal, but is a product formed by the combination of nitrogen and hydrogen, roughly about 14 parts by weight of the former to 3 of the latter. The whole of the nitrogen existing in the coal is not, however, converted into ammonia, although there is always more hydrogen present than would be necessary for this total combination. Only a portion is thus utilized, part of the remainder escaping unaltered, while some part clings to the coke, and a small fraction combines with carbon to form cyanogen. This matter was fully treated in a paper read by Professor Forster, M.A., F.C.S., before the Chemical Society of London, last December, and we understand that still further investigations are now in progress.

Mr. Henry Simon reports that at Bessèges nearly 3 cwts. of ammoniacal water and 72½ pounds of tar are obtained per ton of coke. In preliminary work with the Otto system at Wattenscheid, Germany, the quantity of tar obtained ranged between 3·13 and 3·90 per cent of the weight of the coal, while the value of the ammoniacal water averaged 10·93 marks on a coal which was worth 60 marks per ton at the pit's mouth. Mr. Aitken got 11 gallons of oil per ton, and 30 gallons of water, containing in one test ammonia equivalent to 9·7 pounds of sulphate of ammonia per 100 gallons of water. Mr. Jameson reports that with Shiremoor coal, 13 gallons of crude oil, and ammonia equal to 9·87 pounds of sulphate, were obtained per ton of coal; while with Longhirst small, 9·28 gallons of oil, and ammonia equal to as much as 17·78 pounds of sulphate, were recovered. With fractional distillation, the results are especially interesting, and the following is given as a sample experiment with one charge:

Number of delivery-pipe.	Quantity collected.	Specific gravity.	Remarks.
	Gallons.		
1	5·00	1·015	Contained 18·6 per cent of water, and a great quantity of scale paraffine.
Close to oven	9·87	·990	Contained 1 per cent of water.
2	7·70	·980	Contained 10·4 per cent of water.
3	2·00	·945	No water.
4	6·00	·960	Contained 1 per cent of water.
Dry scrubber			

Altogether, the ammonia in this charge was equal to 12·2 pounds of sulphate per ton of coal.

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ORE-DEPOSITS OF SUMMIT DISTRICT, RIO GRANDE COUNTY, COLO.*

By R. C. Hills. Condensed for the Engineering and Mining Journal, by S. F. Emmons.

The Summit District, which is situated near the summit of the San Juan Mountains, to the west of Alamosa, and south of the head of the Rio Grande above Del Norte, is famous for the remarkably rich gold deposits of the Little Annie and other mines. Mr. Hills's paper, which is too voluminous to be presented in full in these columns, is devoted to a consideration of the geological relations and genesis of ore-deposits of this region, and is based upon extended examination, and chemical investigation conducted by himself.

His views are, briefly, that the vein-like forms of auriferous quartz constituting these deposits have resulted from alteration and mineralization of an eruptive rock by solutions circulating along a contact plane; that subsequent folding and erosion gave rise to the existing series of parallel quartz bands, which have much the appearance of true veins.

In the accompanying diagrams, Fig. 1 shows the relative position and the sinuous course of the outcrops of the various rocks and the so-called veins. Fig. 2 is an ideal section along the line *a b*, illustrating the manner of folding and the number of plications.

The ore-deposits are principally confined to the northern and eastern slopes of South Mountain. The rocks of the region are all eruptive, and belong to the middle of what he calls the Tertiary eruptive series of Southern and Western Colorado. Those exposed in the immediate vicinity of the mine occur in the following order, beginning with the oldest:

1. *Andesite*, of dark green or black color.
2. *Granular rhyolite*, with large twin crystals of sanidine, and granules of quartz, biotite, hornblende, and apatite.
3. *Trachyte breccia*, not always present in cross-section.
4. *Andesitic trachyte*, with large crystals of sanidine and biotite, and a ground-mass composed mostly of plagioclase.
5. *Black rhyolite*, constituting a semi-vitreous ground-mass, with crystals of sanidine and biotite.
6. *Gray andesitic trachyte*, the most recent rock exposed in the district.

The aggregate thickness of these rock does not exceed 300 feet.

Horizontal pressure, acting in a northeast and southwest direction (that of least resistance), has produced six complete folds and a series of minor undulations. Similar pressure, acting at right angles, or in a northwest and southeast direction, has caused a further plication, which is shown in the sinuous course of the outcrops.

As shown in the section, the apexes of all the folds have been removed by erosion; the only exception being that of the Columbia-Treloar fold where the quartz apex still remains on the Golden Queen claim. These folds are shown sometimes in natural cross-section, as in the Bobtail and Major, and at other times by tunnels driven at right angles to the course of the veins. The metalliferous quartz bands are conformable with the folded strata, and occur along the plane of contact of the granular rhyolite with the breccia or with the andesitic trachyte, when the breccia is absent. The thickness of these silicified bands varies from three to thirty feet, being much greater when, by the folding process, two or more layers of quartz are forced into contiguous position.

The quartz bands, which correspond to the ground-mass of the rhyolite, are usually of compact structure. The quartz granules of the original rock may still be detected in the compact matrix, while the large crystals of sanidine, so conspicuous in the unaltered rhyolite, have for the most part disappeared, although their former existence is indicated by the numerous cavities still retaining the form of the feldspar. In some cases, pseudomorphs of quartz after the Carlsbad twins occur, but mica has entirely disappeared. The ore consists of auriferous pyrite and enargite, with their oxidation products. As accessory minerals are sphalerite and galena, and occasionally native sulphur.

The zone of oxidation to which all the more valuable bonanzas thus far discovered are confined is of varying depth, reaching a maximum of 300 feet. In the Little Annie and Little Ida claims, which are on the same plane, gold is most abundant near the center of the band; sometimes, it consists of innumerable small grains, so closely aggregated as to appear like a continuous sheet of metal. At the actual outcrop is the zone of impoverishment, which extends down to a depth of 50 feet or more, in which the quartz, while slightly impregnated with oxide of iron, is not sufficiently auriferous to constitute valuable ore. As an exception to this rule, in the Little Annie and Major claims, the oxidized ore at the surface is extremely rich; in the former, it is colored reddish-brown by oxide of iron, and often contains barite. Gold is mostly confined to fracture planes containing oxide of iron, and is found occasionally in dodecahedral crystals a millimeter in diameter. Near the ore-bodies, the decomposition has progressed more or less in the country-rock; and in their immediate vicinity, the feldspars are completely altered to kaolinite. Traces of lime or potash are seldom obtained from these decomposed rocks, and biotite is invariably altered to white potash-mica or muscovite. Kaolinization is not confined, however, to the immediate vicinity of the bonanzas, but is taking place on a large scale in districts at considerable distance from the ore-bodies.

In the Missionary and Golden Star claims, are two vertical veins running about north and south, which traverse the andesite and granular rhyolite, and connect with the quartz band in the latter. There are several other such vertical veins in the district, filled with kaolin or a little calcite and earthy matter, but none besides these two seems to have been mineralized. In the Missionary tunnel, the compact quartz matrix is from five to seven feet wide, passing insensibly into andesite, from which through alteration it has been produced. Its metallic minerals are pyrite and enargite, with more or less gold and silver, the latter being associated only with enargite. As far as known to the writer, there is no evidence of silicification or deposition of ore along the contact of the granular rhyolite with the underlying andesite.

He considers that these two characters of deposits, the contact quartz bands and the vertical veins, have a common origin and are of contemporaneous mineralization; that the absence of quartz granules in the feldspar cavities and of pseudomorphous minerals in the vertical veins may be accounted for by the difference in the character of the micro-crystalline andesite in which they occur. The vertical veins as a rule are found traversing the anticlines, but do not occur in the synclines.

With regard to the folding of the rocks, the evidence shows that, while in the earliest stages it may have advanced gradually, it culminated with considerable violence. In some cases, on the south side of the mountain, for instance, the rocks are shattered with such violence as to pile the whole mass into a promiscuous heap. It is not at all likely that these resulted from an earthquake movement subsequent to the folding, as the shattered rock is confined to the area embracing the undulations. It is impossible to conceive that mineral waters could be confined to the contact plane in the present position of the rocks; and the conclusion is therefore forcibly arrived at that the folding must have followed the silicification and ore deposition. The perfection with which the form of the Carlsbad twins is retained both by the quartz pseudomorphs and the numerous cavities present in the quartz is opposed to the notion that the mass has undergone any considerable contraction since the removal of the bases, although it is evident that more silica is contained in a given bulk of the ground-mass than was originally present in the same bulk of rhyolite base; and at the same time, it does not seem reasonable to suppose that more than a very limited amount was derived by precipitation from the altering solution. The minuteness of the crystals and the evidence of crystalline structure in the mass of the quartz, with other facts, suggest that their formation is due rather to a rearrangement of the molecules since the silicification. It is, therefore, fair to conclude that much of the silica contained in the sanidine crystals has, in a mechanical sense, taken the place of the bases in the ground-mass; in other words, that silicification has been brought about mainly by removal of the bases only.

Mr. Hills's remarks on the chemical reactions involved in the alteration and mineral deposition are too extended to be given at length. One of his main points is, that these altering solutions must have contained a certain amount of free sulphuric acid, for the reason that the bases, especially of alumina, have been removed, while silica has been left.

Silica is soluble to a limited extent in solutions of alkaline carbonates, which, however, do not affect silicate of alumina. Silica, on the other hand, is practically insoluble in solutions of alkaline sulphides and chlorides, and those containing hydrogen sulphide and free sulphuric acid; while in these solutions silicate of alumina is decomposed, and a soluble sulphide or chloride of alumina formed. Sulphuric acid may have been generated through the oxidation of hydrogen sulphide, the former existence of which may be argued from the presence of native sulphur. The disappearance of mica furnishes conclusive evidence that free sulphuric acid must have existed in the silicifying solution. The experiments of G. Rose and Kobell, as quoted by Bischof, show "that while biaxial mica resists the action of the stronger acids, uniaxial mica is completely decomposed by digestion with sulphuric acid." From this it seems that, if carbonic acid determines the decomposition of biotite, potash-mica will result; but if sulphuric acid is the decomposing agent, it may be entirely removed, as is the case in the quartz masses of the Summit District. In respect to the metallic sulphides, it is obvious, from their presence in feldspar cavities, that they have been deposited there since the alteration of the rock, and possibly under somewhat different circumstances. Those which exist in the compact matrix, however, may have been precipitated during the alteration. These may have existed as sulphates associated with alkaline sulphates, or may have been precipitated from a solution of alkaline sulphides or sulphureted hydrogen. The latter seems the most plausible supposition, as the abundance and minuteness of pyrite and enargite crystals show that decomposition took place very rapidly, and the reduction of sulphates to sulphides would require the presence of organic matter in much larger proportion than is generally found in mineral springs.

The precious metals occur in such small proportions, as compared with the baser ones, that it is not likely they exercised any material influence on the chemical changes then going on. Most of the rocks in the vicinity of the Summit District are found to contain a trace of gold, which may be inclosed in pyrite, as this mineral is frequently met with, especially in andesite. It is therefore possible that gold may have been segregated from the underlying rock. The silver was probably derived from the same source as the enargite with which it is associated, namely, that from which nearly all the ores of Southern Colorado are derived, the older Tertiary eruptives.

OXIDATION AND IMPOVERISHMENT OF SURFACE ORE AND CONCENTRATION OF GOLD IN BONANZAS.

To this important subject Mr. Hills devotes considerable space, his principal result being that the gold has been concentrated by waters containing salts of iron in the central channels of the deposits, as oxidation and erosion progressed. The connection existing between gold and hydrous oxide of iron, by no means rare in gold deposits, is particularly intimate in the Summit bonanzas. In all probability, pyrite was originally disseminated through the entire mass of quartz, and sulphate of iron, and finally limonite, resulted from its oxidation. Gold is slightly soluble in ferrous sulphate, still more so in ferric sulphate, both of which salts might have been formed during oxidation of the pyrite. Limonite is very abundant along the circulating channel, near the center of the Little Annie and Little Ida bonanzas.

The concentration of silver seems to have taken place at greater depth than that of gold, and the conditions of this concentration are as yet too little known to form a satisfactory conclusion with regard to it.

Summary.—The sequence of changes which produced the existing deposits may be briefly summarized as follows:

1st. The silicification of granular rhyolite by a solution containing free sulphuric acid, and the deposition of the metallic sulphides with gold and silver.

2d. Folding of the strata or beds.

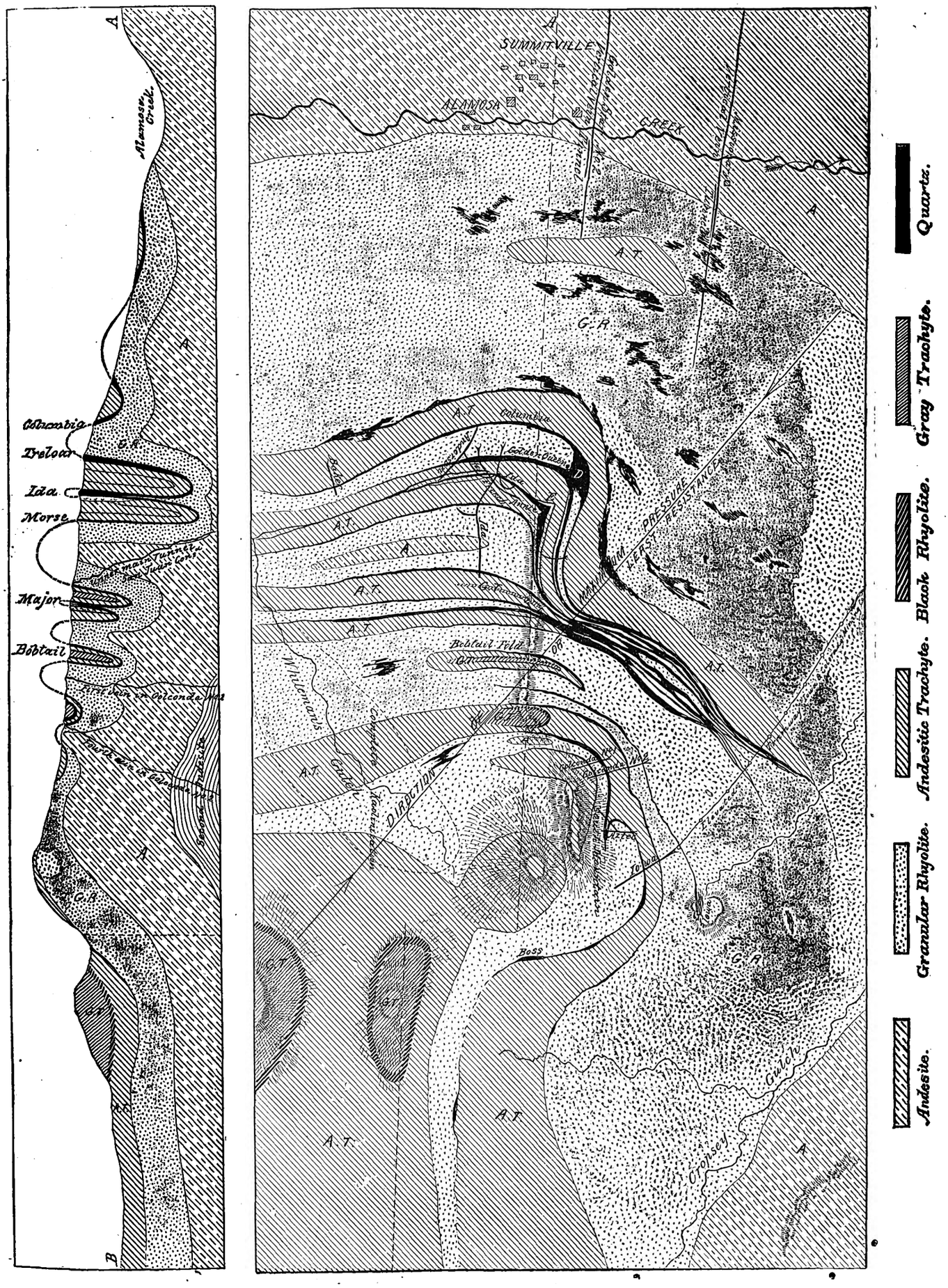
3d. The oxidation and impoverishment of the surface ore, and the concentration of the precious metals in bonanzas.

In conclusion, Mr. Hills says:

"In the preceding remarks on the genesis of these deposits, it may appear that some of the conclusions are based upon insufficient evidence; but the anomalous features presented certainly demand something more than a mere statement of observed facts. For that reason, I have ven-

* Abstract of a paper read at the March meeting of the Colorado Scientific Society at Denver.

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tured to put forward my own views in this particular case; and although they may be only approximately correct, they are such as seem to me the most plausible under the circumstances."

Although I have not yet visited the Summit District, and can therefore give no personal confirmation of the correctness of Mr. Hills's observations, embodied in the paper of which I have made the above brief abstract, I have reason to believe that he is a correct and trustworthy observer. Moreover, his views with regard to the processes of ore-deposition, as shown therein, are in direct confirmation of those which I have held during the past few years with regard to an increasingly large class of ore-deposits. My report on Leadville shows, I think, conclusively, that ore-deposits there are the direct replacement of the dolomite rock in which they occur. While I have not yet had opportunity for studying with the same amount of detail other ore-deposits in crystalline and eruptive rocks, as shown in my chapter in the Census Report on the Precious Metals, now in press, I consider it reasonably certain that a very large proportion of the so-called fissure-veins in the Rocky Mountain region, notably those in Colorado and Montana, are simply the alteration, silicification, and mineralization of the country-rock along certain planes, which, for some reason or other, offered exceptionally easy access to percolating mineral solutions, and are not the filling-in of pre-existing cavities in the rock, as is generally supposed to be the characteristic of a true fissure-vein.

THE WORK OF THE PERNOT FURNACES AT CAMBRIA.

Mr. Magnus Troilius reports to the *Jern Kontorets Annaler* on the result of a number of runs in the Pernot furnaces at the works of the Cambria Company, at Johnstown, Pa., as follows:

Heat No. 1452; Furnace No. 2. October 22d, 1881. Side-walls, bottom, and roof had previously stood 12 heats. Time of heat, 3 hours 59 minutes. Charge: 10,000 pounds pig, 500 tons old rolls, 5000 pounds English rail crop ends, 10,000 pounds open-hearth scrap, 2000 pounds steel rail rolling-mill scrap, 6000 pounds converting mill scrap, and 500 pounds miscellaneous scrap—a total of 34,000 pounds. Furnace charged at 12.43 P.M.; charge melted, 4 o'clock; 100 pounds ore added at 4.35; 300 pounds pig added at 4.40; and 530 pounds 60 per cent ferro-manganese added at 4.43 P.M. Furnace tapped at 4.48, giving six ingots, weighing 32,450 pounds from a charge of 34,930 pounds.

Heat No. 1744; Furnace No. 2. January 4th, 1882. Side-walls and bottom had stood 7 heats and the roof 93 heats. Time of heat, 3 hours 50 minutes. The charge consisted of 7000 pounds of No. 4 pig, 3000 pounds old molds, 2000 pounds rolling-mill scrap, 15,000 pounds Scranton crop ends, 3000 pounds open-hearth scrap, and 500 pounds miscellaneous scrap—a total of 30,500 pounds. At 1 P.M., a part of the charge was in, and melting began; at 4.10 the remainder was charged, 3000 pounds being pre-heated; and at 4.20, the whole charge was melted. At 4.40, 500 pounds of No. 4 pig were added; and at 4.45, 375 pounds of 70 per cent ferro-manganese, making the total charge 31,375 pounds. At 4.50, five ingots, weighing 27,970 pounds, were tapped.

The bottom of the hearth at Cambria is made of equal parts of white sand from Mill Creek, Pa., containing 97·83 per cent of silica, 1·02 per cent of alumina, 0·88 per cent of protoxide of iron, 0·32 per cent of lime, and a trace of magnesia and of red sand from Columbia, Pa., containing 89·14 per cent of silica, 8·91 per cent, of alumina, 1·01 per cent of protoxide of iron, and 0·51 per cent of lime.

THE IRON ORES OF THE VALLEY OF VIRGINIA.*

By Andrew S. McCreath, Harrisburg, Pa.

Having recently been called upon by the Shenandoah Valley and Norfolk & Western railroad companies to make an examination of the iron ores in the Valley of Virginia tributary to their lines of railroad, it has been suggested to me that a brief statement in regard to some of the more important points might prove interesting to my fellow-members of the Institute at this meeting.

The Valley of Virginia, so-called, extends from the Potomac to the Tennessee line, a distance of about 330 miles. It forms part of the Great Limestone Valley which traverses in an unbroken line the States of New York, New Jersey, Pennsylvania, Maryland, Virginia, and Tennessee. In New York State, it is called the Wallkill Valley; in Eastern Pennsylvania, the Kittatinny Valley; in Middle Pennsylvania, the Lebanon or Cumberland Valley; in Virginia, the Shenandoah or Winchester Valley, the Roanoke Valley, the James River Valley, and the New River Valley; and farther south, the Valley of East Tennessee.

Two ranges of mountains hem the valley in. The range on the southeast is called the South Mountains in Pennsylvania; the Blue Ridge, with its southwest prolongations, Poplar Camp and Iron Mountain, in Virginia; and the Smoky Mountains in Tennessee. The range on the northwest is usually called the North Mountain; but it has such local names as Shawangunk, Kittatinny, Blue and Brushy Mountain.

The primary rocks consisting of granitic strata (gneiss) and crystalline slates (mica slate, chlorite slate, etc.) form the Eastern Blue Ridge, while the Primal or Potsdam sandstone formation lies upon its western slope along the southeast edge of the valley. The valley itself varies in width from ten to twenty miles, and its floor is composed of two different kinds of rock, limestone and slate, separated from each other by an irregular line running along the middle of the valley its whole length, the limestone land stretching to the foot of the South Mountain, and the slate land stretching to the foot and up the slope of the North Mountain. The North Mountain consists of Upper Silurian rocks—Oneida conglomerate and Medina sandstone, Formation No. IV.; except in Southern Virginia, where, by reason of the great upthrow faults, the Vespertine or Pocono sandstone, Formation No. X., makes the North or Brushy Mountain. It will be sufficient, however, for my present purpose, to consider only the two great geological formations: No. I., the Primal or Potsdam sandstone formation; and No. II., the Lower Silurian limestone formation; for it is in these that nearly all of the ores which I have examined occur.

Formation No. I.—The Primal or Potsdam sandstone formation consists of conglomerates, sandstones and slates, and it may be conveniently divided into (1) lower slates, (2) sandstones, and (3) upper slates.

First. In the *lower slates*, or those geologically underneath the Potsdam sandstone, occurs a red hematite ore, sometimes in beds of considerable thickness and of good quality. This is the so-called "specular ore" of the Blue Ridge, and it has been quite extensively developed at numerous points, notably in Botetourt and Bedford counties. In Northern Virginia, the ore is generally very lean, being little better than a ferruginous sandstone. But over large areas it is a fairly rich ore carrying from 40 to 45 per cent metallic iron, with the phosphorus varying from 0·25 to 0·60 per cent. The siliceous matter varies from 25 to 35 per cent, and consists for the most part of small grains of quartz. The ore occurs in beds varying from 18 to 40 inches in thickness, although beds of much greater thickness have been reported. The following is a complete analysis of a sample of this ore from the "Pollard cut" on the Arcadia furnace property, in Botetourt County:

Protoxide of iron	1·221	Sulphuric acid	·007
Sesquioxide of iron	55·928	Phosphoric acid	·607
Sesquioxide of manganese	·043	Water	3·144
Alumina	1·808	Siliceous matter	35·690
Lime	·730		
Magnesia	·706		99·884
Metallic iron	40·100	Phosphorus	·265
Metallic manganese	·030	Phosphorus in 100 parts iron	·660
Sulphur	·003		

Second. In the *Potsdam sandstone* itself, important beds of iron ore have been observed. The ore is generally a close-grained, brittle, dark-brown hematite, invariably cold-short. In Rockbridge County, a bed of it fully ten feet thick is exposed for a considerable distance on the Vesuvius property. The ores from this horizon will probably average 50 per cent metallic iron, with about one and a quarter per cent phosphorus. Their composition is such that they are peculiarly adapted to the manufacture of pig-iron for conversion into steel by the basic process; as it has been found that a pig-iron with about two and one half per cent phosphorus gives the most satisfactory results. The following complete analysis of a sample from the "cold-short" bank on the Vesuvius property, Rockbridge County, will show the ultimate composition of the ores of this horizon:

Sesquioxide of iron	74·893	Sulphuric acid	·012
Sesquioxide of manganese	·433	Phosphoric acid	3·357
Sesquioxide of cobalt	·030	Water	11·318
Oxide of zinc	None.	Siliceous matter	8·050
Alumina	1·005		
Lime	·740		100·198
Magnesia	·360		
Metallic iron	52·425	Phosphorus	1·466
Metallic manganese	·302	Phosphorus in 100 parts iron	2·796
Sulphur	·005		

Third. The *upper slates*, however, are by far the most important from an economical stand-point, forming, as they do, one of the richest repositories of brown hematite iron ore in Virginia. They intervene between the Potsdam sandstone and the base of the Calciferous limestone, and they are found all along the western slope of the Blue Ridge, being geologically coextensive with it. They are generally more or less disintegrated or decomposed into variegated clays; and while they may not always carry a continuous ore-bed, yet wherever the formation exists, deposits of iron ore of greater or less extent may be confidently looked for. It is this horizon which has supplied a large amount of iron ore to the blast-furnaces of Pennsylvania, and it has been the source of practically the whole of the stock of the old charcoal furnaces of the Shenandoah Valley: to the Shenandoah Iron Company's furnaces, from the noted Smith and Fox Mountain ore-banks in Page and Rockingham counties; the old Mount Torry furnace in Augusta; Cotopaxi, Buena Vista, Vesuvius, and Glenwood furnaces in Rockbridge, and the Arcadia and Cloverdale furnaces in Botetourt County. The new modern coke-furnace recently established at Roanoke by the Crozer Steel and Iron Company will also be largely supplied with ores found in this formation at the company's mines in the so-called Cloverdale ore-belt.

It would be tedious to mention all the localities where large deposits have been developed and are now successfully worked; and the increased railroad facilities afforded by the completion of the Shenandoah Valley Railroad will doubtless be the means of greatly stimulating their further development by more thorough and systematic methods of mining.

The average character of the ore is good, and in some localities it is exceptionally fine. The average of 31 carefully selected samples shows the following: Metallic iron, 49·956; phosphorus, 0·399; siliceous matter, 12·459. The iron varies from 38·95 to 56·55 per cent, and the phosphorus from ·061 to 1·266 per cent. Eighteen of the samples show considerably over 50 per cent metallic iron, and only one sample shows less than 40 per cent.

The following complete analyses will represent the character of some of the more important deposits. The samples represent the *lump ore* alone; and the ores were dried at 212° Fahr. previous to analysis:

	No. 1.	No. 2.	No. 3.	No. 4.
Sesquioxide of iron	74·678	75·321	77·643	74·571
Sesquioxide of manganese	4·619	1·831	·568	2·038
Sesquioxide of cobalt	·080	·130	·020	None.
Oxide of zinc	·040	·050	Trace.	None.
Alumina	1·415	2·100	·747	·951
Baryta	None.	None.	None.	·040
Lime	·670	·550	·430	·550
Magnesia	·320	·331	·324	·356
Sulphuric acid	·052	·025	·040	·040
Phosphoric acid	·233	·609	·446	·444
Water	11·810	12·398	10·310	10·822
Siliceous matter	6·310	6·910	9·390	10·450
	100·227	100·255	99·918	100·269
Metallic iron	52·275	52·725	54·350	52·200
Metallic manganese	3·216	1·275	·396	1·419
Sulphur	·021	·010	·016	·016
Phosphorus	·102	·266	·195	·194
Phosphorus in 100 parts iron	·195	·504	·358	·371

No 1. Donovan property, Beverly Ore Company, Page County. No. 2. Fox Mountain bank, Shenandoah Iron Company, Rockingham County. No 3. Buena Vista furnace property, Rockbridge County. No. 6. Houston mines, Nos. 5 and 6 openings, Botetourt County.

It has been part of my duties as chemist for the Second Geological Sur-

* A paper read at the Roanoke Meeting of the American Institute of Mining Engineers.

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vey of Pennsylvania to sample and analyze every important deposit of brown hematite ore that has been opened up along the flank of the South Mountains in Pennsylvania, which is simply a continuation northward of this same ore-belt. The average of 46 samples from the Cumberland Valley shows: Metallic iron, 42·95; phosphorus, ·464 per cent; and it is believed that the brown hematite ores at present mined in the Lehigh Valley will not average over 40 per cent metallic iron in the furnace. It will thus be seen that the ores from this horizon in the Valley of Virginia rank considerably above the average.

In these upper slates are also found important deposits of manganiferous iron ores, some of which might be used in the manufacture of spiegel. The average of six samples analyzed shows: Metallic iron, 31·64; metallic manganese, 19·12, equal to 50·76 total metallic contents; with the phosphorus averaging ·130 per cent. The variations are as follows: Iron, from 12·325 to 47·15; manganese, from 7·277 to 44·312; and phosphorus, from ·061 to ·265 per cent, with the average as stated above.

In addition to these, rich deposits of a very pure manganese ore have been successfully worked for a number of years. Thus far, the most important is that at the Grimora mines in Augusta County; and the deposit seems so large, and the ore is of such fine quality, that I give in detail the analysis of an average sample of the *lump ore*, now quite extensively shipped to England:

Binoxide of manganese	81·703	Lime	·880
Protoxide of manganese	7·281	Magnesia	·630
Sesquioxide of iron	·533	Sulphuric acid	None.
Oxide of cobalt	·354	Phosphoric acid	·171
Oxide of nickel	·096	Alkalies	·467
Oxide of zinc	·623	Water	3·405
Oxide of copper	None.	Silica	2·132
Alumina	·896		100·000
Baryta	·829		
Metallic manganese	57·291	Phosphorus	·075
Metallic iron	·373		

Formation No. II.—In the body of the Great Limestone Formation, No. II., are found innumerable caverns and pot-holes, now filled with brown hematite iron ore. Although such deposits may prove somewhat irregular, yet their extent is often very great, and they have yielded large quantities of the finest quality of ore. In the northern part of the Valley of Virginia, these limestone ores have not been developed to any great extent; but in Southwest Virginia, they have furnished practically the whole of the stock to the charcoal furnaces of the district. Commencing at Mack's Creek near New River, and pursuing a course parallel to Poplar Creek and Iron Mountains for a distance of thirty or forty miles, they have been developed in large quantity and of remarkable purity. This is generally known as the New River-Cripple Creek Ore-Belt; and the cold-blast charcoal furnaces of Wythe County, whose iron is in good repute for car-wheel purposes, draw their supply of ore exclusively from this belt.

The ore occurs generally mixed with clay in clefts and cavities in the limestones; and some of the deposits have been proved to a depth of over one hundred feet. The bulk of the ore is wash-ore, and the wash material will average fully one half clean ore. At some points, however, the workings show quite a good deal of lump ore; and this not infrequently carries an appreciable amount of iron pyrites, which occurrence may be suggestive of the origin of the ore. The superior quality of the ore is shown by the analyses of seventeen samples from different localities, yielding an average of: Metallic iron, 54·514; phosphorus, 0·106; siliceous matter, 7·094 per cent. The iron varies from 49·35 to 57·20; the phosphorus from ·048 to ·197; and the siliceous matter from 3·60 to 13·93. Nine of the samples show over 55 per cent metallic iron, and only one contains less than 50 per cent; and in no case is the phosphorus over ·200. The general character of these limestone ores may be represented by the following complete analyses:

	No. 1.	No. 2.	No. 3.
Bisulphide of iron	None.	·064	None.
Protoxide of iron	None.	·047	None.
Sesquioxide of iron	76·214	80·618	73·167
Sesquioxide of manganese	·051	·103	1·334
Oxides of nickel and cobalt	·040	·060	·110
Oxide of zinc	None.	·150	·220
Oxide of lead	None.	·184	None.
Oxide of copper	None.	Trace.	None.
Alumina	2·365	1·476	1·410
Lime	·820	·750	·710
Magnesia	·486	·515	·677
Sulphuric acid	·157	·092	·012
Phosphoric acid	·171	·110	·451
Water	12·072	11·174	10·576
Siliceous matter	7·480	4·500	11·510
	99·856	99·843	100·117
Metallic iron	53·350	56·500	51·175
Metallic manganese	·036	·072	·929
Sulphur	·063	·071	·005
Phosphorus	·075	·048	·197
Phosphorus in 100 parts iron	·140	·085	·384

No. 1. Rich Hill, or Forney property, near New River. No. 2. New River Mineral Company's property (Van Liew's). No. 3. Speedwell Furnace property.

In addition to the ores already mentioned, I desire to call attention to another remarkable group of ores occurring in the Great Limestone Formation, and found at several points in Southwest Virginia and Eastern Tennessee, namely, red hematite and magnetic iron ores. These may be said to be as yet practically undeveloped; for the ores were found to be too refractory for the small cold-blast charcoal furnaces of the district, and the lack of railroad facilities prevented their finding an outside market.

Sometimes the ore is a dense, fine-grained red hematite, with a steel-blue color on fresh fracture, as at the Sharp, Thomas, and Crockett banks in Sullivan County, Tennessee; again, it is a fine, rich magnetic ore, as shown at the Ripplemead mine on New River, near Pearisburg, Giles County, Va., from which about 5000 tons have recently been mined and shipped to Harrisburg, Pittsburg, and other points. Sometimes the ore changes into brown hematite; and indeed, all three varieties may occasionally be found in the same opening. But whether the ore be red or brown hematite, or magnetite, it seems to possess the uniform feature of being very free from phosphorus. An exception might perhaps be sometimes made to the magnetite. At some points, this has been found to be more or less impregnated with slaty material, and when this is the case, the phosphorus may run somewhat higher; for I have observed that quite an appreciable amount of phosphorus is sometimes carried in the slate. But when the ore is free from this slaty gangue, the percentage of phosphorus is invariably low; and even where the ore carries considerable slate, the phosphorus has never been found over one tenth of one per cent. It may prove interesting to note here that the magnetite is generally strongly impregnated with carbonaceous matter, sometimes to the extent of two or three per cent.

At the Sharp and Thomas banks, in Sullivan County, Tennessee, the ore (red hematite) is reported from 5 to 10 feet thick, between walls of limestone; but owing to the difficulty of reducing these hard, dense ores in the small local furnaces, the openings have long been abandoned. Increased railroad facilities and the present demand for high-grade ores will doubtless be the means of having these deposits receive the attention which the fine quality of their ore seems to justify. The analyses of nine samples of the red hematite and magnetic ores yield the following average: Metallic iron, 62·094; phosphorus, ·032; siliceous matter, 5·290. The iron varies from 56·05 to 66·47; the phosphorus, from ·020 to ·051; and the siliceous matter, from 2·89 to 7·90. Separate analyses of four samples of the accompanying brown hematite show an average of: Metallic iron, 54·532; and phosphorus, ·031.

The following complete analyses will show the general character of these ores:

	No. 1.	No. 2.
Protoxide of iron	12·117	1·928
Sesquioxide of iron	66·607	90·214
Sesquioxide of manganese	None.	None.
Alumina	2·197	1·863
Lime	1·890	·500
Magnesia	1·982	·317
Sulphuric acid	·150	·020
Phosphoric acid	·082	·050
Carbonic acid	1·806	None.
Water and carbonaceous matter	5·458	1·834
Siliceous matter	7·760	2·975
	100·049	99·701
Metallic iron	56·050	64·650
Metallic manganese	None.	None.
Sulphur	·060	·008
Phosphorus	·036	·022
Phosphorus in 100 parts iron	·064	·034

No. 1. Golleher bank, Washington County, Virginia. Magnetic iron ore. No. 2. Crockett bank, Sullivan County, Tennessee. Red hematite.

In view of the fact that the iron ores of the Valley of Virginia are of such superior quality, and there is sufficient evidence that they exist in large quantity, it may well be asked, Why have they not been more largely developed? Two reasons may be given, and these are: 1. Previous lack of railroad facilities; and 2, an insufficient supply of fuel for reducing the ores in the blast-furnace. Although ever since early colonial times, numerous small charcoal furnaces have been operated from time to time, producing a fine quality of pig metal, yet the lack of facilities for getting their product to market, and the gradual diminution of their fuel supply, together with the ravages caused by the late war, have not only greatly retarded their extension, but have prevented the establishment of other enterprises. These obstacles, however, have now been overcome by the completion of the Shenandoah Valley Railroad from Hagerstown to Roanoke, thus affording ample railroad facilities; and by the building of the New River division of the Norfolk & Western Railroad to open up the great Flat Top coal region, with its superior coking coals. The New River-Cripple Creek ore-belt will soon be supplied with convenient railroad communication; for a branch road has already been located, and there are good prospects that the line will be built in the near future.

During the present year, the two pioneer *coke* furnaces of the valley have been started, and are now in successful operation. The Shenandoah Iron Company's furnace at Milnes Station on the Shenandoah Valley Railroad was blown in during the month of February, and it has been producing from 60 to 70 tons of coke iron per day ever since. The Crozer Steel and Iron Company's furnace at Roanoke has just been started, and it promises a successful future; for it has all the modern and improved appliances, combined with an intelligent management. Both of these furnaces will draw their supply of coke (made from Flat Top coal) from the ovens of the Southwest Virginia Improvement Company at Pocahontas. This company commenced operations in February, 1882, by opening up the Nelson or Big bed of coal. It is now building 200 beehive coke-ovens, and it expects to have a daily production of at least 250 tons of 48-hour coke, which output can readily be increased to meet future demands. In addition to this, it will ship a thousand tons of coal daily. Already in its preparations for regular mining, it has taken out from the various drifts some 40,000 tons of coal. The main drifts are 9 feet wide and 8½ feet high, and the mine will be worked by the double-entry system of mining. The quality of the coal is very fine, as shown by the following analysis of samples selected from five different points in the drifts—the samples representing a complete section of the coal-bed from roof to floor.

Water	·932	Sulphur	·618
Volatile matter	20·738	Ash	3·984
Fixed carbon	73·728		100·000
Phosphorus			·0013

This brief statement will suffice to show, in a general way, the mineral resources of the valley. With a convenient supply of the finest quality of coke, which the Flat Top coal promises to furnish; with a great variety and abundance of excellent iron ore, which can be cheaply mined; and with good railroad facilities to markets in every direction, the iron interests of the Valley of Virginia seem assured of a prosperous future.

MR. W. W. HABIRSHAW, chemist, of this city, reports the following as the analysis of the steel made in the Henderson furnace, referred to in a recent issue: Carbon, 0·0014 per cent, and phosphorus 0·1528 per cent. It will be noted that the carbon is exceptionally low, 0·2 having been aimed at, a proof of the unexpectedly great oxidizing character of the flame.

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THE SPELTER PRODUCTION OF EUROPE.

In our last issue, we printed an estimate of the spelter production of Europe for 1881, by an Austrian statistician. The following is a statement for 1882, compiled by Herr Landsberg of the Stolberg Works, Germany:

	1882.
Rhenish Provinces and Westphalia	45,354 metric tons.
Silesia	69,846 "
Belgium and France	91,800 "
Spain	4,500 "
England	25,000 "
Austria	4,000 "
Poland	4,500 "
Total	245,000 "

These figures are evidently erroneous in some points. Belgium and France together are probably nearer 100,000 tons, and Spain produces now at the rate of fully 7000 tons per annum, while the English figure looks excessively high.

THE LEAD PRODUCTION OF GERMANY IN 1882.

Herr Landsberg, the able manager of the Stolberg Works, has published the following detailed production of the German lead works:

	Lead. Metric tons.		Silver. Kilograms.	
Prussia:	1882.	1881.	1882.	1881.
Stolberg Company	14,919	13,996	26,130	20,227
Rheinisch Nassau Company	6,239	7,200	7,608	6,212
Mechernich Company	25,055	22,409	5,108	4,438
Commern Company	2,727	2,362	988	1,181
A. Poensgen & Söhne	3,100	3,189	1,175	1,382
Rothenbach Works	40	55	901	969
Walther Cronek Works	5,858	5,489	3,679	4,056
Friedrichs Works	8,683	8,450	5,245	5,532
Mansfeld Works	.....	.....	62,708	59,836
Hanover:				
Upper Hartz	10,447	9,428	32,592	26,385
Lower Hartz	579	424	3,375	3,854
Nassau:				
Ems	5,803	5,772	7,403	6,887
Braubach	3,176	2,721	6,085	5,515
Saxony:				
Freiberg	5,064	4,494	50,985	39,133
Total	91,690	85,989	213,982	185,607

In addition to this, the German works produced 4170 tons of litharge in 1882, against 4227 tons in 1881.

A NEW NOTE-BOOK.—Messrs. Keuffel & Esser, of this city, have published a new Transit Book for the Use of Engineer on Railroad Surveys. Its novelty consists in having printed on the last three leaves all the tables and curve formulæ necessary for the location of a railroad. By the use of these note-books, the necessity for carrying an engineer's field-book of tables is avoided. The cost is not materially increased, and they will be found very convenient.

EXPERIMENTS made in the Saarbrücken coal district with the lime process seem to indicate that the action of slacking compressed caustic lime with water is chiefly by means of the expansion of the lime cartridge. The breaking down of the coal seems to depend very little upon the generation of steam of high pressure. The ordinary explosive test in lead cylinders showed that the lime has only to a limited degree the attributes of an explosive.

SILVER PRODUCTION OF BOLIVIA.—A Lima letter in the New York *Herald* gives Bolivian statistics which are very difficult of access. If they be correct, they are doubly acceptable. They are certainly new, although they cover the year 1881 only, when the exports from Bolivia are said to have been as follows:

Silver from Oruro, Potosi, and Chinchas, 71,101 kilos	$3,086,000
" " Huanchaca and Guadalupe, 85,935 kilos	5,811,130
Copper from Corocoro, 3,250,600 kilos	420,000
Tin	458,000
Argentiferous lead	6,268
Bismuth	61,819

ELECTROLYTIC EXPERIMENTS.—In the *Journal* of the Chemical Society for May is an abstract of a paper by A. Bartoli and G. Papasogli, on the results of the electrolysis of various solutions. From the experiments they have made, the authors draw the following general conclusions: 1. In liquids whose electrolysis is not accompanied by evolution of oxygen at the anode, wood charcoal, retort-carbon, and graphite are not disintegrated, and do not suffer any appreciable loss of weight. 2. On the contrary, in liquids whose electrolysis gives rise to liberation of oxygen at the anode, wood charcoal, retort-carbon, and graphite, employed as positive electrodes, are partly disintegrated and partly oxidized to carbonic oxide and carbonic acid (the relative quantities of which depend upon the strength of the current and the superficial area of the positive carbon), together with other products varying according to the nature of the carbon. 3. Graphite used as positive electrode in these liquids never colors the electrolyte, whereas retort-carbon and charcoal previously purified by the action of chlorine at a high temperature color the liquid deep black, both in alkaline solutions and in those of certain acids and their salts. 4. Charcoal or retort-carbon employed as positive electrode in solutions of acids or of neutral salts whose electrolysis gives rise to evolution of oxygen at that electrode forms chiefly, or rather almost entirely (beside carbonic oxide and carbonic acid), a black substance—called by the authors mellogen—whose composition is represented by the formula $C_{14}H_8O$, or a multiple thereof, together with mere traces of benzo-carboxylic acids; while in solutions of phosphoric acid, hydrofluoric and potassium antimonate, a substance is formed analogous to mellogen in its properties, but containing phosphorus, fluorine, or antimony, according to the electrolyte employed.

FURNACE, MILL, AND FACTORY.

Ex-Commander Gorringe, in the ships he is building at Philadelphia, is going to use the Bower-Barff process for protecting those parts of iron and steel which are inaccessible after the ship is completed.

A. Garrison & Co., of Pittsburg, have just sent a train of three-high plate rolls 31 by 112 inches to the Springfield iron mill. They are building rolls for the Maumee Rolling-Mill Company, Toledo, Ohio.

The Spang Steel and Iron Company, of Pittsburg, is rolling its universal mill steel plates 40 feet long and somewhat under 8 feet wide. It can roll plates 9 feet wide. It is also rolling a large quantity of angle steel, to be used in building the new bridge intended to span the Niagara River.

The Springfield Malleable Iron Company, of Springfield, Ohio, is increasing the capacity of its works fully 50 per cent. It is putting in one additional air-furnace, three annealing-ovens, and a molding-room 100 by 75 feet, which will give it a capacity of 3500 tons of iron a year. These improvements will be finished about June 15th, and then the company will employ 250 men.

The Bullard Repeating Arms Company intends to erect, either in Springfield or Worcester, Mass., a building 168 by 40 feet, and four stories high, with a tower at one end. This building will give facilities for working 200 men, the company having orders enough to employ that number, and leave a space for a 120-foot addition on the other side of the tower when the business shall require it. Nothing is settled yet as to location. Springfield capitalists are working hard to secure it. The company expects to have its buildings erected and ready for occupancy in September.

An Associated Press dispatch reports: The Grafton Iron Company, of Leetonia, Ohio, has failed. Its liabilities are about $600,000. Two large concerns in Pittsburg—Graff, Bennett & Co., iron manufacturers and furnace-men, and Robinson Rea—are stockholders in the Leetonia corporation. Their solvency is undoubted. All rumors to the contrary disregard the fact that their own indebtedness would have to be paid before any claims on the score of the Grafton Company could come upon them. Both firms are extensive, and have always been managed with the most conservative views. The Elba Iron-Works have also been mentioned as being in trouble, but a correspondent of the Associated Press is informed by an undoubted authority that there is no foundation for the report.

The wheels of a new locomotive which have just been built at Salt Lake City were cast from pig-iron made at the Ogden Iron-Works, and hence are strictly a Utah production. The frame-work of the engine was forged in those shops, and the locomotive represents Utah labor and skill, and partly Utah material.

The reverberatory gas-furnace, already successful in smelting iron and steel, has now, according to the *American Manufacturer*, proved equally so in the treatment of fine ores. An old style furnace in the plant of the Miners' Smelting and Reduction-Works at Golden, Colo., was recently remodeled into a McNair gas-furnace. Slack is used as effectively in it as lump coal. Pittsburgers are largely interested in this experiment, as among the stockholders in the Miners' Smelting and Reduction-Works at Golden are Messrs. R. B. Townsend, the secretary and treasurer; W. W. Young, E. T. Dravo, Matthew Graff, John Graff, Thomas J. Graff, B. L. H. Dabbs, and W. B. Neale.

The Missouri Malleable Iron Company, of St. Louis, has decided to increase its capital stock from $50,000 to $100,000. It will also gradually increase the capacity of its already extensive works.

E. G. Denniston, proprietor of the San Francisco Plating-Works, has achieved a notable feat in his line, in the manufacture of the largest silver-plated amalgamating plates, for saving gold, ever made. These plates are five by eight feet—each containing forty square feet of amalgamating surface. These plates have been shipped to Denver, Colorado, where they are to be used for amalgamating purposes. They are made of the best Lake Superior copper heavily plated on one side with pure silver, and are ready for instantaneous amalgamation by the application of quicksilver to the plated surface. The dynamo machine has a capacity of depositing fifty-five ounces of silver per hour. It is from the Mather Dynamo-Electrical Manufacturing Company, of Hartford, Conn. Mr. Denniston claims to have, at his works, the largest tank for electro-plating purposes in the United States, if not in the world. Extensive additions and improvements are making in his works.

Judge Treat, in the United States Circuit Court, at St. Louis, has recently rendered a decision of great importance to nearly every part of the United States, settling the great barbed wire fence controversy. The court holds that the patents issued to Kelly & Glidden are void, and therefore refused to grant the preliminary injunction asked for by the Washburn & Moen Manufacturing Company and Isaac L. Ellwood. The Washburn Company likewise sought an injunction against Gustave Griesche and Henry Fuchs relative to the manufacture of patent machines for barbed wire. This injunction was refused, on the ground that there was no infringement. The earliest barbed wire patent was issued in 1867 to one Hunt, since which time the issues and reissues have been almost innumerable. All of these, or at least all of them that possessed practical business features, have been from time to time acquired by the Washburn & Moen Manufacturing Company of Worcester, Mass., and Isaac L. Elwood of De Kalb, Ill., the plaintiffs in the cases referred to. Of all the numerous patents the only practical ones are those known as the Kelly & Glidden patents, the original issue of which has been claimed by the defendants in the suits, enlarged and amplified out of all knowledge by subsequent reissues. It is precisely here that the controversy took place and where the battle has been fought out. If the reissues had been declared to be within the meaning and intention of the original patents, or if they are, in other words, valid, the defendants would have been guilty of infringement. If otherwise, and the courts declared the reissues vitally at variance with the original patents and invalid, the business of manufacturing barbed wire would be thrown open without restriction.

GENERAL MINING NEWS.

ARIZONA.

Glowing reports coming from Turkey Creek state that important strikes have been made there. The whole country for a mile and a half on each side of the original discovery is monumented, and the excitement runs high. A new town-site has been located and incorporated, and in all probability a new town will come into existence within the next sixty days. The country for miles in every direction is permeated with ledges of high-grade ore.

COPPER MOUNTAIN.—This company's smelter, during the thirty-hour trial run, produced six tons of black copper, which were run into bars of from 600 to 700 pounds each. The mines consist of the Copper Mountain and the first south extension of Copper Mountain. Both of these claims are constantly worked. Thirty-two hundred tons of ore are on the dump, consisting mostly of carbonates, red and black oxides, and some black and gray copper.

TOMBSTONE DISTRICT.

TOMBSTONE MILL AND MINING COMPANY.—The superintendent telegraphs as follows: Gross output for May: Mill, $53,600; furnace, $23,000 for twenty-one days. Furnace runs without any trouble and works forty tons daily. The

mine looks well. We have begun fourth level, west side; new ore-body in Tough Nut yielding well.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended May 26th shows: Ore crushed, 172·08 tons; average assay value of pulp, $45.45 per ton; of tailings, $6.50 per ton. Bullion shipped, $5182.02. West cross-cut, 1000 level, is in 240 feet. North drift, same level, is in 160 feet. North drift, 800 level, is 490 feet long. Winze No. 5 is 28 feet deep; the rock continues hard and the vein narrow. From near the end of the north drift from winze No. 5, 672 level, a rise was started last week; rise now up 10 feet. It will be known as rise No. 23, and will probably open up a block of fine ore to the 640 level and north of winze No. 6. South drift from winze No. 5 is 166 feet long, and shows some good ore in the face.

BODIE TUNNEL.—The ore formation is again looking favorable in all the workings of the mine. Lately 16 feet were added to the length of the west cross-cut from the 300-foot level. The north drift on ledge No. 21 has been advanced 7 feet. The north drift on the east ledge has been advanced 12 feet in ore 3 feet in width. The south drift on ledge 21, 300-foot level, has been advanced 3 feet. The ore is 2½ feet wide. The mill is crushing about 40 tons a day.

GREENVILLE DISTRICT.

PLUMAS CONSOLIDATED.—A vein of ore about four feet wide has been struck in a prospect-tunnel. The ore is of fair quality, the ledge appears to be well defined, and stands nearly vertical. It is thought that this vein is only a stringer, and will soon run into a much larger ore-body.

WILES.—The parties interested in this ledge, which shows favorable prospects, intend to lease the Kettle mill and proceed at once to work the mine. The distance from the mine to the mill is only a few hundred yards. The ore can be got and worked very cheaply.

CANADA.

PROVINCE OF NOVA SCOTIA.

GALLIHAR GOLD MINING COMPANY.—It is stated that the company is so much encouraged by the results of the operations at its mine at Isaac's Harbor, Guysborough County, that it proposes extending its works.

ONTARIO.

WALLBRIDGE.—Pumping machinery has been erected at this mine and work will be commenced shortly.

WINNIPEG.

The Argyle has struck rock that will go $69 to the ton.

The depth attained by the Winnipeg Consolidated is ninety-five feet, with four drifts.

William Young left last Wednesday for the property of the International Company, which he is stripping and making ready for its inspection.

Mr. John T. Nagle, superintendent of the George Heenan Company, states that they are sinking on the vein, and that he considers the indications particularly favorable.

A location was surveyed lately by Messrs. Davidson & Smith, for Messrs. Simpson, Newell, and others of Keewatin. The vein is situated near that village, and, judging from specimens shown, is rich in the precious metal.

A portable stamp-mill was shipped on Saturday for Clearwater Bay by Messrs. Thomas & Co., for the purpose of working a location at that point, the property of the Mining Investment Company.

COLORADO.

CHAFFEE COUNTY.

CHAFFEE CITY.—The name of this town has been changed to "Monarch" by the Postmaster-General, to take effect after July 1st next. This was done in accordance with a petition numerously signed by the citizens. Indications point to active work in the mines of this locality this season, and good reports may be expected.

CLEAR CREEK COUNTY.

We glean the following from the Georgetown *Miner*:

BONANZA TUNNEL.—This enterprise is now in nearly 600 feet on the west side of Democrat Mountain. At a distance in of 330 feet, it cuts the Jordan lode about 120 feet deep. A drift has been run about 220 feet east on the Jordan, which produced, with some stoping, about $3000. A streak has been struck from three to ten inches thick of solid galena ore, carrying considerable gray copper and running about 500 ounces silver per ton. Eighty-five feet beyond the Jordan, a blind lode was struck, from two to three feet wide, with streaks of mineral through it, the average assays from which were 150 ounces. From this lode, the tunnel has been run 175 feet in barren ground.

DUMONT.—In the Lincoln tunnel, which is about 600 feet in, they struck the California lode at a depth of about 300 feet, which shows a foot of solid gray and yellow copper.

LITTLE EMMA.—The Matthews tunnel connected with the main shaft about April 1st, at a depth of 440 feet below the present working tunnel level, and about 640 feet below the summit of Democrat Mountain. The Matthews tunnel is 1250 feet long where it connects by an eighty-foot winze with the sixth level, which latter connects 200 feet farther east with the main shaft now down 360 feet below the working tunnel level. Seven men are working on a single-day shift, principally in the fifth level, which is now about 120 feet west of the main shaft. This will be continued eighty feet, so as to connect with the eighty-foot winze from the sixth level to the Matthews tunnel. This same connection will be made with all the levels, when rock and ore can all be shipped by gravity from 440 to 640 feet, thus saving an immense sum for hoisting. The Matthews tunnel is run all the way on the lode and cost an average of $6.50 per foot to run it.

MENDOTA.—Shipments from this mine for May were thirty-eight tons; average value, $60 per ton, making $2280. Beck & Co. have three cars ready for shipment, and Hennessy & Shay have ten tons. The Mendota tunnel is eighty-eight feet under cover in solid rock. The total length from the starting-point is 100 feet, all in solid rock, twelve feet having been in open cut, to secure a face.

TISHOMINGO.—In this Sherman Mountain property, a party of six has leased the shaft. It started sinking on a foot of lead ore that runs 60 ounces silver and 45 per cent lead.

VIRGINIA CITY.—The managers of this property have concluded to sink the new fifty-foot shaft from the tunnel level considerably deeper. They are accordingly raising the shaft to the surface, a distance of about sixty feet, intending to erect a whim and push the sinking as rapidly as possible.

GARFIELD COUNTY.

Dotsero is the name of a new metropolis that has recently sprung up. The town is located at the junction of the Eagle and Grand rivers.

HINSDALE COUNTY—RED MOUNTAIN DISTRICT.

In the immediate vicinity of this district are the following mines, many of them paying and all capable of shipping pay ore: The Congress, Silver Belle, Senate, Silver Ledge, Turquois, American Girl, Champion, Excelsior, Charter Oak, Treasure Trove, National Belle, Hudson, Enterprise, Galena Lion, Albia, Genesee, Yankee Girl, Orphan Boy, Guston, Robinson, Lily, Holiday, Prescott, Albany, Jed, H. A. W. Tabor, Bonanza King, John Wilson, and Tag End. These mines are all developing, and when the snow, which is quite deep, disappears, the activity will be remarkable. The Yankee Girl has two shafts. No. 1 is 30 feet deep, and is cut by a cross-cut, through which the ore is dumped. The shaft is continued. No. 2 is 90 feet deep, to which the cross-cut is also extended, and each shaft is in solid mineral, the body being from ten to fifteen feet across. Since November, this mine has shipped 1300 tons. The ore averages ninety ounces in silver and forty per cent lead, with a liberal per cent of copper, and the value increases with depth. The Orphan Boy, a parallel lode 150 feet west, owned by the same company, and a cross cut with levels, will connect them as developed. The Orphan Boy vein shows from four to six feet in width, and is widening.

LAKE COUNTY.

Late Leadville exchanges report the following:

CHRYSOLITE.—Since last October, the property has again been self-sustaining, and during the month of March of this year, the yield reached a figure sufficiently large to leave some profit. During April, the surplus returns amounted to about $12,000, and a few days ago Manager Clark made a transmission of money to the New York office, consisting of a draft for $15,000. During March, the mine sold to the smelters 832 tons of ore, netting $25,499; an average of $30.64 per ton. For April, the shipments from the mine were 696 tons, netting $24,555, or an average of $35.23 per ton. The shipments for thirty days in May show 965 tons, and the ore being of better grade than during the two previous months, the returns will exceed $30,000, and permit another remittance to New York. The present resources of the company's mines in ore in sight are limited; but the prospects of opening up new ore-bodies are worth something, while the old workings of the mine will continue producing for an indefinite period yet, but no great advance on the present production can be anticipated. The exploration-work of the mine is confined mostly to the incline starting on the third iron from the foot of the Colorado Chief No. 2 shaft. This body of iron ore occurs as an interstratified vein, and is situated near the center of a stratum of Silurian limestone seventy feet in thickness. The ore consists of oxide of iron and manganese, quite siliceous, and also containing some lime. The mineral presents a quite different appearance from the iron found in the upper workings of the Chrysolite, and it may be safely said that its character and composition are not very favorable to mineral of paying grade. Some ore has been obtained in pursuing this work, but it was found mostly filling vuggs in the iron, and showing no continuity. Occasionally scattered cubes of galena are also found in dark, hard iron, but it is seldom that seams of lead ore are encountered. The incline from the Colorado Chief shaft leaves the perpendicular shaft at 200 feet from the surface, and starts on an incline of 75 degrees from the horizon, toward the Roberts shaft, located 400 feet to the northeast. At 210 feet, the workings of the Sliver shaft are passed, some distance below the old developments about the Sliver. The incline then continues forty feet farther, where its face is now in worthless iron ore. At the point where the incline passes beneath the Sliver workings, a rise was made, showing the following formation: Third iron, 16 feet; parting quartzite, 12 feet; second iron, 10 to 14 inches; block porphyry, 62 feet. This carries the rise up to the old Sliver workings where the upper ore-body of the Chrysolite formerly existed. In addition to the prospect-work in progress from the Colorado Chief shaft, the manager is employing quite a force in exploring the territory of the company through its old workings, and also into new sections, particularly to the north and west, with varied results. A mill was recently erected, and all the waste and low-grade ore-dumps are carefully sampled with the view of ascertaining their silver contents and other features for guidance in the proposed erection of a concentrating mill. Up to the present time, the company has recovered from its old waste and low-grade ore-dumps 197,507 ounces of silver and 507 tons of lead, the result of jigs and hand-sorting, done on tribute.

CLIMAX.—It is reported that the lessee is meeting with unusual success in working the Montana shaft. A large force of miners is employed, and considerable high-grade ore is extracted.

COLORADO PRINCE.—The stamp-mill belonging to this company has been taken down in South Evans Gulch, and is in course of removal to Twin Lake Mining District for re-erection.

GREEN MOUNTAIN.—It is reported that this company has just leased its properties, located on Ball Mountain, surrounding the Green Mountain mine.

HUMBOLDT.—A great deal of work is doing on the properties of this company, situated on the south side of Carbonate Hill. The Humboldt and Gold Leaf lodes are worked by lessees, and the Thistle is developing by the company.

LITTLE CHIEF.—A drift has been driven from the 186-foot level of the Daly shaft eastward to the eastern line of the Little Chief claim, and then northward on the eastern side-line of the Little Chief for a distance of 250 feet. The face of the drift here is in fine-looking iron. A rise was made from the breast of the north drift, and for fifty feet the rise continued in fine-looking iron, then cut through some medium-grade ore, and finally broke into a stope made by the O. K. lessees, who were found trespassing on the territory of the Little Chief. Investigation showed a stope about twenty-five feet in length, seven to eighteen feet high, and four to ten feet wide. The breast of the stope showed iron, galena, and lead carbonates, carrying considerable silver. The streaks were quite strong, and the entire stope is supposed to have contained rich ore. Several specimens were taken from the walls of the stope and an assay made, returning thirteen hundred and odd ounces in silver to the ton.

LITTLE PITTSBURG.—A drift has been driven east to the Amie line, and is now driving to the north of the line, with fair indications of soon cutting iron. The old workings of the lode proper are worked on tribute by F. B. Grant & Co., who began operations recently. The eastern portion of the old workings of the discovery claim was leased to Hereford & Co. about a fortnight ago. Considerable dead-work has been done so far, but pay-work will soon be in order.

Mr. Hawley, formerly with the Grant Smelting Company, and more recently superintendent of the Little Sliver, resigned yesterday, and has accepted the position of metallurgist with the Manville Smelting Company, which will start up the Elgin smelter in about a week.

PARK COUNTY.

FREELAND.—Twenty-eight men have been discharged from the Freeland mine and mill, twenty-four from the former and four from the latter. This reduction is owing to the fact that during the past year development has been carried on to a large extent, and that now the extraction by stoping of the higher-grade ores required a smaller force of men without diminishing the value of the output.

DAKOTA.

Owing to the spring floods, things at Deadwood, and, in fact, throughout the hills generally, are rather dull. The recent cave in the Terra (Deadwood-Terra) did not injure any one. Ten floors went down. The necessary repairs incident to the late flood will be made on the Homestake railroad immediately, when

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the Caledonia will be furnished with wood, and operations will be resumed. Work on the lower winze was recommenced recently.

CALEDONIA.—The superintendent reports for the week ended May 20th: On the 18th, all men were discharged with the exception of force enough to pump out the mine. A heavy rain fell on the 17th, and caused water to rush into the mine to the depth of three feet, at which we kept it. The roads and railroads are so washed out that wood can not be brought in here. Think it will be about two weeks before we can resume milling. Shipped 671 ounces gold—about $11,500. May 27th, he reports: We have worked 12 men per day at the mine for the past week pumping water, overhauling machinery, and doing other necessary work. The mine is now clear of water, and we resumed sinking the winze last night. We expect to secure wood by the 29th, and will start the mill immediately.

IDAHO.

VALLEY VIEW.—The Wood River *Times* says that this mine has paid its way from the grass-roots. The developments consist of a tunnel 225 feet in length, five cross-cuts about 20 feet long each, two rises, and an incline-shaft or winze. The cross-cuts are run from the tunnel, two on each side, at distances about 20 feet apart, and all show ore. The width of the vein-matter is very great, probably exceeding 50 feet. The ore is of high grade, carrying an average of 265 ounces of silver and 72 per cent lead. Some 60 tons of second-class ore are on the dump, and there are large reserves in the mine.

MEXICO.

GUANAJUATO.—A new mining company has been organized, known as the International Mexican Mining Development Company, on a basis of $4,000,000, divided into 40,000 shares of $100 each.

MICHIGAN.

INDIANA.—It is claimed that this company has made a sale of 5000 tons of ore at $5.25 on the cars, and can sell its entire product for the season at the same price.

LAKE ANGELINE.—The management has sold the entire season's product, the shipment of which has been commenced. The ore is from the newly opened deposit, and a very fine quality of soft hematite.

QUINCY.—The ledge has been struck, at a depth of 55 feet, where ore of better quality than hitherto found in that vicinity was obtained.

MONTANA.

DEER LODGE COUNTY.

PHILLIPSBURG.—According to a correspondent of the Butte *Daily Miner*, the placer mines of this locality will soon be heard from. The Granite mine is looming up. The header of the lower tunnel now stands in six feet of 80-ounce ore. A large force of men is busily at work opening the new road to Hasmark, to connect the mine with the Algonquin mill. The Hope mill is running steadily. The mine keeps the batteries supplied, besides holding a reserve on hand. The diamond drill, intended to prospect the mines of the Hope Company on Hope and Apache hills, is testing. In the San Francisco, the face of the tunnel shows over three feet of ore, assaying 90 ounces and better. This mine lies in the granite, just over the contact. The owners of the Virginia, Elgin, Stonewall, and Lady Mary mines in the granite are preparing for immediate work.

JEFFERSON COUNTY.

AMAZON.—Contracts have been made for 200,000 bricks for the roasters and smelters and for a large amount of lumber for the buildings. These works will be pushed to completion during the present season.

MADISON COUNTY.

ALTA-MONTANA.—According to the Helena *Independent*, there is a project on foot looking to the removal of these works to Helena. The principal reasons for so doing are, that the iron ore and lime-rock used as flux at present have to be hauled from Helena to the works at great expense, and on finishing the railroad, coal for fuel will be laid down here at rates so low as to greatly reduce the cost of smelting.

The Rochester Mining District is just now attracting considerable attention, and the indications point to renewed activity in that section during the present season. The sale is reported of a fourth interest in each of the three properties known as Magna Charta, Garfield, and True Fissure, for the sum of $10,000, to Eastern parties.

SILVER BOW COUNTY—SUMMIT VALLEY DISTRICT.

ANACONDA.—It is said that this company has invested upward of $1,000,000 in the development of the Anaconda and St. Lawrence mines, in the purchase of machinery, the erection of buildings, and in buying fuel.

The present prosperity of the mining interests of Summit Valley District, says the *Inter-Mountain*, is of an extremely gratifying character, and is beyond all dispute. The mines, mills, and smelters are all in profitable operation and running in full blast. Two hundred and twenty-five stamps are pounding merrily away on pay ore, and the output of our silver mines is limited only by the capacity of the mills to treat their product. The four smelters are daily reducing to a marketable form between 250 and 300 tons of high-grade copper ore, and at least 50 tons of crude copper ore are shipped daily to Baltimore or Swansea. The indications are all favorable for an output this year of a total value of between $9,000,000 and $10,000,000. Fully 2500 men are given constant employment at remunerative wages in the mines, mills, and smelters of the district.

POSER.—The new strike in this mine, the property of the Silver Bow Company, is of even greater importance than was at first supposed. The 100-foot east shaft, which follows the vein from the surface, shows good ore all the way down. At the bottom, a cross-cut showed the pay-streak to be fifteen feet wide. Drifts have been started east and west, and an ore-breast twelve feet wide is extracting, three feet of the pay ore-body being of rather low grade. The remaining 12 feet, however, assay from $50 to $100 per ton.

PROVIDENCE.—This mine, situated near Lincoln Gulch, on the Big Blackfoot, yielded 60 ounces of gold, the result of a few days' run of the ten-stamp mill belonging to the company owning the mine.

NEVADA.

ESMERALDA COUNTY.

MOUNT CORY.—A mill to be provided with three sets of Krom rolls is to be put up, and probably a leaching plant will be built.

SAFFORD DISTRICT.

ONONDAGA.—This mine has been stripped on the surface along the ledge a distance of 800 feet, exposing ore varying in width from eight inches to six feet, and in price from $30 to $450 per ton. A force of 20 men is employed at present, and more are to be put on. A new tunnel has been started about 25 feet below the old workings, which is to be run a distance of 800 feet, there to connect with a shaft which is sinking on ore on the northern end of the claim.

ZANOLI.—This claim shows a considerable amount of work. The ledge was first encountered in the shaft at a depth of 30 feet, and has since continued down a distance of 112 feet, varying in width from three inches to six feet, the latter being the present width of the ledge in the bottom of the shaft. The ledge is perfect and well defined, the foot and hanging-walls being plainly discernible throughout the entire depth of the shaft. The ore averages high. A tunnel had been run a distance of 300 feet without success, finally going to a place above, where, at a depth of 300 feet, the ledge was encountered. If present indications continue, it is the intention of the owners to erect a mill on the Humboldt River at Gerald, about a mile distant, where it is estimated ores averaging $12 per ton can be worked at a profit.

NEW MEXICO.

The Santa Fé *New Mexican* states that in the south and eastern portions of Santa Fé County, in the New Placer District, is a section of New Mexico which will become one of the most productive districts in the territory. Its immense area of rich placer ground, its wealthy gold-bearing quartz veins, its fine mines of copper, and its large deposits of argentiferous lead ores all impress one with the greatness of the future possibilities of the district. Although much has been written about the auriferous gravel deposits of the district, their wealth and extent are such that they will continue bearing favorable reference, until steps are taken to work them on a scale proportionate to their magnitude. Almost every gulch or arroya containing deposits of earth is rich in gold; and notwithstanding the drawback occasioned by the scarcity of water, the time must be near at hand when these deposits shall be effectually and systematically worked. Here, it may not be amiss to give a short sketch of the history of the New Placer mines. The discovery of gold was first made in 1842; and within the next five years, the population of the district increased to nearly 4000 souls. Over 1000 persons were engaged in placer mining in the vicinity in 1847. The amount of gold secured has never been even approximately made public; owing to the dangerous and lawless elements, all information as to the product at the time having being kept very quiet. The mode of working was by sinking shafts and drifting, extracting only the richest pay-streaks. In the winter season, when there was snow on the mountains, the miners utilized the snow, melting it with heated stones. When there was no snow, water was brought from springs and the creek at from one to two dollars per barrel, and thus the work was continued. The washing was done in wooden bowls, and carried on under disadvantages; nevertheless it paid well. Many nuggets of considerable value were found, among them one reported that had a weight of eleven pounds and nine ounces avoirdupois, sold for $6000, being at the rate of $16 an ounce troy. At present, several companies are engaged in drilling for water in this section, and it is to be hoped that they will succeed in securing the necessary flow to permit them working on a large scale. Fair pump-wells have been opened; but the supply necessary for working on a large scale has not been secured, though the operations continue with a very sanguine spirit. The quartz-veins of the district are among the richest in the West. The veins as a rule are very strong, and the dissemination of gold through the vein seems general and generous. In the Tuerto Mountains, especially, some of the finest quartz leads to be found anywhere have been opened and worked to some extent, although doing but little just now.

The hitherto abundant supply of iron boulders in the Gallinas Mountain, says the Santa Fé *New Mexican*, utilized for flux in smelting, is rapidly failing.

CUCHILLO NEGRO MINING AND SMELTING COMPANY.—The furnace of this company at Fair View, in the Black Range, is again idle.

IVANHOE.—Work is to be resumed at this mine.

OLD MAN.—This location, at Silver City, is reported to have been bonded for $500,000, the bond including the privilege of exploring the new discovery. Work is reported in progress, and the property is showing up very well. A report just received states that an important strike of horn-silver has been made.

SAN JOSE.—This smelter has been blown in again.

SIERRA BELLE AND SIERRA APACHE.—These mines are to be prepared for large productions. The mines contain a great deal of 50 to 250-ounce ore, which is to be utilized as soon as possible.

UTAH.

FRISCO DISTRICT.

HORN-SILVER.—The bullion shipments for the week ended May 26th were $39,000; previously reported output of this mine for the present year, $1,309,500; present total, $1,348,500.

SUMMIT COUNTY.

CRESCENT.—Mr. J. J. Daly resigned his position as superintendent of this mine recently, and Mr. Peter Porter was elected by the trustees to succeed him.

SAMPSON.—The vice-president of this company reports that 31 tons of second-class ore from the company's mines were sold at Salt Lake City on May 22d at $32 per ton, and that two cars of first-class ore were to have been shipped from the mine on Monday last. Reports from the mine state that on May 18th the east drift of level No. 2, Van Praag incline, had opened into three feet of solid ore, averaging 55 ounces silver per ton and 32 per cent lead, and that the west drift was in one foot of first-class ore running 100 ounces silver per ton and 42 per cent lead. The new shaft is down 60 feet and is to be connected with the vein at a depth of 200 feet by the first of August next.

SILVER MOUNTAIN.—The Salt Lake *Tribune* is authority for the statement that a big strike has been made in this mine, which is situated on Kessler's Peak, Big Cottonwood. For some time past, a tunnel has been run to cut the vein; and when this was accomplished, the tunnel had penetrated the mountain 400 feet. An ore-body five feet wide, the first-class assaying 55 ounces silver, 58 per cent lead, $3 gold, the second class 23½ ounces silver, 26 per cent lead, was encountered. The tunnel is 400 feet below the upper workings, and all the ore can be extracted through it.

WASHINGTON COUNTY—SILVER REEF.

STORMONT.—The superintendent reports: The chamber now opened at twenty-three winze is about fifteen by thirty feet. From above the chamber, about 100 tons have been extracted, and it is reasonable to suppose that the ore will extend enough farther into the solid ground on all sides of this chamber to furnish another 100 tons. Indeed, I shall be disappointed if it does not produce 1000 tons. We are just blasting the ore down and sending it to the mill, and are not yet drifting in it. The fifteen-winze strike shows no change since weekly report of 26th, as we have been stripping the vein, taking down only waste. Assays yesterday showed $108.41 per ton as the average of thirty inches in thickness of ore.

The superintendent telegraphs that a new strike has been made in winze 15. Two feet of $100 ore. Bullion for May, $20,000.

WYOMING.

ALBANY COUNTY.

The *Laramie Boomerang* says that a valuable deposit of iron ore has been discovered near Rock Creek. The iron ore is found in the same hill or "hog-back" containing the soap. It is reddish-brown in color, but gets almost black after being exposed to the air for a time, and is found in lumps something the shape of a kidney, ranging in size from six inches to four or five feet across. It lies about 1000 yards from the railroad track, opposite the eating-house.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, June 8.

This week has been one of remarkable dullness in the mining market. The dealings have been mostly confined to a few stocks, and the Comstocks were the attraction at strong prices. The fancies were all weak, especially Robinson, Sonora, and Decatur. Sonora, as usual, was very actively dealt in, but gradually declined, and closed to-day at its weakest price. Stormont is looming up as an active stock in the market, and indications point to better prices. Sierra Grande was stronger than of late, but the transactions were small. The total number of mining shares sold at all the Exchanges aggregates 196,662, as against 355,084 last week.

The Comstock shares had a fair business at strong prices. California was strong, selling from 29@38 @36c. Consolidated Virginia was moderately dealt in, and was strong; it sold from 58@72@69c. Sierra Nevada had a small business at strong prices, selling from $6@$6.88. Union Consolidated, with a small business, was also strong, selling from $6.25@$7.25. Consolidated Imperial records a moderate business at steady prices, selling from 11@10c. Best & Belcher was dealt in to the extent of 30 shares at $5.25@ $4.75. Sutro Tunnel had a very active business, at irregular prices; it sold from 23@29@26c.

The Leadville stocks were quiet and steady. Amie was quiet and a little weak, selling from 19@16c. Chrysolite had a small business at steady prices; it sold from $1.15@$1.20. Hibernia sold from 3@4c., with a business of 1100 shares. Iron Silver had a small business and was steady; it sold from $3.10@ $2.85, the latter price is ex dividend. Leadville sold at 50c. under a small business, and Little Chief at 40c. Little Pittsburg was irregular, with small transactions, selling from 78@65c.

The Bodie stocks were also quiet and steady. Bodie Consolidated sold from 90c.@$1 under a small business. Standard was moderately dealt in at strong prices, selling from $6.88@$7. Bulwer sold from 60@55c., with a business of 200 shares. Goodshaw was quiet and steady at 5@4c.

The Tuscarora stocks had a small business, and were weak. Argenta sold at 50c. under one small transaction. Belle Isle sold assessment unpaid, and was irregular under a small business; it sold from 20@15@ 22c. Navajo passed its dividend, and in consequence was weak, with a fair business; it sold from $1.70@ $1.50. Independence was quiet and irregular, selling from 35@30@32c. Elko Consolidated was quiet and steady at 18@19c.

In the miscellaneous list, Alice was quiet and steady at $2.75. Bassick sold at $8, the transactions being small. Caribou Consolidated had a fair business at steady prices, selling from 14@13c. Eureka Consolidated was moderately dealt in at weak prices; it sold from $3.45@$3@$3.05, assessment unpaid. Reports state that the company has started up another furnace, principally on account of the increased ore-shipments from Eureka Tunnel and expected shipments from Albion. The Green Mountain stocks were quiet and steady. Gold Stripe sold at 9c. Green Mountain sold from 70@72c., and Cherokee sold at 3c. Homestake was very quiet at $15¼. Horn-Silver was quiet at irregular prices; it sold from $6.63@$6.25@$6.50. Robinson has been quiet and weak; it declined from 83@75c. under a business of 9400 shares. Sierra Grande was moderately dealt in at strong prices; it sold from $1.50@$1.70@$1.65. Stormont has been actively dealt in at strong prices; it sold from 60@72@70c. The stock of the reorganized company has been listed on the Mining Exchange, and the developments at the mines are reported to be good. Expenses have also been reduced.

Alta-Montana has been weak at 4@8c. Bradshaw has also been weak, selling from 33@25c. under a small business. Caledonia records a sale of 100 shares at 80c. Central Arizona sold at 30c. Decatur has become quite weak under an active business, selling from 7@3c. Durango was quiet and steady at 7@6c. Eastern Oregon had a small business at steady prices, selling from 30@32c. Harlem records a moderate business and was irregular; it sold from $1.55@ $1.40@$1.45. Hortense sold at 9c., and Lacrosse at 12c. Oriental & Miller was quiet and steady at 18@16c. Silver Cliff was moderately dealt in and developed a little strength; it sold from 15@20c. Sonora Consolidated had a very active business at declining prices; it sold from 40@29c. State Line Nos. 1 & 4 developed considerable activity at steady prices, selling from 5@4c.; Nos. 2 & 3 quiet and steady at 7@6c. South Pacific sold on Saturd ay at 6c. Monday the stock was struck off the list of the Mining Board, as no attention had been paid to the request of the Board for a statement from the company, and for an explanation of the fact that the books were not kept open for transfer of the stock.

The Trustees of the Gold Placer Mining Company recently issued a notice to the stockholders of the company, stating that unless they came forward and paid a voluntary assessment of four cents per share before June 12th, the property of the company would be sold to pay a claim of about $8000. A meeting of the stockholders was held yesterday at No. 60 Broadway, at which no definite action was taken in the matter beyond the conclusion to make a strong endeavor to raise the money.

An assessment of twenty-five cents per share has been levied by the Tip Top Silver Mining Company, delinquent July 6th.

The Great Boulder Consolidated Gold and Silver Mining Company, of Colorado, in 1880, mortgaged its mines to secure $100,000 of its bonds. In 1881, no interest was paid on the bonds, and the trustees of the mortgage foreclosed it at the request of George William Ballou and Edwin Ford, who held $74,000 of the $89,000 bonds issued. The property was sold, and the trustees bought it in for $60,000 in the interest of the bondholders. Since the sale, the two parties in interest have been unable to come to an agreement, and Judge Donohue has granted an order directing a resale of the property, after the usual six weeks' notice, at the Exchange Salesrooms in this city.

It is said that the stock of the Barcelona Mining Company will soon be listed at the Mining Board. The mine has been leased on very advantageous terms, and the lessees are reported to be taking out ore which will soon be milled and pay the company good royalty.

MEETINGS.

Bonanza King Consolidated Mining Company, No. 29 Wall street, New York City. Meeting of stockholders, June 16th, at two o'clock P.M., to sanction and approve an agreement to consolidate with the Trojan Consolidated Mining Company.

Central Coal Company of Pennsylvania, office of Messrs. G. B. Newton & Co., No. 329 Walnut street, Philadelphia, Pa. Annual meeting of stockholders and election of directors, July 10th, at twelve o'clock noon.

La Plata Mining and Smelting Company, No. 58 Broadway, Rooms 12 and 13, New York City. Annual meeting of stockholders and election of trustees, June 21st, at one o'clock P.M.

Old Dominion Copper Company, No. 72 Broadway, New York City. Postponed annual meeting of stockholders, June 29th, at twelve o'clock noon.

Trojan Consolidated Mining Company, No. 29 Wall street, New York City. Meeting of stockholders, June 16th, at two o'clock P.M., to sanction and approve an agreement to consolidate with the Bonanza King Consolidated Mining Company.

DIVIDENDS.

The Standard Consolidated Mining Company has declared its monthly dividend of twenty-five cents per share, payable June 12th at the Farmers' Loan and Trust Company.

PIPE LINE CERTIFICATES.

As will be seen by reference to our quotations and sales below, the oil market this week has been very active, and the fluctuations have been of a very wild and varied character. Opening on Saturday morning last at $1.19½, oil fell to $1.18½, then took an upward turn to $1.23⅛, closing at $1.20. On Monday, it was weak, and closed with a demoralized market. Tuesday witnessed a still further decline; but on Wednesday there was a reaction, and the "bulls" had the advantage. Yesterday (Thursday) was a field-day for the "bulls," the market being very strong. To-day, the market again turned and lower prices prevailed. The market throughout has been one of manipulation.

No news of an important character has been received from the oil regions during the week. The report of the Pipe Line Company shows an accumulation of oil in its custody from the first of June to the 5th inclusive, of 29,682 barrels in excess of its deliveries. The recent fire near Alleghany City, Pa., destroyed 32,000 barrels, and an assessment of one barrel per thousand has been levied to pay the insurance. Notice has also been given by the Trust Company that all certificates sent to the Clearing-House must be accompanied by a check for $3 per thousand barrels as a guarantee against fire assessments, the Trust Company to return the balance after such assessments have been deducted.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
June 2....	$1.19½	$1.23⅛	$1.18½	$1.20	3,553,000
4....	1.21	1.21⅝	1.14	1.15	4,891,000
5....	1.14⅞	1.15⅞	1.09⅞	1.11⅝	5,524,000
6....	1.11¼	1.18⅛	1.10⅝	1.18⅛	4,047,000
7....	1.19	1.23¼	1.15¼	1.17	3,884,000
8....	1.16⅝	1.17⅝	1.15	1.15½	2,210,000
Total sales.					24,109,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. June 1.	June 2.	June 4.	June 5.	June 6.	June 7.
Albion						
Alpha	2½		3			
Alta	.80	.65	.80	.75	.75	.75
Bechtel						
Belcher	1⅜	1¼	1½	1¾	1½	1½
Belle Isle	.25	.20		.25		
Best & Belcher	4½	4	4¾	4½	4	4⅛
Bodie	1⅜	1⅛	1	1	1	1⅛
Bullion						
California	.35	.35	.35	.35	.30	.30
Challar	3⅞	3⅝		3⅝	3½	3⅝
Con. Virginia	.60	.60	.70	.65	.60	.65
Crown Point	1¾	1⅝	1¾	1¾	1⅝	1⅝
Elko Cons	.20	.20		.20	.20	.30
Eureka Cons	3⅝		3½	3¼	3½	3½
Exchequer	.40	.40	.45	.45	.40	.50
Gould & Curry	3⅜	3½	3⅜	3¼	2¾	3¼
Grand Prize	.50	.50	.50	.45	.50	.50
Hale & Norcross	7½	7⅝	8	7¾	7¼	7⅜
Independence	.35		.35	.35	.35	.35
Martin White	.30	.30	.30	.30	.25	.25
Mexican	4½	3¾	4¼	4¼	3⅝	4⅛
Mono						
Mount Diablo				3		
Navajo	1⅝	1¾	1¾	1¾	1⅝	2¼
Northern Belle	6⅞	6⅞	6¼	6⅞	7¼	7¼
North Belle Isle				.15		
Ophir	3¼	2¾	3¼	3¼	2¾	3¼
Overman						
Potosi	1⅝	1⅝	1⅝	1½	1¼	1⅜
Savage	2¾	2⅜	2¾	2⅜	2¼	2½
Scorpion						
Sierra Nevada	5¾	5½	6⅛	6⅝	5⅞	7
Silver King		10¾		10⅞	10⅞	
Tip-Top						
Union Cons	6	6⅝	7⅛	7⅛	6⅞	7⅝
Wales Cons						
Yellow Jacket	4⅛	4	4½	4¾	4⅛	4⅝

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, June 7.

The market for copper and silver stocks continues to rule dull and inactive. There is so little doing that it is difficult to obtain reliable quotations on the greater portion of the list of stocks dealt in at the Exchange. In copper stocks, Calumet & Hecla, as usual, takes the lead, and in face of the decline of ingot copper to 15½c., shows an advance of $3¼ per share over last week, with sales at $237½. Franklin sold at $10 in small lots, with same bid for it. The May product was 170 tons, and the reports from the mine are all of a favorable character. Quincy is firm at last week's quotation, with sales at $44. A small lot sold to-day at $45, which was also bid for it at the close. The stock is said to be largely oversold and scarce for delivery. The product for May was 261 tons, against 201 tons last year in May. Osceola was quite firm early in the week at $21½, but later sales were made at $20½, closing $20 bid. This stock has been rather more freely offered than usual, and the desire to sell it is the cause of the decline. There were no sales of Pewabic for the week; it is held at $4, with $3 as the best bid. A letter from the Pewabic mine says: The lode in the

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shaft continues to show a little copper, but not of much value. The lode in the 31st level, both north and south, is improving. It seems as if we should have some ground at these points that will pay to stope. There is no change to notice in any other part of the mine. The May product was 70¼ tons. In other copper stocks there is nothing doing. A letter from the agent of the Huron copper mine says: There is but little change to notice in the mine since my last report, except in No. 10 shaft, where the lode is quite rich in stamp and barrel copper. Work at the mill seems to be gaining a little faster for the past few days than for some time before. On the whole, Huron never looked so well as it does to-day. Huron stock is quiet at $1⅛ asked. The reports from the Douglas Copper Company, of Maine, are encouraging. The company has produced sufficient ingot for a month to pay expenses, and hopes soon to be on an undoubted self-sustaining basis. One ton of ingot copper per day is about the present product of the mill. The management is commendably conservative in what it says of the future and will not encourage the hope of dividends for a couple of years. Meanwhile, it hopes to accumulate a good working surplus. There is but little of the stock offered in the market, $1 being bid for it without calling any of it out.

With the exception of Sullivan, the market for silver stocks is dull and lifeless. Sullivan opened strong, and in the early dealings sold quite freely at $2⅛@$2¼, but later it declined to $1¾, rallied to $2, and finally settled down to $1⅞, which was the closing sale and bidding price. About 2000 shares changed hands. Bonanza sold at $2¼, and Harshaw at 50c. Nothing doing in Catalpa or Crescent.

At the Boston Mining Exchange, trading is confined to a few specialties, and prices are generally unchanged.

3 P.M.—There was was no change in the market this afternoon, which was dull as ever. Harshaw sold at 50c. and Quincy advanced to $46. Bonanza, $2¼ bid, $2⅛ asked. Catalpa, $50@$55. Crescent, 25@30c. Sullivan, $1⅞@$2. San Pedro, 35@40c. Calumet & Hecla, $287 bid. Franklin, $10@$10½. Osceola, $20@$20¼. Pewabic, $3@$3¾. Quincy, $45½ bid.

BULLION MARKET.

NEW YORK, Friday Evening, June 8.

The London market comes weak, and the tendency would seem to be toward somewhat lower figures.

DATE.	London	N. Y	DATE.	London	N. Y.
	Pence.	Cents.		Pence.	Cents.
June 2.	50⅛	109¾	June 6.	50⅛	109¾
4.	50⅛	109¾	7.	50⅛	109¾
5.	50⅛	109¾	8.	50 1-16	109⅝

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended June 8th, as compiled from various sources, amounted to $174,000, as against $117,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,409,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended June 2d	$154,000
Corresponding week last year	502,700
Since January 1st, 1883	5,845,911
Corresponding period last year	29,157,548

Imports.

Week ended June 2d	$24,006
Corresponding week last year	18,426
Since January 1st, 1883	6,712,939
Corresponding period last year	1,782,653

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £329,000 bullion, but the proportion of reserve to its liabilities was raised only from 35¼ to 35¾ per cent, against 48¼ per cent at this date a year ago. To-day, the bank made a further gain on balance of £33,000 bullion. The weekly statement of the Bank of France shows an increase of 1,200,000 francs gold, and a loss of 825,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of April.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	$86,226	$320,419
*Alta-Montana, G. L. S.	"	.....	$10.625
*Belmont.	"	5,171	17,775
Bodie, G. S.	Cal	25,085	91,342
Bodie Tunnel, G.	"	10,470	45,319
*Bonanza King, G.	"	57,000	199,077
*Boston & Montana, G.	Mont	18,741	72,318
*Central Arizona, S.	Ariz	.....	35,845
*Christy, S.	Utah	24,249	92,654
*Chrysolite, S. L.	Colo	24,146	142,238
*Contention, S.	Ariz	83,754	293,014
Crescent, G.	Cal	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak	.....	120,231
*Derbec Blue Gravel, G. S.	Cal	10,041	31,844
*Father de Smet, G.	Dak	26,596	127,985
*Frisco M. and S. Co., G. S. L.	Utah	16,366	$77.084
*Head Center Cons.	Ariz	6,865	6.865
*Head Center and Tranquillity	Ariz	13,893	18,486
*Hecla Cons., G. S.	Mont	$57,060	234,984
*Homestake, G.	Dak	.....	330,060
*Hope, S	Mont	.....	20,574
Horn-Silver, S. L.	Utah	291,000	1,055,000
*Independence, G. S.	Nev	7,779	34,722
*Kentuck, G. S.	"	2,100	8,237
*Lexington, S.	Mont	96,317	421,204
*Little Pittsburg, S. L.	Colo	3,296	22,873
*Marguerite, G.	Cal	.....	33,200
*Martin White, G. S	Nev	.....	136,317
*Moulton, G. S.	Mont	.....	123,288
Mount Diablo	Nev	65,221	75,078
*Navajo, G. S.	"	69,646	281,626
*North Belle Isle	"	1,953	1,953
Northern Belle, S.	"	75,700	343,015
*Ontario, S. L.	Utah	222,274	807,695
*Oxford, G.	N. S.	6,181	21,324
*Phœnix, G	S. C.	.....	13,666
*Pinal Cons., S. L.	Ariz	37,388	137,860
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont	29 433	101,241
Standard, G.	Cal	108,477	371,483
Star, S.	Nev	.....	27,095
*Stormont, S.	Utah	19,677	74,281
Syndicate, G.	Cal	4,869	14,086
Tintic M. and M. Co.	Utah	.....	7,632
*Tip Top, S.	Ariz	.....	‡22,983
*Tombstone, G. S.	"	53,071	‡246,230
Yellow Jacket, S.	Nev	54,120	152,873
Total amount of shipments to date			$6,963,072

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, June 8.

Copper.—The event of the week has been the sale by the principal lake producers of from 18,000,000 to 20,000,000 pounds at private terms. As to the details of the transaction, nothing but vague rumors are as yet current. A large portion of it—some say all—has been taken by manufacturers, the delivery to extend over the next five months. It is stated in other quarters that some of it was for export. The price is given as 15c., while some of it brought 15⅛c.

For jobbing lots, it is not possible just now to do better than 15⅞c., but of course there is little buying, and for a long time to come there will be little movement in lake copper. Meanwhile, we must record also export sales of upward of 3,000,000 pounds of Arizona copper, details not having been made public as yet. The market has not settled down sufficiently after these transactions to permit of any statement of its condition. We quote nominally Lake 15⅝@15¾c., and other brands 14@15¼c.

Should it prove correct that the Lake companies have supplied the principal consumers with the bulk of their requirements for some months to come, there can be no doubt that values of other brands must recede a little more. There is reason to believe that a certain, though perhaps small, quantity of lake copper, produced by the smaller mines, will find its way into the markets and will compete with the other brands, of which a large proportion will have to seek a foreign market, unless our home demand picks up. Producers will therefore watch the foreign markets more closely than ever, and thus far the outlook is encouraging. Considerable eagerness has been shown by foreign buyers to take Arizona and other metal produced in the West, and values have thus far been fairly well maintained. England cables £69 10s. f. o. b. for Best Selected, and £64 10s. f. o. b. for Chili Bars.

Tin.—Business has been dull during the week, the market closing nominally 21⅜c. for Straits, 21⅝c. for Australian, 21⅞@22c. for Lamb & Flag, and 22c. for Banca. England cables lower, £94 10s.

Lead.—The market has been dull and lifeless, but has been well maintained. Transactions are on a moderate scale, the closing quotations being 4·45c. for Common and Refined.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is firm. Sales will not aggregate 200 tons of Refined, at 4·13c., and 160 tons of Chemical at 4·12½c.

Messrs. Everett & Post send us the following dispatch to-day:

We have no change to report. Our market is quiet and steady at 4·15@4·17½c. Two hundred and fifty tons of a special brand sold at 4·20c.

Spelter.—The market has weakened, and we hear of sales, in a small way, at 4·45@4·50c. for good domestic brands.

Antimony.—A large transaction has been recorded during the week at private terms. We quote Cookson's 10¾c., and Hallett's 9¾c. for jobbing lots.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 8.

At the Metal Exchange, there were two tickets in the field, one headed by Theodore Sturgis for President, called the "Wall street ticket," it being favored by and favorable to the members of the old "Wall Street Exchange;" and the other headed by T. Delafield for President, and supported generally by the members of the old Pearl Street Exchange. The latter proved successful. Mr. Delafield was elected President by a vote of 113, to 59 for Mr. Sturgis; Frank Dickerson Vice-President by a vote of 172, to 52 for George V. Tompkins; and Mr. Carl Mayer Treasurer by a vote of 154, to 70 scattering. The contest for Secretary excited the most interest. Mr. Edward J. Shriver was elected, receiving 182 votes, to 42 for Mr. William Allen Smith. The following is the rest of the ticket elected: *For Managers*—John C. Cook, Joshua Hendricks, Theodore Sturgis, John T. De Blois, Elliot F. Driggs, William P. Tilton, B. F. Judson, John J. Williams, E. P. White, A. W. Humphreys, H. B. Moore, A. G. A. Harnickell, D. Houston, E. S. Wheeler. *For Arbitration Committee*—D. Thompson, C. E. Maxwell, E. A. Caswell, Daniel F. Cooney, Austin G. Gorham.

American Pig.—Early in the week, the Thomas Iron Company followed openly the example of other companies who had been quietly, as we reported in our last issue, selling No. 1 Foundry here at $20, and during the week that company has closed contracts for season's delivery with the regular customers for upward of 9000 tons of Nos. 1 and 2 at $20 and $19 respectively. No. 1 is fairly steady at that price, but No. 2 is weaker. We quote Foundry No. 1 at $20@$21 for good to choice brands; No. 2, $18@19; and Gray Forge, $17.50@19. Bessemer pig is quiet. England quotes, per cable, 50@51s. Spiegeleisen is moving off with a fair demand, particularly so far as the higher grade is concerned, fetching $31@$31.50. Foreign spiegel is only in limited supply, while low grade, 10 to 12 per cent metal, finds few buyers.

Scotch Pig.—Very little is doing, as the market for American pig is not such as to warrant heavy or even light purchases of Scotch pig. Quotations are almost entirely nominal as follows, ex ship: Coltness, $24@$24.50; Glengarnock, $22@$22.50; Langloan, $23.75@$24; and Eglinton, $21. Warrants are cabled to-day to the Exchange, 47s. On June 6th, the Glasgow quotations received at the Exchange were: Coltness, 61s. 6d.; Langloan, 61s.; Summerlee, 59s. 6d; Gartsherrie, 57s. 6d.;

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	June 2. H.	June 2. L.	June 4. H.	June 4. L.	June 5. H.	June 5. L.	June 6. H.	June 6. L.	June 7. H.	June 7. L.	June 8. H.	June 8. L.	SALES.
Alice, Mon.			2.75				2.75						200
Amie Con., Co.	.18		.19	.18	.18	.17			.16				4,800
Argenta, Ne.			.50										100
Bar. & Walker, Ut.													
Bassick, Co.	8.00						8.00						250
Belle Isle, Ne.			.20		.15		.15		.22				325
Bodie Cons., Ca.			.25						.95	.90	1.00		1,500
Breece, Co.													
Bulwer, Ca.	.60	.55											200
California, Ne.	.30	.29	.32	.29	.38		.29		.29		.36	.31	2,425
Cal. & Hecla, Mich.													
Carbonate Hill.													
Caribou Con., Co.	.13				.14	.13	.14				.13		3,200
Chrysolite, Co.	1.15				1.15		1.20						1,500
Cons. Va., Ne.	.60	.58	.65	.60	.72	.70	.68	.63	.70		.69		3,425
Crown Point.													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.	3.45	3.35	3.00						3.25		3 05		510
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.	.10	.08							.09		.08		2,400
Gold Stripe, Ca.					.09								400
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.													
Green Mountain, Ca.					.71	.70			.70		.72		1,000
Hale & Norcross, Ne.													
Hall-Anderson, N. S													
Hibernia, Co.					.03		.04						1,100
Homestake, Dk.							15.50						100
Horn-Silver, Ut.	6.63	6.38							6 25		6.50		180
Hukill, Co.													
Independence, Ne.			.35	.30	.32								600
Iron Silver, Co.	3.10		2.90		2.90		2.90	2.85					1,100
La Plata, Co.													
Leadville C., Co.	.50												1,000
Little Chief, Co.			.40										17
Little Pittsburg, Co.			.78	.65									605
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	1.70		1.60	1.50	1.55		1.50		1.55	1.50	1.55	1.50	2,300
Northern Belle, Ne.			6.50		6.38								165
North Belle Isle, Ne.													
Ontario, Ut.													
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.					8.00								100
Rising Sun, Ca.													
Robinson Cons., Co.					.83	.80	.81	.77	.77	.76	.78	.75	9,400
Savage, Ne.													
Sierra Grande, N. M.	1.50		1.55	1.50	1.70	1.60	1.65						3,300
Sierra Nevada, Ne.	6.25	6.00			6.25	6.00					6.88		630
Silver King, Ar.			11.00								11.00		30
Spring Valley, Ca.													
Standard, Ca.			7.00	6.88	7.00	6.88							820
Stormont, Ut.							.70	.60	.72	.68	.70		7,3 0
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	June 2. H.	June 2. L.	June 4. H.	June 4. L.	June 5. H.	June 5. L.	June 6. H.	June 6. L.	June 7. H.	June 7. L.	June 8. H.	June 8. L.	SALES.
Advance.													
Albion.													
Alta.													
Alta-Montana, G.	.04		.04							.03			3,000
Am. Flag, s.													
Barcelona, G.													
Bear Creek.													
Bechtel Con., G.													
Belvidere.													
Best & B'cher, G. S.	5.25				4.75								30
Big Pittsburg, S. L.													
Bondholder.													
Bradshaw, S.							.38				.25		700
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye.													
Calaveras, G													
C'law'r's W.&M.Co.													
Cal., B. H., G.										.80			100
Central Ariz'na, S.							.30						1 00
Cherokee, G.								.08					200
Climax, Co.													
Cons. Imp'r'l, G.S.			.10		.11						.10		3,200
Crowell, G.													
Dahlonega, G.	.03												100
Decatur.	.07		.06		.05		.06			.04	.03	.04	.03	23,300
Dunderberg.													
Durango, G.	.07				.06								1,000
Eastern Oregon.							.30			.31	.30	.32		1,100
Elko Cons.	.18		.18		.18					.19		.19		8,300
Enterprise.													
Fannie Barret.													
Globe Copper.													
Gold Placer, G.													
Goodshaw, G.	.05		.04										600
Granville, G.													
Harlem M. & M. Co.	1.45		1.55	1.40	1.50		1.50	1.45			1.45		2,100
Hortense, S.							.09						10
Lacrosse, G.										.12		.11		1,000
Lucerne.													
Mariposa Pref., G.													
" Com., G													
Mexican, G. S.													
Miner Boy.													
Mono.													
North Standard, G.													
N. Horn-Silv'r, S L.													
Orl'nt'l & Miller, S.					.18					.18	.16			1,300
Quartz Creek.													
Rappahannock, G.	.08											.06		1,400
Red Elephant, S.	.07	.05												1,500
Ruby, of Arizona.													
Silver Cliff, S.	.40		.40	.39	.40	.39	.38	.37	.38	.35	.34	.29	27,900
Sonora Con.													
South Bodie, G.													
South Bulwer, G.													
South Hite.			.11							.10				200
South Pacific.	.06													200
State Line, 1 & 4, S.	.05	.04	.05		.05		.05			.05	.04			14,800
" Nos. 2 & 3, S.			.07	.06										1,300
Sutro Tunnel.	.25	.23	.29	.25	.28	.27	.28	.26	.27	.25	.27	.25		50,450
Taylor-Plumas													
Unadilla, S.											7.25			
Union Cons., G. S.	6.63		6.25											300

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 50,982. Non-dividend shares sold, 145,680.

BOSTON MINING STOCKS.

	June 1. H.	June 1. L.	June 2. H.	June 2. L.	June 4. H.	June 4. L.	June 5. H.	June 5. L.	June 6. H.	June 6. L.	June 7. H.	June 7. L.	Sales
Allonez.													
Amie.													
Atlantic.													
Astec.													
Bodie Con.													
Bonanza D.	2.38	2.25			2.13		2.25		2.25				460
Bowman Sil	.17	.16	.17		.19	.18	.18	.17	.18	.17			18,844
Bruns. Ant.													
Bulwer.													
California.													
Cal. & Hec.					235		236	235	237		237½		25
Catalpa.	.55				.56		.56	.55	.56				1,200
Central Ariz													
Cherryfield.													
Co. Virginia			.93										300
Copper F'lls													
Copperop.													
Crescent.							.27½	.25	.25				600
"Cusi"													
Decatur.							.06						500
Deer Isle.													
Denver City													
Douglas.	.90				1.00								70
Duncan.													
Dunkin.													
Empire.							.18						500
Eureka Con.													
Franklin.			10.25				10.00		10.25				85
Hancock G.													
Harshaw.			.50				.50				.50		575
Huron.													
Independ'ce													
Indian Q'n.													
Mammoth.	.05												2,200
Mass. & N.M.	.07		.06		.07	.06	.07		.06				9,900
Milton.													
Napa.													
National.							1.25						100
North Belle							6.50		6.50				20
Ontario.													
Osceola.			21.50		21.50		21.00	20.50	21.00	20.50	20.50		227
Penn-Breck.													
Pewabic.													
Pine Tree.													
Plymouth.													
Quincy.					44.00						46.00	45.00	118
Ridge.													
Robinson.													
San Pedro.			.40										100
S'ra Nevada													
S'ra Grande													
Silver Islet.													
Silver King.													
Simpson Gd													
So. Pacific.													
Standard.					.07								300
Sullivan.	2.25	2.13	2.13		2.13	2.00			2.00	1.75	1.88		2,725
Sutro Tun.	.30				.26		.28	.27	.28				1,500
Sycamore.													
Twin Lead.	.14												2,300
Vizina.													

PHILADELPHIA MINING STOCKS.

	June 1. H.	June 1. L.	June 2. H.	June 2. L.	June 4. H.	June 4. L.	June 5. H.	June 5. L.	June 6. H.	June 6. L.	June 7. H.	June 7. L	Sales.
Amer. Cons.											.01		
Argent.			.15		.16		.16	.15	.15		.16		5,650
Battle Mt.							.03						2,500
Black Sul.							.02						10,000
Buena.													
California.													
Calista.													
Chrysolite													
Cincinnati.	.12	.11	.11		.12	11			.12	.11	.12		10,849
Comprom'e.	.21				.20						.21		6,400
Contention.			2.00		2.00								80
Con. Virg.	.75		.72½										1,000
Dauntless.	.01												1,700
Del Monte.													
Denver City									.15				100
Eureka.	3.50												100
Girard.			.09	.08	.08		.07		.07		.07	.06	8,500
Golconda.													
Governor.	.08										.08		9,000
Grand Uni'n							.19						2,000
Gunnison.	.77¼	.70	.77½		.77½		.72½	.70	.60	.50	.52¼	.50	13,650
Homestake.													
Horn Silver.													
Iowa Gulch.	.07		.07		.07		.07		.07		.08	.07	62,950
Iron Silver.			3.05										150
King Bul'on													
Ledger Con.													
Little Dia'd.	.08				.08								2,700
Little Maud													
Little Pitts.													
L'g & D'y H													
Montana	.07		.07		.08	.07							5,800
Mt. Sheridan					.04		.04		.04				7,000
Navajo.													
North'n B'l.													
Orion.													
Orion Pref.													
Palmetto E.													
Pembina.													2,600
Penn-Breck.	.09		.11	.10	.11				.10	.09	.11		12,600
Permanent.													
Pizarro.													
Pizarro Ex.													
Potosi.													
Rara Avis.					.40	.37½	.32½	.30	.30	.27½			5,700
Rara Avis E.	.12				.12				.12	.11	.11		7,100
Record.													
Rico Pion'r.													
Sierra Apac.							.37½	.30	.40	.35	.42½		13,500
Sierra Bella.							.60		.80	.75	.80		4,600
Sierra G'nde	1.42½	1 22½	1.52½	1 45	1.52½	1.45	1.70	1.55	1.65		1.60	1.50	29,250
Sierra Nev.	6.35		6.25										250
Silver Cord.							1.85		1.85		1.80		1,900
Silver King.													
Silv'r Plume			.01				.02						10,000
Sonora Con.													
Standard.													
Sultana.	.04				.04		.04		.04		.04		9,000
Sutro Tun'l.	.30		.30				.27½				.27½		1,700
Tombstone.					.77½		.77½				.80		4,700
Victor.	.02				.02								3,000
Yale Mt.							.03						1,000

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Glengarnock, 54s.; and Eglinton 48s. Freights are 7s. 6d.

Rails.—The mills are well supplied with orders, though it is generally understood that the business was secured by making concessions. Now, however, $38 at mill is the ruling quotation. England cables £4 15s.

Old Rails.—There is nothing of interest to report. Business is dull and quotations remain nominally $22.50@$23 for Ts.

Scrap.—Dealers are generally so well supplied that they are entirely indifferent. Most of them are unable to market their stock at any thing like remunerative figures, and Scrap is therefore neglected at $23 50@$24 for No. 1.

Pittsburg. June 7.

The settlement of the labor difficulties in this city has strengthened the chances of the blast-furnace interests for selling the current output at firm prices. Gray Forge is moving slowly at from $17@$18; Foundry, $19@$21; Bessemer, $21@$22. The commission men report improving inquiry from manufacturers, who, in anticipation of a strike, permitted stocks to run down, and are now virtually without material. There is no assurance given, or possible to be given, that the mills will continue in operation all summer. The threats of a suspension developed an encouraging activity for the past three or four weeks, in all branches of the finished iron trade, and consumers being now fairly supplied for at least thirty days, are not expected to purchase with any activity for that time. The fact that the producing capacity is in excess of probable requirements points to overproduction, to a declining tendency, and then to a restriction. The iron trade regrets the lack of harmony in counsels, but places the responsibility on those who sought to profit by the suspension of iron making.

Small sales are made at 2@2·10c. for Refined iron. Nails continue active. Muck Bars are under good inquiry at $34.50. Wrought Pipes are 70 and 10 per cent off. Boiler tubes, 55 and 5. Oil Well Casing, 45@50c. per foot. Tubing, 15@16c.; fair activity. T rails will sell at $22@$22.50. Sales of between three and four thousand tons have just been closed at these figures. Buyers of steel rails are placing orders with more confidence for summer and early fall delivery. Prices are firm enough to keep large buyers back, as desired concessions can not be obtained.

Steel rail requirements are expected to develop during the summer, and rail makers look for firmness and an improving demand throughout the year. In merchant steel there is a lull, but mills continue in full operation.

Cleveland. June 6.

Trade for past week has been fairly good and a decidedly better feeling shown since the 1st instant. There is a more settled and confident feeling in the trade, and a large amount of mill iron has been sold within the past two or three days, as mills, in anticipation of the strike, had run stock completely down. Foundries generally have a good amount of work, and now that they know about what to figure on, are buying ordinary size lots, instead of pursuing the hand-to-mouth policy that has for some time ruled. While we can not note any advance in price, yet there is a firmer feeling and current prices are readily obtainable. We quote:

No. 1 Bessemer	$22.00@$23.00
" 1 Foundry, all ore	21.00@ 22.00
" 1 Foundry, cinder mixture	20.00@ 21.00
" 1 Soft Foundry	20.00@ 21.50
" 1 Open Silvery	19.50@ 20.00
Mill irons	18.00@ 19.00
4 months f. o. b. cars furnaces.	
Nos. 1 and 2 Charcoal	$24.00@$26.00
" 3, 4, 5, and 6 Charcoal	25.00@ 26.50
Hanging Rock Charcoal	23.00@ 25.00
Strictly Cold-Blast Charcoal	25.50@ 30.00
4 months f. o. b. cars Cleveland.	
Bessemer ores	$7.00@ $8.00
Hematite ores	5.00@ 6.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 8.

Anthracite.

The anthracite coal trade has relapsed into a state of the most absolute dullness. A few inquiries are made by dealers who want to buy coal for June and July delivery at present prices, with a view to guarding against the threatened increase in July. Thus far, these offers are declined. The companies insist that they mean to put up prices in July, and will be ready to restrict sufficiently to force the market to take the coal at the advanced figures. Until now, however, it can not be said that the announcement of this programme is frightening buyers much. On the other hand, the companies are not showing signs of weakness, but there is considerable other coal pressing upon the market. Manufacturers are cutting down their requirements to narrow limits, and the general depression in business, which will not probably be relieved to any extent during the present month, is telling on the consumption of anthracite coal, notably in the Eastern States. A spirit of extreme caution prevails in all business circles, and the movements of some of the anthracite carrying companies are not regarded with much favor in financial circles.

The following is an abstract of the minutes of the meeting of the Western Anthracite Joint Committee, held in this city last week:

As questions were continually arising, during the intervals between the meetings, that required prompt action, it was thought expedient to appoint a committee to whom such questions could be referred. The following resolutions were accordingly adopted:

Resolved, That an Executive Committee of five be appointed (one representative of each of the five competitive interests), whose functions and duties shall be to act in the interim between the meetings of the Coal Committee upon all matters that may be submitted to them, and they shall report their action to the next succeeding meeting of the Joint Committee for approval.

Resolved, That the secretary of this committee be appointed Secretary of the Executive Committee, and that he communicate to the members of this committee any action taken by the Executive Committee; and further, that the Executive Committee be authorized to invite any members of this committee to attend their meetings.

Pursuant to the above, the following persons were appointed such committee: Messrs. Holden, Frisbie, Sayre, T. M. Richards, and Stickney.

After a general discussion as to the condition of the trade, etc., the following resolutions were adopted:

Resolved, That the prices, as fixed for coal on cars at Chicago, apply to all coal going out of Chicago *by rail*, and that the same price shall apply to all coal on cars shipped from Racine or Milwaukee.

Resolved, That the circular prices of coal, as established by this committee, shall be held to apply only to sales to dealers regularly established in the business, and to manufacturers for their own consumption, and that sales to all other parties shall be at *fifty* cents per gross ton above the circular prices.

Resolved, That sales of coal for municipal purposes, either directly or indirectly, through the medium of local dealers or otherwise, shall be upon the same footing in all respects as any other business, and that no deviations from the prices and terms of sale as fixed by this committee shall be made in consideration of such municipal sales.

Resolved, That *ten* (10) cents per ton be added to the regular car prices, for coal screened into wagons for local delivery in Buffalo.

Resolved, That the fixing of prices on lump coal be referred to the Executive Committee.

Resolved, That the fixing of prices to points not yet arranged be referred to the Executive Committee, who shall promptly transmit the figures to all parties in interest.

Adjourned to meet at the Gilsey House, in New York, on Wednesday, June 27th, at ten o'clock A.M.

JOSEPH J. ALBRIGHT, Chairman.
W. E. STREET, Secretary.

Bituminous.

Absolute stagnation characterizes the bituminous coal trade. The manufacturing demand and the quantities supplied to steamers have fallen off very much, and we hear of little or no business. We quote, alongside, nominally, for Clearfield, $4@$4.25; and for Cumberland, $4.20@$4.40, according to quality.

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HOLBROOK, F. N.,
Mining Engineer,
SUPERINTENDENT MINING DEPARTMENT OF THE CORRALITOS COMPANY, CORRALITOS, STATE OF CHIHUAHUA, MEXICO

TIP TOP SILVER MINING COMPANY.
Location of principal place of business, San Francisco, Cal.
Location of works, Yavapai County, Arizona Territory.
NOTICE IS HEREBY GIVEN, that at a meeting of the Board of Directors, held on the 29th day of May, 1883, an assessment (No. 6) of twenty-five (25) cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the Company, Room 44, Nevada Block, No. 309 Montgomery street, San Francisco, California, on all certificates of stock issued at San Francisco, and at the Farmers' Loan and Trust Company, No. 26 Exchange Place, New York City, on all certificates issued at New York.
Any stock upon which this assessment shall remain unpaid on
FRIDAY, THE SIXTH (6th) DAY OF JULY, 1883,
will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, THE SIXTH (6th) DAY OF AUGUST, 1883 to pay the delinquent assessment, together with cost of, advertising and expenses of sale.
By order of the Board of Directors.
HENRY DEAS, Secretary.
Office: Room 44, Nevada Block, No. 309 Montgomery Street, San Francisco, California.

MAPS.

ARIZONA AND NEW MEXICO.—This Map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc. 1881. Scale, one inch to thirty three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S. Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea-level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch: 10·5 miles, Size, 31 × 40 inches. Pocket form. $1.50, on thick paper.

THE SAME, AS A WALL-MAP, GREATLY ENLARGED. 1881. Scale, 1 inch: 6 miles. Size, 46×64 inches. Backed on linen, mounted on rollers, and varnished. Price, $6

COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st, 1880. Scale, 1 inch: 8 miles, 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch: 10 miles. Size, 28x30 inches. Pocket form, $1.50; as a wall-map, $2.

SAN JUAN MINING REGION (COLO.).—Kibbe's Geographical and Geological Map of the San Juan Mining Region. 1881. Shows county lines, wagon-roads, stage routes, trials, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide. Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half-inch to the mile. 21×27 inches. Includes, on same sheet, a reduced Map of the rate of Colorado. Printed in colors, with board covers. $1.50.

SAN JUAN MINING REGION (COLO.).—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1=63360. 28×38 inches. Pocket form, stiff paper cover, $1.50; or as wall-map, $1.50.

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CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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MR. O. D. COTTON, our representative in the Western and Southern district, has changed his address from No. 35 Wiggins Block, Cincinnati, to No. 26 North High street, Columbus, Ohio.

THE American Society of Mechanical Engineers, the record of whose meeting at Cleveland occupies a part of our space this week, is showing all the evidences of a vigorous growth. The meetings are very well attended, and every one present has the air of meaning business. There are a few in older societies of this class who come to meetings because they want to enjoy the social features, and care little or nothing for the technical matters which come up for consideration. It is probably merely a question of time when the Mechanical Engineers will also count such members in their ranks ; for they will soon, if they go on having, incidentally, such pleasant receptions as the one in Cleveland, acquire a reputation attractive to those who can only prevail upon themselves to attend opening sessions.

It is not a matter to be wondered at that in so young a society there should be some minor defects in the organization and conduct of the meetings. Some of the members will ramble ; but on the whole, the discussions during the meetings of the Society of Mechanical Engineers prove a close attention and are vigorous and well sustained. An admirable system is that of preparing, previous to the meetings, printed slips of the papers, and distributing proofs of accompanying illustrations for reference. It is, of course, possible only when members can be induced to prepare and submit their papers in time to be put into type in advance. On the other hand, this system should make it possible to present only a summary of long papers, with a view to saving time and avoiding the necessity of discriminating between members, by dividing the papers into two classes, those which are actually read and discussed, and those which are condemned to be read "by title." The meetings of the Society of Mechanical Engineers will probably at an early date become models for her sister societies. The society is now launched on the tide of success, and gives promise of fully meeting the most sanguine expectations of its founders.

THE RAILROADS AND HIGH EXPLOSIVES.

The position which the different railroads of the country have taken on the question of carrying high explosives is peculiar in many instances. Some of the greatest lines in the country, the Vanderbilt system, the Erie, the Union Pacific, the Michigan roads, and a considerable number of lines in the West, East, and South, decline to carry high explosives under any circumstances. Some are entirely deaf to arguments, while others cut off all discussion by assuming the position that the profit of the business of carrying explosives does not warrant the risk attending it. Upon the latter point, they adhere to notions once formed, and decline to listen to the most liberal offers to afford them the means of forming an opinion based upon experiments carried out by experts of their own choosing. The manufacturers of high explosives above all others are intensely interested in carefully studying every means of avoiding accidents in transit or in use. They have been prompt and conscientious in carrying out instructions framed by railroad officials with a view to making the carriage of explosives safe ; but honest effort ceases when met with such stolid indifference. They have submitted to what in some cases seemed the inevitable, and have in many instances practically abandoned territory in which they did a good trade.

Roughly, about ten million pounds of high explosives are annually distributed among consumers, much of it being shipped over long distances by rail because the points of consumption are far from the centers of production. In some cases, local works supply the demand of important regions, or water routes give access when communication by rail is cut off. Still, the policy adopted by some of the railroads has undoubtedly a tendency to cut off a considerable portion of the scattered trade, and from the manufacturer's point of view is quite a serious matter. It is not our purpose for the present to discuss the question whether as common carriers the railroads have legally the right to refuse to carry any class of goods without showing better cause for such refusal. They undoubtedly have the right to make and enforce such regulations, within reasonable limits, as will protect their own life and property and that of their patrons. They are justified, too, in charging rates of freight which will compensate them for the risk incurred in carrying dangerous freight. They have freely exercised these privileges. They demand from one and a half to double the rates on first-class freight, and are apparently well content with assuming the risk for that consideration, as they have declined proposals on the part of responsible manufacturers to give bonds to pay any damages inflicted upon property in all but those cases where accidents were due to carelessness on the part of railroads. The consideration for the assumption of the risk by the manufacturers was to be, that the rates of freight be the same as those governing the carriage of any ordinary freight, the classification to be on the same basis.

How unfair is the stand taken by the railroads in peremptorily declining to carry high explosives, may be judged from a glance at the records of accidents due to their transportation. The only two cases we know of are the explosion of a car-load of dynamite at Council Bluffs, where the car in question was one in a burning train. It is a difficult matter to explain the cause of this explosion, when facts are on record showing that large lots of dynamite have been consumed in conflagrations of storehouses and shops without causing an explosion. It is believed that in breaking down, some of the iron-work of the car must have been thrust, in a red-hot condition, into some of the unconsumed explosive. A second more recent case happened at Kittanning, Pa. It appears that two persons were amusing themselves in practicing pistol-shooting, making a freight-car their target. The car happened to be loaded with explosive material, and a stray bullet penetrating into the cases exploded them. It will be conceded that the probability of the occurrence of such a chain of circumstances as those leading to the Kittanning accident is not great, and still such happenings strengthen in the minds of railroad officials and the general public the unreasonable fears in regard to high explosives. They will not bear certain treatment, it is true ; but when handled by men of ordinary intelligence, they are less dangerous than many other substances, and notably black powder. There is as much logic in the proceeding of the refractory railroads in declining, as there would be in the action of a State to the crossing of rivers by railroads on bridges, because occasionally trains will drop through them into the water below.

Until now, the struggle on the question of the carriage of high explosives has been conducted by private conference between the manufacturers and the railroad officials. The consumers, it is true, could have no better champions ; but, after all, it is they who have had to carry the greater part of the burden inflicted upon the article by the restrictions of the railroad companies. They are content to pay the manufacturers a fair profit, and to see the railroad companies compensated for the work and the risk of transportation ; but it is too much to ask them to submit to paying for special methods of carriage or go without high explosives entirely, because a few railroad officials are too timid or too indolent to go into the merits of an important question, and prefer to brush it aside by an arbitrary exercise of power.

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THE ROANOKE MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.—II.

The second session of the Roanoke meeting of the Institute of Mining Engineers was held in Rohrer Hall on Wednesday morning, June 6th.

An interesting address was made by Major Jed Hotchkiss, on the Iron Ores of the Virginias West of the Archæan or Eastern Blue Ridge, and on the Coals of the Lower Measures, or Conglomerate Group in the Virginias. The address was illustrated by maps and sections.

The Major talked in his usual entertaining manner. He described at length the different iron ore formations, and mentioned several localities where the ores were in great abundance and of fine quality. He said there was no anthracite coal in Virginia worth a button. He felt obliged to make this emphatic declaration, because Wall Street was all the time starting companies on bogus anthracite coal-beds in this State; and he wanted all the members of the Institute to tell any body who said there was anthracite coal (worth a button) in Virginia that Jed Hotchkiss said it was a lie.

Mr. Edward Gridley, of Wassaic, N. Y., then read a paper on Cast-Iron of Unusual Strength. The iron was made at Wassaic Furnace, Dutchess County, N. Y., from a mixture of two thirds roasted carbonate ore and one third raw carbonate. The tensile strength varied from 39,669 to 47,500 pounds per square inch, with 41,349 as the average of thirteen tests. The roasted carbonate ore contained iron 54·042; manganese, 2·165; and phosphorus, 0·120. The pig-iron was analyzed by Dr. T. M. Drown with the following result: Graphitic carbon, 2·310; combined carbon, 0·780; silicon, 1·307; sulphur, 0·086; phosphorus, 0·294; manganese, 1·512; iron, 93·700; total, 99·989.

Dr. Persifor Frazer read a paper on the Copper Deposits of the South Mountain. He also exhibited a barometer made by Hicks, of London. It was made of aluminium, and was inclosed in a cork case. It was characterized by great lightness, being only about one third the weight of an ordinary barometer.

A paper on the Porosity and Specific Gravity of Coke was then read by Prof. F. P. Dewey, of Washington, D. C.; after which, Mr. E. Gybbon Spilsbury, of Lancaster County, S. C., presented a valuable paper on Gold Mining in South Carolina.

Many of the members afterward visited the Rohrer Iron Company's mines, situated a few miles from Roanoke, where preparations are making to mine on an extensive scale large and valuable deposits of brown hematite iron ore. The Crozer Steel and Iron Company's furnace and the Roanoke Machine-Works were also visited. These latter at present form a most important part of the industrial establishments of Roanoke, and as they are so complete and so convenient in their arrangements and equipments, I give somewhat in detail a description of these works from information kindly furnished by the courteous superintendent, Mr. Charles Blackwell.

ROANOKE MACHINE-WORKS.

Engine-House.—Annular in shape, one half of a circle, or 180 degrees, completed. Radius of outside brick walls, 157 feet. Span of iron, Fink roof-trusses, 64 feet from center to center of pins. The inside wall consists of wrought-iron columns and heavy glazed wooden doors, opening outward. The roof is covered with slate, finished with galvanized iron cornices. There are two principal entrances, one from the Norfolk & Western and another from the Shenandoah Valley Railroad. No doors are required at these, as brick walls carried up to the ridge of the roof completely shut off these passages from the rest of the building, thereby reducing the danger in the event of fire. Twenty pits provide shed room for as many engines. Each pit is provided with a jack for the escape of smoke; and in order to avoid the otherwise frequent renewal, on account of corrosion, that portion of each jack which is above the roof-line is constructed of terra-cotta. One of the pits is supplied with a driving-wheel and truck-wheel hydraulic drop arrangement, for the purpose of facilitating repairs to driving-boxes, and changing of truck-wheels of engines without lifting the engines. The entire shop is floored with two-inch oak plank.

A combined lighting-up furnace and sand-drier is constructed against the outer wall, about the middle of the shop, thus saving the necessity of lighting up engines with wood, and avoiding thereby considerable danger from fire caused by the sparks from the partially consumed wood, and likely to be thrown from the stack or ash-pan while running the first few miles after starting with a train. Each pit has a water-hydrant conveniently placed for the purpose of attachment of hose for washing out and filling up of boilers. On each side-wall of each pit are placed four steam pipes for heating purposes, steam for which purpose is intended to be taken from a stationary engine boiler, at the west end of the machine-shop. Each pit is separately drained into a twelve-inch terra-cotta main drain, and terminating at Lick Run (a small stream in the neighborhood), and provided with two traps for the accumulation and removal of solid matter. The turn-table is placed at the center of the area inclosed within the annular building when completed. It is 75 feet diameter, and of the upper truss type, thus necessitating an extremely shallow pit, the ordinary build of table with deep pit being undesirable, on account of liability to flood from back-water through drains at high stages of the creek. This unusual diameter was decided upon, as the necessity for frogs was thereby obviated and the serious expense of their maintenance and renewal avoided.

A compromise gauge, with two inside guard-rails, suiting both 5 foot and 4 foot 9-inch gauges, is laid on the table, thus serving equally well both the Norfolk & Western and the Shenandoah Valley section of the engine-house. Should necessity arise, the table can be arranged to turn by steam power. About 40 men will be employed in this building.

Smith-Shop.—This is rectangular in shape, 350 feet by 72 feet, with iron roof-trusses, and covered with slate. Additional light and means of escape for smoke are provided by the movable sashes in the louvre, which is 20 feet in width and extends nearly the entire length of the building. It is intended to take the smoke from the various fires by means of two overhead flues to the stack of the machine-shop stationary engine boiler.

Two bolt-forging and heading machines will be used, thus very considerably reducing hand labor. Blast is supplied by a No. 10 Sturtevant blower. Steam-hammer work will also be done in this shop; four steam-hammers of 600, 1100, 1500, and 3000 pounds capacity respectively, and one 3000-pound drop-hammer, being provided. Engine frames and axles will be forged, and truck-bars and other car work shaped, by means of these hammers. Steam for the use of these various hammers is supplied by a continuous pipe leading from the machine-shop boiler at the west end and the two boilers over the two furnaces at the east end. The waste heat from the furnaces is utilized for the purpose of making steam. This shop will employ from 90 to 100 men.

Between smith and machine-shops is located the tube-shop, where tubes will be cleaned, cut, and pieced, the welding being performed by a steam-hammer made expressly for that purpose.

Machine-Shop.—This is rectangular in shape, 381 feet by 72 feet, with iron Fink roof-trusses, and covered with slate. To give additional light and ventilation, movable sashes are placed in the louvre, which extends nearly the whole length of building.

An annex, 28 feet by 19 feet at the northwest corner of this building, contains the stationary engine of 100 horse-power, which drives the machines in this as well as the smith-shop. The engine is of the Hartford Engineering Company's well-known make, with cylinder 14 inches by 24 inches, and will be run at 120 revolutions per minute. Steam will be supplied by a centrally fired Galloway boiler, 7 feet diameter and 28 feet in length, and made by the Edgemoor Iron Company. This is a class of boiler much used in England, on account of economical consumption of fuel and facility of cleaning, and has only recently been introduced into this country. To insure economical consumption of fuel, a brick stack, 140 feet in hight, has been provided. Placed in the engine-room is the Worthington duplex compound steam-pump, with steam cylinders 12-inch and 18-inch diameter, and 10-inch stroke, which takes its supply of water from a 10-inch main laid from the McClanaghan spring about one and three quarter miles distant, and discharges into an eight-inch distributing main, the open end of which is connected with two pine water-tanks, each having a capacity of 50,000 gallons, and erected on the top of trestles 30 feet in hight, at the highest point of Woodland Park, giving, when full, a head of 140 feet above rail level in the yard. Pipes connected with the eight-inch main will distribute the water when desired. To prevent dangerous water-hammer, air vessels will be placed at proper intervals. The machine-shop will contain the usual machines necessary for finishing castings and forgings required in the construction of engines and cars. The principal feature in it is the four-ton walking-crane, running on a single rail the entire length of the shop. Its power is obtained from an endless hemp rope running at the speed of 1800 feet per minute. These cranes are very frequently used in England, but never hitherto in this country. This shop will employ more than 150 men.

Between machine and erecting-shops, the tool-room and offices for master mechanic and time-keeper are located. In the tool-room, machines for the construction of all tools required in the various shops will be placed; also metal and oil testing-machines.

Erecting-Shop.—This is rectangular in shape, 516 feet 8 inches by 64 feet, with iron Fink roof-trusses, and covered with slate. To give additional light and ventilation, movable sashes are placed in the louvre, which extends nearly the entire length of the building.

The erection of new engines and tenders, and the repairs of others, will be carried on at the western end of this shop, which is connected with the engine-house by a three-rail track suitable for both 5 foot and 4 foot 9 inch gauges. This track extends the entire length of the shop. On each side of the central track, and for a distance of 250 feet from the west end of the shop, will be a pit upon which building and repairs will be executed. To transfer engines to the side-pits from the center track, two overhead 25-ton cranes (traveling) will be used, similar to those at Altoona, and as very generally at work in engine-building establishments in England and other parts of Europe. Power to operate these cranes will be obtained from an endless hemp rope, running at the speed of 4800 feet per minute. This rope is driven by a 7 by 7 Westinghouse engine, placed in the southeast corner of the shop and on the top of the wall on which one of the rails for cranes is placed. The engine makes about 400 revolutions per minute. (The sheave for the driving-rope is keyed directly on the engine-shafts. Boiler and tender work will be carried on at the east end of this building; and to save both time and a large force of skilled labor, a set of Tweddelles's hydraulic riveting plant, made by Fielding & Platt, Gloucester, England, has been ordered, which will insure the best possible class of boiler work being made. This shop will employ about 120 men.

The machines required for boiler work are driven by a 12 by 12 vertical engine, supplied by the New York Safety Steam Power Company, and making 120 revolutions per minute. The main driving-shaft is placed about two feet below the floor of the shop, and is coupled directly to the end of the engine-shaft. Both this engine and the Westinghouse engine are supplied with steam from the foundry boiler.

The Foundry.—This building is rectangular, 252 feet by 72 feet, with iron Fink roof-trusses, and covered with slate. Additional light and ventilation will be provided by the louvre, which extends nearly the entire length of the building. Castings for engines and cars will be made in this building, which is constructed sufficiently large for casting 50 car-wheels per day in addition. A brass foundry will be located in the southwest corner. The two cupolas are of the well-known Collian type, and 40 inches and 47 inches internal diameter respectively. Blast for the cupolas will be supplied by a Baker blower with independent engine.

Hydraulic cranes will be employed to handle the wheels when their construction is begun, and to work the stock-hoist. Two or three molding-machines have been ordered, which will save a large amount of time and labor. The shafting for working the bolting-machines, etc., is driven by a 10 by 12 vertical engine, steam for which, as well as for the Baker blower, accumulator, pump and two engines in the erecting-shop, being supplied from a boiler made by Best & Son, Lancaster, Pa. This shop will employ from 50 to 80 men.

Immediately west of the foundry, the building for stores and offices is located. It is 165 feet by 72 feet, constructed of brick, and roofed with slate, affording accommodation for superintendent, draftsmen, and clerks. It will be heated by steam, and will have two hoists for shifting material between the two floors.

Freight-Car Erecting-Shop.—This is an annular-shaped building, 92

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feet wide and 408 feet diameter over outer brick walls. The roof is made of timber, and covered with slate. One half a circle, or 180 degrees, has been built and finished with a brick gable at each end. A louvre provides ample light and ventilation. A central turn-table, 100 feet in diameter, serves the two entrance tracks and the twenty tracks in the building, each of which latter is capable of holding two freight-cars. The large table is capable of accommodating two freight-cars and a switch-engine at once, thus saving a large amount of time and labor. Steam-power will be employed to turn this table, which is of a similar design to the engine turn-table, and with a shallow pit. This shop will employ from 60 to 120 men.

Planing-Mill.—This is a rectangular building 250 feet by 72 feet, with iron Fink roof, covered with slate, and provided with a louvre for additional light and ventilation. The engine-room is 27 feet 6 inches by 16 feet 6 inches, and the boiler-room and shaving-tower 59 feet by 26 feet 6 inches. The engine, made by the Hartford Engineering Company, is 20 inches by 30 inches, and will make 100 revolutions per minute, developing about 150 horse-power. It is supplied by steam from two under-fired Galloway boilers, each 18 feet 5 inches by 7 feet diameter. Shavings and chips conveyed through a tube from the planing-mill will form its fuel, which will be fed automatically by an endless grate. These boilers are made by the Edgemoor Iron Company. The stack is of brick and 120 feet in hight. The planing-mill will employ from 30 to 50 men.

Lumber-Drier.—This building is rectangular in form, and 70 feet by 39 feet 4 inches, with tin roof, and of the well-known form peculiar to the Excelsior & Chicago drier. Exhaust steam from the planing-mill engine will be used for providing the necessary heat.

Steam Heater.—The machine and erecting-shops will be heated by the exhaust steam from the machine-shop engine. The freight-car erecting-shop will be heated by live steam from a special boiler. The planing-mill will be heated by exhaust steam from its engine.

Water Supply.—A thorough system of water supply has been provided in case of fire, and a trained fire brigade will materially add to the general safety of the works.

The wood-working machines of the planing-mill are of the well-known build of Messrs. London, Berry & Orton.

In the afternoon, a special train, provided by the Norfolk & Western Railroad, conveyed the members to the Upland mines of the Crozer Steel and Iron Company, situated near Blue Ridge Springs. These are the mines from which this company will draw a large supply of ore for its new furnace. The ores are expected to yield fully fifty per cent metallic iron in the furnace. In the evening, an elaborate entertainment was provided by the citizens of Roanoke, at the Blue Ridge Springs Hotel.

A session of the Institute was afterward held in the ball-room of the hotel. Mr. J. P. Witherow read an interesting paper on the New Blast-Furnace of the Crozer Steel and Iron Company. The furnace was built under the direction of Messrs. Witherow & Gordon, of Pittsburg, Pa. Building was begun in April, 1882, and finished May 1st, 1883. The furnace was blown in May 28th. The stack is 70 by 16; hearth, 9 feet diameter; tunnel-head, 12 feet 8 inches; columns, 20 feet above hearth-level, below which they extend 2 feet. The shell or casing is 23 feet diameter at bottom, and 19 feet at top. Double bell, 8 feet 4½ inches external diameter, and 4 feet 4 inches internal diameter, operated by a 32-inch by 68-inch air-shaft, provided with safety catch-rods. The tuyeres are seven in number, with 7-inch nozzles placed 5 feet 6 inches above hearth-level. The furnace is provided with three Whitwell fire-brick hot-blast stoves, 18 feet diameter and 70 feet high, each containing over 20,000 square feet of heating surface. The iron chimney draught-stack is 160 feet by 8 feet. There are ten steel flue boilers; and two Weimer blowing-engines, with steam cylinder 42 inches and 4-foot stroke, and blowing cylinder 84 inches with 4-foot stroke, and each capable of blowing 12,000 cubic feet of air per minute. The steam-hoist is the Crane Brothers' pattern. The stock-house is 75 feet by 150 feet, frame; cast-house, 138 feet by 50 feet by 28 feet, brick, with corrugated iron roof. The engine-house is roofed with a sway-bottom iron water-tank 6 feet deep in center. The furnace will have a daily capacity of one hundred tons. The fuel at present used is Connellsville coke; but the future supply will be drawn from the ovens of the Southwest Virginia Improvement Company, at Pocahontas, Va. The flux—which is a dolomitic limestone—is obtained a short distance from the furnace. The ores used are brown hematites, chiefly from the company's Upland mines, near Blue Ridge Springs, and from the Houston mines, in the Cloverdale ore-belt; the average distance of these mines from the furnace being about fourteen miles. The ores will average 50 per cent in the furnace.

At the conclusion of Mr. Witherow's paper, Professor Hitchcock made some remarks on the Geological Position of the Philadelphia Gneisses, which were discussed by Messrs. Frazer, Ashburner, Rand, Chance, and Sanders.

Professor Egleston announced the death of Professor Gruner, of France, an honorary member of the Institute, and gave a short sketch of his life. Mr. Ashburner spoke of the recent death of Mr. James Parke, Jr., of Pittsburg, and moved that the President of the Institute be requested to prepare an obituary notice for the Transactions of the Institute.

Sixty-six members and associates were then elected. The secretary read the following papers by title: Repairs and Improvements at Cedar Point Furnace, Port Henry, N. Y., by T. F. Witherbee, of Port Henry. Leaching of Gold and Silver Ores in the West, by Dr. T. Egleston. The Schwartzkopf Control and Safety Apparatus for Steam Boilers, by C. A. Stetefeldt, of New York City. The Shelf Dry Kiln, by C. A. Stetefeldt. The Coals of Pocahontas, Virginia, by Captain C. R. Boyd. The Treatment of Slimes, by F. G. Coggin, of Lake Linden, Michigan. Boilers and Boiler Settings for Blast-Furnaces, by F. W. Gordon, of Pittsburg, Pa. The Timber of West Virginia, by Professor S. P. Sharples, of Boston. Notes on the Geology of Alabama, communicated by Dr. R. W. Raymond, of New York City. The Langdon Gas-Producer, by N. M. Langdon, of Chester, N. J. Determination of Manganese, by Magnus Troilius, of Philadelphia. The Geologico-Geographical Distribution of the Iron Ores of the Eastern United States, by Professor J. C. Smock, New Brunswick, N. J. Volumetric Determination of Manganese, by Messrs. Beebe, Colby, and Mackintosh, of New York. Russell's Improved Process of Lixiviating Silver Ores, by C. A. Stetefeldt, New York. Copper Rocks of South Mountain, by C. Hanford Henderson, Philadelphia. Notes on the Construction of Chimneys, by P. Barnes, Elgin, Ill.

Resolutions were then passed thanking the different railroad companies and the citizens of Roanoke and Lynchburg for courtesies extended to the Institute; after which, the meeting was declared adjourned.

On Thursday, a trip was made to the Flat-Top coal-fields, going over the New River Division of the Norfolk & Western Railroad, which has just been opened for traffic. This division starts at New River Bridge, and has its present terminus at Pocahontas, the length of the line being 73·9 miles. It follows the valley of New River for a distance of thirty-seven miles, and then turns sharply to the west and follows East River to its head-waters; thence it crosses a summit to the head-waters of the Bluestone, and it follows this river to the mouth of Laurel Creek, where it strikes the edge of the Flat-Top coal-field; thence up Laurel Creek to Pocahontas, where the Southwest Virginia Improvement Company has opened up a magnificent bed of the finest quality of coal—a coal which is the exact counterpart of the *best* of the Clearfield coals in Pennsylvania.

New River is one of the few rivers of the world which flows almost due north. It cuts the mountain ranges at right angles, making many gaps, which exceed the celebrated Delaware Water-Gap in Pennsylvania. The scenery generally is very grand; indeed, it is difficult to imagine any thing more varied and beautiful.

Going up New River, we passed Eggleson's Springs, an old popular Virginia summer resort, now somewhat fallen into decay, but exceedingly beautiful still, with its magnificent rock scenery.

Less than eighteen months ago, what is now the thriving mining town of Pocahontas was a dense forest. In February, 1882, the Southwest Virginia Improvement Company located its coal mines at this point; giving employment, at present, to about 500 men. It has opened up what is known as the No. 3 or Nelson bed of coal, here 12 feet thick. Already some 6200 feet of gangways have been driven, the main drift being 1600 feet long, 9 feet wide, and 9 feet high. The mine will be worked by the double-entry system of mining; pillars 16 feet, and rooms 18 feet. Nine feet of the coal-bed will be worked out in advance, leaving 3 feet in the roof to be taken out when the pillars are drawn. Two hundred bee-hive coke-ovens, 12 feet by 6 feet, have already been built, having a daily capacity of 250 tons of 48-hour coke, and the ground has been laid off to accommodate 500 additional ovens, which will be built whenever the market demands.

The present daily output of coal is 400 tons, and in six months it is expected to be a thousand tons or more, which amount can be doubled in a comparatively short time. Expressions of admiration were heard on all sides, not only as to the fine quality of the coal, and the great thickness of the bed, but also as to the thorough and systematic manner in which the entire developments had been conducted; and to the able and energetic superintendent, Mr. William A. Lathrop, the credit of this belongs.

After an examination of the mines and coke-ovens, we were handsomely entertained with an elaborate lunch provided by the Southwest Virginia Improvement Company. The banquet-room was tastefully decorated and festooned with evergreens and flowers; and above the door, worked in flowers, were the words, "Welcome, ye Sons of Science!" The occasion was a very happy one, and every one fully appreciated the good things so bountifully supplied.

Our next point was Wytheville, where we spent the night. Some of our number were the guests of the citizens of Wytheville at their private residences; but the majority found comfortable accommodations at Boyd's Hotel. Here we found ourselves the guests of Colonel Boyd, and right royally did he entertain us.

Next morning (Friday), an early start was made for Cranberry. What member of the Institute had not heard of Cranberry before? A special train, on this as on other occasions kindly provided by the Norfolk & Western Railroad, took us over the Norfolk & Western Railroad, and the East Tennessee, Virginia & Georgia Railroad to Johnson City, Tenn., where we found another train, composed chiefly of observation-cars, waiting to convey us to Cranberry. The Cranberry mine, the property of the Cranberry Coal and Iron Company, is located on the north slope of Hump Mountain, Mitchell County, N. C. The mine is reached by the East Tennessee & Western North Carolina Railroad—a narrow-gauge road 3 feet wide, with 40-pound iron rails—34 miles east from Johnson City. The heaviest curves on the railroad are 18 degrees; and the heaviest grade, going east, 150 feet to the mile for two miles, and, going west, 80 feet to the mile for a short distance. The railroad follows first the Watauga River and then the Doe to its head-waters. The scenery is magnificent, and beggars description. At the mine, the elevation is 1500 feet above Johnson City and 3250 feet above tide. The mine is worked by tunnel which goes through gneiss rock, etc., for 220 feet, and then through hornblende and associated minerals to ore. Five or six machine drills are in operation, worked by compressed air. The daily output of the mine is at present 140 tons, and from ten to twelve thousand tons of ore have already been mined, a large proportion of which has been shipped to furnaces in the Lehigh Valley of Pennsylvania. The ore appears to be of good quality, and will doubtless make a first-class Bessemer pig-iron; for all the analyses show it to be comparatively free from phosphorus.

We returned to Roanoke in the evening, greatly delighted with our trip. This ended the regular programme. On Saturday, many of the members availed themselves of the courtesies extended by the Shenandoah Valley Railroad to visit the Natural Bridge and the Luray Caverns; while others accepted the hospitalities of the iron-masters of Wythe County, and visited the famous Cripple Creek ore-belt.

It is the unanimous verdict that the Roanoke Meeting has been a grand success. Never before perhaps in the history of the Institute have the members received a more cordial welcome or been more handsomely entertained.

To the members of the local committees and to the citizens of Roanoke we were indebted, not only for the dinner tendered us at Blue Ridge Springs, but also for numerous lunches (I might almost say a perpetual lunch) furnished on the cars during our excursions, and for their unceasing efforts to make our visit agreeable.

The great kindnesses received by every one will doubtless be the means of keeping the memory of the Roanoke Meeting as ever-green as were the decorations at Pocahontas.

ROANOKE, VA., June 9.

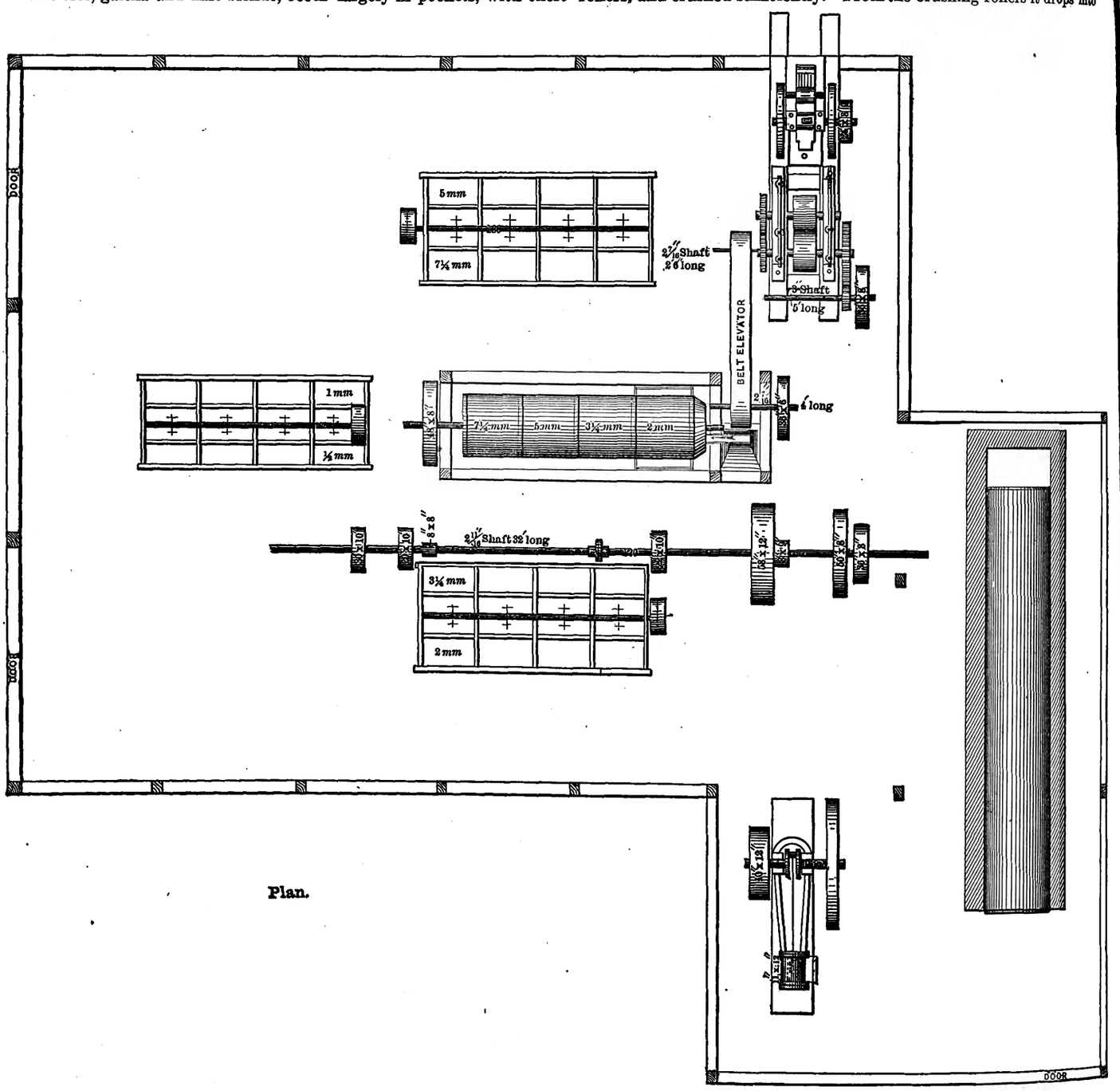
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THE CONCENTRATING MILL AT THE O'NEIL MINES, GALENA, KANSAS.

Referring to the "Concentrating of Ores in Southwest Missouri," published in No. 15, Vol. XXXV., page 207, of this JOURNAL, we now give our readers a description and sketch of one of the numerous small and cheap concentrating-works erected in the last few years in the lead and zinc region of Southwest Missouri and Southeastern Kansas, by the Fort Scott Foundry and Machine-Works of Fort Scott, Kansas. These works were constructed and erected under the superintendence of F. de Stwolinski in charge of their mining department.

The concentrator herein described is situated at the O'Neil mines, formerly the Stanley mines, three miles from the town of Galena, Cherokee County, Kansas.

The ores, galena and zinc-blende, occur largely in pockets, with chert and lime-rock. The raw ore has an average of from five to six per cent of galena, and from twenty to twenty-five per cent of zinc-blende.



Plan.

The building for the concentrator is 35 feet wide, 44 feet long, and 16 feet in scantling. The boiler and engine are in a small outbuilding, and are inclosed and covered by an extension of the roof of the main building.

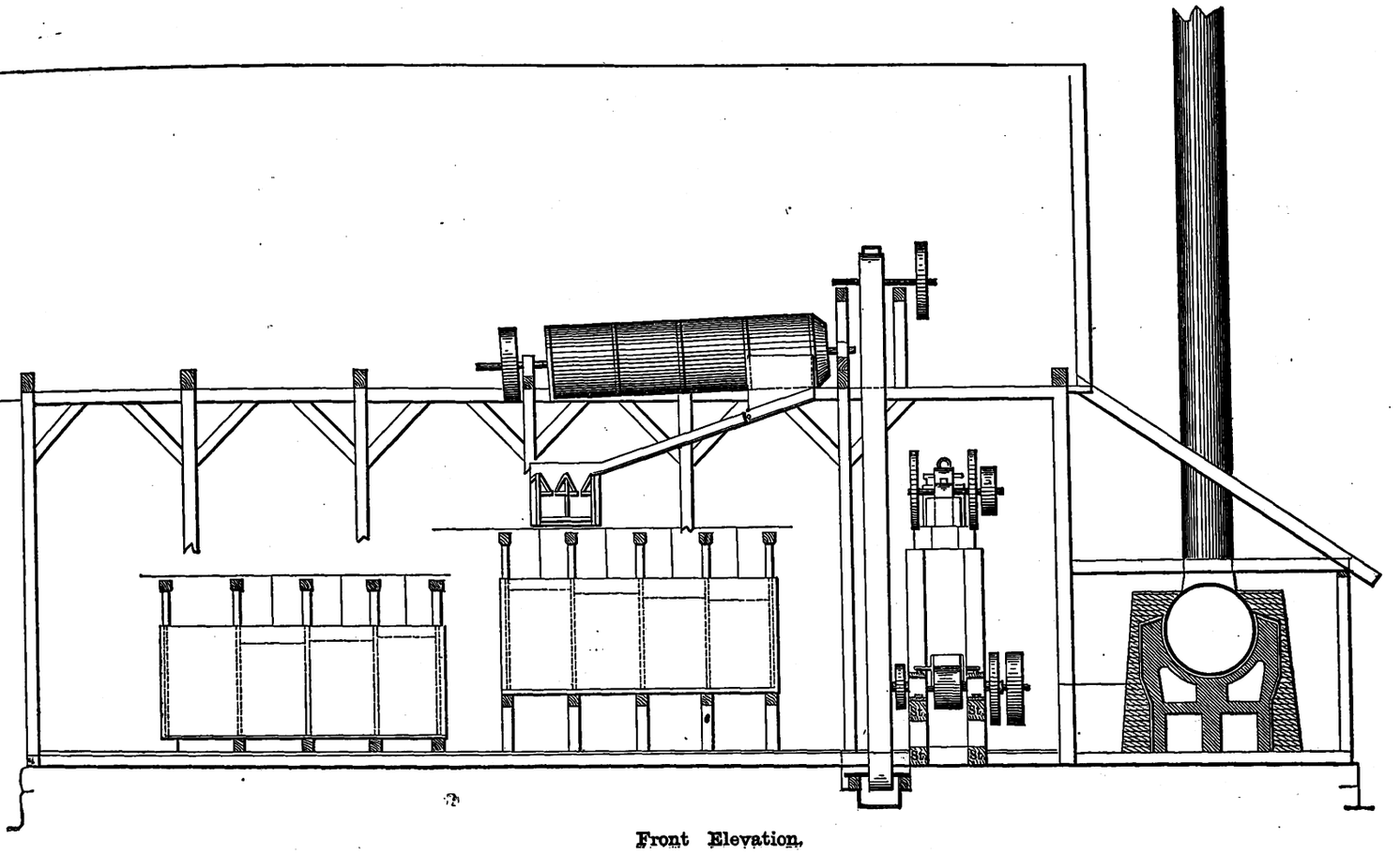
The machinery consists of an improved Blake breaker, 7 by 10 inches opening, one set of crushing-rollers 20 inches in diameter and 14-inch face. The tires on the rollers are of very hard chilled iron, and so arranged on their cores that they can be easily replaced when worn out. The springs used are of rubber. The mill contains one elevator, with 12-inch belt; one revolving sizing-screen, having four sections, each 2½ feet long and 3 feet in diameter, made of Juniata sheet-iron and perforated with holes 2 millimeters, 3½ millimeters, 5 millimeters, and 7 millimeters; one hydraulic classifier, having two sections; and three double jig-machines, each having eight sieves, four on each side of the box, and forming two complete four-sieved jigs. The sieves on two of these double jig-machines, used for 2 millimeters, 3½ millimeters, 5 millimeters, and 7¼ millimeters, are 18 inches by 32 inches. The sieves for treatment of fine stuff are 16 inches by 32 inches. The sieve proper consists of a wooden net-shaped frame covered with No. 10 and No. 15 copper wire clothing. The jig-machine for 2 millimeters, 3½ millimeters, 5 millimeters, and 7¼ millimeters has side discharge (Rittinger) 4 inches square, and bridge regulated by a movable slide. The jigs for fine stuff, 1 and ¼ millimeters, have bottom discharge. The jig-machine for the coarser stuff furnishing the most mixed stuff for recrushing is placed so high that it can spout this stuff to the crushing-rollers.

The motive power consists of a direct line, double balance crank, horizontal engine with cylinders 11 inches in diameter and 12-inch stroke. A 35 horse-power boiler is provided to furnish steam for the engine, and a No. 5 Cameron pump lifting water from the creek to a tank near the concentrator, to supply the boiler and machinery with the necessary water.

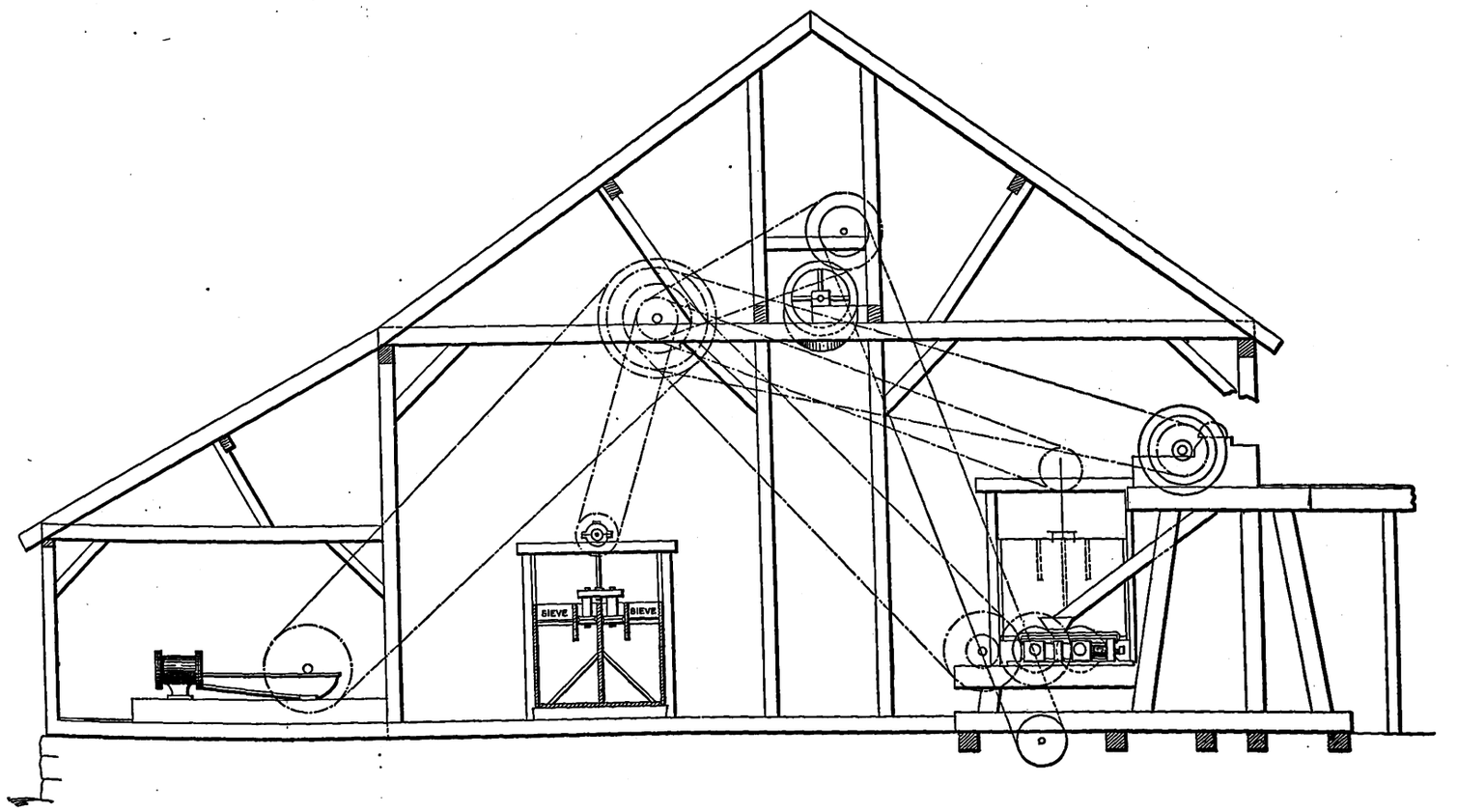
The raw ore is dumped on a platform in front of the Blake breaker, by which it is broken in pieces of one inch and less, spouted to the crushing-rollers, and crushed sufficiently. From the crushing-rollers it drops into the elevator, and is lifted to the revolving sizing-screen. The screen divides the crushed stuff into 2, 3½, 5, and 7¼ millimeters. The stuff larger than 7¼ millimeters is returned by a spout to the crushing-rollers, and the 2 millimeters and less is subdivided by the hydraulic classifier into three grades, 2, 1, ¼ millimeters. The 5 and 7¼ millimeters is spouted from the screen to the double jig-machine near the crushing-rollers; the 2 and 3½ millimeters to the one opposite; and the fine stuff, 1 and ¼ millimeters, to the jig on the end part of the building. Each of these six sizes has for its separation four sieves, having a jigging surface of 16 square feet.

The first sieve of the jig-machine discharges very clean galena; the second sieve, galena and zinc-blende mixed; the third sieve, clean zinc ore; the fourth sieve, zinc ore and rock; and the overflow is clean rock. The galena drops from the discharge into boxes; the clean zinc ore from both sides of the jig is spouted to small cars on the end of jigs; and the tailings are spouted to the outside of the building.

The capacity of these works is sixty-five tons per twenty-four hours. The force to run it is one hand feeding the Blake breaker, one hand attending to the jigs, and one hand for removing the clean product to the outside—a total of three hands for one shift. The cost of all the machinery complete, including engine and boiler, was only $5200.



Front Elevation.



Side Elevation.

THE CONCENTRATING MILL AT THE O'NEIL MINES, GALENA, KANSAS.

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CORRESPONDENCE.

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Mr. Arents and the Stetefeldt Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. A. Arents, of Alameda, Cal., has written a report upon the metallurgical treatment of the ores from the Mount Cory mine, Esmeralda County, Nev., which contains such valuable generalizations as to certain combinations of machinery and processes that they should become generally known. The crushing of the ore is to be done by Krom's steel rolls; and for extracting the silver, lixiviation with hyposulphite solution will be adopted. As the most important point to be settled, there remained the selection of the roasting-furnace. Let us see how Mr. Arents disposes of this question. He says:

"For roasting in a Stetefeldt furnace, and subsequent amalgamation, or amalgamation in any case, finely-divided pulp is required; while for purposes of leaching, a coarse material is just as good, and even preferable, for which reason stamps, Stetefeldt furnace, and amalgamating pans should go together, and rolls, cylindrical roasting-furnaces, and leaching-tubs also."

After speaking of the cylinder furnaces at the Geddes & Bertrand mill, Nevada, he says:

"A Stetefeldt furnace of the same capacity these four furnaces possess will use about 5 cords of wood, 5 per cent of salt, and 3 men in 8-hour shifts in the twenty-four hours, the Stetefeldt furnace not requiring any power to drive it, except the elevator and screen, which is very little compared with the power to drive these four furnaces, each of which requires from 4 to 6 horse-power all the time. All these facts speak in favor of the Stetefeldt furnace. But, at the same time, the Stetefeldt furnace requires finely-divided pulp, and to obtain it stamps are necessary, while stamps are certainly more expensive in every way than rolls; and, after roasting such fine pulp, amalgamation must follow, which again is in every respect more expensive than leaching."

These sentences seem to possess the ring of good coin, and may be taken as good law even by professional metallurgists, who have a limited experience only in this direction. I am myself a strong advocate of rolls versus stamps, and put my opinion in print before the success of Krom's rolls was established at the Geddes & Bertrand mill. I am also very enthusiastic about lixiviation, and have advised its introduction in the new Ontario mill in place of amalgamation. The results of the remarkable experiments which Mr. E. H. Russell has carried out at the Ontario mill with his new lixiviation process will be published shortly by myself.

So far, the conclusions of Mr. Arents have my earnest support. When, however, he proceeds to wipe the Stetefeldt furnace out of existence with a stroke of his pen, it is only fair that I should be granted a hearing because the good coin which he offers may be, after all, nothing but counterfeit.

Mr. Arents has made quite a reputation as a smelter, and he is well known as the inventor of the so-called siphon-tap for lead furnaces. His milling experience has been confined to the running of a tailings-mill in Dayton, Nev. With the Stetefeldt furnace he has had no experience whatever, and does not know what it can do, or what it can not do. In such a case, a man is easily misled, if he allows his fancy to formulate general laws.

Now, what are the facts in the case? A full discussion of this question would require more space than is at my disposal, and I can consider only the principal points.

The fineness to which an ore has to be pulverized for a complete roasting, preparatory to amalgamation or lixiviation, depends principally on the manner in which the silver-bearing minerals occur in the gangue. If the minerals are finely disseminated in a hard quartz, crushing as fine as No. 60 screen may be necessary. For ores of granular structure, much coarser screens can be successfully used. The limit in each case must be found by experiment. For amalgamation, this limit is fixed by the settler. The settler will not operate with coarser material than is produced by crushing in a battery through No. 30 screen. In order to convey a better idea of what this really means, I will state that if pulp crushed through No. 30 is sifted by hand through a No. 40 screen, only from 8 to 10 per cent of the ore does not pass this screen. At the Ontario, I had some ore crushed through No. 20 screens. Of this pulp, 13·8 per cent remained on a No. 40 screen. In this case, there was a marked difference between the value of the coarse and fine portions of the ore, the latter assaying 80 ounces, and the former only 30·2 ounces in silver per ton. At the Lexington mill, Butte, Montana, the difference between the fine and coarse portions was by no means so marked. In former times, No. 80 and No. 60 screens were used in dry-crushing silver mills. The wrong idea prevailed, that the results of amalgamation would be thereby improved. This idea was an inheritance from raw amalgamation, where the ore is finely ground in the pan. It was also an inheritance from the Freiberg barrel amalgamation, where the roasted ore was bolted. In this case, the bolting was done to get a pulp of uniform consistency in the barrel. The amount of water used in barrel amalgamation is hardly sufficient to bring all the soluble salts of the charge into solution. Hence any lumps in the roasted ore would not soften, and their silver remain unextracted. This is also the case, to a certain extent, in pan amalgamation. I have drawn attention to this fact in my article on the Lexington mill, which explains why chloride of silver is found in tailings.

The low capacity of the battery with fine screens stimulated to try coarser crushing, and No. 40 screens came into general use. For a long time, nobody dared to go farther. Finally No. 30 was given a trial with good results, and is now generally adopted. All attempts to go still farther have failed, on account of the impossibility of working heavy sands out of the settlers without losing quicksilver. Only recently a No. 26 screen was used at the Ontario, but had to be abandoned for the reasons stated above.

While there exists a mechanical limit in the coarseness of crushing for amalgamation, there exists none if lixiviation is used. Here it simply becomes a question how coarse can the crushing be done to get a perfect roasting, because those particles of mineral which have been reached by the roasting can, undoubtedly, also be reached by the solutions used for the extraction of the silver. If we closely analyze the two rules of Mr. Arents, and the explanations accompanying them, by which metallurgists are to be guided in the future, we have the following propositions: 1st. The Krom rolls can not produce pulp the principal percentage of which will pass through a No. 40 screen. Mr. Arents excludes the combination of rolls and amalgamation, and distinctly states that to obtain such pulp stamps only can be used. 2d. Finely-divided pulp is essential for amalgamation. This statement is somewhat loose, since Mr. Arents does not give the size of screen. But it is evident he meant that for amalgamation a large percentage of the ore should be in that fine condition which approaches dust, and is produced largely by stamps, and much less by rolls. 3d. Ore crushed by stamps and roasted in a Stetefeldt furnace must be amalgamated, and can not be worked by lixiviation. 4th. The Stetefeldt furnace can not roast ore which is crushed by rolls, since it can treat finely-divided pulp only. This statement is also loose, but, most likely, intended to convey the same meaning as in the second proposition.

Let us examine these propositions in detail.

1st. Regarding the first one, I beg to refer to a correspondence from Mr. Krom, who knows best what his rolls can do:

C. A. STETEFELDT, M.E.:

DEAR SIR: In answer to your inquiry in relation to the capacity of my steel rollers for producing pulp which will pass through a No. 40 wire screen, or finer, I have to say that there is no more difficulty in crushing fine with rollers than with stamps. The difference is, however, in favor of rollers for producing fine pulp. The fineness to which the ore is crushed in either case limits the capacity. For example, we have demonstrated that two sets of 26-inch steel rollers are equal to about 50 stamps, say of 750 pounds each, whether the ore is crushed fine or coarse. The amount of fine dust produced by rollers is not so great as when the ore is crushed by stamps. At the Austin mill, I found that crushing with rollers through a No. 16 mesh screen there was produced 16 per cent of fine pulp, which passed through a No. 100 screen. One half of this went into the dust-chamber as floating dust. Yours very truly, S. R. KROM.

2d. If Mr. Arents is of the opinion that finely-divided pulp is essential, or even beneficial for amalgamation of roasted ores, he is very much mistaken. The fine dust which is drawn from the dust-chambers of a Stetefeldt furnace, if amalgamated by itself, gives results far below its chlorination. There is a good opportunity at the Ontario mill to observe this fact. The dust escaping from the battery is collected in a long flue, which can only be cleaned when the battery stops. As many as 30 tons of dust accumulate in this way, and have to be roasted by themselves when the mill is to be shut down. Although well chloridized, this dust yields in amalgamation only from 75 to 80 per cent of its silver, the regular mill work being from 89 to 92 per cent. The crushing at the Ontario was formerly done through No. 40 screens. A change to No. 30 produced no detrimental effect. Recently the No. 30 screens were replaced by No. 26 screens. Mr. Russell has averaged the mill work for two weeks prior to the change, during the change, and for two weeks after it, with the following results:

	Furnace No. 1.	Furnace No. 2.
Using No. 30 screen.....	89·8 per cent.	89 7 per cent.
" No. 26 "	90·0 "	91·1 "
" No. 30 "	90·4 "	90·2 "

If these results prove any thing, they prove that coarse crushing is rather beneficial than injurious to amalgamation. Most decidedly, it is not essential. At the Lexington, the ore coming from the battery was passed through a Krom revolving screen with No. 40 wire-cloth, and about 10 per cent of coarse material was returned to the battery for recrushing. It was done as an experiment, and also to relieve the settlers. The returning of the coarse material to the battery proved to be inconvenient, disturbing the action of the self-feeders, and Mr. Wartenweiler provided the Krom screen with No. 30 wire-cloth. No increase in the value of the tailings was observed, and the amalgamation of the silver has averaged, from December 1st to April 1st, 90·6 per cent.

At the Panamint mill, I tried crushing through No. 20 screen, without lowering the results of amalgamation, but could not continue to use it on account of settler work.

3d. That ore crushed by stamps and ore roasted in a Stetefeldt furnace can not be worked by lixiviation is a most remarkable statement. Since Mr. Arents seems to be satisfied that ore crushed by stamps can be well roasted in a Stetefeldt furnace provided the pulp is finely divided, he refers, no doubt, to the mechanical difficulties of lixiviation merely. Here again he imagines that he has to deal, principally, with impalpable dust, which would prevent filtering of the solutions. Very likely he is also entirely ignorant of the fact that nearly all the dry-crushing silver mills now use No. 30 screens on the battery, as we have stated above. But we have an array of facts which flatly contradict his assumption. Mr. Russell's lixiviation experiments at the Ontario mill, which have been conducted on a working scale with charges of 2 tons in one tank, have met with no mechanical difficulties whatsoever. The solutions pass freely through a charge 30 inches in depth. Forty tons of Ontario ore extracted by lixiviation yielded 92·6 per cent of the silver, when amalgamation, at the time these experiments were made, extracted only 90·2 per cent. It will be of importance to state that the character of Ontario ore is by no means very favorable for the mechanical part of lixiviation, since it contains about 25 per cent of clay.

Mr. Arents should also be aware of the fact that O. Hoffman has successfully leached the ores from the Silver King mine in Arizona, and that lixiviation is in use at the Barranca mine and others in Sonora, Mexico. In both cases, the ore is crushed by stamps. In the first case, the roasting was accomplished in cylinder furnaces; in the second case, in reverberatory furnaces.

4th. We now come to the most important proposition, namely, that the Stetefeldt furnace can not roast ore which is crushed by rolls, since it requires finely-divided pulp.

We have stated before that for a certain ore there exists a limit of coarseness in crushing in order to obtain a good roasting. This limit, in

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particular cases, has not been reached with the Stetefeldt furnace, because, wherever this furnace has so far been used, amalgamation follows the roasting. We have also stated that the limit is fixed by the capacity of the settler to deal with coarse material. Neither are there facts extant as to this limit, if the roasting is done by furnaces which roast the ore in charges, and not by a continuous process. Taking it for granted that this limit is sooner reached by the Stetefeldt furnace than with the reverberatory or cylinder-furnace, it becomes a question of economy to which furnace preference should be given. Now of the different operations through which the ore has to pass, the crushing is the least costly, and the roasting the most expensive.

It is also evident that, if we approach the limit of crushing for periodically working furnaces, the charge will have to be kept a longer time in the furnace to effect a complete roasting of the coarser particles. If this was not the case, why, for instance, would it be necessary, at Mansfeld, to pulverize the copper matte so fine for the Ziervogel process that it will pass a No. 32 wire screen? Here, too, leaching follows the roasting. Hence, with coarser crushing, we need a more extensive furnace plant, and augment the cost of roasting. Mr. Arents himself puts considerable stress on the economical working of the Stetefeldt furnace as compared with the cylindrical furnaces. After all, the two limits can not be very far apart, and a slight increase in the cost of crushing and a considerable saving in the expense of roasting must be considered as the only true economy.

Old statistics on the working of the Stetefeldt furnace have created the impression that the dust is better chloridized than coarser portions of the ore. Those statistics came from mills where the roasted ore is immediately cooled after discharging, and not "banked up" and left in red-hot state for twelve hours on the cooling-floor, as done in the Ontario and Lexington mills. For some ores, this treatment is not essential, and, in fact, the older mills had no facilities for doing it. Other ores are so materially benefited thereby that differences in chlorination as high as 45 per cent may occur if chlorination tests are made, taken immediately after discharging, or after the ore has been left for twelve hours on the cooling-floor. The dust-chambers are not discharged frequently, and the last ones may be left undisturbed for a week. Consequently, the ore in these chambers has already gone through the "banking-up" process by the time it is discharged. If, in the cases to which reference is made above, the ore from the shaft had been left for twelve hours on the cooling-floor, and then sampled, the chlorination would have been several per cent higher, and above that of the dust.

That coarser crushing does not deteriorate the work done by the Stetefeldt furnace is partly shown in answering the second proposition of Mr. Arents. But some more facts will be adduced here. When the experiment of crushing through No. 26 screen was made at the Ontario, the chlorination tests with Mr. Russell's improved lixiviation process gave the following results:

	Furnace No. 1.	Furnace No. 2.
Using No. 30 screen	92·2 per cent.	92·4 per cent.
" No. 26 "	92·8 "	93.0 "
" No. 30 "	92·3 "	92·5 "

In reference to these experiments, Mr. Russell writes to me: "I think the Stetefeldt furnace would chloridize as well ore crushed with No. 20 screen as with No. 30 screen on the battery."

Mr. Russell also made the following experiment. A number of cars of roasted ore drawn from the shaft, return-flue, and dust-chambers of the Stetefeldt furnace were sampled immediately after discharging, and subjected to Russell's lixiviation test:

	Silver extracted.
Roasted ore from shaft	93·2 per cent.
" " return-flue	91·8 "
" " dust-chambers	91·4 "

Further comment is unnecessary.

The supposition that the Stetefeldt furnace requires finely-divided pulp is entirely refuted.

If Mr. Arents wants any of my statements verified, he will please address the proper parties to whom I refer. He also will oblige me by a reply.

C. A. STETEFELDT.

24 CLIFF STREET, NEW YORK CITY.

OFFICIAL STATEMENTS AND REPORTS.

THE RAY COPPER COMPANY, MINERAL CREEK, ARIZONA.

The Ray Copper Company, of which George H. Sargent, of New York, is president, and Louis Zeckendorf, secretary and treasurer, is a company recently incorporated under the laws of the State of New York, with a capital of $5,000,000 divided into 500,000 $10 shares, of which 125,000 shares have been reserved to provide a working fund. Under date of December 20th, 1882, Col. John M. Haskell reports on the property, which is located in the Mineral Creek District, Pinal County, Arizona, and embraces seventeen mining claims, a furnace rated at 30 tons, water-right, etc. There are two groups of mines, the first the Ray group, on one vein, reported to be of great width and carrying large bodies of rich copper ores. Mr. Haskell figures out over 2000 tons of ingot copper in one block, 150 feet long and 50 feet in depth. Some development-work has been done on it. The ore carries principally native copper, and it is proposed to crush and wash it. The second group of mines, including the Bilk, Scorpion, and Munroe, are narrow veins, but little developed, carrying carbonate smelting ores. They and a number of prospects are estimated to have 3000 tons of 20 per cent ore in sight, and the work of putting them through the smelters is to be begun at once.

AN OLD ENGINEER DEAD.—On the 11th of June, Calvin Briggs, who fired the first coal-burning engine, the Phœnix, on its first trip over the Long Island Railroad, and who is said to have run an engine more miles without repairs than any other engineer, died suddenly at Greenbush. The original cause of his death was an injury received in a steamboat explosion thirteen years ago.

THE CLEVELAND MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The arrival of increasing numbers of mechanical engineers during Monday and Tuesday made the appearance of the blue badge of membership more and more frequent at the head-quarters of the society, the Forest City House; and at the opening session of the society, the rooms of the Vocal Society at the City Hall were completely filled, fully one hundred ladies and gentlemen being present.

Mr. J. F. Holloway, Chairman of the Local Committee, introduced Mayor Farley, who, in behalf of the citizens of Cleveland, welcomed the society. Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass., President of the Society, made a brief reply, in which he dwelt upon the beauty of the city, and then called upon Mr. J. F. Holloway, of Cleveland, President of the Cuyahoga Steam Furnace Company, for his paper on

THE MARINE ENGINES ON THE LAKES, AND A DEVICE FOR GETTING THEM OFF THE DEAD-CENTERS,

in which he sketched the history of the development of the marine engines of the lakes. The carrying capacity of the vessels has been largely increased, and the peculiarities of the navigation of the lakes have made it necessary to obtain this mainly by adding to their length and beam, rather than by increasing their depth of hold. Since the strength of a hull is largely dependent upon the depth of its sides, and since the overhead arches, formerly used, have been found of late years to interfere with loading iron ore and lumber, the difficulty now is to build a hull that shall be strong enough to carry, in addition to its own cargo, the power required for its own propulsion, as well as the power required to tow one or two vessels of the same tonnage behind it. One of the results of putting such powerful machinery into hulls of this description is, that the hull, being long and comparatively shallow, lacks vertical stiffness. It readily responds to the pulsations of the engine, until, at certain speeds, where the number of strokes comes into unison with what might be termed the time of vibration of the hull, due to its weakness, the shaking becomes a very serious matter. While this is true of an engine having a single crank, the use of engines having double cranks placed at right angles does not in the least help the matter; for not only are cranks so placed much more difficult to balance, but they have, in addition to the up-and-down motion, another motion which may be called an *athwartship* motion. When the crank-pins of such an engine are both on one side of the main shaft, they produce a severe side-thrust upon the main journal-bearing, opposite them, which tends to push it sidewise. This side strain, on the return-stroke of the piston, is of course transferred to the other side of the journal-box, and thus these alternating side-thrusts, added to and merging into the up-and-down motions, combine and form a sinuous motion much more destructive to the hull than the simple up-and-down motion first referred to. Of course, these difficulties are increased when the engines are to any extent unbalanced, experience having shown that, the better all engines are balanced, the less will be their influence upon the hull. The first successful attempt to overcome this vibratory action of the engine upon the hull was made in the construction of the steamship Amazon, which was built in the year 1873. The hull of this vessel was in some respects peculiar: it was 240 feet long, 40 feet beam, and 20 feet depth of hold. She was propelled by twin screws, and had two stern-posts, and was built without overhead arches. Each wheel was driven by a pair of fore-and-aft compound engines; but the cranks, instead of being placed, as usual, at right angles with each other, were placed so as to bring the crank-pins directly opposite each other. These engines made, ordinarily, 75 revolutions per minute, and so well was the labor divided between the two cylinders, and so carefully had the reciprocating parts of the engine been balanced, that the main shaft, instead of being first pounded down on the bottom of the journal and then against its cap, seemed to be almost suspended in the air. The result was, that there were no vibratory motions to be transferred to the hull, and it was almost impossible to tell, when standing on the bow of the boat, whether the engines were in motion or not. As a better evidence still of the value of this arrangement of the crank-shafts of a marine engine, there is an instance of a large propeller built recently, which had a pair of fore-and-aft compound engines, coupled to the main shaft in the usual way by cranks placed at right angles with each other. While the construction of the hull of this propeller differed in no way, either as to its shape or strength, from boats as usually built, it was so severely shaken by the machinery during the first season it was in commission, that it was very evident to the owner as well as the crew that it could not long endure such usage. At the close of navigation, the cranks upon the main shaft were so changed as to bring the crank-pins directly opposite to each other, and the result was, that the hull no longer suffered from any motion of the engine.

Vessels heavily laden are now obliged to move slowly and with great caution while entering or leaving port, and the frequency with which the engines are made to stop, start, back, or go ahead, renders them quite liable to "catch on the center." Owing to the crowded condition of the ports, and the numerous bridges to be passed, if an engine is thus, even for a brief time, disabled, there is great danger lest the vessel shall do or receive serious damage before the engine can be started "off its center," in the usual way—the usual way being to hunt up an assistant or a fireman and send him below slowly to pinch over the crank-wheel, with a pinch-bar—an operation not only slow, but also dangerous. Mr. Holloway describes the device which he has successfully employed for starting the engine off its center as follows:

It consists of a short-stroke steam cylinder, located in the hold of the vessel, and alongside of the propeller shaft. I place it at the point where the in-board and out-board shafts are coupled together, as the rim of the coupling is very convenient for carrying a portion of the machinery. I place on the coupling-flange or on the shaft a wheel having on its face a series of V friction-grooves. Opposite to this friction-wheel, I place either a short segment of a wheel, or a short straight block of iron, which has upon its face a series of V friction-grooves corresponding to those on the wheel. This block or segment, as may be most convenient to be used, is connected directly with the piston-rod of the short-stroke steam cylinder; and it is also so arranged that it may be made to move toward

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the friction-wheel, and to come in close contact with it, by means of an eccentric journal, or a similar device.

Now, if in working the main engine forward or back, it becomes caught upon either the upper or lower center, the valve-gear of the engine may be set for turning the engine in the direction wanted, and the throttle-valve may be opened so as to admit steam on the piston if desired. Now, if the block or segment of the starting engine be brought in close contact with the friction-wheel on the propeller shaft, and steam then be admitted to the piston of the starting engine, the friction-wheel and the shaft to which it is attached will be turned a distance equal to the length of the segment or the block. This distance is regulated by the length of stroke of the cylinder of the starting engine, and will be just enough to throw the crank "off the center."

The main engine will move off at once, having already had its valve gear placed in position, with the throttle-valve open; while the starting engine has pulled or pushed the segment or block out of gear with the friction-wheel, and of course out of the way, without any further attention from the engineer. The handles for bringing the block or segment into gear with the friction-wheel, as well as the handle for admitting steam to either side of the piston of the starting engine, will both be placed conveniently near to where the engineer stands while working the main engines. He is not obliged to leave his place to work the starting engine.

The starting engine is designed to work either way, and to turn the engine off either center. If, when it is required for use, the piston should happen to be at the wrong end of the cylinder, the engineer will move the block or segment back from contact with the friction-wheel, will make one stroke of the piston without touching the wheel, and will then move the segment or block back in contact again, when the starting engine will be ready to turn the propeller shaft in the direction wanted. This is done with but a very slight loss of time, and without any necessity for calling upon any one for assistance.

The next paper was by Mr. Howell Green, of Jeanesville, Pa., on

THE HISTORY AND DEVELOPMENT OF THE WINDING AND PUMPING MACHINERY OF THE ANTHRACITE COAL REGIONS.

The anthracite coal-beds of Pennsylvania (some 15 in number)—classified by the color of the ash—may be divided into four groups. The uppermost group is red ash; the second, gray ash; the third, white ash; and the fourth, or lowest group, is, again red ash. This color of the ashes might seem more of a chemical than a mechanical question; but as it is a tolerably sure criterion of the condition of the water in the mine, as well as of the burning properties of the coal, it was early noticed.

These beds of coal lie at every possible inclination to the horizon, dipping under the surface over 2000 feet (say 1000 feet below the level of the sea), and running up mountains hundreds of feet above the beds of adjacent streams.

The first coal was mined where it was most easily got at, so that in the earlier days of the trade (which commenced about 1820), only drifts or tunnels above water-level, and strippings near the surface, were used to get the coal.

Soon the requirements of the market made it necessary to go into the depths of the earth for coal, and means had to be provided to hoist the same, and to keep the mine clear of water.

The soil in the coal regions is poor; and before mining began, population was sparse, the few inhabitants combining hunting, fishing, farming, and lumbering in about equal proportions for a livelihood.

On the influx of strangers, who thronged to the newly-opened mines, among others there came miners and engineers from England, Scotland, Wales, and Germany, who had seen mining machinery and appliances at home; and here in the new world they constructed engines and pumps. Native ingenuity and the absolute necessities of the situation prompted men to plan and build the contrivances to win the coal. Money and enthusiasm lent their powerful aid, and the ever-increasing sum of human knowledge has made it possible to show, in the last number of the series of mining plants, very handsome examples of the mechanical engineering of the anthracite coal regions. The progress is shown in that series from first to last. Some of the early members are yet standing, in obedience to the old law of the survival of the fittest; while many of them kindly (though sometimes unkindly) have been consigned to the cupola and heating furnace, where have been transmuted so many darling creations.

Very early in the progress of mining below water-level, it was seen that means had to be provided to hoist from 300 to 400 feet at one lift, so as to get space for breasts, to work the coal profitably; and the quantity of water to be raised was found to run into hundreds of gallons per minute. From the first, both slopes and shafts were used. The mine-cars in the anthracite regions have always been large, starting in the early days at about 40 cubic feet capacity, and standing now at about 96 feet. The wheels of the cars have been from 12 to 20 inches diameter; 18 inches is now most generally used. The axles have been from 2 to 2¾ inches diameter. The gauge of the mine railroads varies from 30 inches to 48 inches; in a few cases, it is 4 feet 8½ inches. At first, chains were used for hoisting, and some of the early shafts had hemp ropes. Flat chains, or rather, three chains side by side, with alternate large and small links, and with blocks of wood through the large link, were tried. These flat chains were wound on flanged spools like a ribbon. Iron and steel bands were used, but the conclusion of the greatest number now is to use iron-wire round ropes. Not that iron-wire ropes are better than steel-wire ropes; but questions of endurance, cost, etc., in relation to wear and weight and work in acid water, have rather been against steel-wire ropes. In a shaft, no rope rollers are used, but on a slope—particularly one with varying pitches—the question of a roller to protect the rope is most important. While it has been a vexed question, yet after trials of hundreds of forms and many kinds of material, it seems to be considered that a hardwood roller about eight inches diameter, truly turned, and kept clean and clear, is the best for ordinary strains. It was soon found out, in using wire ropes, that the life of the rope was much lengthened by making the drums and sheaves of large diameter; the rope must spring around the drums and sheaves, and spring back, and not receive a permanent set.

The first steam-engines used for hoisting anthracite coal and pumping the water (and at first they combined both duties) were single high-pressure engines, with flat bed-plates bolted on wood frames. The steam cylinder would be perhaps 18 inches diameter, with 6-foot stroke. A cast-iron crank-shaft, with perhaps a 10-inch journal, carried the heavy fly-wheel. On the crank-shaft, there was a pinion 30 inches diameter, of 8 inches pitch and 12 inches face, which geared into a drum-wheel 60 inches diameter, which was just above the pinion. Just under the pinion, was the pumping-wheel, 8 feet diameter; this pumping-wheel had holes in it to receive a pin for working the pump. The drum-shaft was of cast-iron, with perhaps an 8-inch journal; its body, as that of most all other shafts then, was octagonal, and the drum-wheel spiders and almost every thing else were staked and keyed on by the methods of the old millwrights. The drum was from 5 to 8 feet diameter, and about 11 feet long, and was formed of hardwood laggings bolted on spiders. To wind a car 400 feet with a 5-foot drum, the engine would have to make about 48 revolutions, which it was made to do in about one minute. The pumping-shaft was also of cast-iron, with perhaps 11-inch journals; and the drum-shaft was lifted in and out of gear by a strong wooden lever, one of the pillow-blocks being hinged for that purpose. The pump was, of course, near the bottom of the mine, perhaps 400 feet away. It was a lifting-pump, 16-inches bore, 7-foot stroke, fitted with a bucket faced with sole-leather, the rod of which went through a stuffing-box in a goose-neck or turn-piece. Up the slope or shaft went a wooden rod, 8 inches square, carried on flanged rollers. The rod was spliced with plates 4 inches by five eighths of an inch by 10 feet, and on top of the slope or shaft were one or more rocking bobs, provided with great balance-boxes.

The rods connecting the balance-bobs to the wheel were 8 inches by 16 inches, and were provided with suitable straps, etc.

The valve-gear of this engine consisted of two eccentrics and rods with hooks on the ends, which the engine-man lifted in and out of gear with his feet, thus leaving his hands free for full control of the slide-valve, which he operated with a long bar. He regulated the quantity of steam for the engine by a throttle of the stovepipe-damper pattern. Thirty years ago, such a pumping and hoisting-engine was considered first-class, and many of the old fellows are yet at work.

Such an apparatus was subject to many mishaps. With a heavy fly-wheel whirling around, and the slide-valve at the will of the engine-man, unnecessary strain could be easily thrown against the engine, and broken cranks and shafts were often the consequence. Also, if in lifting the drum out of gear, it was not securely scotched, the unbalanced end of the chain would fly down the slope or shaft. When it was necessary to connect or disconnect the pump-rods, the rocking bobs had to be securely blocked, and sometimes the assistant forgot to take out the last block—and then trouble came.

This state of affairs was much improved by putting up another engine, so that one engine could pump, and the other one could hoist. Next it was discovered that two engines could be attached to the same shaft, at right angles to each other, so that no fly-wheel would be wanted. Yet on some of the first pairs so built, small fly-wheels were put on—probably to verify Darwin's theory of gradual development. The first of these double engines had two eccentric hooks to each engine, making four in all, which the engine-man had to lift with levers now he had two engines to handle, and it took a lively man to do it; but since there was little or no fly-wheel, no great danger was incurred. The engine-man, therefore, hooked one engine in and started the load with the free engine. These double engines with four hooks did very well. Next, links for valves were introduced, and they are now generally used.

It was found that hoisting and pumping-engines in which cog-wheels were used were subject to noise and break-downs; and as the miners went deeper, it was found that drums keyed immediately on the crank-shaft of a double engine did the best. This change, of course, involved larger steam cylinders, and in the place of wood-faced drums cast-iron ones were made, which soon led to the use of spiral grooves to keep the ropes from chafing. Still further, these drums were made conical, so that when the heavy load was to be started, the small end of the cone did the pulling, while the empty car (and cage, if in a shaft) pulled by the large end of the cone on the other side. This arrangement is the best yet tried, and so the hoisting-engines stand to-day. These are strongly-built double engines on strong stone foundations, with steam cylinders from 20 to 40 inches diameter and stroke from 4 to 6 feet. There are heavy wrought-iron shafts, spiral-grooved cast-iron conical drums, steam-brakes and steam reversing gear, with appliances to prevent over-winding, with safety-catches and detaching gear; and, barring waste of steam, the world can show no better hoisting-engines than are in the anthracite coal regions of Pennsylvania.

To a mine below water-level, the pump, or other appliance to raise water, is of first importance. When man enters nature's great store-houses in search of wealth, he finds that water is ever ready to dispute his supremacy. Sometimes it is the constant stream, only varying with the season; often there are great quantities stored in the crevices of the rocks. In parts of the anthracite coal regions, the fact has been shown that the first 100 yards down the vein has the most water; the next 100 yards has less; and after that, the vein is often perfectly dry. Perhaps the most discouraging situation for a mechanical engineer to be called to in the anthracite coal regions is to have to provide the remedy for an old drowning mine, where the vein is large, the pitch steep, the top bad, the mine full of fire-damp, the timbers old and rotten, and the water so full of acid that it will eat up a shovel in a night, with the air so close that one can hardly breathe. On these occasions, darkness and danger are our companions, and great expense and long delay are our inevitable followers.

The first mining-pumps used were of the Cornish pattern—the old drawing lift with an iron bucket faced with leather. This leather was held in place by a wrought-iron or brass ring which nearly fitted the working barrel, and was driven full of wooden pegs. If the working barrel was made of hard iron, and the length of the rod nicely adjusted so that the leather would come slightly above the bore in the up-stroke, and if the water was clean and not acid, and the lift not too heavy—then, this is still the best mining pump ever made. The red-ash veins were the first ones worked below water-level, and the water in red-ash mines will not, as a rule, eat up iron; but when slopes and shafts had to be sunk on the white-ash veins, there the lifting-pumps would not do. The sulphuric acid in the water ate them up. Some brass

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working barrels and brass rods were tried, but they were expensive and short-lived. Open-topped force-pumps were made, hoping that they could be lubricated and made to stand; but the general conclusion arrived at, about the year 1848, was, that plunger pumps must be tried. Since that time, they have been generally used, and the reason of their longer life is, that plungers can be lubricated and the corroding action of the acid water lessened. As the first lifting-pumps were worked by rods running up to the engine, quite a change in balance-boxes occurred when lifting-pumps were changed to plungers, and about this time quite a number of double-acting pumps were put in. These pumps, of course, discharged water at each pass of the piston, and had four valves instead of two. About the years 1854 or 1855, the Bull engine and pump were introduced. These did away with cog-wheels for pumping, as the pump-rods were fastened to the piston-rod of the steam-engine. No fly-wheel or crank was necessary on these engines, since the cylinder was made large enough to lift the rods, which were made heavy enough to force up the water on their downward stroke.

These engines and pumps have been a real success. They had to be very strong, from the nature of the case. The valve-gear is beautiful. It is the result of one hundred years' experience in Cornwall, whence the idea came. The engine-man has to be a man of good judgment, as he deals with very heavy weights. Yet, as regards consumption of steam, the two-valved engine of the anthracite coal region compares very unfavorably with the three-valved Bull engines of Cornwall.

About the year 1860, steam-pumps began to be used in the coal mines; the great departure being in bringing the engine and pump together; and from the unfortunate nature of the case, the engine had to be taken down in the mine from 500 to 1000 feet from the boilers. Here commenced another trouble, which is the great loss of power of the steam so conveyed.

Strange as it may seem, the old war between acid water and pistons and rods had to be fought over again, and the acid water came out ahead with steam-pumps, just as it did with lifting-pumps.

This paper must be too short to go over all the questions of steam-pumps, with their valve movements—positive, isochronal, and steam-moved—of pumps alternate and reciprocating, with bronze linings, rods, and valves; with roomy valve-chambers and easily changed seatings, etc., with air-chambers and air-lodgments; together with questions of relative size, speed, and portability. Yet I must take time to say, that to pump acid water, a plunger seems the best, because it can be protected by grease (in cold water), and the action of a piston on the lining of a pump will even hasten the corroding action of the acid water; that steam carried from 500 to 1000 feet, in pipes ever so well covered, will lose much of its power; that ordinary high-pressure steam-engines, using such steam and making no use of the principles of expansion, are great wasters of steam; that centrifugal pumps, even with short lifts, will hardly do for acid water; that the introduction of steam into vessels just emptied of cold water seems to return to the days before James Watt; that the ponderous engines of Cornwall, or the splendid examples lately set up at our American water-works, are too costly for the ever-changing locations incident to anthracite coal mining; and that while to men who daily see hundreds of tons of good culm thrown away small savings of steam seem foolishness, yet in view of the great fact that in the best steam-pumps in the coal regions the fuel used is four times as much as it might be, there seems room for improvement on that score. As the pumps now stand in the anthracite coal region, those which use the least fuel are the old plungers, worked by engines on the surface, using cog-wheels and pinions. Next in point of economy are the Bull pumps. Then follow various kinds of steam-pumps—good, bad, and indifferent. None uses the principle of expansion to a very great degree, and the duty done by 100 pounds of coal may be stated at from 10,000,000 to 20,000,000 pounds of water raised one foot high.

The pumping of the water of the anthracite mines is an ever-increasing trouble. The mine widens, the outcrops fall in, and as the quantity of coal to be had decreases, the water increases. For this state of affairs, there is no help. Some colliers in the middle coal-field use, at certain seasons of the year, one hundred tons per day for pumping water, to raise 8,000,000 of gallons in twenty-four hours from a depth of four hundred feet. When wet seasons come on, the water in the mines gets more troublesome on account of acid which is extracted from the rubbish left in the mine. The water of the mines is not good for use for purposes of condensation, because, when heated to one hundred degrees, it acts on iron with increased force. Fresh water gets more and more scarce, and water is brought long distances by pipes, and often in cars, to supply the boilers; and in some districts, good artesian wells are bored. Here, however, another troubles comes in: if the holes go down too deep, the mountain limestone is reached, and lime is more troublesome than sulphuric acid. But by mixing the two together, under intelligent care, a good water is obtained.

And so the situation is. The question that to-day troubles the minds of many engineers in the coal regions is, How had we best build our mine pumps—shall we stick to the old method of a plain steam-pump, with no expansion or condensation, because it is so handy to put in and take out? So far as the pump alone is concerned, the answer seems, Yes; but when we see the long row of boilers, and immense piles of fuel for them, it calls attention to the other side of the question. If by this imperfect sketch, the writer shall have called the attention of this society to this difficult and important question, he will be satisfied.

The last paper of the session, which we print below, was that of Mr. George N. Comly, of Wilmington, Del., on

ECONOMY IN LUBRICATION OF MACHINERY.

In large manufacturing establishments, the sum of money paid annually for lubricants is surprisingly great, and, where oil is the lubricant, the quantity wasted is a very large percentage of the total amount purchased. Being convinced that such was the case, I endeavored to ascertain the actual quantity of lubricating material used in a given time on the various machines and in the various shops connected with the establishment at which I am engaged. The result was startling, and the investigation proved that one of the most extravagant users of oil was the vertical engine used for driving the principal part of the works used for machine-shop and bridge construction, etc. The engine was nominally 60 horse-power, with 16-inch cylinder and 18-inch stroke, with an 84-inch diameter pulley, making 106 revolutions per minute; but the indicator cards were evidence of the fact that frequently 83 horse-power were produced by the engine. Owing to the fact that the engine was overloaded, the crank-shaft bearings and crank-pin gave much trouble by heating, and occasionally it was necessary to stop the engine during working hours. The expense for lubricating oils on this engine during the month of May, 1882, was at the rate of 3·53 cents per hour of the time during which the engine was actually running. The oil used was cosmo-lubric No. 2, costing 65 cents per gallon, and the specific gravity of the oil was 26 Baumé. During June, the oil cost 3·91 cents per hour run, and the engine was running 120 hours per week, or on an average of 20 hours per day. About the 1st of July, I commenced using No. 10 lubricine-grease on the crank-shaft bearings *instead of oil*, and the result was, that the engine shaft-bearings worked much cooler, gave no more trouble, and the cost of lubricating material was reduced to 1·15 cents per hour run. The crank-pin at this time was still using oil, and continued so doing until October 9th, when I had a copper box attached to the stub-end of the connecting rod close to the crank-pin with a ¼-inch tube connecting the box with the crank-pin bearing, and No. 4 lubricine grease packed in it. No. 10 lubricine was also applied to the guides for the cross-head, the result being that the cost of lubrication was still further reduced to 0·78 of 1 cent per hour run, and the guides and pin worked much cooler than they did previously when oil was used. A mixture of palm-grease and bees-wax in proper proportions will compare favorably in efficiency with the lubricine-grease. I have also found mixtures of bees-wax and tallow or bees-wax and suet to work very well as lubricants for shafting. The relative proportions must, of course, be made to suit circumstances.

During the past eight months, the line-shafting has been running *without oil*, depending exclusively on the mixtures such as already described. The shafting is all provided with ball and socket hanger-boxes, and the top half of the box has two cups cast in it in which the grease is packed, each having a cast-iron cover fitting closely over it to keep out the dust. This cover is chained fast by a very light chain, to prevent it from being lost or knocked down by ladders, etc. The center oil-hole, where a self-oiler is usually placed, should be stopped up with a cork to keep out dust at that point, and the use of oil is not allowed on any of the shaft-bearings where the grease can be applied.

By the regulations already described, the cost of lubricants has been reduced 44·6 per cent in the cases noted above. Means have been provided for using the grease on nearly all of the engines running at the works and on several of the heavy machines, the result being a saving of lubricant and a cool running of the journals. It is better, when applying the grease, to make large holes in the caps of the bearings (perhaps 1½ or 1¼ inches diameter if allowable), and permit the grease to be packed directly on the journal surface. Where this can not be done, a funnel-shaped cup is attached to the oil-hole, in which is a copper rod, one end of which presses against the shaft while the other end passes through a spiral spring which is tightened to the required tension by a screwed cap. The cup is filled with the grease, and the rod passing through it melts the grease by the heat caused by the friction of the copper rod on the journal, the spring being tightened sufficiently to produce the necessary friction on the end of the rod. Plain copper boxes, however, are frequently preferable with lids to keep out the dust. A piece of copper rod run through the center of the box touches the shaft, and the hole between box and shaft is made much larger than the size of the rod of copper, so that the grease can be well pushed down on to the shaft.

A brief discussion followed in which it was argued that, as the friction in using grease was greater, the increased wear and tear would more than counterbalance the money in running expenses. After the acceptance of an invitation to inspect the working of a machine for making seamless pulp barrels, the members were introduced to the gentlemen of the Cleveland Civil Engineers' Club, with whom a few hours were spent in friendly intercourse and in the discussion of a collation.

THE SECOND SESSION.

After the transaction of some routine business, including a report by the tellers, announcing the election of a number of new members, a report by the treasurer and by the council, Mr. W. F. Durfee, of Bridgeport, Conn., was called upon to read his paper on Balancing Vertical Engines, in which he gave a detailed description of a vertical high-speed engine built by him as early as 1868 for the American Silver Steel Company, of Bridgeport, making frequent reference to drawings, without which it is not possible to follow his explanations. During a lively discussion which followed, and in which Messrs. Henning, Scott, Barnet le Van, Miller, Hamilton, Sweet, and others took an active part, an interchange of opinion and of experience was had concerning a number of points raised by the paper. The merits of vertical *versus* horizontal engines, for high speed particularly, brought out facts in regard to the piston speed now attained by some of the horizontal engines of the Porter-Allen and Buckeye class, it being reported that as high as 1200 feet had been attained without affecting the working of the engines.

This was followed by the reading of a long paper written by Mr. W. E. Ward, of Port Chester, N. Y., on

BETON IN CONJUNCTION WITH IRON AS A BUILDING MATERIAL.

Noting, as early as 1867, how great was the adhesion of cement to iron, Mr. Ward gradually, and through a long series of experiments, worked up the reciprocal value of béton in combination with iron, first in construction of beams designed for supporting the floors and roofs of houses, and then for all the various portions of buildings. He built a very elaborate residence at Port Chester entirely of béton and iron. He carefully investigated the proportions of the materials composing the béton for the requirements of the different parts of the structure. For floor and roof supports, the béton is enforced by iron T beams placed near the bottom of the béton beam, so as to utilize its tensile quality for resisting the strain below the neutral axis, while the béton above this line is relied on for resisting compression. Under a load of 9500 pounds, placed in the center of a béton and iron beam 12 feet long the deflection was only seven sixteenths of an inch, the beam returning to the original line after the load had been removed. Mr. Ward suggests an inverted ⊥ beam for the iron in future works. The floors of the Port Chester building were made of a one-inch layer of béton upon which iron rods five sixteenths of an inch in diameter were placed eight inches apart, both

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longitudinally and laterally. On the top of this came a two-inch layer of béton, over thirteen thousand square feet of flooring and roofing being thus constructed. For the walls, Mr. Ward recommends the thin double-wall system; and for heating the buildings, he places a large number of pipes in walls and floors communicating with a central heater, thus securing uniformity of temperature and good ventilation. The reinforced béton system has also been employed with good results in heavy foundations for stationary engines, a 250 horse-power, tandem compound engine, of very heavy pattern, having been mounted by him on a reinforced béton bed, 23 feet long, 5 feet wide, and 7 feet deep. He also mounted the out-board bearing of the main shaft on a single block of the same kind, the entire cost of the foundation chamber being less than the estimate for the same in first-class brick or stone mason work.

Mr. Ward's elaborate paper which contained many facts which lack of space does not allow us to allude to at length, excited considerable interest, remarks on its contents being made by Messrs. Barnet le Van, Root, Weightman, and Thompson.

In the absence of Mr. H. R. Towne, of the Yale & Towne Manufacturing Company, Stamford, Conn., his paper, Cranes—a Study of Types and Details, was read by a member. It is a valuable summary of the results of every practical experience, for which we shall make room in an early issue. Though long, it was listened to with close attention, and called forth an animated discussion, which added to the regrets that the writer was not present. The closing minutes of the session were occupied by an earnest but rambling speech by Mr. Thomas R. Morgan, Sr., of Morgan, Williams & Co., Alliance, O. Mr. Morgan took exception to the conclusions arrived at in important matters of detail by Mr. Towne; but in his earnest efforts to impress the members with his determination to give them facts, did little beyond reiterating the statement that a traveling crane, built by him for the Dickson Manufacturing Company, embodied features meeting all the requirements of such work. Mr. Morgan received a respectful hearing, to which his long experience and the excellent work turned out by him fully entitled him; and his promise to put on record what he had to say in the Proceedings of the society gave much satisfaction.

THE THIRD SESSION.

The adjourned discussion of Mr. Towne's paper on cranes was again taken up, Mr. W. F. Durfee, of Bridgeport, Conn., leading off with the description of a cheap traveling crane built by him, for the special purpose of removing the rolls from their housings in a train of rolls. Mr. Walker, of the Walker Manufacturing Company, Cleveland, dwelt upon the results of some investigations recently made under the auspices of the government, in reference to the winding on drums of chains, the result of which was, that the frequent breakage of chains could be averted by so arranging matters that the horizontal links did not twist.

Mr. George W. Maynard, of New York, then followed with a paper on the Bower-Barff Process, in which he summarized the data submitted in earlier papers by Professor Barff and the Bowers, father and son, and gave the latest results attained in recent American practice, the few months of active work here having led to many modifications of detail, insuring better work. This paper too brought out a lively discussion, in which Messrs. Henning, Smith, Partridge, E. D. Leavitt, Jr., Hand, Weston, and Root took part. The president, Mr. Leavitt, spoke of the difficulty he had experienced in preventing the corrosion of the brass tubes in the superheaters designed by him, in which the question of the corrosive action of sulphurous acid gas from fuel came up.

Mr. William J. Baldwin, of New York, then, in a paper entitled Standards in Pipe Fittings, made a plea for the establishment of a standard in elbows, tees, and crosses, and referred at length to the scale advocated by the late Robert Briggs. While in the main coinciding with him in the necessity of such a reform, the opinion did not seem to prevail that the appointment of a special committee to report on the subject would be the best means of agitating the subject.

Mr. William Kent, of Pittsburg, in a paper on the Relative Values of Bituminous Coals, pulled the recent report made under the auspices of Quartermaster-General Meigs to pieces, and gave some general hints as to the best method of burning, particularly those coals containing between 20 and 40 per cent of volatile matter. He submitted tables showing the results of evaporation tests made with a number of American and foreign bituminous coals in Babcock & Wilcox boilers.

Mr. C. C. Collins, of the Stearns Manufacturing Company, Erie, Pa., followed with a paper on Balanced Valves; and Prof. J. B. Webb, of Cornell University, on Reuleaux's Kinematic Models.

Before adjournment, Mr. J. F. Holloway announced that he had received a dispatch from Prof. R. H. Thurston, of the Stevens Institute of Technology, which at its commencement this week conferred the honorary degree of Doctor of Engineering on E. D. Leavitt, Jr., President of the American Society of Mechanical Engineers. This announcement was received with much applause. After a brief reply by the doctor, the meeting adjourned.

In the evening, the members attended a reception tendered them by citizens of Cleveland.

AMMONIO-PHOSPHATIC DEPOSIT IN THE VICINITY OF CAPE TOWN.—Writing to the *Chemical News*, Mr. A. B. Griffiths reports on a deposit which was found some time ago in some caves, a few miles to the southeast of Cape Town, South Africa. The deposit is in a powdered condition, and of a brown color, but contains solid nodules. These nodules present the appearance of contortions like ordinary guanos; and when reduced to powder, and washed in distilled water, and the sediment treated with acids, followed by washing in water in the usual way, a microscopical examination showed that these nodules contained a large amount of diatomaceæ, and a few sponge spicules. The powder-deposit also showed the presence of diatomaceæ. On submitting a fair sample of the deposit to analysis, it was found to contain: 70·21 per cent of ammonium compounds, 17·5 per cent of phosphates, 3·3 per cent of nitrogen, etc. Probably these deposits may furnish a very useful manure. From these observations it is most probable that these deposits consist of the more or less altered excrementitious matters of an extinct fauna.

FURNACE, MILL, AND FACTORY.

The Rosedale, Kansas, iron-works have started up for a short run. The mill is to be sold in October for the benefit of the stockholders.

The new Taylor-Langdon ore-roasting furnace, erected by W. J. Taylor & Co., at their Chester, N. J., furnace, is averaging 40 tons per day of thoroughly roasted ore.

The Dickson Manufacturing Company, of Scranton, has been awarded the contract to furnish the Calumet & Hecla Mining Company, Michigan, with a steel boiler 90 inches in diameter, 36 feet in length, and to carry 150 pounds pressure. The total weight of this boiler will be 108,000 pounds, and the castings for it will weigh 10 tons. It will have 199 three-inch tubes.

A stock company has been formed in Harrisburg, with a capital of $35,000, for the manufacture of edge tools.

The Parkersburg Iron Company, Pennsylvania, has erected a steam-hammer that weighs 47,000 pounds.

The Maumee Rolling-Mill Company, Toledo, Ohio, is building a mill which will be in operation by January 1st, 1884. The capital stock of the company is $500,000.

The new Crozer Furnace, at Roanoke, Virginia, made a very successful start on May 28th. The first cast was a gray forge of fine quality and great strength, weighing about eight tons. The daily output is expected to be from 80 to 100 gross tons.

The Shelby Iron Company, Alabama, having two blast-furnaces at Shelby, is experimenting with the Mathieu process of making charcoal. By this process the by-products are saved.

A company with a capital of $200,000 is forming at Mobile, Alabama, for the purpose of establishing a pig-iron furnace with a capacity of sixty tons daily.

The California Iron and Steel Company has just blown in its new blast-furnace at Hotaling, Placer County, Cal. The buildings are iron and have the latest improvements.

It is understood that the directors of the Puget Sound Iron Company have in contemplation the building of a large rolling-mill at Irondale, Washington Territory.

A company of Toronto capitalists is proposing the erection of blast-furnaces in that city, and has appealed to the Dominion Minister of Finance for higher duties and an increase of the promised duty of $1.50 per ton on pig-iron of domestic manufacture.

The Blakeney Foundry Company, of Springfield, Ohio, recently organized, is building extensive works at that place for the manufacture of the Blakeney cupola-furnaces and general castings.

The Missouri Malleable Iron Company, of St. Louis, Mo., has recently put its works into full operation. The works are supplied with the latest and most improved machinery and apparatus for turning out a general line of malleable castings for agricultural and other castings.

The McKenney Tubular Rail Company, of Chicago, recently incorporated, has located its works at La Grange, Lewis County, Mo., where the necessary buildings are in course of erection.

The converting-works and rail-mill departments of the Chicago works of the North Chicago Rolling-Mill Company have started up with from 700 to 800 men. All other departments of the works at South Chicago and Bay View, Wis., are in operation.

The Link-Belt Machinery Company, Chicago, is building a hay-conveyor for Hall, Warner & Co., Wellington, Ohio; one large conveyor and elevator for the Cincinnati Linseed-Oil Company, Cincinnati, Ohio; an ear-corn conveyor to go to Beloit, Wis.; one stone-conveyor for W. A. L. Thompson, Topeka, Kansas; and a grain-weighing and transferring-car for Wells, French & Co., of Chicago.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents have been promulgated from the General Land-Office under date of June 1st, 1883:

ALABAMA.

HUNTSVILLE DISTRICT.

The placer claim of Stephen E. Dobbs, De Kalb County.

ARIZONA.

TUCSON DISTRICT.

Louis C. Hughes *et al.*, Copper Queen lode.

CALIFORNIA.

MARYSVILLE DISTRICT.

John C. Gray, Good Luck placer mine.

SACRAMENTO DISTRICT.

George David Endriss, placer, El Dorado County. Christopher Buddecke, Strap Ravine placer mine, Placer County. George Nichols, placer, Calaveras County.

SHASTA DISTRICT.

Louis F. Roab, Roab & Perkins Bar placer mine, Trinity County. George Simmons and James Quinne, placer, Siskiyou County. John D. Mello *et al.*, placer, Siskiyou County.

SUSANVILLE DISTRICT.

Plumas Eureka Mining Company, Amador placer mine, Plumas County.

COLORADO.

CENTRAL CITY DISTRICT.

R. W. Knowles, Syndicate, Golden Rule, and John Sherman lodes. Pizarro Gold and Silver Mining Company, Pizarro and Pizarro Extension lodes. William W. Flagg, Atlantic lode. John Hunneau, Mary Ann lode. Charles A. Martine *et al.*, Cuba lode and mill-site. James Lotridge *et al.*, Silver Star lode. J. Wesley Miller, E. W. Lyon lode and mill-site. Lewis C. Snyder, Egyptian Side lode. Ernest Stahl, Kalamazoo lode. Ivers Phillips, placer, Boulder County. Albe M. Saxton, Keystone lode. D. J. Hutchinson *et al.*, Bonanza lode. William M. Roworth, Stewart & Company lode. Hal Sayr, Rainbow and Sans Souci lodes. Henry M. Teller, Running lode, West lode. Hal Sayr *et al.*, Valverde lode.

DURANGO DISTRICT.

Simon H. Stern, Crown Point lode. N. J. Bradley *et al.*, Uncle Ned lode.

LAKE CITY DISTRICT.

Isaac Thomas, Ophir lode. Rico Silver Mining Company of Colorado, Bobtail lode. Desire Friend *et al.*, Independence lode. C. E. Schoellkopf, Oriental lode. Thomas C. Wilson, Ben Bolt lode. Engineering, Mining, and Developing Company, Mountain Monarch No. 2 lode. David Geiger *et al.*, Monarch lode.

LEADVILLE DISTRICT.

W. G. Reid *et al.*, W. G. Reid lode. Americus L. Pogue, Galena lode. Roswell Sprague Jones, Westmoreland and Harrison lodes. Abia G. Hooper *et al.*, Governor lode. Lennox Mining and Milling Company, Kansas City No. 2 lode. Canada Consolidated Mining Company, Eva, Little Rose, Little Maud No. 2,

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Little Lulu, Lady Elgin, and Little Bell lodes. Abraham Jacobs *et al.*, Why Not lode.

PUEBLO DISTRICT.

Game Ridge Consolidated Mining Company, Times lode. James A. Melvin *et al.*, New Year lode.

DAKOTA.

DEADWOOD DISTRICT.

Samuel McMaster, Little Nettie lode.

IDAHO.

BOISE CITY DISTRICT.

William H. Nye *et al.*, Idahoian lode.

MONTANA.

HELENA DISTRICT.

John McLaggan *et al.*, Simon lode. Nathan S. Vestal *et al.*, Empire lode and mill-site. Edward B. Corely *et al.*, Keystone lode. Edward Hickey *et al.*, Black Hawk lode. Thomas Cruse, North Star lode. Thomas Wilkinson *et al.*, placer, Lewis & Clark County. James D. Heald, placer, Madison County.

CARSON CITY DISTRICT.

Manuel San Pedro *et al.*, Arctic lode. Luther A. Buckner, Montgomery lode.

NEW MEXICO.

LAS CRUCES DISTRICT.

The Sterling Price Mining Company, Sterling Price and South Virginia lodes. William H. Henry and James B. Price, Johnny Bull lode. Daniel H. Moffat, Jr., forty-five patents upon the Santa Rita lodes Nos. from 1 to 31, both inclusive, and 33, 34, and 47, 48, 49, 50, 53, 54, 55, 57 to 61, both inclusive.

UTAH.

SALT LAKE CITY DISTRICT.

Sunbeam Mining Company, Lady Aspinwall lode. Martha Martin *et al.*, What Cheer lode.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

Work at the various mines continues with the usual results. No important developments have been made since our last issue.

PIMA COUNTY.

COPPER QUEEN.—The production of this company for the year 1882 from the two smelters was upward of 8,000,000 pounds, with an average fineness of 96⅓ per cent, and they are still running with the same degree of success.

YAVAPAI COUNTY.

NONESUCH.—This property, discovered in 1864, and named the Goodwin, in honor of Arizona's first governor, after a series of ups and downs, has at last fallen into the hands of a company which promises fair to systematically test its merits by a proper development.

SILVER JOE.—This mine is situated near the Goodwin. The ledge has been traced for over 900 feet, and wherever uncovered shows a continuous vein, from two to eight inches in width. The lode bears north and south, and has a nearly vertical descent at all points where it has been sunk on. The ore is a chloride and sulphuret of silver, containing but very little base.

CALIFORNIA.

Dispatches from the City of Mexico state that the government has ordered troops to be sent to the new gold diggings in Lower California, for the preservation of order. The prefect of the territory has been ordered not to admit locations until he receives special instructions from the federal government. The richness of the diggings has been officially confirmed.

AMADOR COUNTY.

According to the San Francisco *Stock Report*, a suit has been begun in the United States Circuit Court by the New York Mill and Mining Company, an incorporation in the State of New York, against the Amador Mill, Mining, and Tunnel Company, of California, for the possession of 600 feet of a mining claim near Middle Bar, Amador County. The complaint alleges wrongful possession. An injunction restraining the Amador Company from working the mine is also asked for.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—The mill has been stopped.

GOLD STRIPE.—Work has begun at the tunnel and stopes, in order to get out what ore is in sight there. An arrangement is about completed with John McIntyre and W. Deal, by which the ledge recently discovered by them will be made available for work in the mill.

INDIAN VALLEY.—The necessary repairs on the wrecked machinery have been completed, and work has been resumed at the mine and mill.

LUCKY S.—Prospecting-work has been kept up steadily on this claim, situated in Emerald District. The mine is now so far developed that the building of a mill will be decided upon shortly.

SUN SET.—The developments continue good. Mr. C. G. Rogers, superintendent of the Green Mountain, and J. O. Hemler, have bought a half-interest in the mine.

SIERRA COUNTY.

SIERRA BUTTES.—The company has begun the erection of a new forty-stamp mill at Sierra City. It is expected that this company will employ 100 more men than hitherto.

CANADA.

A dispatch from Montreal states that a contract has been given out for the building of the Gatineau Railroad from Ottawa seventy miles up through the district where the phosphate mines are situated. The cost will be $16,000 per mile.

NOVA SCOTIA.—One of the best gold discoveries so far in Halifax County has just been made on the old De Wolf property at Montague, close to the celebrated Rose leads. Three leads, respectively 33, 11, and 7 inches in width, have been found about twelve feet below the surface, and give indications of a rich yield.

HALL-ANDERSON.—The secretary of this company has sent us the following information: The management has changed hands, owing, it is said, to a sale of a large block of stock to a syndicate. Messrs. H. K. Adams, late president, and E. F. De Camp, late general manager, have resigned their official positions, and also retired from the directory. Mr. E. D. Davidson, late acting superintendent at the mine, was elected president. He reported the mill as in a splendid condition, and the mine itself never looking better. The last ore he crushed, and with a good return, came from the Orion Belt, and just at the beginning of a big strike.

OXFORD.—The superintendent telegraphed on the 8th that he had shipped a gold brick, value $4000, from a mill-run of six days. The ore is running richer. The Split lode, just opening, promises as well as the rich Mill lode. Prospecting just east of the company's ground shows up a new and very rich lode.

COLORADO.

BOULDER COUNTY.

Important strikes have been made in the Richmond and Three Brothers mines, situated near Salina.

CHAFFEE COUNTY.

The building of the railroad is progressing steadily; the grading of the highest and most difficult points along the route is pushed with vigor, the level and easier portions being left for later on in the work. Under such circumstances, the casual appearance of progress is deceptive to those expecting to find tracks laid and the road within the promised time, thus putting Chaffee City, which will then be known as the Monarch, in direct communication with the railroad lines of the United States.

CLEAR CREEK COUNTY.

CAMPBELL.—The managers announce the want of a sufficient amount of the right kind of ore as the cause of the delay in starting the smelter at Idaho Springs.

DIAMOND JOE.—Work will be resumed.

DIAMOND TUNNEL.—The No. 5 lode is opening an excellent streak of ore. The vein has shown continued improvement since passing the horse, and the work ng force has been increased. The prospects look well for a large ore-body. The Corry City veins are also showing more encouragement. Rising has been commenced on No. 2 with a streak of scattered ore, which grows larger as work progresses. No. 3 is showing ore coming in more plentifully in places across the drift heading, with evidence of being near the horse.

LITTLE JACK.—A vein of mineral, containing a great deal of gray copper, has been opened up on this lode.

MATILDA FLETCHER.—The lessees propose to sink a shaft below the lower level. It is already fifty feet down, and when it reaches a depth of sixty feet, drifting will be commenced on a good pocket of ore which has yielded largely in the upper workings in the past.

DOLORES COUNTY.

SILVERADO.—The recent strike of copper ore shows a vein two and a half feet wide. The company owns twenty-one claims and considerable other property.

EL PASO COUNTY.

There is considerable excitement in Colorado Springs on account of a rich mineral strike in the Mount Pisgah District, about thirty-five miles southwest of Colorado Springs. It is stated that there are already over one hundred prospectors at work, and others are coming in rapidly. The mineral found is said to be rich gold-bearing rock.

GUNNISON COUNTY.

MOFFET REDUCTION-WORKS.—The desulphurizing furnaces of these works at Gunnison City have been started up and are working well. The water-jacket blast-furnaces of the establishment are to be blown in shortly.

HINSDALE COUNTY.

CROOKE'S MINING AND SMELTING COMPANY.—Concentrates at the rate of 20 tons a day are stored in bins near the smelter. Drying by artificial heat has been stopped. Both sides of the concentrator are running, and will soon be delivering 40 tons of concentrates a day.

GOLDEN WONDER.—The important suit involving part of the property of the Golden Wonder syndicate, which was to have been tried in Denver, has been compromised in Mr. Alvord's favor. The owners of the property expect soon to be ready to push development and put in a stamp-mill.

OHIO CONSOLIDATED.—J. B. Downman is to take charge of this company's property. An examination of the Dolly Varden and other properties of the company will be made and assessments worked.

LAKE COUNTY.

Late Leadville exchanges report the following:

ARKANSAS VALLEY SMELTER.—Four furnaces are in blast. Numerous improvements are making at the works; and to assure a constant and desirable supply of water, connection has been made with the large reservoir of the American Smelting Company, and a new reservoir has also been constructed near the works, 80 by 125 feet, and six feet in depth.

CHRYSOLITE.—A strike of substantial dimensions is reported from the Muldoon shaft, which is developing by lessees.

ELGIN SMELTER.—The works have lately been overhauled and put in first-class running condition by the Manville Smelting Company. The establishment has begun to receive ore, and at the present time the ore-platforms contain considerable fine smelting ore, to which additions are made daily. The equipments of the smelter have been improved by the addition of a new pair of Cornish rolls, the enlargement of the ore-bins and rearrangement of the machinery generally.

EVENING STAR, AND MORNING STAR.—A body of ore of considerable importance has been opened in the Evening Star mine on the line of the Morning Star Consolidation. The mineral is a dark oxide of iron and galena, having an average value—determined by six or eight assays—of about one hundred dollars to the ton. The discovery is some distance from any of the previously opened ore-bodies in the Evening Star, and sixty feet west of any opened ground in the Morning Star. The new McHarg shaft of the Morning Star lode has attained a depth of 391 feet.

LITTLE CHIEF.—During the past month, twenty-one hand-jigs have been placed in Big Evans Gulch, a few hundred yards from the mine, and at present over one hundred tons of dump material are sent to the jigs daily. From six thousand to ten thousand tons of waste rock now encumber the premises of the Little Chief mine, a great deal of which is worthless for any other purpose than concentration. In the system adopted, this material is concentrated on an average of from ten to fifteen tons into one, and a product obtained ranging in value from 40 to 50 ounces in silver, and from 12 to 20 per cent in lead.

TENDERFOOT.—This property, whose record as a producer is yet in its infancy, is in good condition. The amounts shipped have consisted of that which was taken from the path of development without a particle of stoping, and netted thirty ounces per ton. There are upon an average four feet of hard and sand carbonates, with now and then a stringer of quartzite that carries from half an ounce to two ounces in gold. A contract has been let for the sinking of the shaft fifty feet deeper, and from that point another drift will be run to cut the body, which has already been proved up in the upper level.

PITKIN COUNTY.

Mr. Gilaspie, one of the principal mine-owners of the district, is negotiating for himself and other mine-owners of Pitkin County, for a lease and option on the Aspen smelter. The works were recently erected by a company from Texas, and are now offered for sale. The establishment is complete in every respect,

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ready for blowing in at a day's notice, possessing even the necessary fluxes, coke, and charcoal. In the absence of cash capital with which to place the works on a basis for a good start, in the event they can be secured, it is proposed to form a company which shall pay its capital in ore.

Brooks, Bethune & Wemel's smelter at Ashcroft has been blown in and makes a successful test-run.

CASTLE PEAK MINING AND SMELTING COMPANY.—The machinery will not be started this season. The company owns a number of valuable properties, all of which are patented, and this year will expend its capital in development, to change them from prospects to mines.

SUMMIT COUNTY.

A letter written from Kokomo shows that the most pressing need of Ten Mile District is sampling-works. The larger mines ship their product in car-lots to the smelters at Leadville, Cañon City and Denver; but the prospector who takes out a ton or two while doing his assessment-work is practically without a market. The writer states that it is not an extravagant assertion to make, that there are to-day a thousand tons of different graded ores lying on the dumps of what are known as non-producing mines, within a radius of two miles from Kokomo, which would be brought in and sold if there was market for it. The concentrating-works of Mr. Greer are now handling about eighty tons of Robinson low-grade ores.

DAKOTA.

FATHER DE SMET.—The secretary writes, under date of May 27th, as follows: Herewith express company's receipt for bar No. 159, containing 673·40 ounces of gold, the result of run of mill for the first half of May. We have just passed through one of the worst floods that this country has ever seen. It did not injure the mine or mill belonging to this company, except causing a stoppage of the mill for three days, caving of cuts, shafts, and winzes, which we are now removing, and crushing *débris*, which will pay very little, thereby making shipments for May very light. All the roads and bridges in the hills are swept away, causing supplies to be very short and high in price. However, we are now supplied, so that the mill can be run steadily and at a profit. On the 15th inst., I drew for $18,500 for April expenses. The bullion did not leave Deadwood until the 26th inst. Ore extracted from first, second, third levels, 2840 tons. Ore milled, 2790 tons. Golden Gate north-header advanced 14 feet, making 31 feet for the month. Header in 125 feet. Tramway level rise for the month 15 feet. Rise up 74 feet.

GEORGIA.

CHESTATEE.—Thirty stamps are now running regularly, producing satisfactory results. Some trouble is, however, experienced with the water, the supply of which is not at all times as plentiful as could be desired.

COLUMBIA.—The new pump is forcing water from the Hand Ditch to the new reservoir.

FISH TRAP.—Prospect-work is continued.

IDAHO.

According to the Salt Lake *Tribune*, mining operations are progressing at Snake River. At Eagle Rock, a short time ago, some men made an apparatus for saving the fine or flour-gold, which is so plentiful in all the gravel-beds in the valley of that stream, and they have apparently solved the question of how to save this gold. Their apparatus consists simply of a sluice-box with a portion of the bottom constructed of an iron plate having numerous small perforations, for the purpose of permitting the black sands and fine gold to pass through and drop into a box beneath, while the coarse gravel, earth, etc., is washed out at the end of the box. The lower box has three openings on each side, with gates to regulate the flow into the three sluice-boxes running off at an angle from each side. In each of these are placed burlaps or gunny sacks, to catch the fine gold as it is washed along. The system has been found to work well, besides costing but little to adapt, is easily and cheaply operated. The amount of gold taken out per day with the first apparatus put in operation averaged between $20 and $25, and two men operated it.

MULDOON.—The furnaces are running on Muldoon ore, and turning out bullion steadily.

PHILADELPHIA MINING AND SMELTING COMPANY.—The company has from 15 to 20 six-horse teams constantly employed in hauling hematite ore from the Iron mine to its furnaces.

ST. PATRICK.—This mine has been sold to Baltimore gentlemen, who propose to organize a company.

MEXICO.

The smelting works at Mapimi, Durango, are reported to be the largest in the northern part of Mexico. By the aid of new machinery lately received, a capacity of 90 tons daily will be obtained.

BERNALEJO.—It is reported that a New York company has just closed negotiations for this Zacatecas mine, and will proceed to systematically develop it.

CIENEQUILLA.—The Chihuahua *Mail* states that these mines, sixty miles west of Chihuahua City, promise early prominence again. These mines were worked earlier than 1691; abandoned that year on account of the Indians; resumed operations again in 1696, and worked until 1832, when, on account of Indians, they were again abandoned. Under old-fashioned methods, immense fortunes were realized by their owners. Yet the mines were merely tinkered at until 1881, when the company now working took hold of them and actively pushed work, clearing out and developing the old shafts. It has employed sixty men, opened two new shafts and a vein that will average ten feet in width, and will soon equip the mines with the best modern machinery.

CONSOLIDATED MINING COMPANY.—This company's property, situated at Las Minas, Vera Cruz, owns about twenty-five mines of gold, silver, copper, and lead. The ores are low-grade, but abundant and easily worked. The company has been working for over a year. A Tasker pulverizer is operating and other machinery erecting preparatory to a large output.

MEXICAN INTERNATIONAL DEVELOPMENT COMPANY.—This company, which, as mentioned in our last issue, organized at Guanajuato, proposes to develop gold, silver, and other mines; to make loans on good properties; to beneficiate metals of mines belonging to the company and others; to drain mines and to do other work pertaining to the industry.

PACHUCA RIVER REDUCTION COMPANY.—The company has received two Frue vanner concentrators, which will be erected at once. The company is taking in the "tailings" from the river-bed, in anticipation of the rainy season.

ROSARIO.—The mine has been drained of water. The shaft proves to be only 250 feet deep.

ZIMAPAN COPPER COMPANY.—At a recent meeting of this company, it was resolved to send to Swansea, England, for a copper refiner and furnace builder.

MICHIGAN.

The following are the returns of the reporting mines for the month of May:

	Tons.	Lbs.
Calumet & Hecla	1837	1490
Quincy	261	40
Franklin	170	25
Atlantic	162	385
Allouez	102	985
Pewabic	70	450
Peninsula	58	600

CONGLOMERATE.—Mr. Thomas has resigned his position as superintendent. Mr. S. W. Hill will succeed him.

JOHN DUNCAN LAND AND MINING COMPANY.—The financial statement presented at the annual meeting shows cash paid in, $40,000; real estate purchased, $36,803.10; expenses, $827.59; leaving cash on hand, $2369.31.

MONTANA.

GALLATIN COUNTY.

LARD HYDRAULIC COMPANY.—The company is said to have an abundant ca work its gravel deposits, which vary in depth from 50 to 150 feet.

JEFFERSON COUNTY.

BANNER.—This mine is tapped by two tunnels, 600 feet apart, at a depth o about 100 feet from the surface. The lower tunnel is extended along the vein 300 or 400 feet, exposing a body of ore from one to three feet thick. Levels are run each way along the vein, from where the upper tunnel strike shows a strong vein of good ore.

GREGORY.—The shaft has now attained a depth of nearly 600 feet, and work is prosecuted on the 300, 400, 500, and 600-foot levels. In all of these levels, a strong vein of high-grade galena ore is exposed. The company anticipates increasing its concentrating capacity by erecting a ten-stamp battery. It also contemplates putting up new hoisting-works when these improvements are made. It is expected that the roasters and smelters will run steadily.

NELSON.—This lode is an old location, having been discovered in 1872. The ore-vein is cut by two tunnels, one tapping the lode 200 and the other 300 feet from the surface. Levels have been run from each tunnel along the vein several hundred feet.

ROBBINS.—This property adjoins the Banner on the east. It has a shaft fifty-eight feet deep; the bottom of the shaft is in good ore, of the same character as that of the Gregory.

SOLO.—The vein cuts the tunnel seventy feet from the surface. The vein is six feet wide, containing a mixture of free-milling and smelting ores, which assay well.

STANDARD.—Not much development-work has been done at this mine. Two open cuts have been run to the lode, exploring the vein twenty feet from the surface.

NEVADA.

HALE & NORCROSS.—The official letter, dated June 4th, shows that the winze is sunk to a depth of 20 feet below the 2600-foot level and three sets of timbers have been put in place. At a distance of about 8 feet down, we encountered ore on the west side of the winze, which still shows at the bottom. This ore seems to be a new stringer, east of that shown at the station level, or it may be a widening of that ore. There is some water in the winze, which is easily handled with a donkey pump. This winze water is evidently a portion of the water that we already had on this (2600) level, as there is no increase in the quantity flowing from our ground to the joint shaft.

NORTHERN BELLE.—The superintendent writes that there is no change of note in the formation on and below 5th shaft level. The southwest drift has been extended 8 feet, now in 106 feet. The streak of sulphuret mentioned last week shows an increase of width and also in value of assays from same. On 4th level, the stopes continue to look well and are yielding as usual. No change in drifts and cross-cuts on this level. In uprise above 1st, the stopes are producing some very fine ore and the outlook is quite promising. In other shaft levels, there are no changes of importance. Section of the mine above the adit presents about the same appearance as last reported. From stopes on 7th and 9th, we are extracting some ore of fair grade. Every thing is running smoothly at the hoisting-works, and all work in the mine is progressing in a satisfactory manner.

NEW MEXICO.

HUBBS'S SMELTER.—Three car-loads of rich ore have been received from Silver City. During last week, there were delivered at the smelter seven car-loads of this same ore, and shipments are now on the way from the same parties. The Silver City ore will continue to be sent. The smelter would have been started up and kept running were it not for the absence of any galena ores with which the harder Silver City ores could have been smelted. Galena ore is now purchased for that purpose.

NORTH CAROLINA.

CAMPBELL MINING AND REDUCTION COMPANY.—A correspondent of the Chicago *Mining Review* announces the temporary stoppage of work on this company's tract, nine miles from High Point, and adds that it would have been better for the company to be satisfied with the exploitation of the large and productive vein on its original tract, of nearly 200 acres, instead of adding constantly by purchase, more than it was able to work.

HOOVER.—It is stated that the production so far this year has amounted to 500 ounces of gold.

UTAH.

CACTUS.—At the annual meeting, held in Salt Lake City, the following directors were elected: A. G. Campbell, A. Byran, Count d'Adhermar, Albert de Lautrippe, the latter two of Paris, France; W. H. Burnison, H. W. Morse, and H. C. Woodrow. After this election, the board selected for officers A. G. Campbell, President; H. C. Woodrow, Vice-President; H. W. Morse, Secretary; and J. E. Dooly, Treasurer. The concentrating mill belonging to this company is ready for work, and has a capacity of fifty tons of crude ore per day, with surplus power to more than double by adding more machinery. At present, twenty-five men are employed in the mine.

DALY.—This group of mines, lying west of the Ontario, comprises twenty-five patented claims, covering about 150 acres of surface. On these claims, to this date, about $78,000 have been expended, and now the property is in a fair way for production. A two-compartment shaft will be sunk at a depth of several hundred feet for the purpose of developing a vein which has been prospected by tunnels for several years, and which has been proved a distance of 5000 feet.

GREAT EUREKA.—This property is producing about thirty tons a day, which it is said will net, after paying mining and shipping expenses, $30 per ton.

HIDDEN TREASURE.—The tunnel is still driving to the lower workings. It will be remembered that it was formerly a great producer, running the old Waterman smelter at Rush Lake for several years. It was worked from the top of the hill, where the series of caves filled with ore came to the surface, and the ores run down on a wire tramway. The mine can be worked to much better advantage from the tunnel, which is expected to tap the old workings within two months.

MAMMOTH.—The difficulties at this mine, according to the Salt Lake papers, have not been settled.

TINTIC.—The mill is supplied with ore mostly from the company's mine, the Northern Spy, which produces a large amount of milling ore.

TRUE FISSURE.—This company owns the Frisco mine at Bingham, and twenty acres of placer ground adjoining. The property came into the hands of its present owners in October last. The ground had been worked last on a lease, and the lessees had left the workings in a dilapidated condition. But a comparatively small expenditure soon put the mine in working order. At present, eighteen men are at work; and it is expected to increase this force to forty or fifty as soon as the new tunnel and air-shaft are through.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, June 15.

There is nothing of interest to note in the mining market this week. Business continues to be very dull, and prices have been very irregular. Sonora Consolidated continues to be the favorite stock dealt in, and has suffered a still further decline. Decatur is another fancy largely dealt in, but its price did not materially change. Sierra Grande has been more actively dealt in than of late, but it seems to be impossible to uphold the strong prices of last week. Robinson has been almost neglected, and the price has remained steady. A complete summary of the market is given below. The total number of mining shares sold at all the Exchanges aggregates 176,418 shares, as against 196,662 last week.

The Comstock shares were quiet at about steady prices. California sold to the extent of 3150 shares at 36@42@37c. Consolidated Virginia had a small business at weak prices; it sold from 80@68c. Sierra Nevada was weak; with a moderate business, it sold from $7.88@$6.50. Union Consolidated has been strong, under moderate transactions, selling from $8.63@$9. Ophir sold at $4; Yellow Jacket at $5.13; and Best & Belcher at $5.50, with one small transaction each. Consolidated Imperial was quiet and steady at 9@10c. Sutro Tunnel was active and irregular, selling from 29@24@25c.

The Leadville stocks were but moderately dealt in, and were steady. Amie was quiet and irregular at 18@16@17c. Chrysolite had a small business at steady prices, selling from $1.15@$1.20. Iron Silver records a moderate business, and was steady; it sold from $2.90@$2.85. Leadville sold at 50c., with a small business. Little Chief was quiet and strong, selling from 49@55c. Little Pittsburg sold at 78c., with transactions of 500 shares. Climax sold at 7c.

The Bodie stocks were almost entirely neglected. Bodie Consolidated was dealt in to the extent of 1640 shares at $1@92@95c. North Standard was quiet and steady at 8@10c.

The Tuscarora stocks were quiet and steady. Grand Prize sold at 25c. Belle Isle was quiet and steady, selling at 20c., assessment unpaid, and from 42@40c., assessment paid. Navajo had a small business at stronger prices; it sold from $1.45@1.80. North Belle Isle was quiet and steady, selling from 20@25c. Independence sold assessment unpaid, and was quiet and steady at 33@30@32c. Elko Consolidated records a moderate business at steady prices, selling from 19@18c.

In the miscellaneous list, Bassick has been moderately dealt in at very irregular prices; it sold from $10@$9.25@$9.50. Caribou Consolidated was quiet and steady at 14@13c. Eureka Consolidated records a small business at strong prices, selling at $4. The Green Mountain stocks have been quiet and steady. Gold Stripe sold from 7@8c. Green Mountain sold at 73c., and Rising Sun at 3c. Homestake was quiet and steady at $15.75@$16@$15.63. Horn-Silver had a fair business at irregular prices; it sold from $6.63@$6.25@$6.38. Northern Belle has been weak, under moderate transactions, selling from $6.75@$6. Robinson Consolidated has been very quiet at steady prices, selling from 77@75c. Sierra Grande records a fair business at very irregular prices; it sold from $1.50@$1.25@$1.30, the business aggregating 7700 shares. Stormont has suffered a decline, under a small business, selling from 69@48c.

Alta-Montana was quiet and steady at 3@4c. Bradshaw was quiet at 26c. Caledonia had a small business at strong prices; it sold from 75c.@$1. Decatur records a very active business, and has been steady, selling from 5@4c. Eastern Oregon records a fair business at strong prices; it sold from 31@38@35c. Harlem was quiet and steady at $1.40. Oriental & Miller sold from 16@18c. under a small business. Rappahannock sold from 6@8c. Sonora Consolidated continues to decline under a very heavy business; it sold from 34@24@25c., with a business of 53,900 shares. State Line Nos. 1 & 4 was quiet and steady at 4@5c.

MEETINGS.

Bassick Mining Company, No. 44 Wall street, New York City. Annual meeting of stockholders and election of trustees, June 26th, at twelve o'clock M.

Great Eastern Gold Mining Company, No. 64 Broadway, New York City. Annual meeting of stockholders, June 16th, at eleven o'clock A.M.

Wide West Mining Company, No. 32 Park Place, New York City. Annual meeting of stockholders, June 16th, at twelve o'clock M.

DIVIDENDS.

The Carbonate Hill Mining Company, of Colorado, has declared dividend No. 6, of five cents per share, payable July 2d, making the total dividends declared to date, $60,000.

The Crescent Mining Company, of Utah, has declared a dividend of ten cents per share, or $50,000, payable June 20th.

The Hecla Mining Company, of Montana, has paid its regular monthly dividend (for May) of fifty cents per share, aggregating $15,000.

The Homestake Mining Company, of Dakota, has declared its usual dividend of $50,000 (for May), payable at the office of the transfer-agents, Messrs. Lounsbery & Haggin, Mills Building, on June 25th. Transfer-books close June 20th. Total of dividends to date, $1,162,500.

The Indian Queen Mining and Milling Company, of Nevada, has declared a dividend (No. 31) of one and a half per cent upon the capital stock of the company, payable July 2d.

The Kentuck Mining Company, of Nevada, has declared a dividend (No. 38) of ten cents per share, payable June 20th.

The Silver King Mining Company, of Arizona, has declared a dividend of twenty-five cents per share.

The True Fissure Mining Company, of Utah, has declared a second quarterly dividend of twenty-five cents per share, payable June 15th.

PIPE LINE CERTIFICATES.

Until yesterday, the petroleum market was dull and featureless. Throughout the week, oil has been dull, the fluctuations being very irregular. Yesterday and to-day saw better prices and a strong "bull" market.

There is but little news from the oil regions. On Tuesday, Patterson Well No. 8 was reported as good for 300 barrels the first twenty-four hours, but later news estimated it from 100 to 150 only. It is said that the patent on the Roberts torpedo expired on May 20th, and that the reduced price on this article has increased its use in the wells. The Cooper tract is said to have declined 900 barrels in production during the past week. To-day's dispatches quoted Anchor Well No. 19 as having given 120 barrels the first hour. Later news, however, states that the well has declined rapidly, and is producing only 18 barrels per hour. The decline in this well, and the fact that the syndicate had made certificates scarce in Oil City, and that the loaning rate was down to thirty cents, or twenty cents below the actual cost of storage, led to-day to a firm and pronounced bull feeling, under which the market was strong.

The annual election for officers of the New York Mining Stock and National Petroleum Exchange was held on Monday last, and the following persons were chosen: President, C. O. Morris; Treasurer, John Stanton; Chairman, A. W. Peters; Secretary, P. J. Sweeny, Assistant Secretary, R. H. Gallaher, Jr.; Members of the Governing Committee, to serve one year: C. G. Fales and Julius Jahn; to serve three years: A. W. Peters, S. V. White, J. A. McPherson, J. S. Stanton, Leo Speyer, J. R. Mullany, F. F. Beals, L. V. De Foreest, and C. L. Parker; for Trustees of the Gratuity Fund, to serve one year: C. F. Woods; to serve five years: S. V. White and Henry H. Truman.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
June 9....	$1.15⅛	$1.19⅜	$1.15¼	$1.18⅜	2,480,000
11....	1.18¾	1.18⅞	1.16	1.16½	2,628,000
12....	1.16½	1.17⅛	1.15¾	1.16⅝	1,248,000
13....	1.16⅞	1.18⅝	1.16¾	1.17⅝	1,744,000
14....	1.17⅝	1.20⅝	1.17⅝	1.18⅝	2,453,000
15....	1.18⅜	1.19⅞	1.17¾	1.19⅜	3,122,000
Total sales.					13,675,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, June 14.

The market for copper stocks this week has evidently turned, showing decided improvement in several, notably Calumet & Hecla and Quincy. The fact is, prices have ranged too low for some time past, and it is quite clear that the best companies can continue to pay good dividends, even with the price of copper at 15c. Calumet & Hecla has advanced steadily from $287½@$243 bid. Even this price does not bring out the stock; it is remarkable how little of it comes on the market, the sales the past week being only four shares. Allouez seems to be an exception to the market, and finds little favor, with small sales a $1⅞. Atlantic at $11 is the first sale for over month, and the stock is in fair demand at that price. Franklin, which has remained very dull for weeks at $10, has become quite active again, advancing to $10½. Of Huron and National, there are no sales, nominally $1⅛ bid. Osceola declined from $20½@$19¼, ex dividend 50 cents, payable July 1st. This company has heretofore paid $1 per share quarterly—now reduced one half. Pewabic, without sales previous to this week, since May 22d; at $3, has started into life again, advancing to $4, and same bid. The accounts from the mine continue encouraging, and it is among the possibilities that this company may "strike it rich" almost any time at very short notice. Quincy, which was working up a little last week, and had gained from $44@$45, farther advanced to $50, with a good demand for the stock through the week. The general expectation that this company will divide $3 per share in August gave strength to the stock, and the upward price has been accelerated by the forcing of a short interest to cover.

In silver stocks, there is a better tone, without any great activity. Bowman is assuming prominence, and advanced from 17@22c. The stock is very strong as it moves up, and it would not be surprising to find it selling at 50 per cent advance on the present price within a few weeks. Sullivan suddenly dropped from $1⅞@$1½, at which 500 shares were put out; later, it is back to $1⅞, and the same bid. Catalpa, which had been exceedingly quiet for some weeks, with scarcely any sales, has suddenly started up from 65@70c. Crescent follows in sympathy, and has reached 30c. The improvement in both is due to the better prospects at the mines, assisted by a speculative movement. Bonanza has advanced from $2¼@$2½; and later, $2⅝ bid. The agent of this company is now in England, on a mission to sell a portion of its property, which, if successful, should greatly enhance the market value of the stock.

3 P.M.—The market this afternoon continues firm, and prices are well sustained. There were large sales of Catalpa (3550 shares) at 65@70c., closing at latter rate bid. Calumet & Hecla, $243 bid. Franklin, $10¼. Pewabic, $4. Quincy receded to $49½, and was offered at that. Silver Islet sold at $4, and same bid, but the stock seems to have few friends.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. June 8.	June 9.	June 11.	June 12.	June 13.	June 14.
Albion	..	..	..	..	..	..
Alpha	..	2½	2⅝	..	3	..
Alta	.80	.80	.75	.80	.80	.75
Bechtel	..	..	..	..	..	..
Belcher	1⅝	1¾	1⅞	2	1¾	1¾
Belle Isle	..	..	.20	.20	.20	.10
Best & Belcher	5⅛	5¼	5¾	6	5¼	5¼
Bodie	1⅛	1	1⅛	1	1	1
Bullion	..	..	..	..	..	..
California	.35	.40	.40	.40	.40	.40
Challar	3⅝	3¾	3¾	3¾	3½	3¾
Con. Virginia	.70	.75	.80	.80	.75	.70
Crown Point	..	1¾	1¾	2¼	1¾	1¾
Elko Cons	.20	.20	..	.20	.20	..
Eureka Cons	3	3	..	..	3½	3
Exchequer	.45	.50	.50	.60	.55	.50
Gould & Curry	3⅝	3⅞	3⅞	3⅞	3⅝	3½
Grand Prize	.45	.40	.25	.30	.15	.20
Hale & Norcross	8¼	8½	8	8½	7¾	7¾
Independence	.35	.35	..	..	.35	.35
Martin White	..	..	..	5	..	..
Mexican	4⅝	4⅞	4¾	5	4⅝	4¾
Mono	..	..	..	10	..	.10
Mount Diablo	..	..	..	..	..	..
Navajo	1½	..	1⅝	1⅝	1⅝	1⅝
Northern Belle	7	7	..	6½	6½	..
North Belle Isle	..	..	.20	.20	..	.20
Ophir	3½	3⅞	..	3¾	3¾	3⅝
Overman	..	..	..	..	..	..
Potosi	1⅜	1½	1½	1⅝	1½	1⅝
Savage	2¾	2¾	2¾	2¾	2¾	2¾
Scorpion	..	..	..	..	..	..
Sierra Nevada	7⅝	8⅜	7⅞	7¾	7	6⅞
Silver King	11	..	10⅞	..	10⅝	10⅝
Tip-Top	..	..	..	..	..	..
Union Cons	8⅞	9½	8¾	9¼	8⅜	8
Wales Cons	..	..	..	..	..	..
Yellow Jacket	4¾	4¾	5	5⅛	5	4¾

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The following are the financial balances of the various mining companies on June 1st:

CASH ON HAND.

Alta	$28,875.09	Hale & Norcross	$17,087.61
Albion Con	54.93	Jackson	2,276.87
Argenta	3,519.58	Lady Washington	59.83
Belcher	26,750.36	*Martin White	1,967.97
Benton Con	6,488.66	Mono	3,044.85
Bechtel	241.96	Mexican	31,557.64
Bodie Con	41,334.99	†Northern Belle	63,746.65
Bulwer	12,229.97	Ophir	25,960.73
California	14,809.93	Occidental	6,629.09
Con. Virginia	35,074.34	Potosi	4,873.05
Chollar	38,984.12	Scorpion	6,231.57
Crown Point	22,161.27	Savage	22,735.53
Challenge Con	5,160.23	Standard	98,754.72
Con. Imperial	396.26	Sierra Nevada	59,104.60
Day	5,519.85	Silver Hill	2,547.14
Gould & Curry	12,349.04	Utah	750.50

INDEBTEDNESS.

‡Albion		Grand Prize	$11,879.04
Best & Belcher	$7,802.41	Utah	3,548.23

*Mine expenses for May not received.
†Unsold bullion, $55,000.
‡Exact amount not yet known; approximates $260,000.

BULLION MARKET.

NEW YORK, Friday Evening, June 15.

The London market is steady and somewhat firmer, but rather inactive, and sterling exchange here is likely to decline the coming week, thus probably neutralizing any advance in silver abroad.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
June 9.	50 1-16	109⅝	June 13	50⅛	109¾
11.	50 1-16	109⅝	14	50⅛	109¾
12.	50 1-16	109⅝	15	50⅛	109¾

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of May.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.		$320,419
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"		17,775
Bodie, G. S.	Cal.	9,248	100,590
Bodie Tunnel, G.	"	6,128	51,447
*Bonanza King, G.	"		199,077
*Boston & Montana, G.	Mont.		72,318
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah		92,654
*Chrysolite, S. L.	Colo.		142,238
*Contention, S.	Ariz.		383,014
Crescent, G.	Cal.		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak.		120,231
*Derbec Blue Gravel, G. S.	Cal.		31,844
*Father de Smet, G.	Dak.		127,985
*Frisco M. and S. Co., G. S. L.	Utah		$77,084
*Head Center Cons.	Ariz.		6,865
*Head Center and Tranquillity	Ariz.		18,486
*Hecla Cons., G. S.	Mont.		234,984
*Homestake, G.	Dak.		330,060
*Hope, S.	Mont.		20,574
Horn-Silver, S. L.	Utah	228,000	1,283,000
*Independence, G. S.	Nev.		34,722
*Kentuck, G. S.	"		8,237
*Lexington, S.	Mont.	109,629	530,833
*Little Pittsburg, S. L.	Colo.		22,873
*Marguerite, G.	Cal.		33,200
*Martin White, G. S.	Nev.		136,317
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev.	52,233	127,311
*Navajo, G. S.	"		281,626
*North Belle Isle	"		1,953
Northern Belle, S.	"	45,510	388,525
*Ontario, S. L.	Utah		807,095
*Oxford, G.	N. S.		21,324
*Phœnix, G.	S. C.		†3,666
*Pinal Cons., S. L.	Ariz.	25,540	163,400
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		101,241
Standard, G.	Cal.	71,313	442,796
Star, S.	Nev.		27,095
*Stormont, S.	Utah	21,377	95,058
Syndicate, G.	Cal.	5,987	20,073
Tintic M. and M. Co.	Utah		7,632
*Tip Top, S.	Ariz.		122,983
*Tombstone, G. S.	"	76,600	‡322,830
Yellow Jacket, S.	Nev.	30,191	183,064
Total amount of shipments to date			$7,734,828

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended June 15th, as compiled from various sources, amounted to $151,000, as against $174,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,560,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended June 9th	$99,828
Corresponding week last year	2,526,451
Since January 1st, 1883	5,945,734
Corresponding period last year	31,683,999

Imports.

Week ended June 9th	$26,144
Corresponding week last year	62,096
Since January 1st, 1883	6,789,083
Corresponding period last year	1,794,749

Foreign Bank Statements.—The governors of the Bank of England, at their regular meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £569,000 bullion, and the proportion of its reserve to its liabilities was raised from 35¾ to 39¾ per cent, against 44⅛ per cent at this date last year. June 14th, the bank made a further gain of £170,000 bullion on balance. The weekly statement of the Bank of France shows losses of 3,400,000 francs gold, and 675,000 francs silver.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 15.

The Board of Managers of the Metal Exchange has adopted floor rules, to take effect on June 25th, providing for a daily call at eleven o'clock A.M.

American Pig.—On Monday, American Pig opened weak at prices quoted last Saturday, $20 for No. 1, and $19 for No. 2, standard brands; but during the week there has been a large turn-over, and the leading Lehigh brands are held firm at $22 for No. 1, and $20 for No. 2, although there are some outside makes that are still quoted at lower prices. Forge has been fairly active at the range of $17.50@$18.50. Bessemer is unchanged in price.

Scotch Pig.—The market is still very dull, prices for American being far below the importing point, and arrivals have been going into store to a considerable extent. Warrants are cabled to-day at the Exchange 47s. 1d. On June 13th, the Glasgow quotations received at the Exchange were: Coltness, 61s. 6d.; Langloan, 61s.; Summerlee, 59s. 6d.; Gartsherrie, 57s. 9d.; Glengarnock, 58s. 9d.; and Eglinton, 47s. 9d.

Rails.—Steel rails have ranged from $37.50 for large lots of heavy sections to $40 for light. The consumptive demand continues good, although no very large orders are placed. The quotations to-day are $37@$38. England cables, £4 12s. 6d.@£4 15s. f. o. b.

Old Rails.—Old rails have again been dull except for a lot of 8000 tons sold by the New York, Ontario & Western Railroad, to go to Pittsburg, at $22.50 delivered there. This price is net to the sellers, the buyers paying the small brokerage, said to be $100 for the lot. Other small lots, aggregating about 350 tons, have been sold at $22.50, Jersey City.

Scrap continues nominal at prices quoted last Saturday, $23.50@$24. There is no business doing.

Philadelphia. June 14.

This week's sales of pig-iron do not foot up very largely. Standard brands are developing a little unexpected firmness, because of some quiet selling that has been going on for future delivery. A good deal of inferior iron is offered, but not much is selling; offers of 500 to 1000-ton lots continue to be made. Quotations are weak all around, except in the case of standard and special brands, concerning which makers refuse to make concessions. To-day's prices are for No. 1 at shipping port, $20@$21. Good iron can be had at $20. An effort is making by some holders to adhere to $21. The panicky feeling which prevailed last week has partly blown over, and several prominent makers have announced that, if they can not have better prices, they will hold on until the weak holders have got out of the way. No. 2 Foundry iron is selling at from $19@$20, with $17.50 at furnace as inside figures, and numerous offerings. Forge iron is selling more freely than any other, owing to the continued demand for finished iron and the low prices prevailing. The lowest prices heard of are $17 at furnace, or shipping port prices, $18@$19. Large lots continue to be offered, but there are few takers. Prices have undoubtedly reached the lowest limits, but consumers feel that it is safe to continue the policy of hand-to-mouth buying for a little while longer. Bessemer iron is to be had at $21; very few sales are heard of. Spiegeleisen can be had at $31; several inquiries are floating around.

Muck Bars are in moderate supply at $34@$34.50; and last week's reported sales foot up about 1000 tons for prompt and future delivery.

Blooms.—Several small sales of Charcoal Blooms took place at figures varying from $58@$61. Prices have been improved recently by the restriction of output. Sales of Anthracite Blooms have been heard of from $50@$53.

Manufactured Iron.—A little weakness has been developed within the past few days, though the best makes are held firmly at 2·20c. at mill. Store deliveries are large, and 2·25@$2·30c. is had in most cases. Some of the mills are short of business, and a more active competition is developed, which results in offers of 2·10@2·15c. for good iron. More or less business is coming to hand in country mills, and common iron is booked at 1·90@2c.

Nails.—A large demand continues for nails, and prices are firm at $3@$3.10.

Plate and Tank Iron.—Plate and Tank Iron are active in small lots at 2·40c. for Angles; 3⅛c. for Beams and Channels. Structural iron shows no additional activity, though there is no falling off in the work at mills.

Steel Rails.—This week's business is restricted mostly to small lots, though there are inquiries for large lots, and offers of $37.50.

Old Rails are scarcely heard of. Occasional offerings are made at $22.50 for shipments. Double Heads are nominal. Scrap-iron sells in small lots at $23@$25. Cast, $17@$18, and offers of cargo at $24.

Pittsburg. June 14.

Pig-Iron.—Numerous indications point to a suspension of iron-making in a good many of the mills, ostensibly for the purpose of repairs, but in reality to wait for orders. The effect of the recent signing is now developed in this way, that large consumers are waiting for lower prices, because of the assurances given during May that, without a restriction of production, prices would decline. They are now looking for that decline. The consumption of iron has not increased, and will not, unless consumers are satisfied that lowest prices have been reached. Several furnaces have recently blown out, and this helps the trade. Forge iron is offered at $17@$18, and Foundry at $19.50@$21. Most of the sales are in from 50 to 300-ton lots; 1000-ton lots of Forge have been asked for, but current prices will not be paid, consumers preferring to buy from hand to mouth, rather than risk heavy purchases. Bessemer iron sells in small lots at $21.50; for large lots, $21 is offered. Consumers of crude iron are looking for weak holders, and are occasionally finding them. One thousand tons of Muck Bar in small lots sold at $34@$34.50. Merchant Bar is selling at 2c., but buyers are holding off for 1·80c. and 1·90c. rates. There is a feeling of apprehension that the threat of weakening prices is made with good reason. Nails are in active demand at $3@$3.10 in car-load lots, 60 days. Stocks in first hands are very low, and orders for assorted are filled with difficulty. Steel rails are quoted at $39@$40, but business is done at less. The declining tendency is at work, but mills here will not be the first to sell below current rates. The general situation is quite satisfactory. The steel mills continue to make a full output. The smaller manufacturing establishments are nearly all busily engaged.

The coke trade is endeavoring to escape from the toils of over-production through organized action. The demand for iron through the oil country is steady. The receipts of scrap-iron and old rails are barely sufficient to meet requirements. Boiler-works, bridge-works, locomotive-works, and the large machine-shops have not reduced their force of hands or the volume of work turned out.

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	June 9. H.	June 9. L.	June 11. H.	June 11. L.	June 12. H.	June 12. L.	June 13. H.	June 13. L.	June 14. H.	June 14. L.	June 15. H.	June 15. L.	SALES.
Alice, Mon.			.17		.18	.16	.16		.17				5,600
Amie Con., Co.													
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.	9.13		10.00	9.50	9.50		9.50		9.25		9.50		510
Belle Isle, Ne.	.20				.41				.42		.40		1,500
Bodie Cons., Ca.			1.00		1.00						.95	.92	1,640
Breece, Co.													
Bulwer, Ca.													
California, Ne.	.40	.36	.42		.42	.38	.40		.39	.37			3,150
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.	.14	.13											1,900
Chrysolite, Co.			1.15						1.20		1.20		1,000
Cons. Va., Ne.	.80	.72			.79	.74	.76		.72	.70	.70	.68	4,200
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.	4.00				4.00								350
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.					.10		.09						600
Gold Stripe, Ca.	.08	.07											200
Gould & Curry, Ne.													
Grand Prize, Ne.									.25				200
Great Eastern, Dk.									.01				1,000
Green Mountain, Ca.									.73		.73		800
Hale & Norcross, Ne.											7.13		100
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.	15.75				15.75						16.00	15.63	370
Horn-Silver, Ut.	6.63	6.25			6.50	6.38			6.38		6.38	6.25	2,270
Hurill, Co													
Independence, Ne.					.33	.30			.30		.32	.30	800
Iron Silver, Co.					2.90		2.85						300
La Plata, Co.													
Leadville C., Co.							.50						300
Little Chief, Co.	.49		.50		.50				.55	.51	.55	.53	1,500
Little Pittsburg, Co.					.78				.78				500
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	1.45						1.70				1.80		500
Northern Belle, Ne.			6.75		6.50		6.00						320
North Belle Isle, Ne.	.25	.20											390
Ontario, Ut.					25.75	25.00					25.00		413
Ophir, Ne.							4.00						50
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.					37.50								100
" Com., Ca.									7.50				50
Rising Sun, Ca.	.03												100
Robinson Cons., Co.	.77		.77	.75	.77	.76	.76		.76		.75		3,800
Savage, Ne.							2.75						100
Sierra Grande, N. M.	1.50	1.40	1.30	1.25	1.40		1.40		1.45	1.40	1.45	1.30	7,700
Sierra Nevada, Ne.	7.88				7.75	7.25	7.25				6.63	6.50	855
Silver King, Ar.													
Spring Valley, Ca.													
Standard, Ca.													
Stormont, Ut.	.69				.55		.29		.50	.48			2,000
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket			5.13										50
.....													
.....													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	June 9. H	June 9. L.	June 11. H.	June 11. L.	June 12. H.	June 12. L.	June 13. H.	June 13. L.	June 14. H.	June 14. L.	June 15 H.	June 15 L.	SALES.
Advance.													
Albion.													
Alta.													
Alta-Montana, G.	.03				.04				.04				1,100
Am. Flag, s.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Bodie Bicher, G. S.					5.50								50
Big Pittsburg, S. L.													
Bondholder													
Bradshaw, s.							.28						300
Buckeye													
" pref.													
Bull-Domingo, s. L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., S. H., G.	.75		.80		.80							1.00	500
Central Ariz'na, s.	.25												50
Cherokee, G.													
Climax, Co.					.07								100
Cons. Imp'r'l, G. S.	.09											.10	200
Crowell, G.													
Dahlonega, G.													
Decatur	.04		.05	.04	.05	.04	.05	.04	.05	.04	.04		19,600
Dunderberg													
Durango, G.													
Eastern Oregon	.33	.31	.34	.33	.35	.34	.36	.35	.37	.35	.38	.36	6,100
Elko Cons.	.19	.18	.18										2,600
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.40		1.40				1.40		1.40				1,100
Hortense, s.			.11									.09	80
Lacrosse, G.							.11						700
Lucerne													
Mariposa Prel., G													
" Com., G													
Mexican, G. S.													
Miner Boy													
Mono													
North Standard, G.			.08				.10						200
N. Horn-Silv'r, S. L.													
Ori'n't'l & Miller, s.			.16		.18								700
Quartz Creek.													
Rappahannock, G.			.08	.07			.07	.06				.08	4,600
Red Elephant, s.							.05						500
Ruby, of Arizona.													
Silver Cliff, s.							.19						600
Sonora Con.	.31	.29	.34	.30	.31	.26	.29	.27	.28	.25	.26	.24	53,900
South Bodie, G.													
South Bulwer, G.													
South Hite										.10			700
South Pacific.													
State Line, 1 & 4, s.	.04											.05	1,600
" Nos. 2 & 3, s.													
Sutro Tunnel	.28	.27	.29	.25	.26		.27	.25	.25	.24	.25	.24	38,600
Taylor Plumas													
Unadilla, s.					.02								1,000
Union Cons., G. S.	8.63				8.75		9.00	8.88					600

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 45,218. Non-dividend shares sold, 131,200.

BOSTON MINING STOCKS.

	June 8. H.	June 8. L.	June 9. H.	June 9. L.	June 11. H.	June 11. L.	June 12. H.	June 12. L.	June 13. H.	June 13. L.	June 14. H.	June 14. L.	Sales
Allouez	.16						1.88						25
Amie	.16												500
Atlantic	11.00								11.00				80
Aztec													
Bodie Con.													
Bonanza D.			2.25		2.38		2.56¼	2.50					500
Bowman Sil	.17		.17		.18	.17	.20	.18			.23	.20	18,622
Bruns. Ant.							15.00						100
Bulwer													
California													
Cal. & Hec.			241										4
Catalpa	.56	.52	.55		.60	.54	.57½		.60		.70	.60	9,775
Central Ariz													
Cherryfield													
Co. Virginia													
Copper Falls													
Copperop													
Crescent							.30				.30	.27½	1,050
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas							1.00						300
Duncan													
Dunkin													
Empire													
Eureka Con.													
Franklin			10.00				10.00				10.50	10.25	650
Hancock G.													
Harshaw	6½				.56¼	.50							250
Huron													
Independ'ce													
Indian Q'n.	1.25				1.15								400
Mammoth													
Mass & N.M.	.07		.07		.07		.07				.07		9,110
Milton													
Napa													
National													
North. Belle													
Ontario													
Osceola			20.50						19.50				27
Penn-Breck.													
Pewabic							3.50				4.00	3.50	95
Pine Tree							.08	.06			.12		600
Plymouth													
Quincy	46.50	46.00	46.50		47.50	46.50	48.00		50.00	48.00	49.50		404
Ridge													
Robinson													
San Pedro	.40	.35											257
S'ra Nevada													
S'ra Grande													
Silver Islet											3.00		100
Silver King													
Simpson Gd													
So. Pacific													
Standard													
Sullivan	1.88	1.75			1.75		1.50				1.88	1.75	1,610
Sutro Tun.	.28	.27			.27		.27				.26		1,600
Sycamore													
Twin Lead.	.18	.13	.18		.19	.18					.16		9,700
Vizina													
.....													

PHILADELPHIA MINING STOCKS.

	June 8. H.	June 8. L.	June 9. H.	June 9. L.	June 11. H.	June 11. L.	June 12. H.	June 12. L.	June 13. H.	June 13. L.	June 14. H.	June 14. L	Sales.
Amer. Cons.													
Argent.	.17	.16	.17				.18	.17	.17	.16	.16		8,500
Arizona So.			.27½						.42½	.40	.42½	.40	1,100
Battle Mt.					.04								4,000
Buena.	.01				.01		.01					.01	6,100
California.													
Calista													
Chrysolite													
Cincinnati			.12						.12		.10		1,400
Comprom'e.	.21		.22		.20		24	.19	.25		.23		15,000
Contention.													
Con. Virg.													
Dauntless													
Del Monte													
Denver City											.13		200
Eureka													
Girard	.05				.06						.05		4,400
Governor	.08		.08		.08		.08		.08		.08	.05	14,700
Grand Uni'n			.23										1,000
Green Mt.			.72½										700
Gunnison	.52½	.50	.55	.50	.52½	.40	.50	.47½	.45	.40	.42½	.40	28,600
Homestake													
Horn Silver			6.50										100
Iowa Gulch	.09	.08	.08		.08		.09		.08		.09	.08	50,900
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Mand					.05		.05						4,500
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan	.04												700
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.	.10		.10		.10		.10	.09	.09	.08	.09		19,800
Permanent.					.03								7,000
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis			.30		.32½		.35		.32½	.30			6,500
Rara Avis E.	.11		.10		.10		.10		.09		.09		8,700
Record													
Rice Pion'r.													
Sierra Apac.	.45	.40	.45	.42½	.42½	.30	.35	.32½	.30	.25	.30		15,900
Sierra Be.la.	.85	.80	.85		.70	.50	.65	.62½	.67½	.55	.60	.55	12,050
Sierra G'nde	1.60	1.52½	1.50	1.35	1.35	1.17½	1.42½	1.35	1.37½	1.35	1.35	1.30	20,000
Sierra Nev.													
Silver Cord.	1.80		1.80		1.80								1,300
Silver King.													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana.	.04				.04		.04		.04		.04		5,000
Sutro Tun'l													
Tombstone.			.80				.80						1,000
Victor.	.02								.02				3,000
Yale Mt.													

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METALS.

NEW YORK, Friday Evening, June 15.

Copper.—On further inquiry, we hear that the sale of Lake Copper referred to in our last week's report, of 20,000,000 pounds, was made to manufacturers only. The price paid is understood to have been 15c. without cask, on the dock, the sellers binding themselves not to sell another pound to consumers under 16c. until November 1st, next, while they are at liberty to sell for export at any price they choose in the mean time. Since then the market has been quiet at 15@15½c. for Lake, and 14@15c. for other brands. By cable, we hear from London that copper there is steadier; Best Selected, £69@£70, and Chili Bars £63 15s.@£64 5s. We hear from Liverpool that large quantities of argentiferous copper ores and matte from Montana arrive there all the time. Of the former a contract was completed recently for about 6000 tons, delivery to be spread over twelve months; and parties were in treaty early this month for a further 2000 to 3000 tons. Large sales have also been made of matte from Montana, 280 tons selling toward the close of May for immediate shipment from here at a very full price. It is added that the course of the copper market in England depends almost entirely upon the supplies that may be received from this country. Prices over there are for the moment upheld by speculation. Whether these speculators are financially strong enough to continue doing so for some time longer in the face of amounts yet to come forward from the United States, the next few weeks will show. As for the Chilian export to Europe, it has been light enough, from January 1st to May 27th, 18,878 tons, against 19,357 last year. Spanish exportation for the first quarter has been 148,059 tons of copper ore, against last year 147,078, and 5954 tons of ingot copper, against 6120 in 1882.

Messrs. Richardson & Co., of Swansea, quote, under date of June 1st, ores and regulus 12s.@12s. 7½d. per unit.

The private sales at Swansea during the month of May consist of 382 tons of Concordia ore at 12s.; 435 tons of Bolivian ore at 12s.; 500 tons of New Quebrada Yellow ore at 12s.; 1179 tons ruby ore and 936 tons regulus at 12s. 3d.; 1086 tons of Libiola ore at 12s.; 54 tons of Mount Perry at 12s., and 20 tons at 12s. 4½d.; 105 tons of Moonta ore at 12s. 3d.; 750 tons of Cueva de la Mora precipitate at 12s. 6d.; 18 tons of Aljustrel at 12s. 3d.; 506 tons of Chili regulus at 12s. 6d.; 1100 tons of Cape ore at 12s. 4½d.; and 954 tons of Rio Tinto regulus at 12s. 6d.

Messrs. James & Shakespeare, Liverpool and London, have published the following statistics of copper in England and France, including metal afloat on May 31st:

		May 1 to 31. Imports. Tons.	May 1 to 31. Deliveries. Tons.	
Fine foreign, chiefly Australian		1,126	1,177	London.
Chili.	Bars and ingots	1,748	1,935	Liverpool and Swansea.
	In ores and regulus	1,108	1,250	
Precipitate and sundries		2,496	3,445	
Totals, England		6,478	7,807	
Fine foreign, chiefly American		460	430	France.
Chili bars, ingots, and Barilla		993	1,361	
		7,931	9,598	

	Stocks. May 31. Tons.	May 15. Tons.	April 30. Tons.	
Fine foreign, chiefly Australian	4,215	4,458	4,266	London.
Chili. Bars and ingots	24,734	24,976	24,921	Liverpool and Swansea.
Chili. In ores and regulus	1,813	2,040	1,955	
Precipitate and sundries	3,288	4,475	4,237	
Totals, England	34,050	35,949	35,379	
Fine foreign, chiefly American	140	110	110	France.
Chili bars, ingots, and Barilla	2,012	2,092	2,380	
	36,202	38,151	37,869	
Advised by mail and telegram: Chili	9,158	9,770	9,719	
Australian	1,650	1,650	1,950	
	47,010	49,571	49,538	

		Jan. 1 to May 31. 1883. Tons.	1882. Tons.	1881. Tons.
Imports	Chili	17,884	16,881	14,099
	Other foreign	17,415	14,166	14,705
		35,299	31,047	28,804
Deliveries	Chili	16,807	19,018	17,930
	Other foreign	17,417	13,228	12,079
		34,224	32,246	30,009

Tin has gone on weakening in our market. The market has ruled somewhat more active at a lower range of prices. Transactions for forward delivery have occurred at 21c. for cash. In large lines, spot, we quote 20¾@20⅞c. nominally. London has declined to £94, spot. Singapore cables £95 10s., cost and freight to New York. The Straits exported to England and America during the first five months, 6110 tons of tin, against 5100 tons same time last year.

Lead.—Sales have been made during the week of 300 tons Aurora corroding at 4·42½c., and 300 tons Common at the same price; subsequently, 200 tons corroding sold at 4·45c. We quote both 4·40@4·50c. at the close, on a firm but dull market. There is a good demand for common lead, deliverable in July, August, and September, consumers being anxious to secure a supply for the opening of the campaign; for current requirements, they are sufficiently stocked. Holders meanwhile show little inclination to meet the views of buyers for the months named, and in this manner little occurs for the present. At any rate, the impression is, that at about current figures lead is safe enough for some six weeks to come. London cables a weak market, at £12 15s.@£13 for English pig. Spain exported, during the first quarter, 29,534 tons of pig-lead, against 28,527 in 1882, and 25,370 in 1881.

Messrs. Everett & Post, of Chicago, send us the following dispatch to-day:

Our market is firmer. Sales are reported of 1000 tons Common at 4·15c., and of 700 tons Refined at 4·20c. The market closed strong at 4·20c.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is firm. Sales for the week are over 450 tons of Refined at 4·13c., and 70 tons of Hard lead at 4·10c. Sales to-day are 140 tons of Refined at 4·15c.; 150 tons of Chemical at 4·12½c.; and 500 tons of Refined, July delivery, at 4·18c.

Spelter is featureless; very small transactions at 4·60@4·70c. in small lots, Common Domestic, while Silesian is nominally worth 5⅛c. Meanwhile a firmer market is reported by cable from London, where ordinary, at shipping ports, is worth £15@£15 5s. Spanish Calamine exportation during the first quarter has been 4802 tons, against 8616 in 1882, and 2091 in 1881.

Antimony is dull at 10⅝c. for Cookson's, and 9⅝c. for Hallett's. On June 1st, French Star Regulus was worth in the London market £39@£40 per ton.

Quicksilver.—We perceive that the export from Spain has fallen off considerably during the first quarter, being only 185 tons, against 520 tons last year same time, and 698 in 1881.

COAL TRADE REVIEW.

Anthracite.

NEW YORK, Friday Evening, June 15.

There are no new developments since our last issue, nor any improvement in the general condition of the trade. The anthracite trade at present is a puzzle to the most intelligent observer. The sanguine lay much stress upon the fact that the output at the present time is practically 1,500,000 tons ahead of last year, and that the requirements for the rest of the year will be as great as for the corresponding period last year, which would bring the total tonnage for 1883 to 30,000,000 tons or over. It seems to be a fact, also, that the large companies are maintaining prices, while the choicer Lehighs and special brands of coal are handled at circular rates without any difficulty. Outside of these, however, large quantities of coal are offered at prices that are more a matter of barter. Notwithstanding these favorable factors, buyers remain apathetic. There is no snap in the trade. The demand for manufacturing purposes is largely abridged, while dealers do not seem disposed to lay on freely, notwithstanding the threatened advance on the 1st of July, which, as far as we can learn, has not yet been definitely decided upon. In our judgment, there is nothing in the present condition of the market to warrant an advance. We apprehend it would slacken rather than stimulate sales; the only probable effect would be to move coal sold at previous figures. By an ill-advised advance, the months of July and August may be made very quiet months for new business. While we recognize the fact that in the near future anthracite will be in a position to be sold arbitrarily, that day is not yet. The time is coming when it will be used only for domestic purposes, and the demand for coarser uses supplied by the practically inexhaustible quantity of bituminous. The present intense rivalry between the different contending soft coal-fields for trade, and their ability to put coal in the market at very low figures, as shown by some of the recent contracts, admonishes anthracite not to rear its head too high at present on the manufacturing sizes, or it will open the way for its active competitor to slip in and supplant it largely.

Since the above was put in type, we learn that the companies are in consultation upon the subject of an advance, and have set the figures at 10c. on broken, 15c. on egg, and 25c. on stove and chestnut. We can not learn, however, that a definite conclusion has been arrived at.

BITUMINOUS.

In bituminous, there is very little current business doing, although last week witnessed the award of the last remaining contract of importance in New England, the Boston & Maine purchase of fifty thousand tons having been divided between the Consolidation Coal Company and the Elk Garden District. It is reported that the price made was an extremely low one, so low as to justify the report that has been for some time current that the Baltimore & Ohio Railroad has finally recognized the necessity of a cut, private or otherwise, in its rates. It is evident that the future of the bituminous interests, for some time at least, will witness a continued, if not increasing, competition, and that the carriers of this coal must accept the inevitable conclusion that the day of high freight rates is passed. At this juncture, it becomes of interest to anticipate what course will be adopted by the Chesapeake & Ohio Canal Company. The confidence with which those in charge of that work started out at the first of the season with unnecessarily high charges must soon give place, if all signs do not fail, to serious doubts as to whether that work can survive the present and coming competition. It is clear, at this time, that important reductions must be made in the cost of transporting coal via this outlet. At a meeting of the Board of Directors of the Chesapeake & Ohio Canal Company, held in Baltimore on the 13th inst., it was determined to make a present reduction in the canal tolls of ten cents per ton, or from fifty to forty cents, including the charge for wharfage at Cumberland, for which a charge of four cents is now made, leaving the net tolls thirty-six cents per ton. While the reduction now made can not be said to be of any importance, it is at least agreeable to note that the Canal Company has abandoned the attempt to compel the trade to pay a charge for the use of the outlet lock at Georgetown, whether it was used by shippers or not.

The Cumberland District seems to be in the least favorable position of any of the competing interests in the existing and coming strife for trade. With the Pennsylvania Railroad on the north and the Chesapeake & Ohio Railroad on the south, fully awake to the demands and necessities of the trade, and reaching more favored points at tide-water than either the Baltimore & Ohio Railroad or the Chesapeake & Ohio Canal, it would appear that, without some heroic action on the part of the carriers from that district, its business must continue to decline. Already the Delaware River, New York Harbor, the Hudson River, and three fourths of New England have been appropriated by other districts, and the prevailing competition is closely contesting the limited area to which the trade of this region is now restricted.

Vessels have been extremely scarce at all shipping points and freights have advanced.

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THE arbitration tribunal appointed under the Wallace act to decide the questions at issue between the operators and the miners in the railroad pits of the Pittsburg District is making very slow progress. Committees have been appointed to look into the condition both of the lake trade and of the local trade, and have reported after considerable delay. The facts, whatever they may have been, do not appear to have carried conviction to the minds of either party as to the fallacy of their position ; and after a number of fruitless meetings, the umpire, Mr. JOHN R. MCCUNE, President of the Union National Bank of Pittsburg, has been called upon to decide the question of wages. It will be remembered that the pits are now working under a temporary arrangement, pending the decision, and that, according to the Wallace act, it is not binding on either party so far as questions of wages are concerned. Whatever may be the ruling of the umpire, it is to be hoped that it will be accepted in good faith, and that no complications will arise from a refusal of either party to abide by it.

THE rapid improvement in the methods of manufacturing steel, notably in the open-hearth, and the growing quantity produced in this country, are beginning to tell on the old established iron manufacture. At the present day, quality for quality, steel for many structural and merchant purposes is cheaper than iron, and after some hesitation, always experienced in the introduction of any thing that is new, consumers are taking hold vigorously. The competition is most keenly felt by the makers of special brands of wrought-iron, and has had the effect to a notable extent to lower the quality of the wrought-iron. In their efforts to meet a steadily declining market, makers of special brands have been found to relax in the choice of their raw materials, and to save as much as possible in manipulation. Quality, of course, has suffered under such a system, the temptation to avoid losses and to hold ground so long absolutely under their sway being too great, in many cases, especially as many consumers have unbounded confidence, and do not stop to investigate. We do not believe that such a system can long be continued with impunity.

DURING the past few years, large consumers of rolled iron and steel have begun more and more generally to devote their attention toward providing facilities for themselves manufacturing the cruder forms of iron and steel. The growth in the demand for all kinds of railroad and agricultural machinery has developed manufacturing establishments of great magnitude in the Eastern and Western States. Beginning with ordering special shapes of cast or rolled metal in small quantities, they have grown as consumers, until, to-day, when reasonably busy, they call for very large quantities of material. They have now begun to invest surplus capital in the building of plant for the manufacturing of their own special shapes from cruder material, which they have no trouble in getting in the open market. Their avowed purpose in putting up rolling-mills and foundries of their own is not so much themselves to pocket the profit which those made from whom they bought. They are actuated chiefly by other considerations, the principal being that, having sole control of the preliminary stages of manufacture, they can better make just what they want, are in a better condition to adapt themselves more promptly to changes in their requirements, and can avoid delays and annoyances incident to their dealings with parties whose interests are not always in harmony with their own. It gives them, they claim, a fuller and more absolute control over the quality of their raw material, and hence allows them to place their finished goods in the hands of their customers with more confidence. Of course, only the very largest concerns are in a position to follow such a policy, as it is possible only when the quantities required in the course of manufacture are such as to give regular employment to a special plant. There are indications that this movement will go even farther, and lead to the building of open-hearth furnaces, etc. The advantages which it offers are undoubtedly great, without reference to any saving in the cost, which we believe is entirely problematical. Comparatively, such works must always be restricted in character, and can not command raw material and facilities as cheaply, nor can they gather and hold permanently a large force of skilled workmen, foremen, and engineers.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Future of Pyrites Mining on the Eastern Sea-Board.

EDITOR ENGINEERING AND MINING JOURNAL :

SIR : Of the manufacturers or those most interested in the question of cheap sulphuric acid in the United States, comparatively few have as yet studied closely or realize fully the importance of the problem now working out by the miners or producers of pyrites.

In an article published by you nearly three years ago, I gave some figures to prove the value of pyrites in comparison with brimstone. It is well known that prices of brimstone in cargo lots have varied but little during that period, yet the wholesale price of commercial acid has changed about 100 per cent. So radical a drop in selling rates can not be accounted for by the lessening of expenses or increased production from like quantities of crude materials ; but a reason can perhaps be found in the erection of surplus chambers to supply the active trade of the years 1881-82 ; and such increase in capacity could only result in a check later on, when the supply was greater than the demand. In seasons of depression, the small firms lower prices, in order to retain trade ; but, unlike former struggles of this kind, the markets are held in the firm grasp of a new class of producers, who claim to be able to make full profits even at this reduced price. These new parties are becoming prominent leaders, from the fact of their ready acquiescence in the manifest destiny of sulphuric acid manufacture from pyrites ores mined in this country. Three years ago, but one or two firms were using pyrites in small quantities, whereas, at the present writing, ores are burned as follows :

Bergenport, N. J., about.....	60 tons.	New Bedford, Mass.....	5 tons.
Newtown Creek, N. Y., about.	65 "	Boston and vicinity, Mass.....	20 "
Bridgeport, Conn....	10 "	Elsewhere.....	10 "
Elizabeth, N. J.....	30 "	Total daily consumption.....	200 tons

There is, of course, a reason for the very slow growth of an industry promising such margins of profit ; but whatever the cause in the past, the fact must now be recognized that acid can not be made from brimstone and sold at present prices ; and further, that manufacturers must meet

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future trade on about the same basis, to do which pyrites alone can be used.

The difference in cost of sulphur from both sources will make this statement more forcible, namely :

Brimstone (98 per cent sulphur) is selling for.....	$28.00
Pyrites, 2 tons (4480 pounds) cost delivered in New York, say 13 cents per unit of sulphur, or 4480 pounds pyrites (48 per cent sulphur) @ $6.25	= 12.50
In favor of pyrites	$15.50

Produce :

2 tons pyrites, 4480 pounds (48 per cent sulphur).....	= 2150 pounds sulphur
Waste, cinders, etc., 5 per cent..	108 pounds.....2042 pounds net.
1 ton brimstone (98 per cent).....	= 1960 pounds sulphur
Waste, ash, etc., 2 per cent.....	39 pounds.....1921 "
Balance of sulphur in favor of pyrites..	121 " "

Nearly enough to cover difference in cost of working pyrites.

It is easy to see why the present consumers of ores can run their plant to fullest capacity while brimstone-burners are complaining of dull times and slow sales ; and the sooner the trade settles down to these facts, the better for it.

The principal demand for surplus low-grade acids (the making of which justifies large acid plant) has been and will continue to be, for manufacture of superphosphates, the bulk of which is sold south of Baltimore. So wide has been the price of acid made from brimstone here and from pyrites abroad that, annually, tens of thousands of tons of rock phosphate have been sent to Europe for treatment, and then returned to us for use on our exhausted soils. The freight alone on this double shipment is all the profit our agricultural people should be made to pay ; and the strange fact remains that, midway between the sections of greatest production in acids and greatest consumption in superphosphates, there are deposits of the choicest pyrites ever found in quantities, so pure as to rival brimstone in acid-making properties, yet utilized to a very limited extent.

It would be safe to say that ores from these deposits in Virginia can be laid down in every city from New York southward at prices which will guarantee commercial acid (66° B.) at one cent per pound from this time on, and this reduction should affect the price of superphosphates at least thirty per cent from established rates. Assuming that 250,000 tons of fertilizers are consumed annually, costing to average forty dollars per ton, this saving, which should go to farmers, would be so enormous as to double the consumption in a short time, and as a result larger chamber capacity would be required than now used. The increase naturally would be placed nearer to consumers, thus shifting the balance of trade southward. The outlook for the acid trade is certainly encouraging ; but pyrites must from henceforth be the material for its manufacture. What has heretofore been a side issue in our mining industries will now come to the front in such grand proportions as to astonish people unacquainted with the productions of European mines.

Should the manufacturers combine, becoming owners of the pyrites deposits, as is the case with the Rio Tinto and Tharsis mines, there will be seen in this country products exceeding those famous properties, and that within a few years. The fertilizer trade of the South would alone warrant such development, outside of the increasing demands of our country generally. So rapidly is the public becoming awakened to a realization of this new but permanent industry in mining that the change will be upon us before we are aware, and a mineral product will be added to the natural wealth of the Eastern slope, rivaling the mine products of the West. Even Europe can be supplied with pyrites at less rates than paid for Spanish ores ; and with the large working of such deposits along our sea-board, a new impetus will be given to trade channels into which sulphuric acid enters.

Connected with this commencement of operations, will be found the usual crop of "prospects" offered by irresponsible parties, and would-be purchasers should remember that over all the world's surface there are but very few paying deposits yet opened ; and from the peculiar nature of the ores, there can not be found any great number of mines, with quality of mineral, and proper location for shipment.

There are so many drawbacks connected with the securing of these attributes that more than careful examinations should be made of all details, to avoid the inevitable loss that attends mining ventures carelessly entered into.

The problem of placing our Eastern sea-board in the lead for pyrites mining will be, however, the work of but a short time, with the activity usually displayed in our enterprises, and to careful men with large capital the promised reward is beyond precedent. W. H. A.

Dredging for Gold.

EDITOR ENGINEERING AND MINING JOURNAL :

SIR : I have been favored with a copy of a prospectus issued by a company which proposes the use of a new dredging system for working auriferous river sands. As regards the apparatus itself, it may be briefly described as a suction-pump actuated by a vacuum produced in a large vessel supplied with steam from a small boiler. The sandy silt, etc., from the river bottom are intermittently raised through a draught-pipe into the vacuum-chamber, and are thence discharged into a sluice-box supported upon the scow which carries the dredging apparatus. As a means of dredging, pure and simple, there is no reason why this system should not work ; and I believe that experiments have shown that it is capable of handling considerable quantities of material. How the results compare with those of the ordinary dredging-machines, I can not say.

But the main object of this invention is apparently the recovery of gold from Southern river-beds. I quote from the circular of the company :

"From the time of the discovery of gold in California to the present day, mining in this country has developed into such gigantic proportions that it seems to have already outstripped the most visionary expectations of the early Spaniards, and the methods of mining, in their variety, immensity, and ingenuity, have followed closely in its wake, and have only been equaled by the circumstances calling them forth. Of the gold produced, it is estimated that 75 per cent has been obtained from river-beds and gravel-banks, and the means used to save the gold contained in this sand or gravel have varied from the primitive mining-pan of early days to the most elaborate system of sluices, riffles, blankets, and the amalgamated copper and silver plates of to-day. A great many streams admitted to be rich in gold-bearing deposits are abandoned because of the outlay necessary to dam them and make their beds accessible, and the fact that heavy rains and melting snows so frequently produce freshets that sweep away all that presents any obstacle to their headlong course. To obviate these difficulties, and make 'river mining' a practical and comparatively inexpensive enterprise," etc.

Schemes of this kind are an old story on the Pacific coast, having been tried in almost every possible variety during the early period of wild experimentation. Dredgers of different kinds, driven by steam and otherwise, were tested in the Sacramento, San Joaquin, Feather, and American rivers and their tributaries, in every case proving absolute failures. At the time of the excitement about the supposed bonanza at Gold Bluffs, on the sea-coast, a steam dredger was made and sent up from San Francisco to this locality, with the view of working the ocean sands.

Now it is a remarkable fact that, in almost every case where the dredging-machine was tried, the actual presence of gold was a fully determined fact ; and in some instances, dredging failed in places where other methods working side by side were successful. The whole matter was given a full and fair trial in California, and the plan has been emphatically condemned. As a Californian, I can say that the man who should attempt to revive the system of dredging for gold in our State would simply be regarded as being deficient in experience ; and any attempt to raise money for a further trial would be met with derision. In California, the principles of mining for the precious metals and for extracting them are now clearly understood, and resolve themselves into a few simple but hard facts. It is in the Southern States, where gold mining has been practiced on a small scale since the beginning of the century, and where presumably the people ought to know something about it by this time, that most of the visionary and exploded schemes are tried ; the only other field being in mines of the far West managed by people who have no practical knowledge of the subject. (I refer to the class popularly known as the "tender-foot.")

The principal reason why dredging for auriferous sands is not a profitable occupation lies in the nature of the occurrence of gold in river-bottoms. The river-bed acts as a sort of natural ground-sluice, and collects the gold in positions which are not accessible to a dredging apparatus. The misconception upon which similar schemes are founded is, that gold is disseminated regularly through the sand and silt of the river-bottom, so that the question is simply one of raising these materials above the surface. As a matter of fact, the gold particles betake themselves, with characteristic cunning, to all the crevices and out-of-the-way places in which they can hide. Hence, if the bed-rock of a gold placer consists of soft decomposed rock, or of slates, or of schists tilted at a high angle, gold is found permeating it to a considerable distance. In cleaning up the bed of every creek from which the water has been diverted, the gold, even if very finely disseminated, is found in pockets or crevices. An experienced miner at a glance detects the likely spots, and works accordingly. Now if the dredging-machine, instead of lifting all the light, loose, and comparatively barren *detritus* of a river, could get at the right places, and coax the gold from its retirement, the scheme would be a very pretty one. I am supposing that the Southern river-beds, particularly some of those in Georgia, really do contain workable quantities of gold. So much exaggeration always accompanies reports from this region that one needs to heavily discount any statement as to the tenor of these sands. It is a very simple proposition, and one which has been thoroughly established in practice, that if the river-bed is poor, it will not pay to work by any method ; and if it is rich enough to pay for damming, fluming, etc., there is no mystery about the means of working.

I recently read a very glowing account of some Georgia mines in one of the daily papers. The enthusiastic correspondent by whom this was written, among other statements, said that the Georgia gold-fields are "the richest in the United States ;" a remark which seems a little "off," in view of the fact that fifteen States and territories outrank Georgia in point of annual production, and that Georgia furnishes less than one per cent of the total annual gold product of the country. Another statement made by this correspondent was, that English capitalists had paid 5,000,000 for a tract of land in Georgia "guaranteed to contain a gold mine." Still another was, that the ores of this particular locality are "the richest known, but so impregnated with sulphur as to be impracticable for mining." This latter difficulty, however, it is proposed to obviate by a process of which the only description is contained in the following words, which I quote : "By means of electricity and silver cloths, of desulphurizing gold ores to a fine assay."

This, of course, is simply idiotic. There is, on the other hand, nothing apparently absurd about the plan of dredging for gold ; indeed, at one time it occupied the attention of many practical and intelligent miners. It is always a most promising method to those who are ignorant of its history. There is only one difficulty connected with it—it has never been known to pay in the past ; it does not pay now ; and the chances are, that it never will pay. A. W.

NEW YORK, June 11.

THE CRUSHER CONTEST.—On the 30th of May, a public trial was had at Meriden, Conn., between the Gates and the Marsden-Blake crusher. The committee having charge of the contest was composed as follows : W. W. Wright, of the Bradley & Hubbard manufactory, Meriden ; P. Callanan, a contractor of South Bethlehem, N. Y. ; J. S. Lane, road-master of the Hartford division of the New York, New Haven & Hartford Railroad ; Simon Ingersoll, President of the Ingersoll Manufacturing Company, Stamford, Conn. ; Isaac Skidgell, official boiler inspector of Meriden. After the contest, the committee met and signed the following report, dated Meriden, Conn., May 30th, 1883 : The committee met at the quarry of the Messrs. Carpenter Brothers on the above date, to investigate the merits of a 9 by 14 Gates ore-crusher, and a Blake crusher with Marsden's improvements, 9 by 15. The Gates crusher was first run with the following result : Amount of stone crushed, 9 yards ; time used in crushing, 20¼ minutes. The Blake crusher was then run with the following result : Amount of stone crushed, 9 yards ; time used in crushing, 64½ minutes. The crushers received and discharged the same sized stone, and same kind of stone. The machines were run from the same shaft.

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-IRON ORE.

Special Correspondence of the Engineering and Mining Journal.

When a telegram came up from Cleveland, on the first of this month, saying that the iron-masters had signed Mr. Jarrett's scale, and that the strike had miscarried, we lake people had a little celebration in a quiet way. Many of our merchants had laid in stocks during the good times of last year, which it would certainly require good times this year to work off, if Bradstreet's agency and the appearance of several of the assessors' rolls signify any thing; and more than one of these saw in a continued strike the infallible portents of bankruptcy. The revival of general business which has set in since the first of June has given buoyancy to all departments of lake industry, and the probabilities are, that the freer circulation of money which has now set in will prevent the phantoms of wholesale and other creditors from materializing in these parts. The mines are now shipping with some energy, although in not so great volume as last season, when the totals sent from Escanaba, St. Ignace, L'Anse, and Marquette had reached by the first week in June 486,101 tons, as contrasted with 269,604 tons for a like period this year. One reason for this discrepancy is the late opening of navigation; but the more adequate reason is the condition of the iron trade. What tactics the mines will pursue as summer comes on, as yet remains to be seen, the future of our shipping depending largely upon sales from now on. One of the largest producing mines will send down cargoes of hard and soft ores until its contracts with vessel-owners have expired, when it will begin a process of restriction. All in all, however, it is probable that the volume will be in increasing and not decreasing ratio, at least until fall.

But a small fraction of the ore which has been consigned to lower ports is as yet sold, and little if any of it is needed by any of the furnaces. In the case of the Republic, however, it was not to be expected that its product would be held at the mine stock-piles, since its fleet of schooners would thereby remain idle or seek business in wild-cat charters. It may seem strange, in view of the comatose condition of the ore trade, that so large a body of ore is sent below, where it must necessarily be much more available to the tender mercies of a glutted market and furnacemen, who, having failed in their battle with the Amalgamated Association of Iron-Workers, are quite likely to transfer the struggle to a less strategically defended field. Even if it should transpire that Eastern puddlers had been guilty of treachery during the debates with Mr. Jarrett, it will not hinder the mills from making common cause against the producers of ore. It was the manifest intention of the iron-masters to make their skilled workmen and the miners share alike in bearing the burdens of the general depression; but as matters now stand, to pinch the mines is their only resource. It was the hight of foolery for certain metropolitan papers to assert that the workingmen were asked to bear the whole burden of hard times, and the arithmetic by which this "answer" was obtained was as novel as it was stupid. Ruling quotations for standard ores would have knocked such columns of nonsense into "pi." To what comparative extent it was really the intention of the mill-owners to make their workmen and the mines bear the financial strain of the present prices for manufactured products, does not, of course, appear, since there are as yet positively no quotations of ores at all which can be given as standard or the basis of calculations; but it may be safely relied upon that, if the schemes of the mill-owners had not miscarried, it is far from likely that the year would have been unremunerative to them, even on a small volume of business. This much, however, is certain, the mines must prepare to lock horns with the mills; for between them from hence must the shock of contest come.

This will further appear when we remember that in all probability American markets will not be troubled with foreign iron products, least of all, foreign ores. A comparison of the imports for the first four months of 1883 with those of 1882 shows a marked falling off this year—a falling off which is not likely to decrease after the tariff bill comes into play in July. And yet a Lancashire authority states that a movement in rails will set in at that time, although probably in no considerable volume. The facts are, ruling quotations have cut off foreign raw and manufactured iron, except it be in tide-water furnaces and markets, and here the profits are so small that it requires a powerful imagination to discover them. The Eastern manager of the largest of our lake mines recently remarked to your correspondent that, if current prices were maintained, no British pig could find its way as far west as Pittsburg. Taking into account the meager number of furnaces and mills on our Eastern sea-board, it may be safely said that, if things continue as they now are, the American market will be held by American mills and American mines. If there be any comfort in this, our mine operators can roll the morsel under their tongues to their heart's content.

The market for our lake ores, both lean and fat, turns accordingly upon the ancient hinges of supply and demand. Given the demand, and the amount of American ore which can safely be thrown upon the market is easy to be computed. A gentleman who has the very choicest facilities for obtaining the precise facts informed me, in a recent visit to the Peninsula, that not less than 500,000 tons of ore from last year's digging lay unsold or unused on the first of June on the docks of Cleveland alone. One of our mines which is already shipping an enormous block of ore from its winter stock-pile had 50,000 tons in the Cleveland yards, left over from 1882. From what your correspondent learns of the Illinois mills, he is led to infer that they are no worse off than their Eastern competitors. Indeed, so large an amount of ore or its equivalent is on hand in furnace markets that, had a strike been inaugurated on the first of June and continued for three months, it is not likely that a reinforcement of even a hundred thousand tons of ore would have been needed to fill all furnace orders until the opening of navigation in 1884. In the light of this fact, the present course of the mines, in sending down unsold ore, is, to say the least, dubious; for if more ore is piled up in Erie ports than buyers will take, the return of another year will find the ore question no less enigmatical and grave than this spring. As it is, we lake men have to confess that the mill-owners have no reason to be particularly anxious about supplies, and are not surprised, though we are somewhat discomfited, that they are taking things easy as regards making contracts for ore deliveries. One of our mines which had found buyers for over 250,000 tons by the first of March, 1882, has sold less than 30,000 tons thus far, and that in petty lots. The president of one of our great mines said to your correspondent recently, that a large mill had written an offer for a large block of ore at prices which would have been ridiculed last year. After consuming a week in conference with the directors, he mailed an acceptance of the offer, whereupon the furnace-men replied that their offer was not intended to hang fire so long, and that it was withdrawn. Now offers are mere bantering, "obstruction," so as to let the season wear on and the mines become importunate if not impecunious. Up to the first of June, no ore had been sold to speak of, by any or all of the mines. As a consequence, many of them have taken in sail and are "developing" their properties, and not at all rushing them. Your correspondent was astonished, on visiting one of the great Marquette County mines a few days since, to find literally no stoping at all going on. It would be tedious to recite the condition of the individual mines at this writing; but a canvass of them made about the first instant demonstrated the foregoing facts.

Concerning prices for ores, owing to the uncertain and fluctuating character of the market, there is nothing at all to be said in this letter, although I am quite certain that the prices quoted by your Cleveland correspondent were looked at by a microscope—none of us has seen them with the naked eye. Certain it is, that mine-owners will "look at" almost any offers that are not altogether unreasonable, and a few, though only a few, of them may be compelled to look at prices which are beyond reason. As a rule, however, the Marquette and Menominee mines have a splendid backing, and any furnace which calculates, by reason of the depression, to catch them on the hip, may find a Daniel come to judgment, which will turn the scales against the said furnace in vigorous measure. I have not attempted to moralize on the lessons which this prosaical study of the industry suggests, not more to our peninsular people than to the iron-masters in lower towns. These lessons, however, are certainly important, and contain several harbingers of hope; but this, your correspondent modestly thinks, is beyond peradventure: the furnace-men and ore-men ought not to play dog eat dog, but to make common cause for mutual interests, lest in their wrangle they each furnish a cat's-paw by which the English *simiadæ* will help themselves to our American chestnuts. But of this more at another time.

SPECULAR.

ON MINERAL VEIN FORMATION NOW IN PROGRESS AT STEAMBOAT SPRINGS, COMPARED WITH THE SAME AT SULPHUR BANK.*

By Joseph Le Conte.

I recently visited Steamboat Springs for the purpose of comparing the phenomena there exhibited with those previously observed at Sulphur Bank and described in this Journal July last. These springs have already been described by Phillips and Laur.† I shall, therefore, give only such brief description as is necessary to make my comparison intelligible.

The springs are in Washoe County, Nevada, about fifteen miles south of Reno and immediately on the railroad to Carson and Virginia City. The place is, therefore, easily accessible, and, being a health resort, there are good accommodations for visitors. The springs issue in a narrow north and south valley, with volcanic ridges on each side, the vents being mainly on the slope of the western ridge. On nearing the place by cars, the attention of the traveler is strongly attracted by the clouds of condensed steam issuing from many vents over a bare rocky space about the hotel and extending northward a half-mile or more. On closer examination, the vents are seen to be separate, but occurring in linear series, showing that they are connected by continuous fissures. These fissures may be traced from vent to vent often as a vein, filled by a deposit of silica from the hot alkaline waters. The separate vents, especially at the south end of the fumarole area, are each on the top of a gently-sloping mound (some of which are from 15 to 20 feet high) formed by deposit from the water. The mounds, however, run together at their bases and form a continuous crust of silica. Toward the northern part of the area, the crust is still more evenly continuous. It forms here, in fact, a continuous rounded shell-like deposit, firm, hard, and ringing under the heel, about 200 or 300 yards wide, at least a half-mile long, and from 15 to 20 feet in thickness. This clean, hard, shell-like crust lies against the slope of the western hill and reaches to near the bottom of the valley.

We have said that about the hotel the vents are mostly separate but arranged on lines which were evidently fissures. These fissures are some of them open, some partly filled, but water still issuing from a narrow crevice in the middle, some wholly filled with deposit. The deposited silica occurs in almost every conceivable form—most commonly as tufaceous sinter in thin horizontal layers, sometimes with beautiful agate-like structure, sometimes milky chalcedonic, and sometimes saccharoid quartz. Everywhere the horizontal-banded structure is conspicuous, and in some cases the filling of fissures by successive deposits has given rise to a vertical banded structure like that found in veins. This structure, however, was by no means so conspicuous as I had been led to expect from the description of previous observers. The deposits in many places are stained and clouded with metals, especially iron oxide and cinnabar. Wherever the issuance of the hot water is still going on slowly, the silica is found in a gelatinous condition. Other observers have found in small quantities many other metallic sulphides, and even free gold is said to have been found in these sulphides. Here then undoubtedly mineral veins are now forming under our eyes, but their metallic contents are in very small proportion.

In the more northern portion of the fumarole area, as already stated, the crust is more continuous and extensive, and probably thicker. This part was therefore probably at one time the principal seat of fumarolic action, but the active vents are now very few. This whole area is intersected by a system of open parallel fissures of great size and differing somewhat from those already mentioned. They are seven or eight in number, and the five largest are at least half a mile long, a foot wide, about twenty-five feet apart, and apparently from 20 to 30 feet deep. They are tortuous, with rough ragged edges, and evidently reach to the bottom of the crust. Water does not now issue from them, but can be seen and heard seven or eight feet below, in violent agitation from the escape of steam and carbonic acid. There is no evidence that it ever issued from

* A paper read at the Washington Meeting of the National Academy of Sciences. From the American Journal of Science.

† Laur. *Annales des Mines* for 1863, p. 423. Phillips, *Phil. Mag.*, 1871, vol. xlii. p. 401

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them; for their sides and edges are sharply jagged like a fracture unmodified by subsequent deposit. The water in them seems to issue lower down to the east and north, where are found active vents and even feeble geyser eruptions which are said to have been more violent at one time than now.

It will be seen then that there are indeed here fissures filled and now filling with quartz veinstone of ribboned structure and containing metallic sulphides, yet these are not fissures and veins in the country-rock, but only in the *crust deposit*. The country-rock is completely buried under this crust, probably from 20 to 30 feet deep, and therefore completely concealed from view. The hot alkaline waters loaded with silica seem to have deposited so abundantly that they cover and choke up their own vents, while other vents are constantly formed by the expansive force of steam fissuring the crust previously formed. The great fissures described above were probably formed in this way, and perhaps opened by a slight bodily sliding of the crust toward the bottom of the valley. The analogy of the filled fissures to the veins is not so complete as I had expected, or as it is at Sulphur Bank. If we could get beneath the crust and find fissures in the country-rock filled by deposit, then indeed the analogy would be complete. This is exactly what we actually find at Sulphur Bank. In the immediate fumarole area, the country-rock is concealed; but wherever not covered by deposit, its character is evident. On the hill slope and in the valley to the very margin of the deposit it is everywhere a quartz-trachyte or rhyolite. Along the crest of the western ridge, however, there is an outburst of black, very basic rock, probably basalt. This ridge is probably a basaltic dike breaking through a rhyolitic country-rock. It is not improbable that the fumaroles are the feeble remnants of a volcanic activity inaugurated by the basaltic outburst.

Cinnabar Mines in the Vicinity.—About a mile to the westward of the springs, cinnabar mines have been opened and reduction-works established. A considerable amount of cinnabar has been taken out, but the work is now abandoned. Here the surface appearances are entirely different from those at Steamboat Springs, and more like those at Sulphur Bank. There is no crust deposit; but, on the contrary, the whole hillside rock is decomposed by acid vapors into a white chalky earth like that at Sulphur Bank, except that in this case the rock being rhyolite, the chalky earth is full of disseminated grains of free quartz. Tunnels have been driven into the hillside at various levels and the ore extracted from the decomposed earthy matter, but the sound rock has not been reached. In this loose earth are found in considerable quantities both cinnabar and sulphur—the former in streaks as if deposited in water-ways, the latter more irregularly and widely distributed, as if formed by oxidation of sulphureted hydrogen gas. In some places, sulphates of iron and alumina are very abundant, even more so than at Sulphur Bank. There can be no doubt, therefore, that there came up, and probably are still coming up, hot waters containing alkaline carbonates and alkaline sulphides, carrying in solution and depositing sulphides of mercury and iron by cooling, and by oxidation depositing also sulphur and forming sulphuric acid. In a word, the phenomena are here very similar to those at Sulphur Bank, except that here the up-coming solfataric waters are less abundant and perhaps less rich in metallic sulphides. This, however, can only be determined with a certainty by deep explorations.

Comparison of Steamboat Springs with Sulphur Bank.—A comparison of the phenomena at these two places is interesting. The surface phenomena, it is seen, are very different; in fact, in complete contrast. At Steamboat Springs, the whole country-rock is covered from 20 to 30 feet deep and completely concealed by a hard crust of deposited silica; at Sulphur Bank, on the contrary, there is no crust but only a soft chalky residue from the acid decomposition of surface rock—a residual silica which from the bases have been all extracted. The reason of the difference is obvious. At Steamboat Springs, the hot waters contain mainly alkaline carbonates carrying silica in solution, while at Sulphur Bank they contain also largely alkaline sulphides and carry metallic sulphides in solution. A crust can not form at Sulphur Bank, because the silica is not brought to the surface, the up-coming alkaline waters carrying silica being neutralized before reaching the surface by the down-going acid waters. The chalky residues of acid decomposition of the surface rocks, so conspicuous at Sulphur Bank, do not occur at Steamboat Springs, because the alkaline sulphides are in too small proportion to produce any conspicuous effects by oxidation; whatever of rock decomposition occurs there, must be alkaline, not acid—by removal of silica, not of bases. Such alkaline decomposition doubtless does occur beneath the crust at Steamboat, as it does at Sulphur Bank below atmospheric influences. Again, since alkaline sulphides are the solvents of metallic sulphides, at Steamboat Springs the deposits are almost pure silica, only stained here and there with metallic oxides and sulphides; while at Sulphur Bank, the metallic sulphides, especially mercuric sulphide, are in large quantity. At the abandoned cinnabar mines near Steamboat Springs, alkaline sulphides carrying metallic sulphides, again occur, but here again also, these are associated with the surface phenomena characteristic of solfataric waters.

At the California Geysers—so-called—we find also solfataric action with its invariable accompaniment of acid decomposition of the surface rocks with earthy residue; but the freight of valuable metallic sulphides seems to be less abundant there, probably only because not met with in the course of the up-coming waters. Iron sulphide, however, is abundantly deposited. In *true* geysers, like those of Yellowstone Park and Iceland, the superheated waters contain usually only alkaline carbonates, and therefore carry in solution and deposit only silica.

Thus, then, we have a connected series of deposits from superheated waters, their characters depending upon the composition of these waters: 1. In true geysers, the waters, being pure alkaline carbonates, deposit only silica. 2. At Steamboat Springs, there are some alkaline sulphides, and therefore some metallic sulphides, but not enough to prevent a crust of deposited silica. 3. At the California Geysers—so-called—solfataric action is conspicuous, and therefore no crust is formed, but only earthy residue of acid decomposition of surface rocks. Here we have also metallic sulphides deposited, but these are of little value. 4. At the cinnabar mines, near Steamboat Springs, we have solfataric waters depositing cinnabar and other metallic sulphides in considerable quantity, but whether in profitable quantity can not be known certainly unless deeper explorations be undertaken. 5. Finally, at Sulphur Bank, the deposit of metallic sulphides is abundant and the formation of metalliferous veins is illustrated in the most perfect manner, on account of the deep explorations undertaken at this place.

In connection with the idea so common, that the metals are derived immediately from igneous rocks, it may be well to draw attention to the fact, that igneous rocks are by far most abundant and igneous action most conspicuous at Yellowstone Geysers and at Steamboat Springs, where there are little or no metals; while at Sulphur Bank, the country-rocks beneath a depth of from 20 to 30 feet are stratified sandstones and shales of Cretaceous age, the igneous rocks being very superficial and evidently contributing nothing to the metalliferous deposits. It would seem that igneous *action* supplies a necessary *condition* (heat) for the formation, rather than that igneous *rocks* supply the *materials* of metalliferous veins.

GOLD MINING IN SOUTH CAROLINA.*

By E. Gybbon Spilsbury.

From time to time, for the last quarter of a century, considerable attention has been called to the gold deposits of North Carolina and Georgia, and much capital has been expended in their development; but the existence of large areas of gold-bearing rocks in the State of South Carolina is known only to a comparatively few. The production of the South Carolina mines, being usually disposed of at the United States branch mint in Charlotte, has been generally credited to the North Carolina or Georgia mines. The mines of Lancaster and Chesterfield counties, South Carolina, have for years been as large producers as any in the neighboring States, and many of them have mint records of yields ranging in the millions. Before the war, most of these deposits were worked in a more or less desultory manner, down to about the water-level, and then stopped; and it is only within the last few years that operations have recommenced in any of them. At the present time, even, there are only four mines of any magnitude operated in the State. These are, the Haile gold mine and the Funderbark mine, in Lancaster County; the Brewer mine, in Chesterfield County; and the West mine, in Union County.

I am aware that the general impression is not favorable to gold mining in the South, owing, doubtless, to the almost general failure of the many companies which have started work in this section. Still, to those who have studied the geology of the country and are acquainted with the auriferous deposits, it will not sound like exaggeration when I say that there is more money to be made to-day in gold mining in the Carolinas and Georgia, with a moderate outlay of capital, than in any equal area in California. The question very naturally arises then, Why, if this is the case, are there not more successes and fewer failures? The answer to this seems to me very plain. Under the old slave *régime*, gold-washing and mining were generally carried on in a very desultory manner and on a small scale, each land-owner just working on his own farm, using his overseer to manage his negroes in the mines as well as on the farm. Thus, both the overseers and negroes gradually obtained more or less knowledge of mining and milling such as they had seen on their neighbors' plantations, and which was of the most rudimentary character. After the war, when the attention of outside capital became attracted to these mines, these people became naturally the miners and foremen of the district. Their shiftless and desultory manner of working, which yielded profit enough to satisfy small individual owners, proved insufficient to grapple with the real difficulties of regular mining and milling, and hence arose the impression that the Southern ores were hard to mine, and harder yet to reduce. This cry was at once responded to by the patent process men, who came in swarms, each to be the deliverer from some terrible difficulty which the extraction of the gold from these ores presented. The process, when completed, would not always work right, and hence the inevitable collapse and general engendering of distrust in the value of the properties. As a fact, however, the average ores of the South present fewer difficulties of treatment than do those of the West, to any one who is at all acquainted with the requirements of the case. For instance, what would be thought in Colorado of a mining engineer who would put up a stamp-mill and amalgamation-works to treat cupriferous pyrites carrying gold? Yet I know of several cases where this has been tried in the South.

Another cause of failure has been the general exaggeration of the values of the ores. As a rule, the surface ores in this section are very rich, owing to a gradual concentration of the gold as the matrix is decomposed by atmospheric influences; whereas the general deposits are of comparatively low-grade ores when once water-level has been attained. Of course, there are exceptions; but this I find to be the general rule.

As the Haile mine is essentially a low-grade mine, and is still one of the largest bullion-producers, if not the largest, of the South, a short description of the mine and system of treatment of the ores may not be out of place.

The mine property, consisting of a tract of some 1900 acres, is situated in the southeastern corner of Lancaster County, South Carolina, about one and a half miles from the Kershaw line. The formation of the country-rock is talcose slate, having a general trend of north 18 degrees east. These talcose schists are tilted up on end, being in places nearly vertical, and nowhere having a dip of over twenty degrees to the northwest. They are throughout very highly impregnated with fine crystals of iron and arsenical sulphides. The beds of auriferous rock seem to follow in general direction the trend of the country-rock. There are at least two distinct mineral belts running in a parallel direction through the property. A series of trap dikes cuts through the slates almost at right angles; and although there appears to be no lateral dislocation caused by these dikes, still they probably bear some intimate relation to the mineralizing of the belts they cross. The main or Haile deposit has been traced over a distance of three miles, and has been worked on for many years, down to a depth of about sixty feet. Its general width may be taken at sixty-five feet. The average value down to the bottom of the present workings, 75 feet from the surface, is about $11 per ton, although bunches of high-grade

* A paper read at the Roanoke Meeting of the American Institute of Mining Engineers

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ores are sometimes found. The ore is undoubtedly an altered slate, and to an inexperienced eye differs very little from the surrounding country-rock. In reality, however, in composition it is nearer a quartzite than a talcose slate, the magnesia being replaced by silica, and contains in places near the center of the beds over 80 per cent of silica. From this, it gradually diminishes in hardness toward the walls, the foliations become thinner and more marked, interspersed with thin seams of pure quartz, until gradually the soft talcose slate is reached. There is no actual line of demarkation visible, except in a very few places near the surface. The amount of gold also diminishes very gradually, and indeed none of the surrounding slates within a distance of fifty feet on each side of the deposit is without more or less show of gold. From the size of the deposit, of course mining is very cheap, and the introduction of power-drills has brought the cost of extraction down to eighty cents per ton.

Across the valley to the north of this Haile deposit, is another parallel one of almost equal magnitude, known as the "Blauvelt vein," the characteristics of which are very similar. These deposits have been worked from time to time in a desultory manner for the last fifty years, showing, according to the mint returns, a yield of over one and a quarter million dollars. During the fall of 1879, the property was bought by the present company, and the work has been pushed steadily ever since.

The ore is hoisted from the mine up a slope, the same cars taking it down on an elevated tramway to the mill. The mill is an ordinary twenty-stamp, California type, the weight of the stamps being 750 pounds, and the average number of drops 80 per minute. The fall of the stamps is seven inches average. The screens used are forty-mesh. The amount of ore put through daily is from 35 to 37 tons. The average value of the ore is from $11 to $12 per ton. Of this amount, from $3.50 to $4 is free gold, the remainder being combined and more or less inclosed in the sulphides. The mortars are provided with inside plates, which are taken out and cleaned every day, yielding from $75 to $80 per day. Each battery is also provided with ten feet of copper plates outside, the average catch of which is about two thirds more than the inside plates. At the bottom of the plate-tables, I have put in a series of small spitzkasten, with an upward current of water, which I find very effective in catching whatever quicksilver is lost from the plates. All the tailings are then run over concentrators, whereby the sulphurets are saved, the average tailings which finally leave the mill showing less than thirty cents of gold per ton. Our entire cost of milling, including labor, cord-wood, wear and tear of machinery, and labor of concentration, is fifty-one cents per ton, to which should be added two pounds of shoes and dies to the ton of ore, say nine cents, making in all a total cost of 60 cents per ton.

The next process is the roasting of the concentrated sulphides, which, at the Haile mine, do not contain the faintest trace of copper. To effect this thoroughly, was supposed to be a matter presenting great difficulties, and a special furnace was designed to overcome them. This furnace consists of a large coil 450 feet long. of five-inch wrought-iron pipe, built in a suitable furnace, and heated to a low red heat. The finely-divided ore is blown through this pipe with a large excess of air into suitable receiving-chambers. Some of the mechanical details of this furnace are not yet perfected; but the roast made by it when working right is most complete, scarcely the faintest trace of sulphur being left in the ore, and it further has the advantage that, through the constant attrition of the particles of ore among themselves in their passage through the pipes, the gold is entirely freed from all scale, and left perfectly bright and ready for amalgamation. Like all mechanical roasters, however, this furnace can not be relied on for perfectly uniform results; and until this and other mechanical difficulties have been obviated, I have fallen back on the old-fashioned but always reliable "Fortschaufelungs" furnace. Here in the South, where labor is obtainable at 90 cents per day, where wood costs us less than $1 per cord delivered at the furnace, the advantages to be gained by automatic rabbling, in whatever way attained, are so slight that they are much more than counterbalanced by the perfect control one has all the time over the charge roasted in the reverberatory furnace. The advantages of the latter, in the matter of first cost, are of course undeniable. Our double-hearth furnaces, 40 feet long by 5 feet wide, do not cost us over $800 all complete, and have a capacity of from six to ten tons per day of twenty-four hours. Taking an average of eight tons per day, the cost of roasting does not exceed $1.10 per ton.

The roasted ores, after cooling, then go to our amalgamation-works, which, from their economy and success, deserve a special notice. It is, I believe, a well-established fact that the old Freiberg barrel process of amalgamation has always yielded as good if not better results than any other process, the great objection to it being the great length of time required for the thorough amalgamation of the pulp, owing to the difficulty of causing each particle of the gold to come in contact with the metallic mercury, and the consequent excessive flouring of the quicksilver. In order to obviate this, and cause a more thorough dissemination of the mercury through the charge, Mr. Designolle, a well-known French mining engineer, proposed using a solution of the bichloride instead of metallic mercury, at the same time placing in the barrel enough metallic iron to thoroughly effect the decomposition of the bichloride. This he found so thoroughly successful that he designed and patented a complete combination plant for treating ores by this process. At first, he claimed to be able to treat unroasted sulphides directly; but as a general thing, this claim has proved a failure. On the other hand, with roasted ores it has proved itself even more successful than was contemplated at first. The process is as follows: The roasted ore, in charges of 600 pounds each, is put into a cast-iron cylinder or barrel, in which are also placed about 1000 pounds of cast-iron balls. The cylinder is then partially filled with water, and about half a gallon of the bichloride of mercury solution is added. The barrel is then rapidly revolved for five minutes, at the end of which time another half-gallon of the solution is added, and the cylinder again revolved for fifteen minutes. At the end of that time, every particle of gold has been amalgamated, and the barrel is discharged into a large settler, in the concave bottom of which is a bed of metallic mercury. The pulp is kept in suspension in his settler by revolving rakes, which keep the surface of the mercury-bed clean and ready to absorb the particles of amalgam immediately as they settle. The pulp is discharged from this settler in a thin stream over a series of revolving centrifugal copper plates, which catch whatever particles of amalgam may still be held in suspension in it. From the plate machine, the pulp discharges into a second settler similar to the first one, thus finally catching what may have passed through the former settler and the plates. The simplicity of the whole process is remarkable. With our plant, costing in all less than four thousand dollars, including building, we can treat from eighteen to twenty tons per day, with the labor of one man and one boy. The whole cost of treatment at our mill, including chemicals, labor, steam, and wear and tear of machinery, is 38 cents per ton.

Having given a general outline of the manipulation of this process, it may be interesting to look into its chemistry. The composition of the standard solution used is as follows: Mercury bichloride, 1; common salt, 2; muriatic acid, 1. The proportion of the acid may be varied according as the gold in the charge to be treated is more or less rusty. These chemicals are mixed with any reasonable amount of water, with us the latter being in the ratio of 64 gallons to 8 pounds of bichloride, thus giving us one ounce of bichloride to the half-gallon of mixture. For all ores containing under three quarters of an ounce of gold per ton, one gallon of the mixture per charge is fully sufficient, after which half a gallon extra is added for each half-ounce of gold additional. The chemical reaction which takes place is $HgCl_2 + 2Fe = 2FeCl + Hg$. This simple reaction is due to the presence of the chloride of sodium in the mixture. Where this is not present, it is probable that the first reaction would be $HgCl_2 + Fe = HgCl + FeCl$, followed by a secondary reaction of $HgCl + Fe = Hg + FeCl$. It was therefore on the former reaction that Mr. Designolle based his invention. The extreme rapidity, however, with which the amalgamation takes place seems to point to some further action than the above, as we know that the decomposition of mercury bichloride by metallic iron is a comparatively slow process, and that the globules of mercury might revolve for a considerable time in the mass, as in the old Freiberg barrels, without coming in actual contact with the particles of gold. In point of fact, however, it is just this slowness of action which is the chief element of success of the process. Very little if any of the amalgamation, I believe, takes place by the particles of gold coming in contact with globules of free mercury, the secret of the whole success being that when, in the acid water-bath, any particle of the gold comes in contact with the iron, an electrolytic action is at once established, and the deposition of the mercury over the whole surface of the gold is instantaneous. It matters not how minute the portion of the gold exposed to the contact is, the whole of the surface is at once amalgamated. Even gold covered over with rust scales of iron, if exposed on one point only, will become thoroughly amalgamated throughout, the scale breaking loose, leaving the amalgam free. The action is indeed so rapid that, on ore containing $43 per ton showing freely in the pan before treatment, not a trace of unamalgamated gold could be found after the trituration had continued for ten minutes.

A few months since, my attention was called to Professor Egleston's paper on the defects of the stamp-mill, and the assertion made by him of the non-amalgability of hammered gold caused me much astonishment. After a careful series of experiments, I have come to the conclusion that the conditions of the gold under which Professor Egleston made his discovery must differ considerably from the general condition of the gold under the stamps, as in no case could I repeat his experiments with the same results as obtained by him. As the instantaneous amalgamation of gold by contact with iron in the bichloride solution is quite a beautiful sight, I have brought some of our standard solution with me, with some small plates of hammered gold, and as you will see, the instant the iron touches the gold, the mercury spreads like a vail over the entire surface.

COPPER SLIME TREATMENT.*

By F. G. Coggin, Lake Linden, Mich.

"If you could only get that motion into a machine," said a gentleman, as he watched the process of making a "van" on a shovel, and saw the copper roll up to the highest point, "it would beat the world for slime dressing." This idea has led to many an effort to get that peculiar motion, called the "vanning motion;" and so cams, eccentrics, eccentric gears, levers, bell-cranks, toggle-joints, links, springs, etc., have been brought into requisition, while a contribution has been laid upon all the conceivable motions, rolling, tumbling, swinging, jerking, tossing, dropping, tripping, intermittent, regular and irregular, or a combination of some of them, to which have been added percussion, concussion, and more discussion—all in a vain attempt to combine in a single machine the consecutive motions of the shovel, in washing, flowing, and tossing the van. The Patent-Office reports, and the various mills of the country, show, as a result of this, a lot of gimcracks, most of which never went beyond a first trial, finding their way to the scrap-heat. Others still running might as well be there; while some have considerable merit for dressing other and richer sands than copper.

It does look tempting to see that clean edge of copper climbing up the shovel-blade; but those who have seen in it such visions of large fortunes have not considered the time it takes to make a van, compared with the small quantity treated upon the shovel; and this points to the reason for the failure of all that class of machines called "vanning machines," when used for dressing copper slimes, namely, a lack of capacity. The writer has come to this conclusion through an experience with the Rittinger side percussion-table of the most improved make, sent from Germany to the Calumet & Hecla Mining Company, and with the Ellenbecker tables, used by the same company, both of which are good types of that class of machines. In both of these machines, the tables are suspended by rods which allow them to swing, and which can also be

* A paper read at the Roanoke Meeting of the American Institute of Mining Engineers.

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adjusted for the purpose of varying the inclination of the table. In the Rittinger machine, the motion of the table is at a right angle to the flow of the slime, being produced by a wiper-cam which throws the table against a spring, which throws it quickly back against a stop, the percussion throwing up the mineral. In the Ellenbecker table, the motion is with the flow of the slime, and has a quick return, produced by the use of eccentric gears, the idea of the latter being taken from the valve-gear of the old Ball steam stamp. The estimated capacity of the Rittinger machine was eight tons per twenty-four hours; but it would not properly treat over five tons in that time, or about fifty pounds per square foot of floor space taken up by the machine. The Ellenbecker table has about the same capacity. The assay of slime was about 1·3 per cent; that of the tails, 0·97 per cent. This is not considered very good work.

Of other machines for dressing slimes, the best known are the fixed round buddle, the revolving table, and perhaps the Frue vanner may be included in this class of machines, although having had no experience with the latter, I can say nothing with reference to its capabilities. The principle governing the concentration upon both the former is the same. In the one, the table is fixed while the distributing and washing apparatus revolves. In the other, the table revolves while the rest of the apparatus is fixed. The revolving table is the most largely used in this country, the design of Mr. Evans, of the Atlantic mine, Michigan, being almost exclusively used in the copper mills of Upper Michigan. This differs little from the German revolving table except that it has a "dead-head" at the center from 6 to 8 feet in diameter, one half of which is used for distributing the slime, the other half being used for clear water. The outer rim of the latter is a spiral, the surface broadening toward that point where the concentration is washed off. I have also made this rim in steps of from six to ten inches, with good results.

It may be said that this dead-head takes up a large area from the table; but this area, being immediately around the center of the table, is of little or no value for settlement; for the current of the slime delivered at the center is too rapid for settlement to take place until it has spread itself over an area equal to that of the dead-head, the office of which is to spread the slime moderately and evenly upon the revolving table.

In a paper read before the Institute at its last meeting in Boston, by Mr. R. P. Rothwell, it was stated that in the German dressing-works the revolving tables were being superseded by the Linkenbach fixed round buddle for the apparent reason that the revolving tables, if over 17 feet in diameter, were expensive to build, were unwieldy, and necessitated more operations to concentrate. Some two years ago, a complete set of drawings of the Linkenbach buddle, with a set of irons for the same, were sent to the Calumet & Hecla Mining Company with a view to their introduction, the German estimate of the cost of a single buddle being $717. A thorough examination of the drawings, with their description, and of the irons sent, compared with the practical workings, etc., of the Evans table, led to the adoption of the latter for several reasons:

1. The cost. The Evans table, with only moderate facilities for its construction, will not exceed $225. The fixed buddle, with the inventor's estimate of the material and labor at prices paid for such in this section, would cost at least four times as much, or $900. This, for the number of tables required by the Calumet & Hecla Company to properly dress its slimes, would make a difference in first cost of $20,000.

2. The fixed buddle, with its revolving apparatus, is more complicated than the Evans table, and therefore more liable to repairs. If there was any thing to compensate for the extra cost of the fixed buddle, it would not matter; but there does not seem to be any thing. The capacity of the two machines seems to be about alike; that is, from 12 to 15 tons of slime (weighed dry) per twenty-four hours. This refers to a table 20 feet in diameter, as compared with those referred to by Mr. Rothwell, said to be about 26 feet in diameter. Comparing the capacity of the Evans table with that of the Rittinger percussion-table, per square foot of floor space taken up, the former gives 96 pounds of slimes against 50 pounds by the latter, a gain in favor of the Evans table, or round buddle, of 92 per cent. The water required by the buddle and table does not seem to vary much. Taking Mr. Rothwell's figures, the minimum, 5½ tons of slime in ten hours with 19 gallons per minute, gives about 2100 gallons of water to the ton of sand. Experiments with the Evans table give about 2000 gallons to the ton. There is no difficulty in making an Evans table 20 feet in diameter or more without making it unwieldy, and at a cost specified above. Nor is there any difficulty in putting one table above another, either on the same shaft, to be driven together, or on frame-work, to be driven independently; and in either case, the power to drive them is of no consequence, as the table revolves upon a steel step 1¼ inches in diameter, and a child could turn one even while loaded. With respect to the surface, those used in Upper Michigan being made of wood, have a wood surface which works very well. One table has a canvas surface, which is said to work well for certain grades of copper. I think that the best surface for the peculiar stuff to be treated can only be determined by experiment. I understand that in Germany much experimenting has been done in this line without fixing upon any one surface suitable to all materials and conditions; marble, slate, cement, wood, rubber, canvas, etc., each having been found best under as many variable conditions. This holds true with respect to nearly all machines, and many a machine that is doing its best in one place is condemned in another because it will not give as good results, under varying conditions, when perhaps only a slight modification in the machine itself was needed. As well condemn the saw that will not split the board it has so easily cut in two.

As to sizing the material for the table, I am not yet convinced as to the necessity for it, in copper dressing. It seems to me that the necessity for it is brought about only by poor separation at the jigs. With the separators usually used, the trouble has been that if enough hydraulic is used to keep the jigs free from slime, it carries over the tail of the separator a great deal of sand that should remain on the jigs, and which otherwise is detrimental to good work on the table. This is true of all separators where the excess of the hydraulic has to pass up through a narrow aperture, through which also the mineral must fall. I suppose as much effort has been made to secure a perfect separation as in any other line in mineral washing. Many have worked with a wrong end in view, and I may add in hydraulic separation, an impossible end, namely, a perfect sizing of the particles. Not only that, but for jigging purposes, a perfect sizing is not desirable, especially with the coarser sands; but as this is not within the province of slime treatment, I will not stop to discuss it.

However necessary it may be to classify the slimes, before going to the tables, it is certainly necessary to first get all the slime free from the sand that should remain on the jigs. I am glad to announce that this has at last been accomplished with the separator recently adopted by the Calumet & Hecla Company, and secured by letters patent. In the usual method of washing and separation, where the mineral has to drop through a narrow aperture, against a rapid and direct current of water, if the current is strong enough to keep back the heaviest particles of slime, it will also keep back the lighter particles of sand, suitable only for the jigs. Moreover, a great deal of the slime clings to the larger particles of the sand, and must be washed off in the separator if good work is desired. Heretofore I have seen no separator that would do this. In the new separator alluded to, the hydraulic is brought into each compartment from behind, by a pipe whose discharge is opposite to and near the spigot. Over this pipe and spigot is placed an adjustable shield which controls the hydraulic so that it reacts with a uniform current against the mineral seeking egress through the spigot, effectually washing all the slime from the particles suitable for the jig. This process being repeated at each spigot as far as carried for the jigs, carries away the slime, leaving the jig-tails perfectly clear, while the tables reveal the fact that no sand suitable for jigging has been carried over. This is a very important part of slime treatment. These results are accomplished with from fifteen to twenty per cent less water, which very much facilitates the subsequent treatment of the slime. This separator was more fully described in a paper read before the Institute at its last meeting in Boston, by Prof. Robert H. Richards, of the Institute of Technology in Boston. The slimes of the Calumet & Hecla assay from 1·2 to 1·3 per cent, the tails of the Evans table going away at about 0·65 per cent—results that are very good, considering that no free copper is found in the tailings. No matter how finely subdivided these sands may be, the particles still contain a finer particle of copper.

Thanks are due to the Calumet & Hecla Mining Company, which has been so liberal in its search for the best appliances, and which has seconded the efforts of those out of whose research and experience these results have come.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

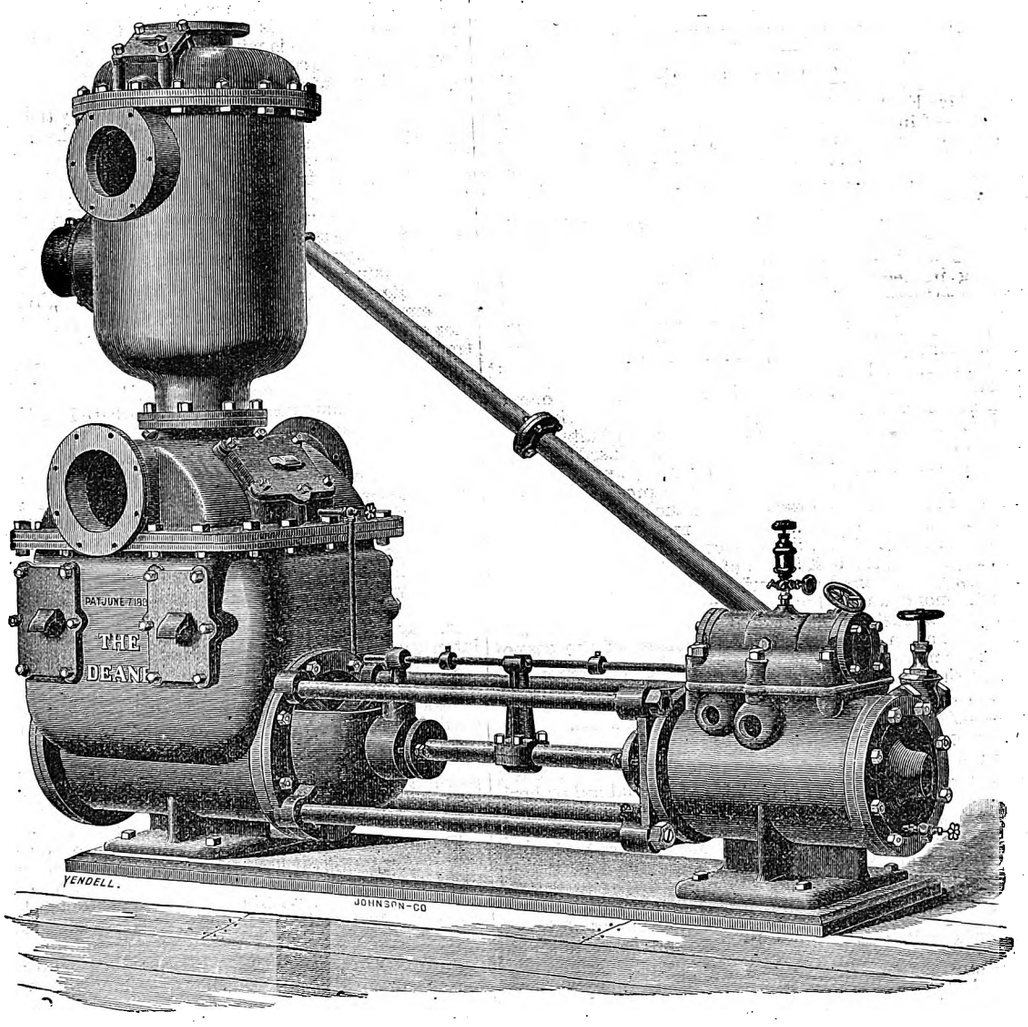
Unofficial Surveys.—The Wisconsin Mining Company, claimant of the Eureka lode No. 2, Colorado, protested to the Commissioner of the General Land-Office against the issuance of patent to John M. Cooper, for his claim upon the Chrysolite lode. The protest is in substance that "the published and posted notices failed to note as conflicting, as adjoining the prior claim of the Wisconsin Mining Company, which crosses the Chrysolite about five hundred feet from the eastern extremity. The plat and field-notes fail to show any conflict with the Eureka No. 2, although the latter had been previously surveyed, and neglected to indicate a thirty-foot tunnel, the property of the protestant, lying within the limits of the Chrysolite claim." By reason of these omissions, it is claimed that the protestant was unable, either by reading the published notices, or by an examination of the plat and field-notes, to ascertain or know, and did not ascertain or know, that said so-called Chrysolite in any manner conflicted with the Eureka No. 2.

The commissioner says: "The survey of, the Eureka No. 2, though prior to that of the Chrysolite, was not official; and there is nothing in the regulations of this office that would require a deputy to note conflicting surveys other than those made by or under the direction of the Surveyor-General. The existence of such a survey in this instance may have been well known, and it could therefore have been readily noted; but such is not always the case; and to require that every survey, whether of record or not, shall be noted, would in many cases work unnecessary hardships, particularly if a failure to recognize such survey was held to invalidate the notice given to adverse claimants. The Surveyor-General may make regulations for the guidance of his deputies in the performance of their work; but a failure to comply therewith does not necessarily annul a survey, unless the same fails to conform with the law. The published and posted notices were, in my opinion, sufficient to have put the protestant upon inquiry, particularly when all the circumstances in connection therewith are considered. The Chrysolite claim must have been well known, both by name and reputation, to protestant, better in fact than the unofficial survey of the Eureka No. 2 could have been to the Chrysolite claimant. It is admitted that the published and posted notices were read with a view of ascertaining if any conflict existed, but this fact could not be ascertained. It is difficult to understand how this could have happened, how any one could have been misled when the name of the claim, of the claimant, the mining district, and county are all given, together with the names of claims on the northeast and south, and the course and distance to a well-known and neighboring rocky bluff. When these facts are taken into consideration, and it is also known that all the workings upon both claims are within three hundred feet of each other, it must be conceded that the relative positions of the two claims were known to protestant when the application for the Chrysolite was made, and that the notice given was all that the law contemplates as could be required thereunder. The real question to be considered is, Would the Chrysolite notice of application for patent have been misleading, had the Eureka No. 2 claim been unsurveyed, with no improvements belonging thereto lying within the Chrysolite boundaries, and said notice failed to give the gratuitous information as to a conflict, thought necessary by protestant? In view of what has been above explained, I do not think that such information could be reasonably insisted upon, the notice being already sufficiently specific, and hereby dismiss the protest."

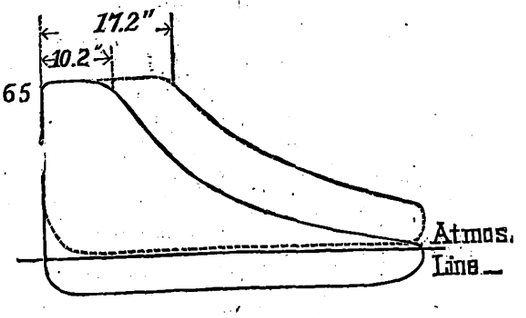
THE directors of the Pennsylvania Coal Company, numbering over fifty, with friends, arrived at Wilkes-Barre June 18th, on a special train from New York. The leading coal operators of the city tendered them a banquet and ball at the Wyoming Valley Hotel.

THE DEANE INDEPENDENT CONDENSING APPARATUS.

We present upon this page an engraving of the improved independent condensing apparatus for high-pressure engines, manufactured by the Deane Steam-Pump Company of Holyoke, Mass., and also a reproduction of two indicator-cards taken successively from the same engine with all conditions of load, steam pressure, and speed remaining constant; but the exhaust in one case being carried to the atmosphere, and in the other to the condenser. These diagrams, of which the originals, with many others of similar character, are on file at the company's office, show very clearly the great saving of steam effected by the application of the condenser. When the exhaust is carried to the condenser, the vacuum therein removes atmospheric pressure and other resistance from that side of the engine piston, thus practically adding to the force on the piston, and allowing less pressure, and consequently an earlier cut-off of steam on the opposite side, to develop a given power, a corresponding saving of steam being thereby effected. If an increase of power rather than a reduction of steam consumption is the end sought, the condenser is equally useful; for with the cut-off remaining constant, and the power due to direct steam unchanged, the pressure of the atmosphere will be added, and the actual power developed by the engine largely augmented.



The style and general arrangement of the Deane condenser is clearly shown in the engraving; but an explanation of construction and manner of application may be of interest. The air-pump and condenser are shown on the left-hand side of the cut, and the steam end which drives the air-pump at the right. Containing motive power within itself, this apparatus is entirely independent of the working parts of the engine, and, without adding in the least to the load, renders its assistance in the most practical manner conceivable by taking up the work on the piston where the engine has laid it down, and obtaining an additional percentage of energy from the steam. The condenser is of the jet type, of approved design, and carefully proportioned, to its work. The injection-opening at the top is connected with a supply of cold water, and the opening at the side with the exhaust-pipe of the engine. The injection water flowing into the top strikes a perforated copper plate and descends in a shower to meet the current of exhaust steam rushing in through the side opening; condensation takes place, and a vacuum is produced or maintained, and the water continues its downward course into the pump, and is finally forced out through the discharge-opening in the air-cylinder cap and carried away by a suitable pipe. As this discharge-water has a temperature of one hundred degrees and upward, a portion of it is often used, if the quality of the injection supply admits of it, for boiler feeding, with economical results. A thoroughly reliable safety attachment on the condenser, shown below and at the left of the exhaust-inlet, is so arranged that, if from any cause water begins to rise in the condenser, the injection supply will be stopped, the exhaust automatically turned to the atmosphere, and the vacuum destroyed, thus effectually preventing accidents to the engine that have been so common with other forms of condensers. The air-cylinder of this apparatus is connected with the steam-cylinder by a set of polished wrought-iron tie-rods. The air-piston and steam-piston are connected by a suitable rod of composition metal, and where the rod enters the air-cylinder it is surrounded by a water-sealed stuffing-box, to prevent any leakage of air into the pump. The admission of steam to the steam-cylinder of this apparatus is controlled by mechanism of great simplicity, yet carefully worked out in detail. The valves are plain flat slide-valves, readily understood by any engineer, acknowledged to be the most durable of any, and when worn most easily repaired or replaced. The exhaust from this steam-cylinder is carried to the condenser, as shown in the cut, so that steam economy is secured at every point. It will be noticed that there are a number of hand-holes provided at suitable places on the air-pump and condenser, to give access to all valves and spaces. All valve-seats and bolts in the air-pump are made from composition metal, the air-cylinder is lined with composition, the piston is arranged for the use of patent fibrous packing, and we are informed that all working parts of both air and steam ends of the machine are made to gauge, and may be duplicated at any time with little delay or expense.



In regard to the practical value of the condenser in connection with the high-pressure type of engine, we suppose little comment is needed. It is generally acknowledged that where a supply of water for injection is available, no man can afford to run his engine with exhaust to the atmosphere.

The condensing apparatus here presented is a reliable and efficient machine, which has proved its merits by a number of years of practical work in all parts of the country, and on almost every style of engine, with success in every instance. On account of its independent arrange-

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ment, it may be located in any convenient place in the engine-room, or, if preferred, in an adjoining room, or in another building, and the exhaust-pipe connected with it; and with no more care than an ordinary feed-pump requires, it will effect such a saving of steam as to render it emphatically a paying investment.

The amount of saving varies with different conditions and circumstances, but has been found in actual practice to be from 20 to 40 per cent of the total quantity required for a given power, due allowance being made for the steam used by the apparatus itself, or a corresponding increase of power may be obtained. The diagram given above was taken from a 20 by 48 Harris-Corliss engine, and shows a net saving of 38 per cent.

This apparatus requires no expensive foundation; it requires no head for the injection supply, and water twenty feet below the engine-room floor, or even more, if the condenser can be set below the floor, is available for this purpose. It is a first-class machine in every respect, and fully guaranteed by the manufacturers in material, workmanship, and operation. Further particulars in regard to this apparatus may be obtained from the Deane Steam Pump Company, Holyoke, Mass.

CRANES: A STUDY OF TYPES AND DETAILS.*

By Henry R. Towne, Stamford, Conn.

In the study of any special class of machines, it is often conducive to a better understanding of the subject clearly to enumerate the several types or forms in which the machine is used, and also to consider each of its more important details separately, rather than in their combination with other elements of the mechanism. It is proposed in the following pages thus to treat the subject of cranes.

The only English text-books descriptive of cranes are Glynn's, which treats of English practice in crane building as it existed more than thirty years ago, and sundry catalogues published by English dealers in machinery as a means of advertising the products of the various builders of cranes for whom they act as selling agents. The practice represented in the former is now almost obsolete, by reason of the improvements which have been effected, and the latter consist of little but a series of pictures of various cranes, without descriptive text, and with no information as to the details of their construction.

The building of cranes has long been recognized in Europe as one of the most important subjects in the field of mechanical engineering, and cranes of many forms are there seen applied to an almost infinite variety of uses. In America, on the contrary, cranes are but little used or appreciated, in comparison, at least, with the extent of their application in European countries. It is the purpose of this paper to present to American readers a brief classification and description of the most important types of cranes, and a similarly brief study of the more important elements entering into their construction, the object of the latter inquiry being to determine, if possible, the best forms of elements to be adopted.

With a better knowledge of crane construction will surely come a better appreciation of their economy and value as labor-saving machines. In hundreds of mills and workshops, heavy material is now moved and handled by manual labor at an expense so much in excess of the cost of doing the same work far more rapidly and conveniently by cranes, that the saving effected by the latter would yield an annual profit of from twenty to fifty per cent upon their first cost, while in many cases this outlay would be entirely repaid by the economy of one year's use.

CLASSIFICATION OF CRANES.

A *hoist* is a machine for raising and lowering weights. A *crane* is a hoist with the added capacity for moving the load in a lateral or horizontal direction.

All cranes, therefore, are provided with hoisting mechanism, and, in addition, must be capable of moving the load in one or more horizontal directions. This second function is effected in some types of cranes by simply pushing the load, in others by the operation of a distinct mechanism.

Cranes are most clearly classified by reference to their modes of transferring their loads horizontally; and, thus considered, are found to divide themselves into the following groups, namely:

1. *Rotary.*—In which the load is revolved around a fixed center, such as a mast or column.

2. *Rectilinear.*—In which the load is moved in straight lines in one or more directions.

Both types of cranes are subdivided into two general classes as to their movements, namely:

(*A.*) *Fixed.*—When their supporting members are fixed in some permanent location.

(*B.*) *Movable.*—When the crane as a whole can be moved about.

And into four other general classes as to their source of motive power, namely:

(*a.*) *Hand.*—When the motions, either vertical or horizontal, are effected by manual power.

(*b.*) *Power.*—When the motions are effected by power derived from line shafting driven by a stationary engine or other fixed motor.

(*c.*) *Steam.*—When the motive power is derived from a steam-engine attached directly to the crane itself and moving with it.

(*d.*) *Hydraulic.*—When the motive power consists of hydraulic pressure obtained from a pump or accumulator, and carried to the crane by pipes.

A further distinction is covered by the term locomotive, which is applied to cranes (usually of the rotary type) which are capable of propelling themselves upon a roadway or track.

Rotary cranes comprise the following principal types:

1. *Swing Cranes.*—In which the central mast is pivoted to the floor and roof of the building, and the load is suspended from a block fixed at the outer end of an arm projecting horizontally from the mast, the only horizontal motion being one of rotation.

2. *Jib Cranes.*—In which the central mast is pivoted to the floor and roof of the building, and the load is suspended from a trolley traveling in and out upon an arm or jib projecting laterally from the mast.

3. *Column Cranes.*—Which consist of a jib crane constructed to revolve around or upon a fixed column forming the support of a building or floor.

4. *Pillar Cranes.*—In which the central column or pillar is entirely supported by a heavy foundation built at its base, and the load is suspended from a boom projecting from the pillar and revolving with it or around it.

5. *Derrick Cranes.*—Which consist of a jib crane for yard use, the upper end or pivot of the mast being held in position by guy-rods or stays, instead of by attachment to a roof or ceiling.

6. *Walking Cranes.*—Which consist of a pillar or jib crane mounted on wheels, and arranged to travel by power or by hand upon one or more rails.

7. *Locomotive Cranes.*—Which consist of a pillar crane mounted on wheels, and provided with a steam-engine and boiler, the power of which is available for operating the crane and for propelling it upon its tracks.

Rectilinear Cranes comprise the following principal types:

1. *Bridge Cranes.*—In which a fixed bridge spans an opening, and the load is suspended from a truck or trolley capable of moving across the bridge.

2. *Tram Cranes.*—In which a truck or short bridge, from which the load is suspended, is arranged to travel longitudinally upon a pair of overhead rails, but is without capacity for transverse motion.

3. *Traveling Cranes.*—In which a rectangular space is provided with overhead tracks upon two opposite sides, and is spanned by a bridge arranged to travel longitudinally upon these tracks, the load being suspended from a truck or trolley capable of moving transversely across the bridge, so that the load may be moved to or from any point within the entire rectangle.

4. *Gantries.*—In which an overhead bridge is supported at each end by a frame or trestle extending downward and having wheels in its base to permit of travel upon two longitudinal tracks laid upon the ground so that the entire structure can move endwise upon the latter, and the load, which is suspended from a truck or trolley on the bridge, can be moved transversely across the bridge.

5. *Rotary Bridge Cranes.*—Which combine a rotary with a rectilinear movement and consist of a bridge having one end pivoted to a central pier or post, while the other or outer end travels on a circular overhead track or is supported by a gantry frame traveling upon a circular track upon the ground, the load being suspended from a truck or trolley traveling transversely across the bridge.

The above nomenclature will be adhered to in the following descriptions of crane construction.

HOISTING GEAR.

The most important factor in the economy and convenience of a crane is the mechanism by which the load is lifted and lowered, as it must necessarily come into action every time the crane is used.

In all applications of power, from whatever source derived, it must be remembered that the gearing of a machine can only modify the power applied in one of two ways, namely:

(1.) By reducing its velocity, and proportionally decreasing its force or "pull."

(2.) By increasing the velocity, and proportionally decreasing the intensity of the power transmitted.

Under no circumstances, unless the motive force is increased, can power be gained except by a sacrifice of speed, or can speed be increased except by a sacrifice in power. If either or both must be increased without diminishing the other, it can only be accomplished by supplying more motive power.

The function of gearing, then, is to change the force or direction of the power applied. If it is well designed and constructed, this may be done with only a small loss from friction; while, if badly made, the gearing may absorb much power in wasteful friction of its moving parts.

In machinery for hoisting, the "purchase," or conversion of velocity into lifting power, is usually effected partly by a multiplication of the ropes or chains of the tackle through which the load is suspended, and partly by gearing within the machine, which latter thus becomes an important feature in crane work. The gearing ordinarily used for this purpose consists either of spur-wheels and pinions, or of worm-wheels and worms, or both combined, and the smoothness and economy of power of the machine depend largely upon the manner in which the gearing is made.

A second feature of prime importance in the hoisting gear of a crane is the mode of sustaining the load, and guarding against its "running down" when the application of the motive power is discontinued. This has heretofore been accomplished, in machines having spur-gearing, by a ratchet-wheel, the pawl of which has to be entirely disengaged to permit lowering to occur, or by a brake which, when on, prevents all motion of the machine, and which requires to be held or thrown off both in hoisting and lowering. In machines having worm-gearing, the end is attained by a construction of their worm-wheels such that the friction between the worm and the wheel is sufficient to prevent the backward rotation of the worm under the pressure of the teeth of the worm-wheel caused by the load, the resistance thus generated sufficing to prevent the running down of the load.

The worm-wheel system is usually safe against accidents, but is not economical of power if the worm-gears are proportioned, as above explained, to hold the load suspended without running backward when the application of power ceases, as is usually the case. The spur-wheel system, on the other hand, is a constant and inevitable source of great danger both to the load and to the operator. With the least carelessness in lowering, the load begins to descend with great velocity, and the mechanism is driven backward with corresponding speed and violence. If not checked, the load then practically falls as if unsupported. If too suddenly checked, violent strain is thrown upon the entire frame of the crane and on its gearing, which latter is thus liable to damage, and even to "stripping" or fracture, in which event the load falls. Where spur-geared cranes are operated by hand, this "running down" of the load involves a reversing or "flying back" of the cranks, which then frequently strike the men before they can escape beyond their reach. Accidents of this kind, resulting in injury to limbs, and even in loss of life, are constantly happening with common cranes, and are reported almost daily in the newspapers.

It is possible, however, so to proportion worm-gearing as to place it

* A paper read at the Cleveland Meeting of the American Society of Mechanical Engineers.

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almost, if not wholly, upon a parity with spur-gearing in regard to economy of power transmitted, and, by the use of cut worm-wheels driven by turned worms or pinions (the teeth of the wheel being formed by means of a chasing hob or cutter), so to construct worm-gearing that it becomes the best and most convenient form of gearing for use in crane mechanism. It is found that gearing thus made will not automatically support the load, and that the latter, if left suspended, will drive the worm-gearing backward; but in this case the descent of the load is quite slow, and no perceptible acceleration takes place, so that the worm-gears thus act as a governor to control the load. By the application of a small brake to the worm-shaft, this tendency is counteracted, and by connecting this brake with the levers which control the motions of the mechanism, the brake is easily made automatic, and thus securely holds the load whenever the crane mechanism is at rest.

In all cranes, except those of small size, provision should be made for one or more changes of speed in hoisting and lowering, so that the speed may be varied according to the load and the nature of the work to be done. Cranes operated by power *may* be so constructed that the maximum load can be lifted at the quickest speed; but they are usually so proportioned that this can be done only at a slow speed. By this plan, much economy of gearing, space, and cost is effected, and the practical efficiency of the crane for all ordinary uses is not impaired. The most perfect construction is one that permits a change of speeds to be made whether the hoisting gear is in motion or at rest, and which sustains the load automatically while a change of speed is making.

The hoisting gear of a crane should therefore attain the following results:

(1.) Such changes in direction and velocity of the power applied as will give the desired motions to the load.

(2.) The accomplishment of this with a minimum loss of power through friction.

(3.) The safety both of the operator and the load under all conditions; to insure which, the load must be always self-sustained and incapable of "running down."

(4.) Capacity for changes of speed and for convenient transition from one of these to another at will, whether the gearing is in motion or at rest, and for the automatic support of the load during the act of changing speeds.

TRAVERSE GEAR.

In this, as in the hoisting gear, good design and construction are essential to economy of power, and frequently to safety against accidents.

In some types of rotary cranes, no traverse mechanism exists, except an arrangement of parts which provides for the rotation of the crane. In others, such as jib and derrick cranes, provision must also be made for moving the truck or trolley horizontally on the jib, and the same provision is required for moving the trolley of bridge and traveling cranes transversely on the bridge. In all such cases, a separate mechanism, distinct from the hoisting-gear, has heretofore been employed, and is still sometimes desirable or convenient. When employed, its parts should be as few and simple as possible, and it should be so far independent of the hoisting-gear as to permit either to be used at any time separately or conjointly. In power cranes, provision should be made for accelerating the speed of the trolley travel whenever the nature of the work admits of it. The best possible result is attained when travel of the trolley is effected without varying the vertical position of the load, and without causing useless movement of the hoisting chain or rope over the sheaves through which it supports the load, which movement would involve much additional friction, and cause rapid wear of the chain or rope.

In traveling cranes, a point of great importance is the parallelism of the bridge travel with the longitudinal tracks. Any defect here results in increased resistance to traction, and any considerable error might cause derailment. In traveling cranes, as heretofore built, the use of flanged wheels has been relied upon to prevent derailment, and the propulsion of the bridge has been effected by a transverse shaft extending the whole length of the bridge, and connected by gearing with the truck-wheels supporting each end of the bridge, so that, by revolving the shaft, the truck-wheels would be rotated, and the bridge be thereby propelled, provided the adhesion between the wheels and the rails was sufficient. In some instances, where the adhesion has not been sufficient to prevent slipping, a cast-iron rack has been laid adjacent to the longitudinal tracks, and extending their whole length, and pinions, gearing into this rack, attached to the axles of the truck-wheels, so that propulsion is effected independently of the adhesion of the truck-wheels to the track. If the load were always central on the bridge, and the motive power always applied to this shaft at the center of its length, this plan would answer well, although it is somewhat clumsy; but in practice the load is constantly varying in position, and the motive power is applied at one end of the long transverse shaft, so that torsion of the shaft induces a considerable variation in the travel of the opposite ends of the bridge. This error is a constantly varying one, according to the portion of the load resting upon each truck, as determined by the position of the trolley, the load being never equally distributed between the two trucks, except when it is exactly in the center. It follows, therefore, that this system of bridge travel, although operative, is radically defective, and that its use involves a constant loss of power by needless friction, and entails a proportionate amount of wear and tear of rails, wheels, and driving gear.

A better and more simple method of bridge propulsion has lately been introduced, by means of which the longitudinal motions of the bridge are effected by *pulling* each of its ends, simultaneously and at equal speed, in the desired direction. For this purpose, light wire cables are used, which, by a very simple and ingenious arrangement of guide-sheaves, are made to act as a "squaring device," to hold the bridge at all times perpendicular or square to the tracks upon which it travels. By this system, the friction of traction is reduced to a minimum, and the danger of derailment from unequal travel of the opposite ends of the bridge entirely obviated.

From the above facts, it becomes evident that a perfect system of bridge propulsion must hold the bridge always absolutely square with its tracks, and must propel the opposite ends of the bridge in the same direction, at the same time and at the same speed, however, unequally the load may be distributed. It is desirable also that, in large cranes at least, provision be made for starting the bridge slowly from a state of rest, and then increasing the speed, and also for varying the speed while the bridge is in motion.

CHAINS VERSUS ROPES, AND CHAIN-WHEELS VERSUS DRUMS.

In almost every type of crane, the load is primarily carried upon a flexible cord of some kind. This usually consists of rope, either hemp or wire, or of chain. Each of these has distinctive merits and objections.

Ropes have the advantage of being formed of many parts or fibers, so that no splicing or welding is necessary in their manufacture; and they thus have an assured and practically uniform strength throughout their length.

Chains, on the contrary, consist of a series of independent links, each of which is formed from a straight bar, and welded, so that a single imperfect weld injures the whole, the strength of a chain being obviously limited by the strength of its weakest link. By care and good workmanship, however, this danger can be avoided, in which case the chains becomes as safe as the rope, and much more durable.

Where a rope is used, the hoisting-gear must necessarily include a drum or barrel, upon which the rope is wound up when hoisting takes place. Chains may also be thus wound up on a barrel, and this has heretofore been the common practice when chains have been employed in crane construction, and a prominent feature in cranes of large capacity has usually been a proportionately large "winding-barrel" to receive the chain. A chain, however, admits of another mode of construction, which consists in substituting for the wide barrel or drum a pocketed "chain-wheel," consisting of a narrow wheel or sheave, of a width only slightly greater than that of the chain, and having formed upon its periphery a series of indentations or "pockets," exactly corresponding in size and shape with the links of the chain, so that the chain and the pockets fit together accurately, and slipping of the chain upon the chain-wheel becomes impossible. It thus follows that rotation of the chain-wheel causes positive motion of the chain at a speed equal to the circumferential velocity of the wheel, in a manner precisely similar to the motion of a rack driven by a pinion, or of one spur-wheel driven by another.

To be used in this way, it is necessary that the chain should have a constant and uniform "pitch," that is, that all the links should be exactly alike, so that the distance from link to link shall be always the same (just as in spur-gearing the spacing or pitch of the teeth must be uniform), and also that the pitch or spacing of the pockets of the chain-wheel corresponds accurately with the pitch of the chain. If this be done, and if the chain have a cross-section of such area that, when carrying the full load, it is not strained to its elastic limit, or to a degree which will cause any permanent elongation of its links, then a chain may be thus used, in engagement with a pocketed chain-wheel, as well and as safely as on a barrel. Indeed, a properly shaped wheel of this kind is much easier on the chain than a winding-barrel or drum, for the reason that the latter has a cylindrical surface, while the bearing face of the former is not cylindrical but polygonal, the bed or bottom of each pocket being tangential to the radius at its center, and so presenting a flat surface for the parallel sides of each alternate link to bear upon. When the chain is wrapped upon a cylindrical barrel, on the other hand, the straight sides of every alternate link, being tangential to the surface of the barrel, can each touch it at one point only, the link being unsupported throughout the rest of its length, and the tendency of the strain induced by the load is to bend each of these links to the contour of the barrel. This effect may be easily seen in any chain which has been wrapped, under severe strain, upon a cylindrical barrel, unless the diameter of the barrel be very large. The spiral grooving of a barrel does not remedy this fault, although it affords a much better bearing for the chain than a plain cylinder; which latter is only permissible for small chains and light loads.

For heavy cranes, hemp ropes are rarely used, owing to the size and multiplicity of parts required, and to their rapid wear. They are also inadmissible where liable to be exposed to much heat, as, for instance, in a foundry. Wire ropes are more available, and are often employed; but these also wear rapidly, unless the sheaves and barrels around which they pass are of large diameter, while this requirement, if met, reduces the effective hight of hoist and necessitates more parts or gearing to obtain the necessary purchase, and augments the bulkiness of the machine. Either material involves resort to a large winding-barrel or drum.

The usual and best device for large cranes is a well-made chain, and this, when used with pocketed chain-wheels and sheaves, gives the best and most satisfactory results, and leaves nothing to be desired. The adoption of this plan dispenses with winding-barrels, preserves the shape, and therefore the durability, of the links of the chain, and in every way simplifies and compacts the mechanism.

The relative merits of the several systems may now be summed up as follows:

(1.) *As to the Sustaining Cord.*

Hemp Ropes.—Admissible only for small cranes not in frequent use and not exposed to the weather or to heat.

Wire Ropes.—Available under any ordinary conditions, but involving a winding-barrel of large diameter and large sheaves; not economical of space.

Chains.—Possessing, if well made, all advantages and the greatest durability; *common chain*, requiring a winding-drum, but permitting it and the sheaves to be of smaller diameter than with wire rope; *pitch chain*, dispensing with a drum and admitting of the use of a narrow chain-wheel.

(2.) *As to the Winding Device for Hauling in and Paying Out the Rope or Chain.*

Winding-Drums or Barrels.—These must have a diameter and length such as will enable them to receive the whole length of rope or chain to be hauled in by winding it upon their surface in one coil, without overlapping. In large cranes, the load is usually carried upon four, six, or even eight parts of rope or chain, so that the length to be wound up amounts to four, six, or eight times the effective hoist, and the dimensions of the barrel thus become very large. Moreover, this barrel must either be caused to travel longitudinally on its shaft, so that the rope or chain as

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it leads off shall be always in the center of the crane and hoisting mechanism (which method of construction involves serious complication and greatly widens the space occupied by the gearing), or the rope or chain, as it uncoils, be permitted to vary in position from one end to the other of the barrel, in which case it is nearly always out of center, thus inducing objectionable lateral strains and causing greater friction and wear.

Chain-Wheels, with Pockets.—These require a width only slightly greater than a single part of the chain, and a diameter merely sufficient to give the proper engagement with it, so that both dimensions become much smaller than in a winding-barrel, and the total space occupied is but a small fraction of that required for the latter device. The *chain-wheel* is fixed in direct line with the chain, and all lateral strains are avoided, while the flat bearings afforded for the chain by the pockets preserve the shape of the links and protect them from bending strains. The slack chain, after passing over the wheel, falls into a proper receptacle below.

From this analysis of the facts is deducted the proposition that chains, if well made, constitute the best form of flexible cord for sustaining the load in a crane, and that a well-constructed *chain-wheel* (as contradistinguished from a winding-barrel) is the best form of device for hauling in and paying out the chain; and therefore, the best method of crane construction involves the use of these two elements.

To visitors to the anthracite coal regions, it will be of interest to learn that the Mansion House, of Pottsville, situated in the heart of the mountains, on the line of the Philadelphia & Reading Railroad, has been entirely and newly refitted, and placed in thorough and complete order for the accommodation of summer and permanent guests. The management is in the hands of H. Hardell, late of the St. Cloud and Girard House, Philadelphia, who will leave nothing undone for the comfort and pleasure of his patrons. As a family hotel and a mountain summer resort, it is gaining in favor rapidly. A mountain park, twenty-five acres in extent, adjoins the house, which is exclusively reserved for the use of guests of the house.

FURNACE, MILL, AND FACTORY.

The Altoona rolling-mill has started on full-time.

Lock Ridge furnace, of the Thomas Iron Company, has blown out.

In the Railroad Exposition, the North Chicago Rolling-Mill Company exhibited a steel rail 130 feet in length, the longest rail ever rolled.

The Keystone Iron-Works, at Reading, which have been idle for some time, have resumed work.

The Greenwood rolling-mill, which has been closed since the failure of C. F. Schoener, has been leased by Daniel Shepp and H. A. Weldy, and will be started this week.

The puddlers at the Porkhouse mill, in Alleghany, have struck for an advance of one dollar a ton for boiling hard iron.

The Manchester Mills have recently sent in their third order for Curtis steam traps, the one this time calling for thirteen.

The charter of incorporation of the Beckwith Carbon Company was filed in the recorder's office on the 7th inst. The company will be located at Pittsburg, and will manufacture carbon points and plates for electrical purposes and crucibles. The stockholders and directors are James Renwick, John Turo, James Reinhart, John Neeley, Charles Corcoran, J. F. Armstrong, and Walter Beckwith. The capital stock is $20,000, and the stock is valued at $50 per share.

The Phœnix furnace of Brown, Bonnell & Co., Youngstown, O., is again in blast.

The Rosena furnace in New Castle, O., is engaged in filling an order for 6000 tons of Bessemer iron.

A steam-hammer with a striking force of twenty-eight tons, and over thirty feet high, has just been completed at the hammer-works of Morgan, Williams & Co., in Alliance.

The Birmingham, Ala., *Age* says: Two years ago, only two furnaces were in the city; now, five furnaces are ready for business. Two years ago, the sites now occupied by Sloss furnaces Nos. 1 and 2, and Mary Pratt furnace, were only pine thickets; now, not only the three furnaces are there, but a little village has sprung up around them.

A. Garrison & Co., of Pittsburg, have sent a train of 3-high plate rolls, 31 by 112 inches, to the Springfield Iron Mill. They are building rolls for the Maumee Rolling-Mill Company, Toledo, O.

The Scranton Steel Company now has its works in Scranton in nearly full operation. In the rail mill, three steel rails are rolled at once, and four will be rolled at once when the mill is in full operation. The works use as fuel culm or coal-dust from a mine close by, which is burned on a patent grate. This fuel costs only ten cents per ton at the mine.

At the annual meeting of the Colorado Coal and Iron Company, the following were elected directors for the ensuing year: William J. Palmer, C. F. Woerishoffer, W. H. Hays, August Ruttan, John Scott, Henry Amy, D. C. Hodge, R. H. Lamborn, and H. H. Danforth. The annual report shows: Gross earnings, $4,175,313; operating expenses, $3,765,736; and net earnings, $509,577. The interest charges were $163,403, and premiums, discounts, bankers' commissions, and sundry old accounts charged to profit and loss, $138,112—a total of $301,515, leaving a net surplus of $208,062.

Powellton Furnace, near Saxton, Bedford County, is producing about seventy-five tons per day of the highest grade of iron, for which Mr. Powell finds a ready market, more iron being shipped in the month of May than any month since the furnace started. Mr. Powell intends to build a second furnace soon. He has ordered a new engine weighing 225 tons. He also intends to put up fifty more coke-ovens, making 155 in all.

The Bay View mills of the North Chicago Rolling-Mill Company have started, the scale having been signed. The furnaces will be lighted in the merchant mill, top and bottom, and in the fish-plate mill and puddle mills.

The Cambria Iron Company, of Johnstown, Pa., has received the contract for steel bombshells for the United States government, the metal to have a tensile strength of 90,000 pounds.

The bids for the new steel cruisers will be opened at the Navy Department July 2d. Secretary Chandler has given notice that the maximum amounts which the Navy Department will pay for the construction of these vessels are as follows: For 4300-ton ship, the Chicago, $1,248,000; for 3000-ton ships, Boston and Atlanta, $783,000 each; for dispatch-boat, not yet named, $399,000; and no bids in excess of these figures will be considered.

In passing by the works of the Cambria Iron Company, at Johnstown, Pa., recently, it was noticed that they were carrying a very heavy stock of ingots and blooms.

The well-known pump firm, Henry R. Worthington, has opened a branch at No. 95 Lake street, Chicago.

The Mahoning Furnace Company, of Armstrong County, Pa., made an assignment June 21st. The liabilities are $70,000, and the assets, it is claimed, $75,000.

At a meeting of the Western Nail Association on the 21st inst., to consider the advisability of curtailing the production by a suspension of operations, the matter was postponed till the next regular meeting, in consequence of some of the manufacturers desiring to replenish their stock.

It is understood that the directors of the Puget Sound Iron Company have in contemplation the building of a large rolling-mill at Irondale, Washington Territory.

The first meeting of stockholders of the Portsmouth Machine Company was held at Portsmouth, Monday, the 4th inst. It was voted that the capital stock comprise 1000 shares at $100 each, all of which has been subscribed. Frank Jones, C. H. Mendum, B. F. Webster, E. H. Winchester, William Ward, J. Albert Walker, M. Eldridge, N. W. Halley, and Edward S. Fay were elected directors. The company organized with Frank Jones, president; W. H. Hackett, clerk; Charles H. Mendum, treasurer, and proposes to erect a machine-shop.

The Pennsylvania Lead Company has contracted for the sinking of a well 4000 feet deep, with the hope of striking a vein of gas, with which to furnish heat for its smelting-works.

The Blakeney Foundry Company, of Springfield, Ohio, recently organized, is building extensive works at that place, for the manufacture of the Blakeney cupola-furnaces and general castings.

The Lewis Foundry and Machine Company (Limited), Pittsburg, Pa., is erecting an additional twelve-ton air-furnace in its malleable iron foundry.

The Richmond (Ind.) Foundry Company has been incorporated under State laws. The capital stock is $25,000, and the directors are Charles F. Coffin, Joseph Marchant, Charles H. Coffin, Turner W. Hayes, William F. Spencer, and William C. Shoemaker.

The Low Moor Iron Company, of Low Moor, Va., recently made a contract for a new double hoisting-engine, with double drum and cages complete, with W. H. Barber & Co., of Allentown, Pa. The engine was shipped about June 1st.

The Fall River (Mass.) Iron-Works will put in a new double Corliss engine of 350 horse-power, one side of which will run the puddling department and the other the plate mill. The old engines will be taken out and a new foundation laid. During the changes, a general overhauling of the machinery in the puddling department will be made. The alterations will require some six or eight weeks.

GENERAL MINING NEWS.

ALABAMA.

The Atlanta *Constitution* chronicles the fact that Colonel Peters, of Birmingham, Ala., has just sold 30,000 acres of mineral lands in Fayette and Walker counties to the Kentucky & Alabama Coal, Iron, and Land Company, for $99,600. The same gentleman had previously sold to the Tennessee & Alabama Coal and Iron Company 50,000 acres for $300,000. This was from the same two counties, and the purchasing company is composed of Nashville and Memphis investors. Their purchase embraces some of the best coal lands in the great Warrior field.

ARIZONA.

HOWELL SMELTING AND MINING COMPANY.—The company is said to be making remarkable progress. The Belle mine, which the company took under lease for three years, abounds in mineral almost from the surface, and in all of the extensive openings scarcely a foot of non-paying rock has been encountered. The company has upon the dump some 2600 tons of ore. To June 1st, the product was 1896 bars of gold and silver bullion, valued at $50,000, and the net profits are at the rate of $10,000 per month. It has been voted to increase the capital from 150,000 to 250,000 shares by an issue of 62,500 shares of preferred and 37,500 of common stock. The company also has the Blue Dick mine, but has no occasion to work it while so much ore is piled upon the dump of the Belle.

GRAHAM COUNTY.

The Clifton *Clarion* reports as follows:

DETROIT COPPER COMPANY.—The Copper Mountain, Arizona Central, Montezuma, and Yankie mines are the property of this company. It is the intention of the management to run two furnaces as soon as tramways can be erected to raise copper from ore-bodies now uncovered. A main working-shaft is to be sunk immediately on Copper Mountain, on which will be placed a hoisting-engine. An improved California whim is also getting into position on the Yankie mine. The mines of this company are very happily adjusted. The gangue of the ore-veins in Copper Mountain carries enough iron to flux the carbonate ores Arizona Central and Lower Yankie.

GREAT WESTERN COPPER COMPANY.—These mines are located on Rocky Creek, about two miles north of the town of Oro, on the Frisco River. Prospecting on this property has been done mainly on the claim called the Olie, which is an extension of the Copper King lode. The vein-matter is a decomposed quartz, well filled with iron pyrites, with granite walls. The work done at present consists of a shaft sunk on the foot-wall of the vein about 72 feet, encountering good ore at a depth of 33 feet. At 50 feet, a cross-cut was made to the hanging-wall, cutting a two-foot streak of rich copper glance ore and exposing a fissure-vein which, at a depth of 50 feet, is 13½ feet wide. It is the intention of this company to continue the shaft to the depth of 100 feet.

CHASE CREEK.—A strike of sand carbonates has been made on the Lulu, one of the mines of this group. A shaft is sinking which is down 14 feet on the vein. Heretofore the Lulu, which is a well-developed mine, has produced copper ore exclusively from its working tunnel, which is in 240 feet.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—During the past week, 166 tons of ore were crushed; average assay value, $33.50 per ton. Work east and west on the 1000 level shows no change.

STANDARD CONSOLIDATED.—Last week, the company extracted 1311 tons of ore, and shipped to the company $33,787 bullion. East cross-cut, 1200 level, is 301 feet long, and is in hard ground. North drift, 1000 level, is 177 feet long. South drift, same level, is in 118 feet. The vein is from 1 to 2½ feet wide, and continues to look well. The uprise from the 700 level is up 131 feet, where the vein is 4 feet wide.

SYNDICATE.—The mill is running steadily on Syndicate ore.

PLUMAS COUNTY—GREENVILLE DISTRICT.

During the past three years, prospecting for copper has been done on the mountain east of North Arm. Last year, a ledge was found cropping out at an elevation of about 1500 feet above the stream; a shaft was sunk forty feet, to test the vein, and the result being satisfactory, a tunnel was started that would cut into it at an additional depth of one hundred feet. This tunnel has now reached the ledge, which is found to be of great width, probably forty feet; the ore is estimated to contain as high as forty per cent of copper. On the surface, the ledge crops out for a long distance.

OPHIR CONSOLIDATED.—This claim is east of the Indian Valley mine, and contains two ledges, named respectively the Ophir and Primrose; these run parallel to each other, and are about one hundred feet apart. North and south, the claim is bounded by patented ground. In sinking a distance of only ten feet in the Primrose, the ledge opened out to over three times the initial width. The prospects of the Ophir ledge are also very encouraging.

YUBA COUNTY.

MILTON HYDRAULIC MINING COMPANY.—The reservoir, containing 650,000,000 cubic feet of water, burst on the afternoon of June 18th. The rush of

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water was irresistible, and swept away every thing in its path. It raised the Middle Yuba River 100 feet. The roar of the running water was heard at several miles' distance. Several lives are reported as lost. The loss on the reservoir amounts to $75,000.

CANADA.

PROVINCE OF ONTARIO.

DOMINION PHOSPHATE MINING COMPANY.—A large number of business men interested in phosphates met in Montreal recently, and organized a company for the purpose of phosphate mining.

COLORADO.

CHAFFEE COUNTY.

The marble discoveries on the northwest side of Monarch will be opened up for quarrying in a very short time. Such development as has already been done shows this new and valuable property to be of great extent, and the quality has been pronounced by experts to be very fine and beautiful. So far, the full extent has not been positively determined, but even at the present time such a large body has been uncovered as to warrant the employment of labor for the full development of it. Work upon it will be commenced in a short time.

OSHKOSH.—This property is but a short distance from Monarch, and of such easy approach that, at a small expense, its ore can be directly loaded upon the cars. Discovered in 1878, it remained in possesion of its locator till the following year, when development began, which has at intervals been continued up to the present time. After the discovery of the ore body was made, a tunnel of 135 feet was run, and ore taken out in sufficient quantities to prove beyond a doubt that the mineral existed in a large and well-defined body. Upon the resumption of work this spring, another tunnel was started, which, in a few feet, caught the vein, and is now, at a length of fifty feet, upon a body of ore, consisting of carbonates and galena. The mineral is upon the contact between blue and white lime, and as work proceeds is widening out and improving in value.

CLEAR CREEK COUNTY.

WORLAND MINING, MILLING, AND SMELTING COMPANY.—This company has expended large sums of money in opening up its mines and in building mills and smelters. The Freeland is worked through a tunnel that has now reached the great depth of 2700 feet. At the distance of 1200 feet from the mouth of the tunnel, a shaft was sunk on the vein to the depth of 480 feet. At a depth of 125 feet in this shaft, another level is run on the vein to the distance of 700 feet, and from this level stoping is done to the tunnel above. This mine has never heretofore been noted for the richness of its ores; but for the last 75 feet and in the breast of this level, ores of surpassing richness have come in. Franklinite, brittle silver, and carbonate of iron, the first and last heavy in gold, stand in great bodies from 3 to 5 feet in thickness. Of the amount of ore in sight, there could be mined daily 200 tons. The timbering in the mine is of the most substantial character. The timbering of the winze is in square sets. This company has a concentrator built at the tunnel entrance capable of handling 150 tons of ore per day of twenty-four hours, and in addition, in close proximity to the mine, is its smelter.

GILPIN COUNTY.

BOBTAIL.—A new process for the separation of the mineral from the tailings from stamp-mills has been placed in the stamp-mill of this company in Black Hawk.

EAST FLACK.—The lessees of this mine, south of the Hidden Treasure, will begin sinking in the main shaft, now 700 feet deep.

GUNNELL.—The production for the month of May was as follows: Retort gold, $4676.50; smelting ore sold, $8885.17; tailings sold, $209.83; total, $13,771.50.

ROLLINS.—Work has been resumed upon the placer claims of this company below Rollinsville.

WHITING AND BUTLER LODES.—Since the new lessees took hold of the Whiting, they have sunk the main shaft some distance, and are now sinking and drifting. The highest runs heretofore received from the stamp-mill dirt have been 3½ ounces gold per cord. In addition to the Whiting, which is a patented claim of 1300 feet, they have leased and bonded the Butler lode, a patented claim of 1100 feet. In the lower workings of the former, they have about eight inches of smelting ore, which is saved for the smelters. The outlook of both veins is encouraging, and improves as developments are continued.

LAKE COUNTY.

Late Leadville exchanges contain the following:

A. Y.—The first shaft on this property was started early in 1880. Since then, three shafts have been sunk to ore, hundreds of linear feet of levels driven, and thousands of cubic yards of ore and waste rock extracted. Inexpensive and modest as the plant on this property has been, it has handled incalculable amounts of water, and the mine up to the present time has produced 32,000 tons of ore, mostly of a fair grade. The latest developments consist of a new shaft, sunk several hundred feet north of any of the previous workings, and some distance higher up on the side of Iron Hill. The new shaft has lately attained a depth of 270 feet, striking ore and connecting with the workings of the mine from other shafts. The underground workings of the mine already extend nearly 100 feet north of the new shaft. A station has just been cut out at the foot of the shaft, and connection made on the west side. As soon as this work is completed, the sinking of the shaft to greater depth will be resumed, when levels can be driven intercepting the ore farther to the northward, in its dip below the present waterline.

CALIFORNIA GULCH.—The mines along California Gulch continue to make the largest production of any one section in the district. Beginning with the Robert Emmet mine and following the gulch to its head, a distance of nearly one and a half miles, almost every mine on the hills on each side is producing and shipping regularly. The largest production, of course, comes from the properties located on the Iron Silver belt where it crosses California Gulch, but very considerable amounts are also produced by the mining properties both east and west.

DUNKIN.—Thirty tons of ore, averaging thirty-two ounces per ton, were recently shipped. The mineral is sand, carrying some galena, and is surrounded by a low-grade iron. The ore was extracted from the northern portion of the mine, in which a great deal of exploration-work is in progress.

HENRIETT.—The north level from the incline running toward the mine has two to three feet of fine ore in a rise, and the prospects of a large body of ore in this portion of the mine are excellent.

MORNING STAR.—The sinking of the McHarg shaft has passed through the body of sand carbonates, and struck a mass of iron. The sand ore shows a thickness in the shaft of three feet. The water is coming into the shaft in such volume that the sinking has been suspended. It is now proposed to run a small drift for drainage and prospect purposes from the face of the lower Waterloo incline, connecting with the McHarg shaft. This drift will be about 125 feet in length, and it will require about thirty days to connect it with the shaft when the sinking of the McHarg is to be again resumed.

RUBY.—This mine has been sold to a St. Louis syndicate for $60,000.

SAMPSON & ESTY CONCENTRATOR.—This concentrating mill, situated in Big Evans Gulch, is now in fair running order. The perfection expected to be attained in concentrating ores, the result of practice and experience, has, however, not yet been reached, though better and more satisfactory work is done each succeeding day. At present, the capacity of the mill is limited to its crushing facilities; but as soon as the screens for additional sizing cylinders can be secured, the mill will be able to handle at least forty tons a day. So far, the works have been kept running on material from the Evening Star mine, which in its crude state returns but about four per cent in lead, and four ounces in silver to the ton. With such low-grade material, but very indifferent results can naturally be attained, and at best the product of the jigs and buddles is not very high.

SAN JUAN COUNTY.

It is stated that the North Star and Sultan have been sold for $475,000. Arrangements have been made by which the Martha Rose smelter will also pass into the control of the same company, which is said to be an English syndicate.

GUSTON.—This mine, situated on Red Mountain, has been sold to Eastern capitalists for $100,000. The purchasers propose to develop the mine extensively.

SUMMIT COUNTY.

The litigation between the Empire State and the Enterprise has assumed a new phase. Simultaneously with the nonsuit of the Empire State in the United States Court at Denver, that company instituted proceedings against the Germania Mining Company in the district court at Breckenridge. The question then arose whether the Germania Company should not be permitted to go on with its case in the land-office and perfect its patent, the owners of the Empire State having failed in their suit before Judge Hallett. Under the law, a party adversing an applicant is bound to bring suit within thirty days, and prosecute the same with due diligence. No decision has been rendered on the question, but it seems likely that the land-office will not forward the Enterprise papers to Washington, until the Empire State people have had an opportunity of establishing their claims before the district court.

CHAMPION TUNNEL.—In consequence of the withdrawal of steam from the Robinson, work had to be stopped at this mine. This property seems to get more deeply involved in trouble each week. At present, the interest of one of the lessees in the lease has been attached, and is to be sold under a judgment.

KEYSTONE BULLION COMPANY.—The works at Breckenridge have been started up. They were originally built and fitted up by the Summit County Smelting Company in 1880, but in consequence of litigation they were run only a few days. During last winter, a company was organized in Philadelphia with a capital of $100,000. The works were purchased, and have been thoroughly overhauled. The buildings are adjoining the town on the west bank of the Blue, occupying a commanding location. The machinery throughout is first-class, and together with the buildings cost the Summit County Smelting Company upward of $129,000. The principal source of supplies is the Union mine, on Mineral Hill, the Penn-Breckenridge mines, and the mines owned by Watson, Corning, and Boylan, on Nigger Hill, which furnish a sufficient variety for all smelting purposes. The owners of these extensive properties are also interested in the company. The location of the works is such that the grade is descending from all these properties, and also from the lime-rock ledges and source of fuel supply. There are now about 500 tons of low-grade ore at the works, and the capacity of the mines is sufficient to furnish a continual supply. The enterprise is now in good shape, so far as finances are concerned, the company having ample funds for the purchase of ore, and will, in addition to handling the product of the mines in which they are interested, conduct the business of sampling and purchasing ore in any quantity offered.

NEW YORK & SUMMIT COUNTY MINING COMPANY.—A correspondent of the Denver *Republican* writes that the company is getting through the large body of water that was encountered, and that it has now good prospects of soon reaching the main body of mineral that is before it, judging from the rich assays it gets from the small feeders in the wall. It is cutting through a large body of black quartz, carrying a large quantity of white iron, with copper pyrites, and has obtained assays from the feeders all the way from 30 to 350 ounces silver to the ton, and from $17 to $28 in gold per ton, 12 per cent copper and from 17 to 31 per cent lead. It is running a large force of men day and night. The company is determined to push the work.

ROBINSON.—The incline is flooded with water up to the 11th level. The mishap was partly due to the disabling of the great pump, but the surface water came in with such a flood after the incessant snows of April and May that no pump could have kept it under control. When the torrent subsides, it is expected that the mine can be pumped dry again in a day or two. Meanwhile, the ore-shipments for May were 92 cars, precisely the same amount as in April; and the shipments thus far in June are 16 cars, as against 11 cars for the same period last year. Nothing further has been done with the dry concentrator; about 100 tons of low-grade ore are shipping to the Greer concentrating-works at Kokomo. A dispatch from Leadville says that Mr. Greer, the lessee, has left there for New York. It is said that he will insist on a modification of the terms of the lease, and that, if he fails to obtain this, he will relinquish the lease. It is reported here that the mine has run behind.

WHITE QUAIL.—Work has not yet been resumed at this mine.

DAKOTA.

A dispatch from Deadwood says that intense excitement prevails throughout the Black Hills over recent discoveries of the greatest importance and value. The first was made about a week ago, but was kept quiet through uncertainty as to the character and value of the ore. Much development-work and many assays have since established the presence of tin in large bodies, running from 50 to 55 per cent tin and with traces of gold and silver. The mine is situated three miles from Harney's Peak, and is in a micaceous formation.

The second discovery was made in the St. Elmo, a gold mine six miles from Custer, near the Sidney stage-road. Work began on the mine two weeks ago, and was continued in good ore from the start. The ledge was cut to a width of 50 feet, and recently a streak of exceedingly rich ore was encountered. Pieces of rock pulverized, making less than a pan, yielded fully $40 gold. The ledge can be traced on the surface a long distance. Miners are flocking to the locality from every direction.

All the mills on the "belt," with the exception of the Gustin, are in operation.

A late dispatch says that little if any placer mining is under way in the Black Hills at present, owing largely to the destruction of flumes, ditches, boxes, etc., by the flood.

CALEDONIA.—The superintendent reports for the week ended June 10th: Ore produced, 1050 tons. Men on pay-roll, 112. The winze advanced 10 feet since work was resumed, making a total of 132 feet. About the last of this week, we shall have it down 100 feet vertical, when we shall begin drifting. The company is operating every stamp. Additional stamps will not be put in until the completion of the 200 level, which will, no doubt, demonstrate the propriety and necessity of increased milling facilities.

FATHER DE SMET.—The superintendent writes as follows, under date of June 4th: Herewith express company's receipt for bar No. 160, containing 848·15 ounces of gold, the result of run of mill for last half of May. This bar fully equals my expectations, as we were idle for three days on account of the flood, which filled open cuts, winzes, and tunnels with *débris*, which have all been cleaned up and run through the mill. We are doing much better now, and a good showing will be made for this month.

FLORENCE.—The enlarged silver mill will start up shortly.

NIGGER HILL.—It is reported that the forty-mile ditch scheme, begun a year ago, by this company, if not finally abandoned, is at least "laid over" for the season.

ILLINOIS.

MCWILLIAMS OIL COMPANY.—Oil has been struck in the company's new well, on the Simmon property, at Litchfield, at a depth of 675 feet. The oil is entirely free from water, and is pumped out at the rate of six barrels in twenty-four hours.

MEXICO.

The Consul of the United States, at Guaymas, Mexico, informs the Depart-

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ment of State that of the miners from Arizona who, in the past three weeks, left that post for the Lower California gold placers, forty-five returned on June 10th. These men report that the placers contain little gold, and that their value has been grossly exaggerated ; that the nearest water is twelve miles from the mines, and even then only enough for drinking purposes ; that there is no pasturage for animals at or near the mines ; and that they advise no one to go there with the expectation of making money ; that the remainder of the miners are expected back in ten days, as they are waiting on the beach for a vessel ; and this may be considered as ending the excitement in connection with the gold placers in Lower California in latitude 28° 29′.

SANTA EDUWIGES.—Ex-Senator Tabor, of Denver, has purchased this mine, situated at Jesus Maria, State of Chihuahua.

MICHIGAN.

NONESUCH.—The stamp-mill is nearly ready to begin work.

SALISBURY.—At the mine, the working force has been slightly reduced of late, and now numbers but about thirty-five men. There are in stock some 20,000 tons of ore, but a quarter of which has been disposed of as yet. Operations this spring have been confined to getting out rock, timbering, and placing the mine in shape to produce ore quickly and advantageously when it is wanted—a condition which has been fulfilled. The force is now taking out from four to five hundred tons per week, and the product for this season can be run up to 50,000 tons if it is called for. The policy of the management is, however, not to push the output beyond the immediate demand.

TAMARACK.—The vertical shaft had reached a depth of 750 feet at the end of last week—having been sunk at the rate of over 60 feet per month (average(since the start. It has passed through seven belts of amygdaloid, two of which carry copper.

MONTANA.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED.—The Butte *Inter-Mountain* gives the following information :

The Cleopatra, the highest mine on Lion Mountain, has now reached the depth of 750 feet. In the past two years, it has produced 32,000 tons of ore. The vein or ore-chute runs from 4 to 30 feet in thickness, with an average width of 15 feet. The Ariadne and Mark Antony are on the same claim. The Ariadne shows a large vein on the surface, and will be worked extensively the coming summer. The Silver Quartz now shows a large body of the best ore ever found on the mountain. Atlantis and Fissure mines are beginning to look up. The Fissure mine has furnished over 30,000 tons of high-grade smelting ore, and can be made to furnish as much more. All the ore of the Atlantis is now dumped into and run out of the tunnel. The Lion Mountain tunnel is now connected with the Atlantis, and will be continued until connections have been made with the Sheep, Fissure, and Silver Quartz. Two hundred and thirty-five tons of first and second-class ores are now run daily over the Hecla and Greenwood tramway, a distance of three miles. Thirteen cars are run to the trip, and are let down by six brakemen with comparative ease and safety. The concentrator works 200 tons daily of crude ore. It is the intention to start both furnaces up on the first of the month, and to load the ore teams at the concentrator.

LEWIS & CLARKE COUNTY.

The construction train and first locomotive of the Northern Pacific Railroad arrived at Helena June 12th, amid the shouts and rejoicings of the people.

NEVADA.

SAFFORD DISTRICT.

ONONDAGA.—The present developments consist of an original tunnel on the north side of the center gouge, run in 75 feet, and a cross-cut north from near the end of the tunnel 30 feet north and 25 feet south, thus cutting the ledge 55 feet in width. The cross-cut passes through low-grade vein-matter, with spots of high-grade ore throughout the whole distance. The ore-body continues beyond both ends of the cross-cut to an undetermined extent on the south. Another tunnel has been started on the south side of the above-mentioned gouge, immediately below Tunnel No. 1, and is extended in 75 feet. This tunnel shows high-grade ore in the breast and on both sides as far as carried. Still another tunnel has been started to cut what is supposed to be the main foot-wall of the ledge, which is well defined, cropping out 400 feet in length and stripped to that extent, showing a vein of very rich ore varying from a few inches to three feet, with ore of a lower grade on the south side extending indefinitely. At the northern end of this development, a considerable amount of ore has been extracted and shipped, varying from 60 to 300 ounces per ton. The ore on the tunnel ledge near the northwestern boundary of the ledge has been exposed 300 feet, showing a large continuous vein, the whole distance in ore varying from 20 to 1060 ounces. At this point, which is 650 feet from the mouth of the tunnel and 500 feet vertically to the tunnel level, a shaft has been started with which the tunnel is to connect. The mine has shipped 69 tons of ore, which have been reduced at Salt Lake with a pulp-assay of 92 ounces for the first lot and 76 for the second. The mine can be worked by a series of tunnels on the ore-veins to a distance of 1000 feet, with an uprise of 600 feet, and can thus be delivered on the dump without the necessity of hoisting or the pumping of water.

ZANOLL.—The mine is situated about a half-mile below the Onondaga. In most respects, as regards the country-rock and the formation, it is identical with the Onondaga. The ledge, which is perfectly defined, extends northwest and southeast as in the Onondaga. The property has been prospected by a tunnel run from near the northwestern extension of the ground, running southerly into the mountain 250 feet. This tunnel, near its mouth, passed through a vein of low-grade ore which gave indications of a width of at least forty feet. A winze has been sunk thirty feet down from a point about 35 feet from the mouth of the tunnel, all in ore. Two hundred feet easterly from the line of the tunnel, a shaft has been sunk 112 feet on the ledge. At the surface, it was only a few inches wide, the ore of which assayed but $1.80 per ton, but has widened gradually to the bottom, where it is fully six feet wide. The character of the ore is carbonate of silver, with a gangue of iron and sulphate of baryta, carrying from 10 ounces to as high as 600 to the ton in silver, without gold. Traces of ruby silver are discernible in the ore, which bears a strong similarity at the bottom of the shaft to that found in the lowest development of the Onondaga. At the depth of 50 feet, a drift has been run on the ledge westerly to a distance of 40 feet, all in gray carbonate ore that assays from 40 ounces up to 612. Taken out without assorting, the entire vein-matter assays over 70 ounces per ton. One car-load of 26 tons has been shipped to Salt Lake for reduction, which pulped 72 ounces.

NEW MEXICO.

In the north end of the Sandia Mountains, about four or five miles from Bernalillo, miners while sinking a shaft discovered a six-foot vein of plumbago or graphite. The experiments made thus far show that it is equal if not superior to an article of foreign importation sold in American markets.

The new camp Fleming, the discovery of which dates back but forty days, is reported to be growing rapidly, having already some four hundred inhabitants. The camp was at first brought into prominence by the discovery of the Penrose and Old Man mines ; at the latter mine, thirty men are already employed, and the ore shipped to the Hubbs smelter shows rich returns. Various locations have been made, and high prices are demanded ; and the boom which generally accompanies the discovery of so-called bonanzas is at hand.

PENNSYLVANIA.

Reports by telegraph from Titusville state that the Grandin well, No. 9, which is situated outside of the oil development in Balltown, was unexpectedly completed June 15th, and began to produce largely. In the first hour, it produced twenty-five barrels, but in the second hour increased to fifty-five barrels. During the first twenty-four hours, it will yield between 400 and 500 barrels. This will possibly open a large amount of territory which hitherto has been considered useless, as traders have regarded the limits of the Balltown District as defined. This strike creates much excitement.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED MAY 1ST, 1883.

276,576. Steam-Boiler or other Furnace. Charles Gearing, Pittsburg, Pa., Assignor of seven eighths to Samuel Harper, same place, and Henry P. Cooke, Lewis M. Hosea, and Charles F. Hesser, Cincinnati, O.
276,582. Stamp-Mill. Frank W. Hall, Dahlonega, Ga.
276,636. Furnace for Desulphurizing Ores. August Th. Schuessler, Newark, N. J.
276,691. Moving Grate for Boiler-Furnaces. De Witt C. Hill, Willimantic, Conn.
276,710. Dry-Ore Separator. Patrick W. Reardon, San José, Cal.
276,712. Machinery for and Method of Manufacturing Steel Railroad-Rails. Jacob Reese, Pittsburg, Pa.
276,738. Ore-Concentrator. William S. Ward, Leadville, Colo.
276,775. Ore-Concentrator. Alexander D. Clarke, New York City.
276,790. Hot-Blast for Blast-Furnaces. H. William Ellicott, Baltimore, Md.
276,861. Dry-Pressing Brick-Machine. Henry B. Morrison and George Willett, Motley, Minn.
276,903. Furnace for Steam-Boilers. Joseph G. Sextro, Carthage, O.

GRANTED MAY 8TH.

276,991. Brick-Machine. James C. Anderson, Highland Park, Ill.
276,997. Apparatus for Extracting Gold and Silver from their Ores. Richard Barker, London, County of Middlesex, England.
277,071. Crusher and Pulverizer. Morrill A. Shepard, Lebanon, Ill.
277,079. Reversing-Valve for Furnaces, and Device for Operating the Same. Henry Swindell, Alleghany City, Pa.
277,134. Crushing-Mill. Frank A. Huntington, San Francisco, Cal.
277,233. Ore-Crushing Machine. William Clark, Brooklyn, Md.
277,244. Rock-Drilling Machine. Henry Dunham, Glen Aubrey, N. Y.
277,277. Apparatus for Melting and Mixing Bituminous Compounds. Brierley D. Healey, Liverpool, County of Lancaster, England.
277,316. Amalgamator. Harrison B. Meech, Chatham, N. Y.
277,361. Steam-Boiler Furnace. Richard L. Slater, San Francisco, Cal., Assignor to Perkins H. Bagley, same place.
277,407. Furnace. Gustavus E. Buschick, Chicago, Ill., Assignor of one half to Charles E. Gregory, same place.
277,421. Brick-Kiln. Willis N. Graves, St. Louis, Mo., Assignor of one half to the Hydraulic Press Brick Company, same place.

GRANTED MAY 15TH.

277,491. Grate for Furnaces. Thomas Kirkwood, Chicago, Ill.
277,505. Process of and Apparatus for the Recovery of Turpentine and other Wood Products and for the Manufacture of Charcoal. H. M. Pierce, Chicago, Ill.
277,530. Machine for Separating Impurities from Coal. Charles W. Ziegler, Scranton, Pa.
277,538. Furnace-Grate. Christian H. Baush, Holyoke, Mass.
277,543. Rotary Crusher. David Bushman, Quincy, Cal.
277,578. Ore-Crusher and Pulverizer. James H. Kirkhead, Reno, Nev., Assignor of one half to Pierce Evans, same place.
277,638. Water-Bosh for Blast-Furnaces. Arthur F. Wendt, New York City.
277,661. Valve for Vapor-Burners. David E. Bangs, Medford, Mass.
277,666. Feed Mechanism for Ore-Crushers. Theodore A. Blake, New Haven, Conn.
277,746. Multiple Milling-Machine. William Krutzsch, Daytoa, Ohio, Assignor to the Buckeye Iron and Brass Works, same place.
277,762. Hydraulic Mining Apparatus. John H. Martin, Bidwell's Bar, Cal.
277,763. Ore-Crusher and Pulverizer. Robert McCully, Philadelphia, Pa.
277,815. Rolling-Mill. Samuel T. Wellman, Cleveland, Ohio.
277,817. Metal-Punching Machine. Moses G. Wilder and Charles T. Parry, Philadelphia, Pa., Assignors to said Parry, Edward H. Williams, William P. Henszey, Edward Longstreth, John H. Converse, and George Burnham, same place.
277,831. Apparatus for Making Bessemer Steel. Thomas H. Burridge, St. Louis, Mo., Assignor of one third to William L. Reynolds, same place.
277,850. Casting Attachment for Open-Hearth Steel-Melting Furnaces. Charles M. Ryder, Chester, Pa.
277,860. Rolling-Mill. Samuel T. Wellman, Cleveland, Ohio.

GRANTED MAY 22D.

277,884. Method of Reducing Metals from their Ores. John Clark, Silchester Road, Kensington, County of Middlesex, England.
277,885. Method of Reducing Metals from their Ores. John Clark, Silchester Road, Kensington, County of Middlesex, England.
277,889. Amalgamator. Henry Cook, Leadville, Colo.
277,929. Process of and Apparatus for Converting Cast-Iron into Cast-Steel. Jacob Reese, Pittsburg, Pa.
277,978. Smoke-Consuming Furnace. George Blackburn, Columbus, Ohio, Assignor to the Standard Boiler and Smoke-Consuming Furnace Company, same place.
277,989. Water-Jacket for Furnaces. John H. Canavan, Globe, Ariz.
278,013. Art of Manufacturing Iron, Steel, etc. James Henderson, Bellefonte, Pa.
278,019. Pumping Apparatus for Deep Wells and Mines. John H. Huffer, Jacksonville, Oreg., Assignor of one fourth to C. C. Beekman, same place.
278,035. Amalgamator and Settler. Frederick Morris, San Francisco, Cal.
278,059. Amalgamator. George W. Strong and Walter L. Strong, San Francisco, Cal
278,080. Brick-Kiln. Jacob H. Beidler, Mount Pulaski, Ill.
278,093. Apparatus for the Manufacture of Gas for Illuminating and Heating Purposes. Amos P. Chamberlain, London, England.
278,107. Apparatus for the Manufacture of Gas. Joseph E. Dowson, Westminster London, England.
278,145. Process of Generating Gas. Erazm. J. Jerzmanowski, New York City.
278,157. Coal-Hod. Emil G. Luscher, Bergen, N. Y.
278,160. Dry-Ore Separator. James Collins McCurdy, San Francisco, Cal.
278,168. Combined Gas-Engine and Air-Compressor. Lewis H. Nash, Brooklyn, Assignor to the National Meter Company, New York City.
278,209. Means for Burning Peat, etc., in Steam and Hot-Air Furnaces. William E. Wright, Rome, N. Y., Assignor to Anna Maria Wright, same place.
278,232. Pulverizing Machinery for Ores, etc. Willard M. Fuller, New York, Assignor of one half to F. S. Burr and J. B. Richmond, Brooklyn, N. Y.
278,234. Hot-Blast Stove. Frederick W. Gordon, Pittsburg, Pa., Assignor, by mesne assignments, to himself and James P. Witherow, same place.
278,250. Compound for Tempering Steel. John T. Mercer, Richmond, Ind., Assignor to himself, Edward F. Preston, Bismarck, Mich., and Samuel C. Richardson, Terre Haute, Ind.
278,279. Smelting-Furnace. Sherman G. Sackett, Denver, Colo.

REISSUE.

10,329. Gas-Furnace. George H. Baldwin, Hollidaysburg, Pa.

GRANTED MAY 29TH.

278,340. Machine for Rolling Tubes, Columns, etc. Charles Kellogg, Buffalo, N. Y.
278,343. Dumping-Car. Sidney D. King, Pittston, Pa.
278,363. Basic Bessemer Process. Jacob Reese, Pittsburg, Pa.
278,407. Machine for Grinding Minerals, etc. Thomas O. Cutler, Jersey City, N. J.
278,451. Valve-Gear for Steam-Engines. Eugene O'Neill, San Francisco, Cal.
278,496. Means for Utilizing the Waste Heat of Furnaces. William H. Brooks, New York City.
278,511. Ingot-Manipulator. Thomas Critchlow, Pittsburg, Pa.
278,512. Soaking-Furnace for Ingots. Thomas Critchlow, Pittsburg, Pa.
278,517. Rock-Drilling Apparatus. George McC. Derby, New York City.
278,593. Method of and Mold for Casting Steel Ingots having Iron Centers. John Pedder, Pittsburg, Pa.
278,629. Machine for Making Spikes and Bolts. William Taylor, Pittsburg, Pa., Assignor to the Angular Steel Nail Company (Limited), same place.
278,663. Molding Apparatus for the Manufacture of Pipe. William Ireton and Samuel E. Whitelock, Camden, N. J.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, June 22.

Although the volume of business in the mining market has not been as large as last week, the character of the dealings has been better and prices stronger. Sonora continues to do a very large business, and also continues to decline. Robinson has been very actively dealt in, and has been weak under rumors that the lessee of the mine has demanded better terms for his contract, and that, if they are refused, he will turn the property over to the company. The Leadville stocks show some strength, especially Little Chief and Little Pittsburg. The Comstocks have been weak under small transactions. Eastern Oregon has been very actively dealt in at stronger prices. The total number of mining shares sold at all the Exchanges aggregates 169,048 shares, as against 176,418 last week.

The Comstock shares were very moderately dealt in, and were weak. California was quiet and weak, selling from 35@27c. Consolidated Virginia sold to the extent of 1000 shares at 63@58c. Mexican was quiet and steady, selling at $3.75. Consolidated Imperial sold at 8c. Gould & Curry records transactions of 100 shares at $2.65. Yellow Jacket sold at $4, and Best & Belcher at $4.25. Sutro Tunnel was quite active, and was a little weak; it sold from 24@21c., the business amounting to 24,800 shares.

The Leadville stocks record a moderate business at strong prices. Amie was quiet and steady, selling from 16@18c. Chrysolite had a small business and was steady, selling at $1.20. Dunkin sold at 20c., and Hibernia at 5c. Iron Silver was moderately dealt in at steady prices, selling from $2.90@3. Little Chief was very active in the early part of the week, and has been quite strong; it sold from 55@65@63c., the transactions aggregating 10,600 shares. Little Pittsburg had a fair business at strong prices; it sold from 90c.@$1.10. Climax was quiet and strong, selling from 5@9c.

The Bodie stocks were quiet and steady. Bodie Consolidated sold at $1. Standard had a small business at steady prices, selling at $6.50@$6.75. Bulwer was quiet and strong, selling from 80@85c.

The Tuscarora stocks have been quiet and strong. Belle Isle was quiet and very strong, selling from 40@71c. Navajo, with moderate transactions, was strong; it sold from $2.10@$2.25. North Belle Isle sold at 20c., with a business of 400 shares. Independence was quiet and steady, selling at 60c. Elko Consolidated was dealt in to-day for the first time this week; it was quite active and strong, selling to the extent of 15,400 shares at 20@30c.

In the miscellaneous list, Alice has been weak under a small business, selling from $2.75@$2.50. Caribou was quiet and steady at 13c. Eureka had a small business at steady prices, selling at $3@$4, the latter assessment paid. Green Mountain records moderate transactions, and was steady; it sold from 75@72c. Homestake was quiet and steady at $15.50. Horn-Silver was quiet and a little weak, selling from $6.75@$6.50. Robinson Consolidated has displayed considerable activity at declining prices; it sold from 75@51@53c., with a business of 28,350 shares. Sierra Grande has had a fair business at irregular prices; it sold from $1.25@$1.05@$1.20. Stormont was very quiet at 40c.

Alta-Montana was quiet and steady, selling at 3c. Caledonia sold to the extent of 100 shares at $1. Central Arizona had a small business at steady prices, selling at 30c. Decatur was very active, and was steady, selling from 4@5c. Durango sold from 6@7c. under a small business. Eastern Oregon has been very actively dealt in at stronger prices; it sold from 36@48c., the transactions aggregating 13,000 shares. Harlem was quiet and steady, selling at $1.40. Lacrosse sold from 11@12c. Oriental & Miller had a small business, and was a little weak; it sold from 19@15c. Rappahannock sold from 10@8c., with a small business. Sonora Consolidated has had a very large business at weakening prices; it declined from 26@21@22c., the business amounting to 24,800 shares. South Hite, with a business of 100 shares, sold at 10c.

MEETINGS.

Caribou Consolidated Mining Company, No. 18 Wall street, New York City. Annual meeting of stockholders and election of trustees, June 28th, at twelve o'clock M.

Salerno Mining and Milling Company, at the office of the President, William H. White, No. 353 Fifth avenue, New York City. Annual meeting of stockholders, July 2d, at four o'clock P.M.

DIVIDENDS.

The Bassick Mining Company, of Colorado, has declared its regular quarterly dividend of $100,000, or $1 per share, payable June 26th.

The Bulwer Consolidated Mining Company, of California, has declared a quarterly dividend of fifteen cents per share, payable July 2d, at the office of the Farmers' Loan and Trust Company.

The Contention Consolidated Mining Company, of Arizona, has declared a dividend of twenty-five cents per share, payable June 28th.

The Osceola Consolidated Mining Company, of Michigan, has declared a dividend (No. 15) of fifty cents per share, payable at the office of the company, No. 69 Devonshire or No. 246 Washington street, Boston, July 2d.

The Hope Mining Company, of Montana, has declared a dividend of $1.50 per share, payable July 2d, at the office of the company, 417 Olive street, St. Louis, Mo.

PIPE LINE CERTIFICATES.

The petroleum market has been very active this week, and at times considerable excitement prevailed. Free selling checked the upward movement, and notwithstanding a published report that a syndicate had been formed to advance the price to $1.50, the market has been depressed. Yesterday, the market was quite strong, but to-day the prices went lower and the market closed weak.

News from the oil regions during the week states that on Saturday last Grandin Well No. 9 came in a large producer, giving 494 barrels the first sixteen hours. On Monday, the Union Oil Company's well No. 5 came in good for 400 barrels the first twenty-four hours, and well No. 6 for 150 barrels. The Murphy well on lot 441 was reported dry. Yesterday, a large well, Balltown No. 3, came in good for 500 to 600 barrels the first twenty-four hours. To-day's news is, that Union No. 7, farthest north of Herrick land, was finished yesterday, and proved a failure. It is reported that the Anchor Oil Company bought a million barrels of oil yesterday at the average $1.16 per barrel and that the syndicate retired 900 certificates from Oil City banks. Balltown No. 3 gave 800 barrels first twenty-four hours, although it is stated that it will probably weaken very rapidly.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
June	16....	$1.18⅞	$1.19	$1.17⅝	$1.19	1,182,000
	18....	1.19½	1.19⅝	1.16⅝	1.16½	2,109,000
	19....	1.16¾	1.18	1.13¼	1.14⅛	2,583,000
	20....	1.14	1.16⅝	1.13½	1.16	4,403,000
	21....	1.16⅛	1.19¼	1.15½	1.18¼	3,145,000
	22....	1.18¼	1.18¾	1.16⅛	1.16¾	2,978,000
Total sales.....						16,400,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, June 21.

The market for copper stocks this week has not come up to the expectations which were indulged in in our last report, which may be accounted for in part by the dullness prevailing in the general stock market, and the want of confidence in the future. Ingot copper is steady at about 15@15¼c. for Lake, but the demand is light; and although at these prices the producing mines can make a good show for dividends, provided they can market their copper, still there is no disposition on the part of the general public to invest very deeply in this class of security. The sales of Calumet & Hecla this week aggregate just 14 shares at $243@245, the last sale of one share being at $241, closing $240 bid, and $243 asked. The holders of this stock are evidently content with the returns made to them, and manifest very little desire to sell, while at the same time the demand for it is not sufficient to advance the price to any extent. Franklin declined from $10¼ to $10, the old figure; only 300 shares changed hands. The promised dividend has not yet been declared, and there are some reasons to believe that it will not be made this year. Pewabic sold at $4, same as last week. Quincy has ruled extremely dull the past week; less than 50 shares sold at $49¾@$49½. Osceola declined on a small sa[le] $19, but subsequently a lot of 100 shares was tak[en] at $19½. The stock was in better demand to-day at $20 bid, with none offering. The rest of the list stupidly dull and inactive. The sales for the week, all told, were only a little over 500 shares; while the morning session of the Board to-day, not a singl transaction in mining stocks was recorded.

In silver stocks, there is much more activity. Bowman has been the feature at the Mining Exchange, and the prediction of last week has been fully verified, the stock selling to-day at 42c. per share against 17@22c. last week. The movement is purely speculative, as we are told there is nothing new from the cutlook at the mine to warrant the advance. Catalpa did not hold the advance of last week, but declined to 60c. on sales of about 3000 shares. Sullivan has maintained a good degree of firmness, with sales of about 2000 shares at $2@$1¾, the latter price being bid. Bonanza, steady at $2½. Harshaw, 50c. Silver Islet sold at $4, an advance of $1 over last week.

3 P.M.—The afternoon market shows no improvement. A lot of 50 shares Quincy sold at $49; closing, $48 bid. Franklin was offered at $10¼. Catalpa, 60c. bid, 62½c. asked. Crescent offered at 25c. Sullivan sold at $1½ and bid, $1⅞ asked. Harshaw, 50c. bid.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. June 15.	June 16.	June 18.	June 19.	June 20.	June 21.
Albion			2¼	2	2	2
Alpha						
Alta	.65	.70		.65	.65	.65
Bechtel						
Belcher	1½	1½	1½	1½	1½	1½
Belle Isle	.20		.40	.40	.50	.60
Best & Belcher	5⅛	5	4¾	4⅞	4¾	4⅝
Bodie	1	1	1	1	1	1
Bullion						
California	.40	.30	.30	.25	.30	.25
Chollar	3½	3⅜	3¼	3⅜	3⅛	3¼
Con. Virginia	.65	.60	.65	.60	.60	.60
Crown Point	1⅝	1½	1⅝	1⅝	1½	1½
Elko Cons	.15			.20		.20
Eureka Cons					3¼	4⅝
Exchequer	.40	.35	.40	.35	.30	.30
Gould & Curry	3¼	3⅛	3	3	3	3
Grand Prize	.30	.30	.25	.25	.25	.25
Hale & Norcross	7⅛	7¾	6⅝	7¾	7⅝	7¾
Independence	.35			.30	.30	
Martin White						
Mexican	4	2⅞	3⅞	3½	3¼	3¼
Mono						
Mount Diablo				3	3¼	3¼
Navajo	2	2¼	2¼	2¼	2¼	2⅜
Northern Belle	6¼	6½	6½	6⅝	6⅞	
North Belle Isle						.45
Ophir	3⅝	3¼	3	3	3	2¾
Overman						
Potosi	1⅝	1¼	1½	1⅝	1½	1⅝
Savage	2⅝		2½	2½	2½	2½
Scorpion						
Sierra Nevada	6	6	5½	5¼	4⅝	4½
Silver King	10½		10½			
Tip-Top						.45
Union Cons	7⅛	7½	6¼	5⅝	5⅝	5¼
Wales Cons				.25	.25	.40
Yellow Jacket	4¼	3⅛	4⅜	4¼	4⅛	4⅜

BULLION MARKET.

NEW YORK, Friday Evening, June 22.

There has been an active inquiry for silver in London the past week, resulting in an advance there and here. But for the weakness of our sterling exchange market, the figures here would be higher.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
June 16	50½@50¼	109⅞	June 20	50⅝@50½	110⅜
18	50¼	109⅞	21	50 9-16	110½
19	50¼	110	22	50⅝@50¾	110⅝

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended June 22d, as compiled from various sources, amounted to $131,000, as against $151,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,691,713.53.

Foreign Bank Statements.—The governors of the Bank of England, at their regular meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £697,000 bullion, and the proportion of its reserve to its liabilities was raised from 39¾ to 41 per cent, against 46 1-16 per cent a year ago. June 21st, the bank made a further gain of £150,000 bullion on balance. The weekl statement of the Bank of France shows a loss

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16,000 francs gold, and a gain of 2,275,000 francs silver.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended June 16th	$108,870
Corresponding week last year	1,162,386
Since January 1st, 1883	6,054,604
Corresponding period last year	32,846,385

Imports.

Week ended June 16th	$49,142
Corresponding week last year	73,893
Since January 1st, 1883	6,788,225
Corresponding period last year	1,868,642

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of May.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$320,419
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"		17,775
Bodie, G. S.	Cal	9,248	100,590
Bodie Tunnel, G.	"	6,128	51,447
*Bonanza King, G.	"		199,077
*Boston & Montana, G.	Mont		72,318
*Central Arizona, S.	Ariz		35,845
*Christy, S.	Utah		92,654
*Chrysolite, S. L.	Colo		142,238
Cons. Bobtail	Colo		18,723
*Contention, S.	Ariz		383,014
Crescent, G.	Cal		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		120,231
*Dolbec Blue Gravel, G. S.	Cal	12,885	44,729
Evening Star, S. L.	Colo		47,061
*Father de Smet, G.	Dak	13,972	141,957
*Frisco M. and S. Co., G. S. L.	Utah		§77,084
*Head Center Cons.	Ariz		6,865
*Head Center and Tranquillity	Ariz.		18,486
*Hecla Cons., G. S.	Mont		234,984
*Homestake, G.	Dak.		330,060
*Hope, S.	Mont	228,000	20,574
Horn-Silver, S. L.	Utah		1,283,000
Idaho, G.	Cal		88,642
*Independence, G. S.	Nev		34,722
Iron Silver, S. L.	Colo	127,109	503,831
*Kentuck, G. S.	Nev		8,237
*Lexington, S.	Mont	109,629	530,833
*Little Pittsburg, S. L.	Colo		22,873
*Marguerite, G.	Cal		33,200
*Martin White, G. S.	Nev		136,317
Morning Star, S. D.	Colo		84,428
*Moulton, G. S.	Mont		123,288
Mount Diablo	Nev	52,233	127,311
*Navajo, G. S.	"		281,626
*North Belle Isle	"	45,510	1,953
Northern Belle, S.	"		388,525
*Ontario, S. L.	Utah		807,695
*Oxford, G.	N. S.	6,855	28,179
*Phœnix, G.	S. C.		†3,666
*Pinal Cons., S. L.	Ariz	25,540	163,400
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		101,241
Standard, G.	Cal	71,313	442,796
Star, S.	Nev		27,095
*Stormont, S.	Utah	21,377	95,658
Syndicate, G.	Cal	5,987	20,073
Tintic M. and M. Co.	Utah		7,632
*Tip Top, S.	Ariz		‡22,983
*Tombstone, G. S.	"	76,600	‡322,830
Yellow Jacket, S.	Nev	30,191	183,064
Total amount of shipments to date			$8,511,225

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, June 21.

Copper.—Business has been very quiet, as it naturally is after the large consumers are well supplied. Although nominally held at 15½c., Lake copper is offering as low as 15⅛c. in moderate-sized lots, and better bids than 15c. are not obtainable. Other brands are dull, 14½c. being asked for Arizona, but there is no buying, and outside brands do not range better than 14@14⅝c., with the market in buyers' favor so far as less well-known brands are concerned. It is not probable that the struggle for placing these brands will be so severe at such prices as it has been, because the figures which can be realized by shipment to England are relatively much better than they were.

The Board of Trade returns for the first five months of the year are as follows:

	Jan. 1 to May 31. 1883.	1882.	1881.
Imports:	Tons.	Tons.	Tons.
Pure in pyrites	7,402	6,938	5,803
" precipitate	9,106	7,158	8,800
" ore	5,680	4,851	4,560
" regulus	4,135	3,229	2,011
Bars, cakes, etc.	14,800	14,034	10,992
	41,123	36,210	32,166
Exports:			
Raw (English)	7,479	4,550	7,533
Sheets	6,617	6,238	5,754
Yellow metal at 60 per cent	4,764	4,585	3,702
Brass at 70 per cent	1,424	1,282	1,251
	20,284	16,655	18,240
Foreign	4,784	4,813	4,575
	25,068	21,468	22,815

Tin.—The week has been a dull one, with quotations at the close at 20¾@20⅞c. cash for spot Straits and Malacca; 21⅛@21⅛ for Australian; and 21⅝@21¾ for Lamb & Flag. England cables at the close £98 15s.

Lead.—There has been considerable activity during the past few days, sales of Common and Corroding aggregating 1000 tons, including present, July, and August delivery, a little in the beginning at 4·40c., but the bulk at 4·42½c. The lead has been quite widely distributed, and has been sold by a number of parties. In spite of the heavy and comparatively dull trade, the metal is well maintained.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

There is no change of any description in our market. Sales aggregate 230 tons of Refined at 4·13c. There have been no sales of Hard lead, which is nominally 4·12½c.

Messrs. Everett & Post, of Chicago, send us the following dispatch:

Our market is quiet and firm; we note sales of 300 tons of Common and Refined at 4·15c. and 4·17c., and one hundred tons at 4·20c. It is noticeable that there is more demand.

Spelter.—This metal continues quiet and dull, with quotations at 4·40@4·50c. for ordinary to good Domestic, and 5⅛@5·15c. for Silesian.

Antimony.—Some small spot lots are pressing on the market, which we quote: Hallett's 9⅝c., and Cookson's 10⅝c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 21.

American Pig.—The principal feature in the market is the comparative scarcity of No. 1 Foundry. Though the leading makers still carry stocks figuring by thousands of tons, the bulk of the metal they hold is No. 2 and Forge, so that there has been a stiffening tendency in the best known brands of No. 1, some of which are bringing as high as $22 at tide-water. Ordinary brands are still quoted low, in some instances, $19.50. In No. 2, the supply is more than ample, and we can not note any marked improvement; but the feeling seems to prevail that bottom has been reached. We quote $18.50@$19 for good to standard brands, while Gray Forge is unchanged at $17.50@$18.50. There is nothing to report in Bessemer pig, which is selling at $21.25@$21.50, while England quotes by cable 50s.@51s. 6d. Spiegeleisen is fairly active at $31@$31.50 for 20 per cent, and $25.50@$26 for 10 to 12 per cent.

Scotch Pig.—The better feeling in the higher grades of American Pig has given encouragement to importers of Scotch pig, though they can not as yet record any business worth mentioning. Arrivals are light, and the fact that under the new tariff there will be heavier freight engagements on goods generally, is giving a firmer tone to freights, which are now from 6s.@7s. 6d. At the Exchange, the following cable quotations were received yesterday: Coltness, 60s. 6d.; Langloan, 59s. 6d.; Summerlee, 57s.; Gartsherrie, 58s.; Glengarnock, at Ardrossan, 54s.; and Eglinton, at Ardrossan, 48s. 6d. Warrants to-day were 47s. 1d. We quote here, all ex ship, Coltness, $24@$24.50; Langloan, $24; Summerlee, $23.50@$24; Gartsherrie, $23.50@$24; Glengarnock, $22.50; and Eglinton, $21.

Rails.—All the near-by mills are supplied with orders until the early or late fall. Nominal quotations are $38 at mill. England cables £4 15s.

Old Rails.—There have been some small sales on the basis of $22@$22.50.

Scrap.—There has been a little business in off lots ex ship. We quote $23.50@$24. Crop-ends are $24.

Philadelphia. June 21.

The following is an official report of the meeting of iron-masters held at the office of the American Iron and Steel Association this afternoon, in accordance with a call issued by the Executive Committee of Eastern Iron Manufacturers, appointed at Coney Island on August 24th, 1882, consisting of Messrs. Oliver Williams, Chairman; William E. S. Baker, Secretary; and A. H. Peacock, J. Avery Richards, and Jesse L. Cooley. The object of the meeting was to form a new schedule of prices for extra sizes of bars, rods, bands, hoops, ovals, plates, and sheets, so as to cover the changes made necessary by the new tariff. The principal mills in the East were represented by the gentlemen in attendance. An organization was effected by the election of Oliver Williams as president and William E. S. Baker as secretary. It was resolved not to change the rates on oval, half-oval, half-round, round, and square iron and on flat iron down to 4⅛ inches to 6 by 2⅛ inches to 8. The prices of larger flats were left to the discretion of the mills. The rates on band and hoop iron were referred for adjustment to Messrs. Nevegold, Cooley, and Williams, who are to report at a subsequent meeting. It was resolved to revive the Eastern Iron-Masters' Association, for the purpose of discussing trade questions. The Executive Committee was continued, and was authorized to call another meeting whenever it should be deemed advisable to have one. It will probably be called during the summer, to meet at the seaside.

Pig-Iron.—No. 1 Foundry has met with an improving demand and better prices. Several sales of 50 to 100-ton lots have been closed within twenty-four hours, and there is a much more active inquiry, owing to the fact that supplies are not as heavy in makers' hands as was supposed, and consumers have been adhering too closely to the "hand-to-mouth" policy. Some of the standard makers have orders in hand for more than they care to take just at this juncture, though this fact does not mean that consumers will find any difficulty in obtaining sufficient iron to answer all requirements. In other words, prices will remain steadier, at least for this number, while No. 2 is still weak and correspondingly lower. Sales of No. 1 have been made at $22 in some cases, and several brands at $21. Very little is offered below this. No. 2 iron is selling all the way from $19@$20. There is a better feeling among foundry-men, but it will remain a difficult matter to dispose of unusually large lots during the heat of summer. The blowing-out of additional furnaces is still talked of, and a few more will most likely go, but the supply will be equal to all probable needs of the trade. In Gray Forge iron, prices range from as low as $17 at furnace, to $19 for some special brands, which appear to be pretty well sold up. The inquiry for Forge is good, but buyers have shown an unwillingness to pay $18 for what they want, and makers think prices have gone as low as they ought to go. Transactions for 1000-ton lots are in hand. Some of the offers referred to, at $17, have been taken. The supply is still large, and there is no appearance of any upward tendency, principally on account of the fact that mills will want about one third less iron during the summer, and by the opening of fall, the trade will have got on to its feet once more.

Foreign Irons.—But little definite information can be obtained from the consumers of foreign iron as to the probable demands for the future. Sellers have nothing to say. Bessemer pig might be bought at $21. Domestic supply is still large, and there is less dependence on foreign sources. Scotch iron is selling without attracting special notice.

Merchant Irons.—Another declining tendency has manifested itself. Yesterday, country mills sold fair iron at 2·10c., delivered, and were anxious for all the business to be had at that figure. Some few mills get 2·20c., but that figure is high, although the few mills selling at that price are not short of orders. Other mills are anxious for business at 2·15c. The country mills look for a revival of Western competition, and are quoting low to protect themselves against it. Several inquiries for 50 to 100-ton lots were floating around this week, and were, no doubt, provided for at 2·10c.@2·15c. Skelp iron is moderately active.

Nails.—Large deliveries of nails were made this week, and prices range from $3@$3.20, according to

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	June 16.		June 18.		June 19.		June 20.		June 21.		June 22.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.75						2.75		2.50				250
Amie Con., Co.					.18		.17	.16	.17	.16	.18		3,400
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.			.40								.71	.61	1,400
Bodie Cons., Ca.	1.00				1.00								750
Breece, Co.													
Bulwer, Ca.											.85	.80	200
California, Ne.					.35						.27		800
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.							.13		.13		.13		1,300
Chrysolite, Co.					1.20		1.20						500
Cons. Va., Ne.	.62		.62		.63		.59						1,000
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.	.20												200
Eureka Cons., Ne.	3.00		3.00		4.00				4.00				180
Excelsior, Ca.													
Father de Smet, Dk.									.10				500
Findley, Ga.													
Gold Stripe, Ca.					2.65								100
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.													
Green Mountain, Ca.							.75				.72		600
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.							.05						300
Homestake, Dk.			15.50				15.50						350
Horn-Silver, Ut.			6.75		6.50		6.50						455
Hukill, Co.	.07												500
Independence, Ne.			.60		.60								900
Iron Silver, Co.	2.90		3.00		2.90						3.00		1,880
La Plata, Co.													
Leadville C., Co.											.50		400
Little Chief, Co.	.55		.55		.62	.59	.65	.60	.65	.61	.63		10,600
Little Pittsburg, Co.					.99		.99		1.00		1.10	1.00	1,100
Martin White, Ne.													
Moose, Co.											2.25		1,100
Navajo, Ne.			2.25		2.10		2.15				7.00		150
Northern Belle, Ne.			6.75										400
North Belle Isle, Ne.									25.75	25.00	25.50		358
Ontario, Ut.													
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.75	.70	.71	.70	.70	.66	.64	.63	.61	.53	.58	.51	28,350
Savage, Ne.							2.50				1.20	1.05	5,400
Sierra Grande, N. M.	1.25	1.15	1.20	1.16	1.20	1.15	1.25	1.20	1.15	1.10	4.65		650
Sierra Nevada, Ne.			5.38		5.75	5.63	5.50						
Silver King, Ar.													
Spring Valley, Ca.													
Standard, Ca.					6.63		6.50		6 75				320
Stormont, Ut.			.40										100
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket					4.00								100

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	June 16.		June 18.		June 19.		June 20.		June 21.		June 22.		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.													
Albion													
Alta													
Alta-Montana, G.	.03		.03				.03				.03		1,900
Am. Flag, s.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'lcher, G. S.					4.25								5
Big Pittsburg, S. L.													
Bondholder													
Bradshaw, s.													
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Eye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., B. H., G.	1.00												100
Central Ariz'na, s.	.30												300
Cherokee, G.													
Climax, Co.													
Cons. Imp'ri'l, G.S.	.08												300
Crowell, G.													
Dahlonega, G.							.03						100
Decatur	.04						.04				.05	.04	11,800
Dunderberg													
Durango, G.			.07	.06							.07		2,200
Eastern Oregon	.38	.36	.40	.39	.42	.40	.45	.40	.46	.45	.48	.46	13,000
Elko Cons.											.30	.20	15,400
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.40								1.40				600
Hortense, S.													
Lacrosse, G											.12	.11	1,500
Lucerne													
Mariposa Pref. G													
" Com., G													
Mexican, G. S.													300
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S L.													
Ori'nt'l & Miller, s.	.19								.16				500
Quartz Creek													
Rappahannock, G.	.10	.09	.08										3,400
Red Elephant, S.													
Ruby, of Arizona													
Silver Cliff, s.													
Sonora Con.	.26	.23	.25	.22	.24	.21	.24	.23	.22		.24	.22	24,800
South Bodie, G.													
South Bulwer, G.													
South Hite			.10										100
South Pacific													
State Line, 1 & 4, s.													
" Nos. 2 & 3, s.													
Sutro Tunnel	.24	.23	.24	.22	.23	.22	.23	.22	.22		.21		24,800
Taylor-Plumas													
Unadilla, s.													
Union Cons, G.											5 50		100

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 61,643. Non-dividend shares sold, 104,405.

BOSTON MINING STOCKS.

	June 15.		June 16.		June 18.		June 19.		June 20.		June 21.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Amie													
Atlantic													
Aztec									1.00				100
Bodie Con.									2.50				300
Bonanza D.			2.63						.36	.30	.42	.35	19,700
Bowman Sil	.24	.23	.25	.24									
Bruns. Ant.							.30	.26					
Bulwer													
California													
Cal. & Hec.			243				245		241				14
Catalpa	.70	.65	.65				.60		.60		.60		5,500
Central Ariz													
Cherryfield													
Co. Virginia							.62						200
Copper F'lls													
Copperop													
Crescent	.27½						.25						500
"Cust"													
Decatur													
Deer Isle	.05												500
Denver City													
Douglas	.95												200
Duncan											.24		
Dunkin											.20		100
Empire	.22												800
Eureka Con.													
Franklin	10.38		10.38				10.25		10.00				475
Hancock G.									.50				200
Harshaw													
Huron													
Independ'ce													
Indian Q'n											.05		2,500
Mammoth	.06		.05				.07	.06	.07				5,300
Mass. & N.M.	.07		.07										
Milton													
Napa													
National													
North. Belle													
Ontario							19.50						120
Osceola	19.00		19.50										
Penn-Breck													50
Pewabic	4.00												100
Pine Tree			.13						.16				200
Plymouth											49.00		189
Quincy	49.75		49.50				49.50						
Ridge													
Robinson									.40				100
San Pedro									5.88		5.63		100
S'ra Nevada													
S'ra Grande													100
Silver Islet			4.00										
Silver King													
Simpson Gd													
So. Pacific													
Standard													
Sullivan	2.00	1.75	1.78				2.00	1.75	1.88	1.75	1.88	1.75	2,793
Sutro Tun.	.25		.24				.24	.23	.22		.22		2,000
Sycamore	.23												100
Twin Lead.	.16	.13	.15						.12	.11	.12	.11	10,800
Vizina													

PHILADELPHIA MINING STOCKS.

	June 15.		June 16.		June 18.		June 19.		June 20.		June 21.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
Amer. Cons.													
Argent													
Arizona So.													
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.10												1,000
Comprom'e.	.23		.22	.21									1,200
Contention													
Con. Virg.													
Dauntless													
Del Monte													
Denver City	10												34
Eureka													
Girard	.05												100
Governor													
Grand Uni'n	.20	.15											4,500
Green Mt.													
Gunnison	.42½	.40	.40										1,900
Homestake													
Horn Silver													
Iowa Gulch	.08		.02	.08									3,300
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Matd			.04										1,000
Little Pitts.													
L'g & D'y M.													
Montana													
Mt. Sheridan													
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina			14										1,000
Penn-Breck.			.10										2,000
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis													
Rara Avis E.	.09		.09										1,600
Record													
Rico Pion'r.													
Sierra Apac.	.27½	.25	.25										6,600
Sierra Be.la.	.52½	.50	.52½	.50									21,700
Sierra G'nde	1.30	1.17½	1.15	1.12½									9,000
Sierra Nev.													
Silver Cord													
Silver King													
Silv'r Plume			.02										5,000
Sonora Con.													
Standard													
Sultana			.04										1,000
Sutro Tun'l.													
Tombstone			.80										50
Victor													
Yale Mt.													

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size of orders. Mills are doing an excellent business, and building requirements are heavy. Some speculative inquiries have been heard of, but the chances are too much against purchase of nails at this time. Interior nails are selling at $3.10.

Structural Iron.—Orders footing up 7000 or 8000 tons have been placed this week, mostly for bridge iron, and the inquiries in hand to-day show that there are a good many requirements coming forward that will prevent any further cutting of rates for the present. Angles are quoted nominally at 2·40c. Other shapes are unchanged.

Plate and Tank Iron.—A good week's business was done in a retail way, and some inquiry for large lots under consideration, the only difficulty being the unwillingness of buyers to pay current prices. There is not much danger of a downward tendency, as the requirements, as a rule, are large, and mills are able to keep going.

Sheet-Iron is in better demand for the fall trade.

Steel Rails are in active demand for late summer delivery at $39 in small lots, and negotiations have closed for two or three round lots for fall delivery at about $38, with offers for winter delivery at less. The week's business has been up to the average, and if concessions were made, some heavy orders could be reported.

Old material is unchanged at $22.50 asked, and $21.50 offered. No. 1 Scrap, $24 offered, and occasional sales.

Cleveland. June 19.

A fair volume of business is doing in pig-iron, though there is not entire confidence on the part of consumers in present prices. However, with stocks steadily decreasing, we think that furnace-men are justified in believing that the bottom has been reached, and that any change in the situation must be an improvement. Much, of course, of the future of the trade depends on our crops. Although the wheat crop is undoubtedly going to be short, indications at present are for a good corn crop, which will help us out. There are no large or speculative lots buying that we learn of, purchasing seeming to be for actual short wants. We quote:

No. 1 Bessemer	$22.00@$23.00
" 1 Foundry, all ore	21.00@ 22.00
" 1 Foundry, cinder mixture	20.00@ 21.00
" 1 Soft Foundry	20.00@ 21.50
1 Open Silvery	19.50@ 20.00
Illirons	18.00@ 19.00
4 months f. o. b. cars furnaces.	
Nos. 1 and 2 Charcoal	$24.00@$26.00
" 3, 4, 5, and 6 Charcoal	25.00@ 26.50
Hanging Rock Charcoal	23.00@ 25.00
Strictly Cold-Blast Charcoal	25.50@ 30.00
4 months f. o. b. cars Cleveland.	
Bessemer ores	$7.00@ $8.00
Hematite ores	5.00@ 6.00

Pittsburg. June 20.

The iron trade in this city is in an exceedingly unsettled condition. Very few important transactions are coming to light. Buyers are waiting for unexpected happenings. In crude iron, the Marshall iron is still the source of uncertainty. Should it be precipitated upon the market, prices would suddenly decline. The uncertainty as to the course likely to be pursued with this large stock of iron prevents the trade from returning to its legitimate limits, and is used as an argument to break down prices from what they ought to be. The local furnaces continue to supply requirements, and hence keep out distant iron on account of commissions and freight incident to shipping. Anthracite Forge iron sells at $18; Lake ore Bessemer iron, $21.50; Coke iron, $17.50@$18; Charcoal iron, $26@$27. Offers have been made from 50 cents to in some cases $1 below these figures, but wants will not be provided for except for immediate requirements. Muck Bars are weak at $34@$34.50. Inquiry for merchant bar has fallen off because of the heavy production and the accumulation of stocks. Mills will shut down for from four to six weeks in some cases, and on the whole, there will be a heavy restriction of output. Prices are still at 2 cents, but there are fears of a break, which, if it starts, will be followed by all. Nails continue in quite active demand at $3 for car-load lots. Large shipments are made, and the demand is fully up to the supply. Gas and steam-pipe is selling at 70 and 10 off; boiler tubes, 55 and 5 off. Consumers are ordering with more freedom, and the trade outlook is good. Bessemer mills are well supplied with orders for from three to four months to come, but are able to take orders for summer delivery in a small way at $38.50. Fall and winter orders can be had at 50 cents to $1 less. Spikes are 2·60c.; Splice Bars, 2c.; Track Bolts, 3·25c. Old Rails are quoted at $22.50@$23 for immediate delivery, and offers are made at $22.25. But few transactions can be reported. The steel trade is in an unsatisfactory shape. Low-grade steels are cut, and mills are not working full time. Crop-ends are quoted nominally at $25. Selected Railroad Scrap, $24; Ordinary, $23.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 22.

Anthracite.

The anthracite coal trade continues dull. The announcement of an advance, semi-officially made, has fallen flat, and the happenings of the past week have fully confirmed the views as to the wisdom of the course adopted expressed in our last issue. The condition of the trade does not warrant any increase in the price, except in the best Lehigh coals, which are now and have for some time been selling for from 5 to 10 cents above the June circular prices. The position of the majority of the companies doing a large business in this city is not such that they can afford to check what buying there is by insisting upon higher prices. It is entirely out of the question, so far as those sizes used chiefly for manufacturing purposes are concerned, and we understand that, in view of this fact, the attempt to put up broken coal 10 cents, as first reported, has been abandoned. We can not help expressing the opinion that it would be wise to do the same for the other sizes.

Coal says editorially this week: The report that the Lehigh Valley Railroad has been leased by the Pennsylvania Railroad has been promptly denied by both the parties, and yet few in the coal trade doubt that some agreement, though perhaps not precisely in the nature of a lease, has been arrived at. The well-known antagonism between the management of the Pennsylvania and Lehigh railroad companies on the one hand, and the Philadelphia & Reading, New York Central, and Baltimore & Ohio companies on the other, gives color to the statement that a closer alliance between the two former companies has been effected, as an offset against the fusion between the Reading and Jersey Central companies. Both the Pennsylvania and Lehigh companies are financially very strong, and the latter has a very favorable traffic arrangement with the Erie, securing to it a well-nursed Western business. The Pennsylvania, with the support of the Lehigh Valley Company, is capable of wielding a tremendous power in the coal trade, and is in a position to inflict much injury when it sees fit to break prices in retaliation for real or imaginary wrongs. What the policy of the new allies will be, it is, of course, impossible to say. They have, of course, a very great interest in making the coal business a profitable one to themselves; but they may become possessed of the idea of hurting others seriously, even though they may injure themselves a little. The past history of railroad wars has shown, over and over again, that reason is little listened to in the heat of the battle.

Such are the comments we hear on every side in the coal trade. There is a feeling of uncertainty and uneasiness, which early events may set at rest. The strategic movements of the first half of the year may lead to a long period of peace, and the coal trade move along serenely, grappling with an increased output. There may be only a shuffle for position in the Western markets; but the manner in which the great powers are manoeuvering for position is not exactly calculated to make the trade feel comfortable.

Mr. John H. Jones, official accountant, has just published the following statement of the anthracite coal tonnage for May, 1883. The statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	May, 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	563,069	2,618,729	2,320,207	I. 298,522
Lehigh Valley RR.	*483,258	2,318,891	2,058,827	I. 259,974
Central RR. of N. J.	380,729	1,745,399	1,483,526	I. 261,872
Del., Lack. & W. RR.	391,239	1,802,036	1,591,201	I. 210,836
Del. & Hud. Canal Co	†266,264	1,243,814	1,094,770	I. 149,043
Penna. RR.	219,609	955,297	836,584	I. 118,713
Penna. Coal Co.	109,779	528,667	472,049	I. 56,618
N. Y., L. E. & W. RR	25,277	127,443	85,648	I. 41,795
Total	2,439,224	11,340,185	9,942,812	I. 1,397,373

* This amount includes the production of the mines of the State Line and Sullivan Railroad Company, amounting to 5789 tons.

† In addition, there were 37,949 tons transported from mines by the Delaware & Hudson Canal Company during May, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, May 31st, 1883, was 645,377 tons; on April 30th, 1883, 719,232 tons; decrease, 73,855 tons.

Bituminous.

The trade during the week has been very dull. Current business is small and the competition for it very active, so that all sorts of prices are spoken of. We understand that coal shipped via Buffalo and the Erie Canal, by the Rochester & Pittsburg Railroad, was sold as low as $3.75, and that some Clearfield shippers are cutting under $4. We quote Clearfield $4@4.25, and Cumberland $4.15@$4.40, according to quality. The Chesapeake & Ohio Canal has reduced tolls to 90 cents to Georgetown and 95 cents to Alexandria.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended June 16th and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co..	99,026	1,603,119	81,556	1,372,920
D. L. & W. RR. Co.	107,637	2,017,009	112,507	1,799,620
Penna. Coal Co.	35,230	563,133	37,757	505,309
L. V. RR. Co.	25,193	465,543	37,843	470,109
P. & N. Y. RR. Co..	5,725	89,402	5,690	86,783
C. RR. of N. J.	58,602	1,091,737	59,656	982,286
Penna. Canal Co.	14,776	136,526	16,709	143,921
North & West Br. RR.		202,304		
	346,199	6,168,833	351,718	5,361,008
Lehigh Region.				
L. V. RR. Co.	129,117	2,100,789	120,834	1,936,052
C. RR. of N. J.	53,737	997,154	59,463	884,036
S. H. & W. B. RR.		20,235		18,000
	182,854	3,118,178	180,297	2,838,088
Schuylkill Region.				
P. & R. RR. Co.	196,250	2,956,319	148,095	2,588,237
Shamokin & Lykens Val.	31,806	589,669		463,444
	228,056	3,545,988	148,095	3,051,681
Sullivan Region.				
St Line&Sul.RR.Co.	1,239	27,440	1,229	23,384
Total	758,348	12,860,439	681,339	11,274,641
Increase		1,585,798		
Decrease				

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878	6,699,864 tons.
" " " " 1879	10,982,190 "
" " " " 1880	9,507,469 "
" " " " 1881	11,446,667 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 299,573 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended June 16th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	4,380	38,243	26,192
Coal for shipment at South Amboy	16,790	369,715	352,042
Coal for distribution	16,566	357,022	318,812
Coal for company's use	3,026	67,532	59,023
Total	40,762	822,512	756,069
Increase		66,441	
Decrease			

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Volume XXV., Number 11.
Volume XXVI., Number 22.
Volume XXVII., Number 7.

Address, stating price wanted, E. W. F., P.O. Box 1833, New York.

DIVIDENDS.

OFFICE OF THE HOMESTAKE MINING COMPANY, Mills Building, 15 Broad Street, NEW YORK, June 12, 1883.

DIVIDEND NO. 58.

The regular monthly dividend of FORTY CENTS per share has been declared for May, payable at the office of the Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on the 25th inst.

Transfer-books close on the 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

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THE ENGINEERING AND MINING JOURNAL

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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THE New York Iron and Metal Exchange is enjoying a little boom of its own. The speculative interest in its future has been strong enough to carry the price of seats to over four hundred dollars.

WE learn that Dr. P. DE P. RICKETTS will start for the coast about the 7th of July, with a number of the members of the fourth year class in the School of Mines. The young men will visit most of the prominent smelting and milling establishments of Colorado, to familiarize themselves, under Dr. RICKETTS's instruction, with the practical metallurgy of gold and silver. Dr. RICKETTS will also visit one or two mines and milling properties, to report upon the same.

DURING the past year, a number of American desilverizing works have introduced with much success the use of steam for stirring the zinc into the bath of base bullion. In the beginning, a little trouble was experienced from the formation of explosive mixtures of hydrogen and air, but of late that drawback has been entirely overcome. The process is one that reduces the labor in desilverizing and saves time. Sometimes, steam is also introduced into the poor lead, when it contains a little too much silver to go to the softening furnaces. The steam then apparently acts chiefly in cooling the metal slowly and bringing to the surface the last traces of the rich silver, lead, and zinc alloy.

THE English technical journals have, with a suddenness that savors of an interested inspiration, discovered that the attempts to recover sulphur in the alkali manufacture have proved a failure both in England and in Germany. They hail this as a great piece of good news for the Rio Tinto, Tharsis, and other pyrites companies whose stocks, we presume, are to be boomed on the strength of it. While it would be a matter of considerable interest to American pyrites miners to see their Spanish rivals busy filling European orders, it is well for them not to be misled by the statements now given out. The great danger which threatens their prosperity is not the recovery of sulphur from the waste, but the abandonment of the Leblanc in favor of the Solvay process.

NEARLY one half of the year has passed, and we are now in a good position to compare the record of the first six months' railroad construction with that of the corresponding period in 1882. To say the least, it is not encouraging to the many industries which indirectly and directly look to the railroads as their best customers. The *Railroad Gazette* of this city, in this week's report of new mileage, places the total thus far reported this year at 1966 miles, against 4166 miles reported at the corresponding time last year. These figures, of course, are not claimed to represent fully the work done; but they do furnish an idea of the relative activity in railroad building, and warrant the statement roughly, that we are adding one half as much new mileage to our net-work of railroads this year as a year ago. The demand for materials for new construction is usually anticipated. The iron and steel put down into new tracks were ordered probably between six months and a year ago, so that the movements of promoters and capitalists in Wall Street and other financial centers, furnish a better indication of what is coming, and are more interesting to the iron trade than the figures indicating the business which, to a large extent, has already been attended to by mills and furnaces. In this light, the prospects are not encouraging, however fair, according to current mileage reports, the past may have been.

THE BUTTE-TOWN-SITE CONTEST.

The recent decision of Judge GALBRAITH, in Montana, declaring that there is no statute of the United States authorizing the department to insert in a patent for a lode claim any exceptions as to town-site rights, nor does the law make any such exceptions, and such exceptions are therefore void, is attracting wide-spread attention. The decision was rendered in the case where the owners of the Pawnbroker lode brought suit to determine the possessory right as to surface ground. There are several similar cases pending, involving a considerable area of the town-site of Butte. The case heard and decided was the Silver Bow Milling and Mining Company *vs.* W. A. CLARK *et al.* The suit was for ejectment; a jury was waived, and the case was tried by the court. The main facts were admitted in the pleadings, and the question of title therefore was one purely of law. The lode claim was located November, 1875, under the law of May 10th, 1872, and patent obtained January 15th, 1880. The patent contained the following provision, for the insertion of which the court says there is no law: "Excepting and excluding, however, from these presents all town property rights upon the surface, and these are hereby expressly excepted and excluded from the same, all houses, buildings, structures, lots, blocks, streets, alleys, or other municipal improvements on the surface of the above-described premises not belonging to the grantees herein, and all rights necessary or proper to the occupation, possession, and enjoyment of the same."

The town-site was patented in September, 1877, and contained a provision that no title should be thereby acquired "to any mine of gold, silver, cinnabar, or copper, or to any valid mining claim or possession held under existing laws of Congress." No adverse claim was filed against the issuing of either patent.

The points decided by the court are in brief as follows:

(1.) The Land Department has no right to insert in a patent any exception or reservation which the law does not authorize. If it is done, such exception or reservation is void and of no effect; and this may be shown at any time, either in an action at law or in a suit in equity.

(2.) A party receiving a patent from the United States is not bound by exceptions, reservations, or conditions inserted in the patent without authority of law.

(3.) There seems to be no law authorizing the Land Department to decide a conflict between a town-site and a lode claim.

(4.) By the location of the Pawnbroker claim in 1875, the locators, according to the Act of Congress of May 10th, 1872, acquired the "exclusive right of possession and the enjoyment of all the surface ground included within the lines of their location," etc. (Sec. 2322, U. S. Revised Statutes.) This act of Congress was of itself a grant of right of possession and the right to purchase. And the "exclusive right of pos-

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session" granted is utterly inconsistent with a right in another to occupy or use the surface for town-site purposes.

(5.) No authority is given by the statutes to the officers of the Land Department to insert in a patent for a lode claim any exceptions as to town-site rights, and such exceptions are void.

(6.) The provision in the Butte town-site patent was authorized by Sec. 2392 U. S. Revised Statutes, and was properly inserted in the patent.

(7.) At the date of the town-site patent, the Pawnbroker was a valid mining claim, and no title to it passed by the town-site patent.

(8.) The patent for the Pawnbroker lode claim related to the location of the claim of 1875, and confirmed the right of possession.

(9.) The plaintiff's title, under the location in 1875 and the patent in 1880, was prior and superior in law to that of defendant's.

It is understood that this decision will stop proceedings in the minor courts in all of the other cases involving the right to a large area of the thriving town-site of Butte. Attorneys in Washington practicing before the Interior Department have always fought against inserting a town-site reservation in mineral patents, claiming that the Secretary in authorizing the same is exercising arbitrary power. Many mineral claimants have positively refused to receive their patents with this reservation, and they are still "on hand."

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Use of Gas Furnaces in Copper Smelting.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: As bearing upon the questions raised in a series of letters to the ENGINEERING AND MINING JOURNAL, I desire to submit the following facts on the use of gas furnaces in copper smelting:

The engineers of the Mansfeld Copper-Works saw the advantages which gas furnaces have over common coal furnaces, and adapted or tried to adapt them to their purposes. As early as 1867, they removed a Siemens furnace for heating sheet-copper at one of their rolling-mills, because it did not work satisfactorily. (See *Berggeist*, 1867. No. 61, p. 268.)

In 1871, they began roasting the concentrated matte in gas furnaces previous to extracting the silver according to Ziervogel's process. These furnaces have worked very satisfactorily. All details are kept a profound secret.

In 1868, they built a reverberatory furnace, according to Siemens's system, for concentrating matte. The furnace was worked for three years until 1871, and was then finally abandoned because it required one third more fuel than ordinary furnaces, and the repairs were frequent and expensive. They used removable tuyeres, and tried quite a number of devices; but they could not get it to work as cheaply as the others, and therefore abandoned it. No patent was taken out for this combination; but the results obtained were published; hence no patent can be obtained for this combination in the United States. These notices were published in the *Berggeist*, 1868, pp. 318, 361; 1869, p. 564; 1870, p. 428. *Berg-und Hüttenmännische Zeitung*, 1869, p. 389; 1871, p. 438; 1871, p. 306. *Kerl: Grundriss der Metallhüttenkunde*, 1881, p. 180.

In his article, Mr. Johnsson mentions the shaft-furnaces of the Mansfeld works; but was apparently not aware of the application of gas furnaces at those works for the very purposes which he advocates, namely, the removal of the iron and sulphur. No doubt gas furnaces were introduced at other copper-works, especially in England, long ago; but the matter has been kept secret, and hence we have no definite knowledge of them. Possibly Siemens or his representatives might be willing to furnish further information.

A. H. W.

FREIBERG, GERMANY, June 5.

Bessemerizing Copper Mattes.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: You have, during the past few months, published a number of articles and considerable correspondence on the working of copper mattes in the Bessemer converter. In replying to these articles, I will give you some details on this process, which works successfully in the establishments of the company which I formed to carry it out.

The idea of working copper mattes in a converter is not new; furthermore, it was only too natural that it should be brought out as soon as the use of this apparatus in the metallurgy of iron had become an established fact. Several attempts were made in Europe, and notably in England, by Mr. Hollway, but not one of them led to success. It could not be otherwise. In reality, these experimenters were content to make one or two trials in a steel converter, without giving any thought to the modifications which the very nature of the metal itself demanded. They were so sure of success that they did not take the trouble to seriously study the subject beforehand.

When I was called upon to go into this matter, I also met with failure in the same way. But I was convinced that it was impossible not to reach a completely favorable result, and I undertook methodically a series of experiments and studies, to which I owe the entire success which I have attained. In order to be more at liberty to work to suit myself, I built a small experimental plant with suitable blowing-engine, and a small converter, capable of treating one hundred kilograms of matte. My tests extended over two years, during which time I constantly modified either the arrangement of the plant or the process itself, until I at last arrived at a regular and perfect production.

These explanations may suffice to show why those who have attempted to solve this important question before me were unsuccessful. The converter, as used in steel-making, was not suitable for the work, and the owners of the works to whom application was made to authorize a trial could not allow them to be carried on for a long time, to modify the plant, etc. It was necessary, in order to reach a successful issue, to go to the expense of a special trial plant. That is what I did, and it is to this that I owe my success.

The following is a brief description of the work as carried out in our establishment, where there are only two operations.

1st. Melting the ore, without any previous roasting, in any suitable furnace, preferably a shaft-furnace, with the object of producing a copper matte.

2d. Casting the matte produced into a converter of special design (the "Manhès converter"), when, under the action of high-pressure blast, it is rapidly transformed into blister copper, carrying 98 or 99 per cent.

During the work in the converter, the temperature is kept very high by the combustion of the iron, sulphur, and other elements which oxidize more rapidly than copper. These substances must be present in given quantities, easily obtained by suitable additions. The oxides formed are rapidly converted into silicates by contact with the side-walls of the converter, and with additions especially provided for. A special design of the Manhès converter protects the copper from contact with the blast as soon as it is brought to the metallic state. Without this precaution, it would set solid, and the operation would be brought to an end without being completed. The operation is very simple, but I need hardly add that success depends upon many special arrangements and methods of handling, which are the result of two years' experience. As you will note, the process is characterized by the omission of all intermediate roasting and smelting processes, by the rapidity of the work and by its economy. According to local conditions, the saving in cost, compared with the Welsh or Swansea processes, is from 50 to 75 per cent, which is the result of the following:

1st. The reduction of the cost for labor to a minimum, because the operations last only a few minutes, and large quantities of metal can be produced rapidly and with little labor.

2d. The cost for fuel is very low, because no coal is necessary, except that for melting and an insignificant quantity for heating the apparatus before starting. I assume that water-power is available. If not, the fuel necessary to run the engines must be added.

I may add that, in consequence of the high temperature and the strong oxidizing action in the converter, arsenic, antimony, etc., are almost completely eliminated, so that the metal produced is always of good quality—a fact the importance of which will be evident to those familiar with the metallurgy of copper. The apparatus are simple, cheap, occupy little space, and are easily worked when their operation is once understood.

Our works are now completely organized, and consist of three melting-furnaces, each capable of putting through from 25 to 30 tons of ore per day; two small cupolas for remelting the matte in case of need; three Manhès converters, treating a ton and a half of matte in each operation; one converter, making from 22 to 24 operations per day; and the necessary blowing-engines. An establishment of such a capacity can be built rapidly and at a comparatively low cost, now that experimental work is over.

I come now to the different objections raised against my process in some articles published in your JOURNAL.

In a communication from one of your correspondents, he seeks to cast a doubt upon the economic advantages of my process, and raises points to which a true and logical reply has been made in your JOURNAL by Mr. H. M. Howe. I will only add that there are, in carrying out the process, a number of details of great importance, which I can not refer to at present, and which are the result of several years' experience.

Mr. Paul Johnsson wants to get at the same results by replacing the converter by a reverberatory furnace, in which he melts the matte. Then he oxidizes it by means of jets of air directed upon the surface of the bath through inclined tuyeres. This idea is not new, being almost as old as metallurgy itself. But the reverberatory can not replace the converter in any case, because the same advantages can not be realized. In fact, it is first necessary to melt the matte in a reverberatory furnace, an operation which is always more costly than the simple and rapid melting in a cupola. Secondly, the great economy of the converter is the result of the utilization of the heat produced by the combustion of the sulphur, iron, and other elements more readily oxidized than copper. This saving in cost is not only not realized in the reverberatory furnace, but the use of fuel to maintain the temperature of the bath of matte constantly cooled by the blast striking it is a source of expense. Thirdly, while the operation in the converter lasts from 25 to 30 minutes, it will be much longer in the reverberatory. In fact, instead of going on simultaneously throughout the mass, the oxidation is effected only on the surface, gradually penetrating farther. From time to time, the slag must be removed, to clear the bath, resulting in a loss of time and in the formation of cinder rich in copper—a natural consequence of the method of removing it. Whatever precautions may be taken, the scorification of a large quantity of iron will rapidly wear the reverberatory furnace, causing increased expense for maintenance, and numerous interruptions in the work.

These troubles are not encountered in my process: the operation is rapid, requires only the fuel necessary to melt the matte in the cupola, and yields cinder melted at a high temperature and low in copper. The wear of the lining of the converter is small, and it can be easily repaired without interrupting the work. During two years of work, we have not missed an operation as the result of an accident of this kind.

I do not want to enter into the controversy in which Messrs. Howe, Johnsson, and Raht have been engaged. I will simply answer this: As to the question of using the converter in the metallurgy of copper, it is certain that, for more than fifteen years, a number of persons have had the idea, some of whom have made experiments, Mr. Hollway apparently having been the one who has paid most attention to it. He aimed at utilizing the heat generated to melt fresh charges of ore and to carry the concentration of the matte to a certain point. But he could not produce metallic copper. Briefly, no one has been able before myself to apply this idea and obtain practical industrial results. Like many others, I have had the idea, I have worked, studied, and have built a plant necessary to carry out needed trials; and I have established the practical working of the method. I am producing daily, by treating matte in the

converter, in the converter alone, large quantities of black copper running from 98 to 99 per cent. I hold that the true author of a process is the one who, seizing an idea, often well known, studies it, and by his labor succeeds in transforming it into a practical method, yielding good results and realizing an important economical progress.

RUE CHILDEBERT 1, LYONS, May 17, 1883. PIERRE MANHES.

Mechanical Roasters.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. E. Gybbon Spilsbury, in a paper on Gold Mining in South Carolina, read at the Roanoke Meeting of the American Institute of Mining Engineers, and printed in your issue of June 23d, after commenting on the virtues and defects of a mechanical roasting-furnace in operation at the reduction-works of the Haile mine, makes the following statement: "Like all mechanical roasters, however, this furnace can not be relied on for perfectly uniform results; and until this and other mechanical difficulties have been obviated, I have fallen back on the old-fashioned but always reliable 'Fortschaufelungs' furnace." He then states that labor in South Carolina is 90 cents per day, and fuel less than $1 per cord, delivered; that a double-hearth furnace, of 8 tons' daily capacity (for concentrated gold-bearing sulphurets), cost only $800 to build; finally, that the cost of oxidizing roasting does not exceed $1.10 per ton.

If Mr. Spilsbury has never succeeded in constructing a mechanical roaster which gives uniform and reliable results, and if he has been so unfortunate as never to operate with one which works satisfactorily, he should not condemn, in a general way, all mechanical roasters. Of all engineers, the members of the American Institute should be progressive and well-informed. What would become of our American mining industry if we were to follow Mr. Spilbury's advice in other departments, and return to devices of a hundred years ago?

Having had especial experience in roasting, I consider it a duty to take up this question of "mechanical roasters" for the benefit of those interested in mining, who might be easily misled by the statement of an engineer so favorably known as Mr. Spilsbury.

It is a fallacy to suppose that the reverberatory furnace can be relied upon for perfectly uniform results. The latter depend entirely upon the individual skill and the fidelity of the laborer in performing his task. With our ever-fluctuating population in mining camps, it is difficult to keep a large force of men for an indefinite period at the same work, and it requires more skill and more judgment to roast a charge successfully in a reverberatory furnace than in a well-constructed mechanical furnace. Even in old-established metallurgical works in Europe, where the son inherits the trade of the father, the results of reverberatory furnace roasting are by no means entirely uniform. At the Mansfeld Copper-Works, the residues from the Ziervogel process are returned for a second roasting if they contain above 0·023 per cent of silver. In roasting zinc-blende, for the manufacture of zinc, the roasters are fined if they leave a certain percentage of sulphur in the charge, and receive a premium if they do better than the permissible margin.

When the Manhattan mill, at Austin, Nevada, abandoned roasting in reverberatory furnaces, and adopted the Stetefeldt furnace, Mr. Allen A. Curtis, the superintendent of the company, stated to me in a letter of October 6th, 1870: "August workings, as compared with the average of 1869 (using reverberatory furnaces), show a saving in cost of reduction of $12.75 per ton of ore. The percentage of silver extracted was 4·72 per cent more than the average of the year 1869."

The first progressive step in the construction of roasting-furnaces was made by William Brückner, in the furnace which bears his name. Here the "rabbler" is discharged; but the necessity of nicely regulating the fire at different stages of the process, and the judgment required to decide when the charge is finished, remain. But the roaster who knows how to treat a charge in a reverberatory furnace will certainly do better in a Brückner, because he is rid of the heavy manual labor, and can pay more attention to his fire. That the Brückner furnace can do, and has done, as good work as the reverberatory furnace, and better, and this with greater economy, Mr. Spilsbury will not deny. I have, at this moment, no statistics at hand to prove this.

The next progressive step in roasting, on this side of the Atlantic, was made by the writer, in inventing the Stetefeldt furnace. In this furnace we not only get rid of the "rabbler," but maintain a uniform condition throughout, which, however, can vary between certain limits. Hence, the fireman is called upon to exercise but a small amount of judgment. In practice, I have never failed to take a "green" laborer of average intelligence, and teach him how to fire a Stetefeldt furnace to perfection in less time than a week. It is not possible to make the same man a perfect roaster on a reverberatory furnace in so short a time.

Most other "mechanical roasters" used in this country, which work on the continuous principle, partake of the construction of the Brückner and Stetefeldt furnaces, but present no essentially new features, even if they differ materially in outward appearance.

I will now give numerous statistics as to the working of the Stetefeldt furnace, which prove that the results, far from being unreliable and lacking uniformity, are rather remarkable for their regularity and small deviations from average figures, especially so if we consider the varying character of the ores treated. In all the following statistics, decimals are omitted for the sake of brevity, and only given in monthly averages.

Surprise Valley mill, Panamint, Cal. Chlorination-tests made from September 19th to October 23d, 1875; certified by C. Weberling, assayer and superintendent.

In 96 samples, we find that the following percentages of chlorinations occur:

85 per cent.	1 time.	92 per cent.	18 times.
87 "	1 "	93 "	24 "
89 "	1 "	94 "	26 "
90 "	3 times.	95 "	12 "
91 "	7 "	96 "	3 "

The two low samples of 85 and 87 per cent were caused by having a new laborer on the furnace, who had never fired it before, the regular fireman failing to be on shift.

Manhattan mill, Austin, Nev. Chlorination-tests made from November 1st to December 24th, 1877; certified by F. E. House, assayer.

In 198 samples, we find that the following percentages of chlorinations occur:

88 per cent.	7 times	92 per cent.	28 times.
89 "	28 "	93 "	15 "
90 "	49 "	94 "	— "
91 "	68 "	95 "	3 "

The same mill. Monthly averages of chlorination-tests from October 1st, 1874, to September 30, 1875; obtained from Alexander Trippel.

1874. Oct.	90·3 per cent.	1875. April	90·8 per cent.
Nov.	89·2 "	May	91·6 "
Dec.	91·1 "	June	92·8 "
1875. Jan.	89·8 "	July	92·3 "
Feb.	90·0 "	Aug.	91·8 "
March.	90·6 "	Sept.	91·5 "

Ontario mill, Park City, Utah Ter. Chlorination-tests during July, 1881; copied from the assay-book; Joseph E. Galigher, superintendent of the mill; C. W. Watkis, assayer.

In 58 samples, we find the following percentages of chlorinations to occur:

88 per cent.	1 time.	92 per cent.	13 times.
89 "	1 "	93 "	21 "
90 "	2 times.	94 "	9 "
90 "	8 "	95 "	3 "

The same mill. Average chlorination-tests from March to September, 1882, according to Russell's method; furnished by E. H. Russell, assayer:

1882. March	92·0 per cent.	1882. July	93·0 per cent.
April	91·3 "	Aug.	92·2 "
May	92·9 "	Sept.	91·4 "
June	92·5 "		

The same mill. Chlorination-tests, according to Russell's method, from October 12th, 1882, to January 1st, 1883; furnished by E. H. Russell, assayer.

In 131 samples, we find the following percentages of chlorinations to occur:

87 per cent.	1 time.	93 per cent.	46 times.
90 "	2 times.	94 "	33 "
91 "	10 "	95 "	9 "
92 "	30 "		

Lexington mill, Butte City, Mont. Ter. A. Wartenweiler, superintendent; G. C. Carson, assayer. Official report.

The Lexington ore contains more or less native silver; hence the results of amalgamation are a better standard for the furnace work than chlorination-tests:

Month.	Furnace.	Chlorination. Per cent.	Left in tailings. Per cent.
December, 1882	No. 1.	82·9	10·0
" "	No. 2.	85·1	11·8
January, 1883	No. 1.	85·9	9·9
" "	No. 2.	85·9	10·8
February, "	No. 1.	86·9	7·4
" "	No. 2.	86·0	8·5
March, "	No. 1.	89·9	7·8
" "	No. 2.	90·1	8.9
April, "	No. 1.	92·6	6·1
" "	No. 2.	92·5	6·5
May, "	No. 1.	93·8	5·5
" "	No. 2.	94·6	5·3

Here we observe a gradual and marked improvement in results, which is, in part, due to a change in the character of the ore, and to Mr. Wartenweiler's skillful management.

At the Auburn mill, Reno, Nev., I have roasted (oxidizing) gold-bearing sulphurets from the Meadow Lake mines with perfect success. The pyrites were completely converted into red peroxide of iron, no magnetite was formed, and no iron sulphate left undecomposed, while the gold was bright (showing itself to be so by panning out a sample of roasted ore), and amalgamated without difficulty by the ordinary pan process.

A small Stetefeldt furnace was also run near Kernville, Cal., on gold-bearing pyrites exclusively, and the gold extracted by pan amalgamation to the entire satisfaction of the owners of the mill. The statistics I have not at hand.

These statements are certainly sufficient to refute Mr. Spilsbury's wholesale condemnation of "mechanical roasters."

But we have another question to discuss, namely, that of economy. Mr. Spilsbury's figure of $800 for constructing a "Fortschaufelungs" furnace with double hearth, 40 feet by 5 feet, seems to me rather low, even if he does not include the chimney. To be rightly understood: I do not doubt the correctness of his statement for a moment; but I hesitate to believe that a first-class and durable double-hearth furnace can be built at such a low figure. And even well-constructed furnaces of this kind are expensive in repairs. For this reason, the double-hearth "Fortschaufelungsofen" has been abandoned in Freiberg, and single-hearth furnaces have taken its place. But we will leave the question of repairs entirely out of consideration, and only speak about first cost of construction. A well-constructed Stetefeldt furnace, with dust-chambers and chimney, of 24 tons' daily capacity, equal to three "Fortschaufelungs" furnaces, can certainly be erected in South Carolina for $8000. We will add to this a nominal royalty of $2500, which would be accepted by the Stetefeldt Furnace Company in such a case. Total cost of furnace, $10,500, or $8100 more than three "Fortschaufelungs" furnaces of Mr. Spilsbury's design. Calculating on this amount interest and amortization at 12 per cent per annum, we have $972. Running the works with 24 tons' daily capacity only 300 days in the year, this interest will increase the expense of roasting in the Stetefeldt furnace 13½ cents per ton.

To roast 24 tons of gold-bearing sulphurets in a Stetefeldt furnace would require 4 cords of wood, 3 firemen (one per 8-hour shift), and 4 men for discharging (two per 12-hour shift). Hence we have cost of roasting 24 tons:

4 cords wood, at $1	$4.00
7 laborers, at 90 cents	6.30
Screens and tools	0.75
	$11.05
Fuel and labor per ton	$0.46
Interest	0.13½
Total per ton	$0.59½

According to Mr. Spilsbury's estimate, his cost of roasting is $1.10 per

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ton. Difference in favor of the Stetefeldt furnace, 50½ cents per ton, or, on a production of 7200 tons per year, a net saving of $3636. Hence the Stetefeldt furnace would pay for itself in a very short time. In this calculation, we have taken no account of difference in cost of repairs, which is largely in favor of the Stetefeldt furnace.

A Stetefeldt furnace of less capacity would not be so profitable, but would still leave a considerable margin in its favor. C. A. STETEFELDT.

24 CLIFF STREET, NEW YORK.

OFFICIAL STATEMENTS AND REPORTS.

COPPER QUEEN MINING COMPANY, BISBEE, ARIZONA.

The second published annual report of this famous mine is somewhat meager. During the year ended March 31st, 1883, 32,942 tons of ore were extracted, 14,886 tons being taken from the 1st level and the open cut, 12,809 tons from the 2d level, 5119 tons from the 300-foot level, and 127 tons from the west end workings. The second level has proved to be all that was expected of it, and Mr. B. Williams, the superintendent, estimates that he has still there reserves amounting to 20,000 tons. Developments below the 300 level have been checked by the heavy influx of water. The incline is sinking in the limestone. During the year, $25,480.46 were paid out for two large new boilers and a hoisting-engine, which will enable a depth of 1000 feet to be reached. For toll-roads, $22,832.63 were paid, and Mr. Williams estimates that, based on last year's transportation, the saving is equal to $34,000. During the year, 33,029 tons of ore, averaging 12·73 per cent of copper, were smelted with 5687 tons of coke, and the consumption of 3125 cords of wood, producing 8,409,112 pounds of black copper running 96½ per cent fine. The total cost of mining, freight, construction, refining, and administration was $761,071.13, or 9·05 cents per pound of black copper. The returns for the sale of black and ingot copper in New York were $1,363,508.72, the net value of the year's product being $1,314,973.25, leaving a profit of $553,902.12, out of which four dividends, aggregating $475,000, were paid, leaving $78,902.12 to be added to the surplus account, which, at the end of the second fiscal year, amounted to $267,028.51.

THE CLEVELAND MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

Thursday was occupied almost entirely by excursion visits to various industrial establishments in the vicinity of Cleveland, following one another in such rapid succession that the zeal of the most enthusiastic began to flag before the day's journey was ended. On a special train, provided by the Pennsylvania Railroad, the engineers were taken first to the works of the Otis Iron and Steel Company, of which Mr. S. T. Wellman is superintendent and general manager, and under whose skillful care the works have developed into the model open-hearth plant and steel plate and axle works of the country. We shall take an early opportunity to describe the works in greater detail; and must only say now that on every hand the engineers met the evidences of a progressive spirit and of long experience.

A short ride brought the party to the works of the Cleveland City Forge and Iron Company, of which Mr. L. M. Coe is vice-president and manager. In one large building, there are fourteen helve hammers in a row, each facing its re-heating furnace, and a battery of two steam-boilers. The principal work done is the forging of car and locomotive driving-wheel axles and shafts, the largest forging of the kind which the works are capable of handling being 26 inches in diameter. A special department of the works is an annex in which coupling-pins and links are made by machinery.

Adjoining these works are the shops of the Cummer Engine Company, of which Mr. F. D. Cummer is vice-president, and William M. Barr is engineer and superintendent. The works are well stocked with modern machine tools, and we understood that special machinery was building to turn out the Cummer engine, the specialty of the works. The engineers carefully examined the work on hand, and the general verdict was a very complimentary one to the company as to carefulness and accuracy of workmanship. The machinery of the shop is driven by a Cummer engine, built at Detroit, and ample opportunity was given to note how closely the automatic cut-off adapted itself to variations. We shall, at an early date, refer more in detail to the latest design of the engine which the company has just begun to build.

The next place visited was the establishment of the Union Screw Company, one of the wonders of which Cleveland is particularly proud. In a building of noble dimensions, are hundreds of machines which automatically first cut wire into lengths and forge a head, then shape and slit it, and finally cut the thread, simultaneously putting a taper into the screw. During the entire process of manufacture, the metal is not touched by hand, the only labor, that of girls entirely, being to keep the machines supplied with raw material, and remove the finished product.

Again entering the train, the party was taken to the large works of the Brush Electric Company, splendidly equipped to manufacture the dynamo-electric machines and the lamps now known in almost every city of the country, which are the invention of Charles Brush, the electrician. Unfortunately, the time at the disposal of the visitors was limited, and the hour being noon, the machinery was not in motion.

At the works of Messrs. Warner & Swasey, was shown the running gear of the dome of the McCormick Observatory for the University of Virginia, the great object being to diminish the friction. With a load of ten tons, the weight of the dome, a force of 30 pounds, applied at the circumference, is sufficient to keep in motion at the desired speed. The dome is 35 feet in diameter, the weight being carried by a circular plate resting on nineteen central wheels, while two outer wheels for each of the latter roll on a flat circular track. Another object of interest at the works of Messrs. Warner & Swasey was a horizontal straight-line engine, designed by Prof. John E. Sweet, of Syracuse, N. Y.

At the Cleveland Malleable Iron-Works, to which the party next went, some time was spent in examining the methods of making malleable iron. The pig is partially refined to white iron in reverberatories, having a roof removable in sections. There were at the works two long rows of annealing furnaces, and the usual accessories of such a plant. We may here add that a firm at Newark, Ohio, has succeeded in constructing a furnace in which the castings are packed in bulk, the expense of the iron boxes, which wear rapidly, being thus avoided.

The enormous establishment of the Cleveland Rolling-Mill Company was then hurriedly walked through, the departments visited being the sheet mill, open-hearth plant, Bessemer steel mill, wire mill, and merchant mill.

We are indebted to Mr. William Chisolm, President, for the following notes on these works: There are four furnaces, 65 feet high and with 16-foot bosh, having each a capacity of 400 tons per day. They use Connellsville coke and Brier Hill, O., coal and Lake Superior ores from the mines of the company, blast being furnished by nine blowing-engines. The puddling-mill has 24 single furnaces with a daily capacity of 50 tons. In the merchant mill, there are four trains with a capacity of 200 tons per day, and in the sheet and plate mill five trains with a capacity of 75 tons per day. In the wire-rod mill, there are three trains capable of working 150 tons per day. One of these trains, which attracted very much attention, being considered one of the best of its kind in the country, can roll 100 tons of No. 5 rods per day of twenty-four hours, and has rolled rods from a four-inch billet 3000 feet long. The open-hearth plant consists of five furnaces, of which three are ten-ton and two twenty-ton furnaces. The best week's record of the open-hearth plant has been 1000 tons. The ingots are cogged in a two-high reversing blooming train, designed and built by the Cleveland Rolling-Mill Company. It has 38-inch rolls, the usual speed being 40 revolutions. The engines have 40-inch cylinders and a 4-foot stroke. The daily capacity of the train is 750 tons, and it can roll 7-inch square ingots down to 1¼-inch square billets. The latter are principally used for wire. The Bessemer plant consists of two converters with an annual capacity of 150,000 tons of ingots, the best record of the rail mill, which the visitors did not see, being 1752 tons of rails of 60 pounds per yard section. The works employ 5800 men, have a monthly pay-roll of $250,000, and use daily 1500 tons of coal. The other part of the works shown had comparatively little that was novel or interesting, most of the machinery and furnaces being of an ancient type.

After discussing a lunch at Dean's Hall, near the works, the party took a train, and was carried off to the Central Works, at which the new blast-furnace, No. 5, of the Cleveland Rolling-Mill, was inspected. We are indebted to the kindness of Mr. Hugh Watson, superintendent, for the following details:

Furnace No. 5 has a total hight of 75 feet, and a 20-foot bosh. Blast, heated to an average of 1200 degrees Fahrenheit, in three Whitwell hot-blast stoves, 68 feet high and 21 feet in diameter, is blown through 8 tuyeres at the rate of about 30,000 cubic feet per minute at a pressure of 8 pounds. The two blowing-engines built by the Cuyahoga Steam Furnace Company, of Cleveland, are vertical, with a 38-inch steam-cylinder, an 84-inch blowing-cylinder, and 4½-foot stroke. They are reported to be doing their work very well, and were much admired by the visitors. Steam is provided by 16 boilers, 46 inches in diameter, 34 feet long, and with two flues, 16 inches in diameter. The hoist was built by Crane Brothers, of Chicago, and has a 14 by 18 inch steam cylinder, link motion, and a 5-foot drum. The ores used at this furnace are exclusively from Lake Superior, the mixture being 12½ per cent of magnetic, 12½ per cent of specular, and 75 per cent of hematite, the fuel being Connellsville coke. The average charge is 6600 pounds of fuel, 9900 pounds of ore, running 58 per cent of iron, and 3660 pounds of limestone. The average product of the furnace is 1400 tons weekly of No. 1 and No. 2 Foundry, the best record made since the furnace was blown out in February of the present year being as follows: Best day, 251 tons (at 2268 pounds) and 2052 pounds; best week, 1526 tons; and best month, 6206 tons. The furnace is admirably located for the receipt of raw materials and the shipment of product, and all its appointments are first-class.

The engineers, who had by this time a tired look, were carried off by their hosts to the city water-works. The capacity of the pumping-engines in twenty-four hours is as follows:

1 pair	Cornish pumping-engines	8,000,000 gallons.
1 "	Worthington compound duplex engines	10,000,000 "
1 "	Henderson " " "	10,000,000 "
1 "	Worthington " " "	10,000,000 "

A new storage reservoir is building in the eastern part of the city, which will have a capacity of 70,000,000 gallons. The lake tunnel through which the supply of water is drawn is 5 feet in diameter, 1¼ miles long, of which 1¼ miles are under the lake.

In going to the water-works, the party passed along the famous ore-docks of Cleveland, on which thousands and thousands of tons of ore were piled awaiting purchasers—a suggestive proof of the stagnation in the iron trade. During 1882, the receipts of iron ore at Cleveland were 1,686,000 tons, which thus far have been handled in a very crude way. Efforts are vigorously making to improve it, and among the most prominent of recent devices is that of Mr. Alexander E. Brown, which is capable of covering a very large field of utility elsewhere, in our immense docks and yards. The Brown hoisting apparatus was shown in operation; but as we propose to give it fuller attention in the near future, we need not refer to it at length here.

The tired and dusty party again got into the train and was carried back to Cleveland, with time enough on their hands to prepare for

THE FINAL SESSION,

which was held in the evening at the rooms of the Vocal Society. The first paper read was by Oberlin Smith, of Bridgeton, N. J., on Spiral Springs. After a general summary as to the value and characteristics of the various classes of springs, Mr. Smith gave the results of a series of over 200 experiments on various materials, including hard brass, soft and tempered steel, iron, phosphor-bronze, etc. The discussion which followed indicated that a number of gentlemen were inclined, from experience, to challenge some of Mr. Smith's conclusions, while others spoke in reference to the formulæ existing as to the capacity of springs.

Gustavus C. Henning, of Pittsburg, then, in a paper entitled Some Notes on Steel, gave some very interesting facts developed in testing the

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steel eye-bars and girders made at the Keystone Bridge-Works, detailing the different methods of manufacturing eye-bars, and submitting data in reference to punching and drilling steel plates. Mr. Henning showed a tracing of a steel plate which had suffered accidental injury. In the efforts made to restore it to its original shape, instructive lines of weakness were developed. Mr. Henning is an enthusiast on the subject of steel for structural purposes, and states that steel is 10 per cent cheaper than iron when proportions are based upon equal strength of the structure made of both materials.

Mr. W. F. Durfee then read a paper on Machinery for Maneuvering Clutch Couplings, to which we shall refer at an early date at length. The following papers were then read by title: Economy in Subdivision, in Installation and Operation of Machinery at Varying Demand, by J. L. Horning, of Jersey City; Ingot Cranes, by Gram Curtis, of New York; On a New Method of Constructing a Crank-Shaft, by J. E. Sweet, of Syracuse, N. Y.; Note on the Water-Hammer in Steam-Pipes, by R. H. Thurston, of Hoboken, N. J.; A New Form of Balance Dynamometer, by S. S. Webber, of Lawrence, Mass.; Some of the Mechanism Employed in Multiplex Telegraphy, by T. W. Rae, of New York; On a New Method of Casting Flange Pipe, by J. E. Sweet, of Syracuse; and Note on the Effect of Prolonged Stress on Iron, by Robert H. Thurston.

After passing a series of resolutions of thanks to those to whom the society was indebted for courtesies extended, the meeting adjourned.

MINERS' SAFETY-LAMPS.*

By J. B. Marsaut.

In an elaborate essay by the engineer-in-chief of the Bessèges collieries, Gard, in the south of France, this important subject is investigated with characteristic care, thoroughness, and discriminating fairness. Belgium having in 1864 decreed the use of a standard pattern of the Mueseler safety-lamp for her deep and fiery coal-pits, the same lamp has come into extensive use in France also, after having there undergone a series of experiments at the hands of Messrs. Mallard and Le Chatelier, on behalf of the French Fire-Damp Commission. The Belgian Mueseler, which has the usual internal funnel or taper chimney of solid sheet-metal, supported above the wick by a horizontal annular diaphragm of wire-gauze, is subject to the serious inconvenience of going out when tilted; its usefulness is thereby greatly curtailed, particularly where there is any haulage on inclined planes. Ten years ago, Mr. Marsaut's own experiments led him to modify the Mueseler lamp, by discarding the diaphragm while retaining the chimney; a sheet-iron casing was also added outside the gauze cylinder, to prevent flame from passing outward through it when exposed to a current of fire-damp; and a movable ring was fitted around the circle of the air-inlets, for closing them all simultaneously, so as to extinguish the lamp. This lamp does not go out when tilted; does go out in fire-damp; and does not let flame pass outward, even when exposed to strong currents of fire-damp in any direction. The only inconvenience noted by the French Fire-Damp Commission, when recording† their high commendation of the lamp, was, that the sheet-iron casing prevents its being seen at a glance whether the lamp is all in proper order inside it.

Renewing his efforts at improvement, the author lately entered upon a further extensive series of experiments at Bessèges, of which a detailed account is given. Excellent drawings are furnished of the numerous safety-lamps tried, of which the following is a bare enumeration, all being examined and commented upon in detail as to their respective merits and demerits: the Mueseler, of Belgian and of English pattern, with several other varieties; the original Marsaut lamp of 1871, and several varieties of its present improved construction; the Davy, of Newcastle, Gard, and Dubrulle patterns, the fire-trier's, and the "tin-can;" the Stephenson, Williamson, Clanny, Bainbridge, Evan Thomas, Upton & Roberts, Birckel, Boty, Westphalian under two forms, Rosenkrantz, Combes, and Cosset-Dubrulle. Tabulated statements are given of the results obtained in the author's trials of the various lamps; in his specially elaborate trials of the Mueseler and Marsaut lamps; in his experiments upon the resistance of wire-gauze to the passage of flame, and upon the influence of the dimensions and shape of the gauze itself; and in trials of the comparative lighting powers of the different lamps.

The practical conclusions derived from these experiments are summarized as follows. With the large Davy lamp used in the Gard District, and with other lamps of the same kind, an explosive still atmosphere outside is fired by an explosion inside the lamp. The addition of a second gauze cylinder to these lamps diminishes considerably the frequency of outside explosions, but is powerless to prevent them. The flame seems to pass out through the cap of the gauze cylinder, rather than elsewhere; whence it is well to add another layer or two of gauze at this weak part. The outside atmosphere is more readily fired by explosion within a lamp in which the wick is burning low; the prevalent practice of lowering the wick on encountering fire-damp is consequently objectionable; it is better to remove the lamp slowly, keeping the wick at its usual hight. Large lamps are more dangerous than small ones, because the volume of explosive mixture they contain increases as the cube of their size, while the area of gauze or of outlet for the flame to pass through increases as the square only. The glass cylinder in the Mueseler and other lamps, though giving a better light, renders the explosions inside more violent, because the explosive mixture is thereby more confined, so that the lamp becomes a sort of miniature cannon; the glass should therefore be kept as small as possible, particularly in hight. The Belgian Mueseler, considered the safest lamp in use hitherto, sometimes explodes a still atmosphere of fire-damp outside it. Lamps with glasses are dangerous when the wick burns low, for the same reason as the Davy; in the Mueseler particularly, the flame can then more readily pass up through the chimney, and so get to the upper side of the gauze diaphragm. The plan long in vogue at Bessèges, of ascertaining the presence of fire-damp by measuring the elongation of the lamp's full flame, is safer than reducing the flame to the utmost for the purpose of seeing the blue cap of gas better; the elongation of the flame is almost always a sufficient indication. When a glass lamp is lifted up into an explosive atmosphere, it should be held there steadily till it goes out, especially in the case of lamps having their air-inlet at top: instead of being immediately withdrawn again, as would intuitively be done either through fear or to keep it alight; for a downward movement seems to have the effect of churning the gas inside the gauze, and so rendering its explosion more violent and thereby more dangerous. As soon as ever the gas burns very visibly in a lamp, and shows its characteristic tuft of flame, there is no fear of internal explosion occurring. It is particularly dangerous for a lamp to get suddenly filled with explosive mixture by a current blowing the flame against one side, or for the lamp itself to be tilted in such an atmosphere: any arrangement for checking undue access of gas to the lamp is a safeguard. The whole of the air-inlets should be protected by a least a double layer of wire-gauze, even in the Mueseler lamp with its chimney, which latter does not always isolate the flame; then, if the inner gauze ever gets red-hot, the outer still serves as a protection. The confined space inside a lamp should be kept as small as possible; but the gauze, which cools down the gases passing out through it when the lamp explodes inside, should present as large an extent of surface as can be; hence lamps are not to be relied on which have a tall glass surmounted by a dwarf gauze, such as the big Cosset-Dubrulle, the Bainbridge, and others like them. Lamps should be made of as small diameter as possible, and should carry as large a flame as they can without getting too hot; the aim should be to make a lamp behave as much as possible like a mere chimney. In glass lamps with air-inlet at top, the wick-holder should be tall enough to raise the flame as high as can be inside the glass; a neutral space is thus left in the bottom of the lamp, whereby the force of an explosion within the lamp is mitigated. A chimney in a lamp is attended with more or less risk. The slightest modification in form or arrangement of a lamp may make a considerable difference in its safety.

Marsaut Safety-Lamp.—In its present improved form, this lamp has a strong glass cylinder, 2·44 inches high, 1·65 inches inside diameter, and 0·31 inch thick, secured in a protecting cage on the top of the oil reservoir, as in the Mueseler lamp; but the Mueseler chimney, and the gauze diaphragm that carries it, are done away with. Surmounting the glass cylinder, and flush with its inside circumference, is an inner gauze cylinder, 4 inches high, tapering slightly smaller upward, and closed at the top by a gauze diaphragm. An outer gauze cylinder, about ¼ inch larger in diameter, ⅜ inch taller, and similarly closed at top, incases the inner gauze; and is fixed at the bottom into the copper ring that forms the upper rim of the cage holding the glass. The mesh of the gauze is nine hundred and thirty holes per square inch, or thirty and a half per lineal inch. The entire gauze is shielded by an external sheet-iron casing, which can be lifted off at pleasure, having inlet holes around the bottom for the air to enter the lamp, and outlet apertures at the top.

While the general shape and construction of the Mueseler lamp, as sanctioned by practice, are thus preserved in the Marsaut, the small horizontal annular diaphragm of gauze supporting the chimney in the former is replaced in the latter by the inner gauze cylinder, which presents a far larger cooling surface for the hot gases inside the lamp to pass out through. Additional safety can be secured by further covering the flat top of the inner gauze cylinder with a gauze hood, so as to double the thickness of gauze at that part, upon which the force of an explosion inside the lamp comes most directly. A third complete cylinder of gauze may even be added, if desired as an extra precaution; but two are considered safe enough by the author, and preferable generally.

The advantages of the Marsaut lamp are, that it seldom goes out when tilted, and not at all in an upward current of air, nor does it explode externally a strong current of gas blowing upon it in any direction whatever. It does not fire an explosive still mixture of air and lighting-gas, as has been proved by upward of twelve thousand trials at Bessèges, when most of the other lamps in use did so, the Belgian Mueseler included. The outside casing effectually protects the gauze from getting injured, clogged with dust, or splashed; and whenever the lamp explodes inside, the casing retards the escape of the burnt gases, which thus help to put the lamp out. By simply covering with the hand the inlet or outlet holes in the casing, the lamp can readily be put out whenever desired.

In the trials made of the Marsaut lamp at Bessèges, an explosive mixture was employed of air and of lighting-gas, which latter fires more readily than fire-damp; and the wick being reduced below its usual flame, the conditions were thus more trying than are met with underground. With three forms of the Marsaut lamp, testing two lamps of each form, upward of six thousand trials failed to produce a single external explosion; whereas fifteen Belgian Mueselers, tested simultaneously, each of them about a hundred times over, let the flame pass through the horizontal gauze diaphragm in 31 per cent of the trials, and in 2½ per cent produced explosion outside the lamp.

Still severer trials were also made, by mixing air with lighting-gas in their most highly explosive proportions, namely, 100 volumes of air to 20 volumes of gas, and exploding the still mixture inside the lamps by an electric spark. Under this excessive test, the large Davy lamp used in the Gard District exploded the mixture outside it every time; the Boty, Clanny, and Belgian Mueseler, and the Marsaut lamp with two gauze cylinders, almost every time; but twelve trials of the Marsaut with three gauzes, and ten of the fire-trier's Davy, gave not a single explosion outside. These tests, and the one preceding, point unmistakably to the desirability of reducing to the utmost both the total internal volume of a safety-lamp, and also the hight of the glass, since the blind space inclosed by the glass acts like a cannon in propelling the inside explosion violently against the gauze, and so driving the flame out through it. How great an effect has the hight of the wick in the glass was proved by these experiments, a variation of less than 0·4 in the Boty lamp being sufficient to produce or prevent explosion outside. The trials also show that the Davy of small diameter, still used in England by the fire-trier, but abandoned in the Anzin and Bessèges collieries, presents important advantages, and, if sufficiently protected against strong currents, would possess a high degree of safety. They further demonstrate that the electric spark is essentially dangerous in fiery mines; which should be borne in mind in any attempts to introduce electric lighting in colliery workings.

Investigating experimentally the mesh and shape of the wire-gauze cylinder, the author concludes that, for the same total area of apertures

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† Commission du Grisou, Paris, Minutes of Meeting of March 8th, 1882.

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per square inch, gauze of finer mesh is safer than a coarser and heavier make. The lamp should be made inside as nearly cylindrical as possible throughout its entire hight; and in particular the bottom of the gauze should be flush with the inner circumference of the glass. Any narrowing at this part, by the insertion of a horizontal annular diaphragm projecting inward, or by contracting the gauze cylinder to a smaller diameter than the glass, is objectionable; doubtless because the explosive mixture inside the lamp gets thereby so churned up as to augment enormously the rapidity with which it explodes, enabling the flame consequently to pass out through the gauze.

The comparative lighting power of the various lamps tried by the author was found to be as follows:

ENGLISH* STANDARD CANDLE, 100.

1. Westphalian.....77	8. Mueseler, Belgian 49
2. Boty.....72	9. " English.....44
3. Westphalian.....70	10. Bainbridge.....39
4. Marsaut.....69	11. Davy, Dubrulle.....32
5. Williamson.....56	12. " Gard.....22
6. Thomas.....53	13. " Newcastle.....20
7. Clanny.....52	14. Stephenson.....17

In the Westphalian lamps, Nos. 1 and 3, the air inlet is through a collar of perforated sheet-iron all around the neck, below the bottom of the glass; No. 3 was protected by the addition of a layer of wire-gauze inside the perforated collar; but No. 1 was without this protection.

The lighting power seems to depend partly upon the metal of which the lamps are made, a brass lamp being found to give only 70 per cent of the light obtained from the same make in wrought-iron. The difference is no doubt connected with heat-conducting capacity. English lamps are generally made of brass, and German of wrought-iron. Mr. Marsaut is inclined to think steel, or perhaps malleable cast iron, would be advantageous.

THE LAKE COPPER INTERESTS.

Special Correspondence of the Engineering and Mining Journal.

The announcement that the Osceola would divide but fifty cents per share among the stockholders on the 2d proximo, instead of its usual dividend of one dollar, is another unmistakable evidence that American copper has entered on at least a transient career of hard times. This mine has never made any bluster or pretension, has avoided every thing that looked like fiction or puff-paste, and as a result it has been regarded for years as among the most trustworthy properties of all our Michigan mines. No mine now furnishes a better thermometer for judging the real condition of the market; for it illustrates what returns a mine can make, even though the percentage of copper be very very small, when the property is managed by brains. Several circumstances make the Osceola the representative mine: first, its yield per cent is as low as or lower than the average lodes; second, while the Quincy has been the foot-ball of speculation, the Pewabic alternately tossed by the bulls and hugged by the bears, according as that far-famed mirage of striking the Quincy bonanza has appeared and vanished; while the Franklin has suffered from domestic broils, and the Central has been out of the market, and the Allouez just getting out of the woods, and the Atlantic ebbing in dry days and flowing as it came time for the division of profits, and the Calumet & Hecla, with its wondrous resources, has remained oblivious to all kinds of markets; the Osceola has gone on the intelligent, economical, and unpretending tenor of its way, neither going higher nor lower unless the market for ingot has shown the most unmistakable reasons for such a procedure. To see the dividends of this mine shrink fifty per cent, therefore, makes the speculator in copper securities pause and recast the forces which now control the market.

The question of supply was considered in my letter of the 2d instant, when your correspondent attempted to give the mines the benefit of the doubt in every case of uncertainty. The reports which are now coming up from the West, and the preparations now going on at the Calumet & Hecla stamps to increase its monthly product by nearly one quarter, are *prima-facie* evidence that my estimates were too low by many million pounds. However, they were large enough for all practical purposes, since they showed, what the grim logic of events is daily proving, that American copper has turned a new and dubious leaf in its history. Your correspondent thought to take up the foreign demand and the South American and Spanish resources for its cheap supply; but the recent sale of the large block of ingot to home consumers (reaching 26,000,000 pounds, the Hancock *Mining Journal* asserts, it says, on the highest authority, instead of 20,000,000 pounds, as given by the ENGINEERING AND MINING JOURNAL), at fifteen cents, with the agreement to maintain home prices until September at sixteen cents, gives us breathing space to turn our attention to a more important field, namely, *cost of production*. Here, of course, lies the rub. The shrewdest superintendents in Copperdom have told me that they have scrutinized over and over again their schedule of expenditures; pored over every item, re-examined every detail, in hopes of finding relief from the pressure of the year's markets. What they will accomplish, like Matthew Arnold's wave of fate, only events can tell us in their hour. The Phœnix closed down, or what amounts to the same thing, last week. This mine, like the Cliff, which also lately suspended operations, was a veteran, and has been famous for its huge masses of copper. Workmen are now engaged on a mass of considerable size, and the general underground appearance of the mine is by no means discouraging, only as present prices for mineral make operations burdensome.

The cost of copper mining depends principally upon—

I. Cost of labor.
II. Cost of supplies.
III. Cost of construction.
IV. Amount of barren ground encountered.

This last factor is always more or less uncertain, excepting, strangely enough, the two mines yielding one the largest and the other the smallest percentage of mineral of all our lodes, the Calumet & Hecla and the Atlantic. Neither of these mines is compelled to "open ahead," although the former has placed eight years' steady working behind its present active workings. The Atlantic does not "open ahead," in fact, could not do so through any barren ground at all and find its returns equal to its expenses. Its percentage of mineral is small, but its yield is regular and to be depended upon. It therefore sinks no winzes, but carries its stopes along with even pace with its sinking and drifting, thus moving its stopes more or less automatically. If this much-praised (and justly praised) property was compelled to go through such long and discouraging stretches of lean rock as the Pewabic, for instance, or the splendid Osceola, the Atlantic stockholders would sit by the rivers of Babylon and try to sing their songs of dividends in vain. The Atlantic, however, encounters no barren ground, but sends every thing through the stamps. The Franklin shows a decided tendency upward in its copper-bearing rock. The same is true of the Allouez, and, at present reports, of the Copper Falls, Peninsula, and, perhaps, the Pewabic. A comparison of the amount of discarded to hoisted rock, in an exhibit taken from the Osceola records, shows that the unproductive ground has been steadily gaining since 1879 at that property, although this is in a great measure due to exploring and other extraneous work. If, as I myself think, the year's work for 1883 should show as high an average yield of mineral per ton of rock hoisted and sent through the mill as was shown in 1880, the cost of producing a pound of copper would be reduced over one cent from present prices. If it reaches the yield both of productive ground and percentage of mineral given in 1879 (of which I do not pretend to be certain), the cost of production will be reduced nearly two cents per pound in this one direction alone. Of course, we can not see into the rock; but from what data there are at hand, it is quite certain that retrenchment will automatically set in along this line, not only in the Osceola, but also in many other of our lake mines.

III. *Construction Account.*—Construction, as a rule, will be particularly light this year. Outside of the railroad at the Conglomerate, the new locomotive at the Allouez, the new mills at the National, Conglomerate, and Peninsula, two heads at the Copper Falls, some improvements at the British and other mines in Ontonagon, and the usual tremendous outlay at the Calumet & Hecla, the aggregate construction account of Copperdom will not cut any remarkable figure in the year's expenditures. In times past, the introduction of improved hoisting-engines, air-compressors, power-drills, ball-heads in the mills, and improved facilities for treating large boulders at the rock-houses, has combined to swell the construction account into a very formidable proportion of the annual outlay. In some cases, it has reached nearly if not quite one fourth of the combined mining expenses. Nearly all of our mines are now well on their feet; the era of excessive expenditures for plants and mills has happily been passed; and they are able to cope with the events of a low market this year as never before. This summary is hopeful, therefore, in this, that it indicates first a decrease in construction expenditures, while it holds out, secondly, a confident hope of very increased returns in work accomplished.

II. *Cost of Supplies.*—Where the mines use coal for fuel, the cost of supplies about equals the cost of labor. Along the whole line of outgoes for supplies, retrenchment reasonably seems to be the order of the day. The general decline in manufactured iron will reduce the cost of supplies in this direction. I do not know as the manufacturers of machinery have as yet succumbed to the logic of the times; but such a course is inevitable, and not distant; for, in case the ironmongers should maintain prices at a notch which should help drive a large number of mines to the wall, a lack of buyers would glut the market with their wares, which is always sufficient, in the absence of combination and restriction, to disorganize and lower the market. There must also be a reduction in the price of coals. From what data there are at hand, it would seem to your correspondent as if we were on the threshold of a collapse in this industry. Whatever may be the condition of the anthracite market, and that forms no part of our present study, it is quite certain that the era of cheaper bituminous coal is very near at hand. Of course, it is impossible at this distance to keep one's finger on the pulse of the Pennsylvania and Maryland fields, and no pretension is made to infallibility of opinion; but the competition among carriers of soft coal has already proved an entering-wedge, and this, coupled with the cut in canal tolls by the Chesapeake people, and the struggle for business by the Cumberland mines, must split prices into smaller fragments. Lake people have always been willing to pay round prices for food, coals, iron supplies, and all items of construction; but, gentlemen, we can do so no longer. We must have lower prices or put our necks beneath the guillotine of bankruptcy. If prices come down, our people will do their level best to keep our mines from turning beam's end until the squall be over or we have adjusted our reckonings and outridden it into new ports.

These considerations lead us to infer that there will be a general movement of retrenchment through the whole list of expenditures, greater with some mines than others, but general and pronounced among all. If it should turn out that, in several of the mines on which attention is now fixed, the rock broken should show a better general average than last year; if the "construction account," which has eaten such holes in past revenues, can now be safely and generally dispensed with; and if the price of metal and fuel supplies comes down within reason, it is altogether probable that the cost of producing copper will be materially diminished this year. This should afford a good crumb of comfort to holders of discouraging properties, even if the comfort be only a mere crumb. It remains to study the wages problem, and then draw a general summary of the outlook of our individual mines. SPECULAR.

* The *bougie de l'Etoile*, frequently taken in French for the standard of lighting power, and so adopted by the author, is a stearine candle, of five to the pound, burning 9·6 grams per hour. The English standard is a sperm candle, of six to the pound, burning 120 grains per hour; it is found to give only 90 per cent of the light from the French *bougie de l'Etoile*. Hence the author's own percentages in this comparison are 0·9 of those here given, and range from 69 per cent for No. 1 down to 15 per cent for No. 14.

THE ENGLISH GUNPOWDER TRADE.—From the tables of imports and exports of gunpowder given in the appendix to the report of the Inspectors of Explosives, it is evident that the exports from Great Britain have been slowly declining during the last twelve years, the figures showing that while in 1870 154,979 cwt., valued at £427,229, were exported, only 126,604 cwt., worth £357,802, were sent out of the country in 1882. The importation, on the other hand, has been rapidly, though somewhat irregularly, increasing—mostly from Germany. In 1870, the total quantity received was 1187 cwt. valued at £6648. In 1882, the quantity imported was 9122 cwt., worth £37,180. England imported 1,008,050 pounds of dynamite during 1882.

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NEW PUBLICATIONS.

THE RAILROAD SPIRAL. By WILLIAM H. SEARLES, C.E. New York : John Wiley & Sons. 1882. 12mo, vii+85 pages.

As a sequel to his well-known work *Field Engineering*, Mr. Searles has published the *Railroad Spiral*, in which he gives the theory of the compound transition curve, reducing it to a practical and convenient form for ordinary field-work. In an appendix, tables of deflections and ordinates for five hundred spirals are added.

THE ALAMO CITY GUIDE. SAN ANTONIO, TEXAS. *Being an Historical Sketch of the Ancient City of the Alamo, and Business Review; with Notes of Present Advantages, together with a Complete Guide to all the Prominent Points of Interest about the City, and a Compilation of Facts of Value to Visitors and Residents.* By STEPHEN GOULD. San Antonio, Texas. 8vo, 151 pages. Illustrated.

Besides such matter as is appropriate to a guide, the author has, in his twenty closely printed chapters, presented to the reader a great deal of historical and statistical information of a more permanent character and more general interest. The history of San Antonio is the history of Texas; for in forty-six days after the massacre of the Alamo, the battle of San Jacinto was fought, the declaration of independence was passed, Santa Anna was captured, and Texas was a nation. The growth of American towns in the West and Southwest to which we have become so accustomed comes out in sharp relief on pages which confront each other in this little book, where, on the one hand, we see, in 1857, the long trains of Mexican carts and "prairie schooners" passing through the narrow streets, by the old adobe buildings; and on the other, read that the total sales of 1881 exceeded twenty-five million dollars. We mention, besides the introductory chapter, giving the General History, the chapters on San Antonio as a Trade Center; Railroads; San Antonio as a Health Resort; Water Power and Manufactures; Building Material; Mines in Western Texas; and Agriculture and Fruit-Growing. Among the illustrations, is one in which the half-Moorish, half-Christian Missions near this new-old town are effectively grouped—Spain, antiquity, and ruin looking down upon a greater than Spain, young, and teeming with energy.

ON A NEWLY-DISCOVERED VARIATION IN THE EFFECT OF PROLONGED STRESS ON IRON.*

By Robert H. Thurston, Stevens Institute, Hoboken, N. J.

Early in the year 1874, the writer presented to the American Society of Civil Engineers a paper on the Strength, etc., of Materials, as Exhibited by a Testing-Machine having an Autographic Registry, in which paper some singular and important effects of prolonged and intermitted stress were described for the first time. In considering the effect of time of application of stress, it was shown that a peculiar difference of effect was observeable in metals accordingly as they belonged to the viscous or non-viscous classes, or, as the writer then stated it, to the iron or the tin class. It was shown that soft metals are subject to a flow which causes gradual yielding under their maximum loads, while common iron and steel, on the contrary, exhibit a singular elevation of the normal limit of elasticity when subjected to internal stress. It was further remarked, that the well-known experiment of Vicat,† in which he found that iron wire loaded with two thirds its breaking weight, as determined by ordinary test, gradually yielded and finally broke, after two years under stress, were indications of the probability that this process of stiffening under load may, nevertheless, be accompanied by a flaw causing ultimate fracture, if the load be heavy. No evidence of such flaw had, however, been detected by the writer in ordinary iron, although occurring almost invariably with other metals. It was finally concluded to repeat the experiment of Vicat in as nearly as possible the same way as the original tests were made.

Two samples of wires made by the Trenton Wire-Works were furnished the writer by Mr. William Hewitt, the vice-president. Both were No. 36 wire (B. W. G.), 0·004 inch (0·1016 mm.) in diameter, and of the same kind of iron. One coil was hard-drawn, directly from the rolls, and the other was very thoroughly annealed, and consequently soft. Lengths of each kind of wire were carefully tested in the usual manner, to determine their strength under ordinary conditions of test, and similar lengths were then measured off for test by prolonged stress. These latter specimens were suspended from a set of coiled springs hung from the ceiling in the study of the writer, where they would be constantly under his eye and where, also, they would be safe against accidental injury. These springs were used because it was found that the jar due to the breaking of one wire was liable to injure those hanging near it. After the wires were suspended, they were carefully loaded and were finally thoroughly painted with oil-paint and left carrying weights as below. The table gives the weights in percentage of maximum loads under test, in the testing-machine, in the usual way :

EFFECT OF PROLONGED STRESS—SWEDISH IRON WIRE.

PER CENT MAX. STATIC LOAD.	TIME UNDER STRESS.	
	Hard wire (unannealed).	Soft (annealed).
95	80 days.	3 minutes.
90	35 days.	5 minutes.
85	18 months, still unbroken.	1 day.
80	3 months.	9 months.
75		17 days.
70		15 months.
65	Unbroken.	15 months.
60		Unbroken.
55		"

These figures seem to reveal an important difference—previously undiscovered, so far as the writer is aware—between hard and annealed iron wire. Hard wire, unannealed and just as it left the draw-plate, sustained 85 per cent its original breaking load, as determined by usual tests, seventeen months; and a wire loaded with 5 per cent less weight, three months (the difference is probably due to some concealed defect in the latter); while the same wire, annealed and then softened so much as to have lost about half as great a maximum load, broke under but 65 per per cent of that reduced load at the end of fifteen months. Those wires which are still unbroken will be left suspended, and, meantime, another series will be put under test. The final result will be reported to the Society in due time, should they all finally break. The broken wires exhibit no traces of corrosion or injury, and the coat of paint with which they are covered is apparently as sound as when first applied. These results evidently more than corroborate the experiments of Vicat, showing progressive disruption in both qualities of wire when heavily loaded. They also exhibit an unsuspected difference in the degree to which this occurs with hard and soft iron, showing the former to be, apparently, the safer. It is interesting to observe that the factor of safety for soft iron, under prolonged stress, must be as great as that for timber under the same conditions, both remaining uninjured by oxidation. These new facts have seemed to the writer so important that he has already announced the conclusion here given by publication in *Science*. They are presented here also as being of especial importance to the engineer.

* A paper read at the Cleveland Meeting of the American Society of Mechanical Engineers.

† *Annales de Chimie et de Physique*, 1834.

DRY AND WET SILVER ASSAYS AT THE ENGLISH MINT.

Prof. W. Chandler Roberts, in the thirteenth annual report of the Deputy Master of the British Mint, makes the following interesting statement in regard to the accuracy of the wet and dry methods of making silver assays: Since 1871, the volumetrical method devised by Gay-Lussac has been used for verifying the composition of bars and coin. It only claims to be a means of verifying the standard of an alloy, and consequently it can not be applied to alloys the composition of which is not approximately known. It is true that this objection does not apply to the ordinary practice of the mint, as "trade assay reports" are furnished either with the ingots or with so little delay that no inconvenience need ensue. The reasons which led to the adoption of the "wet" or verification method in France formed the subject of an elaborate series of papers communicated by M. Thiers to the British government in 1836. I have so frequently alluded to its advantages that it may be well to explain why the assay by cupellation was retained in reorganizing the Assay Department.

The commissioners appointed in France in 1829, to investigate the methods of assay then in use, sent alloys of silver and copper, the standards of which were accurately known, to the assayers of the principal European mints, including the mint in this country. The reports of all these assayers indicated the presence of less silver than the alloys actually contained, the deficiencies varying from 0·2 to 1·0 per cent. The evidence gathered by the commissioners led them to recommend the adoption of Gay-Lussac's method, and the authority of the commission, of which the well-known chemists Thénard, Dulong, and Gay-Lussac were members, discredited the "dry" process on the continent, and led to its being employed only for obtaining an aproximate assay. In this country, on the other hand, the method was retained, carefully devised furnaces and appliances were adopted, and the results of the assays were controlled by an elaborate system of "check assays" on standards of known composition. It is unquestionable that the process has been conducted for centuries in this country with great skill by successive assayers of the mint, and, in later years at least, has yielded results which are not merely trustworthy, but deserve the highest confidence.

I was anxious that this process, which may be considered to be historical, should be retained for its own sake, quite apart from the necessity of employing it whenever the composition of the alloy is not approximately known. The traditional skill in conducting the dry process has, I am satisfied, been well sustained, and all the ingots imported for coinage during the past year have been assayed by its means. Since the close of the year, however, 1097 verification assays of ingots have been conducted by the wet process, and in future either process will be used, as special circumstances may require.

THE SUEZ CANAL TRAFFIC.—The statement below shows that the troubles in Egypt, whatever harm they may have done in other quarters, have not resulted in loss to the Suez Canal Company. During the year 1882, 3198 vessels, of a total of 7,122,125 tons gross, passed through the canal. The total movement of navigation and receipts for each year since the opening was as follows :

Years.	Vessels.	Gross Tons.	Receipts. Francs.
1870	486	435,911	5,159,327
1871	765	761,467	8,893,732
1872	1,082	1,439,169	16,407,591
1873	1,173	2,085,072	22,897,319
1874	1,204	2,423,672	24,859,383
1875	1,494	2,940,708	28,886,302
1876	1,457	3,072,107	29,974,998
1877	1,663	3,418,949	32,774,344
1878	1,593	3,291,535	31,098,220
1879	1,477	3,236,942	29,686,060
1880	2,026	4,344,519	39,840,487
1881	2,727	5,794,401	51,274,352
1882	3,198	7,122,125	60,545,881

Compared with 1881, last year shows an increase of 17·27 per cent in the number of vessels, 22·91 per cent in the tonnage, and 18·08 per cent in the receipts. The average tonnage per ship was 2227 tons. During the year, 407 vessels passed through the canal for the first time. The 3198 vessels which made the passage consisted of 1610 from the Mediterranean to the Red Sea, and 1588 from the Red Sea to the Mediterranean. The total number was made up of 2361 trading steamers, 501 mail steamers, 134 vessels chartered by the British government, 154 government vessels, 10 yachts, one floating dock, and 37 tugs. The passengers carried consisted of 62,898 soldiers, 38,288 civilians, 6390 pilgrims, 797 convicts, and 18,499 emigrants.

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THE DIAMOND-FIELDS OF SOUTH AFRICA.

At the meeting of the British Institution of Civil Engineers, the paper read was on the Diamond-Fields and Mines of South Africa, by Mr. James N. Paxman, Assoc. M. Inst. C.E.

Kimberley, the center of the most important field, is situated in Griqualand West, above 700 miles northeast from Table Bay, and 450 miles inland from Port Elizabeth and Natal on the east coast. Lines of railroad are in course of construction from Table Bay and Port Elizabeth to Kimberley, and are about half completed. In Griqualand, there are several diamond mines, the principal of which are Kimberley, De Beer's, Du Toit's Pan, and Bultfontein. In the Orange Free States, there are also two mines, namely, Jagersfontein and Koffeyfontein, the first of which produces fine white stones. The mines are all divided into claims, the greatest number of which are to be found in the Du Toit's Pan mine. Bultfontein comes next.

The deepest and most regularly worked is the Kimberley mine. The next deepest is De Beer's, which, however, is very unevenly worked. Then follow Du Toit's Pan and Bultfontein. The Du Toit's Pan mine ranks next in importance to the Kimberley mine. Diamonds were first discovered in 1867 by Mr. O'Reilly, a trader and hunter, who visited a colonist named Van Niekirk, residing in Griqua. The first diamond, on being sent to the authorities, was valued at £500. Considerable excitement was caused throughout the colony, and the natives commenced to look for diamonds, and many were found, among which was one of 83½ carats, valued at £15,000. In 1868, many enterprising colonists made their way up the Vaal River, and were successful in finding a good number of diamonds. The center of the river diggings on the Transvaal side is Klipdrift, and on the opposite side Pniel. In all there are fourteen river diggings. Du Toit's Pan and Bultfontein mines were discovered in 1870 at a distance of twenty-four miles from the river diggings. The diggers took possession of these places. Licenses were granted giving the first diggers a right to work. In 1871, De Beer's and Kimberley mines were discovered, and, in 1872, Mr. Spalding's great diamond of 282½ carats was found at the river diggings.

The mines are of irregular shape, and are surrounded by reef. The top reef is a loose shale, and has given great trouble from the frequent slips. Below this are strata of trachytic breccia and augite; the formation is then seamy to an unknown depth.

Within the reef, the surface soil is red and of a sandy nature. The next stratum is of a loose yellow gravelly lime, and the third blue, of a hard slaty nature. This last is the real diamantiferous soil. Large stones have been found in the "yellow," but the working of this generally does not pay. Kimberley mine, however, has paid very well all through. The method of working in deep ground is determined by roadways running north and south. The soil is hauled up to these roadways, and taken to the sorting-tables. The roadways decaying shortly after exposure to the atmosphere, a system of hand windlass was adopted, which worked very well for a time until horse-whims were introduced in 1873. The depth of the mines increasing, horse-whims had to give way to steam-engines in 1876.

The first diggers treated on an average ten loads per day each party. At the present time, the least taken out by an engine, when fully employed, is 250 loads per day. The cost of working, with present appliances, the first 100 feet in depth, is 3s. 6d. per load; the second 100 feet (mostly blue), 5s.; the third 100 feet, 8s.; and the fourth 100 feet, 11s. Through scarcity of water, a system of dry-sorting had to be resorted to for several years; but it was superseded by the introduction of washing machinery, which is now generally employed.

At the beginning, through inexperience, many serious mistakes were made. When the first diggers reached the bottom of the red sand, they thought no diamonds would be found in the next stratum. When, however, diamonds were found in the second stratum, the diggers had again to remove the *débris*, and so also when the "blue" was reached. Some of the claims in the Du Toit's Pan and Bultfontein mines are irregular in shape. The other mines, however, have been properly and regularly laid out. One or two shafts have been connected with the mines by underground galleries. These galleries are convenient in the case of falls of reef. Labor, at first, was cheap; but from 20s. per month, wages rose to 30s. per week, and food. The yellow soil offers no difficulty in working, being loose and broken, but the blue soil requires blasting.

Several methods were adopted for extracting the soil and carrying it from the mine before steam was introduced. The cost of wood for heating purposes was a serious item; but good coal has now been found at 160 miles from Kimberley, costing £13 per ton. Another serious item of expense is the transport over natural roads only, costing from £18 to £30 per ton.

Water is dear, and water-heaters are fitted to each engine, by which 33 per cent of the water is again used, thus saving one third. The boilers are of the locomotive type, mostly of steel, to save weight, and thus reduce the cost of transit. The fire-boxes are also made of steel of very soft and ductile quality. A semi-portable engine is made for driving the wash-mill. The engine is so arranged that it may be removed from the boiler and placed separately. The boiler is made to work at a pressure of 140 pounds per square inch. Automatic cut-off gear is fixed to each engine, and the governors are provided with a spiral spring for adjusting the speed. A screen, or cylinder wash-mill and elevator, is used for dealing with the diamantiferous soil. Standing wires are fixed at the back of the machinery, and pass over a frame fixed at the top of the mine, the ends of the wires being secured to strong wooden posts. After the blue soil has been blasted and collected into trucks, it is placed in tubs, which ascend the standing wires. It is then emptied into the depositing-box. The yellow soil may be put into the wash-mill directly, also that portion of the blue which has passed through the screen fixed over the depositing-box. The remainder of the blue, which is spread out to a thickness of four inches or six inches on the depositing ground some distance from the mine to dry, is delivered into the upper part of the screen. The return water from the elevator, with a portion of fresh water, is also discharged at this point, and operations are thus greatly facilitated, the soil becoming thoroughly saturated and passing more easily down the chutes. The large pieces which will not drop through the meshes of the screen are discharged into trucks at the lower end and carried away. The smaller pieces with water, in the form of sludge, fall through into a chute, and thence are conveyed into the wash-mill pan, and there kept in constant rotating motion by agitators. The diamonds and other pieces of high specific gravity sink to the deepest part of the pan, and the remainder of the sludge is forced over the inner ledge to the elevator. The sludge is then lifted and thrown upon an inclined screen and down the chute over the side of the bank. The residue left in the pan at the end of the day's work is passed through a pulsator, in which, by the force of water, the mud and lighter particles are carried away, leaving behind the diamonds, agates, garnets, and other heavy stones. It is the practice occasionally to put a few inferior stones in the soil, to test the efficiency of the machinery.

In 1881, the author paid a visit to Kimberley, and found the industry a large one. The post-office showed the value of diamonds passed through the office in one year to be £3,685,000. Illicit diamond traffic has hitherto been a source of great trouble at the fields. It is a question whether this industry will ever cease; in any case, there is no doubt but that it will last for over a century. It is believed that the main bed of diamonds has not yet been reached, and that the mines in operation are merely shafts leading to it. Now that the water-works are finished, with a bountiful supply of water, coupled with the great boon of railroads to the fields, and the advantage of a law recently passed for the prevention of illicit buying, a great and prosperous future is in store for the diamond-fields.

RECENT RESULTS OF THE JAMESON COKING PROCESS.

Mr. T. B. Lightfoot, C.E., in a paper read before the Society of Arts, gives the following as the results obtained with the Jameson method of utilizing the by-products in the manufacture of coke:

Kind of coal.	Gals. of crude oil.	Ammonia estimated in pounds of sulphate.
Shiremoor	13·00	9·87
Brancepeth cannel	12·20	6·00
Longhirst, small	9·28	17·78

The following may be taken as an average analysis of the crude oil:

	Per cent.
Lubricating oil	39·5
Burning oil	37·7
Paraffine scale	13·5
Tar and loss	9·3
	100·0

The composition of the gas collected from the Jameson ovens, after its passage through the condenser, varies according to the coal under treatment and the length of time the charge has been burning. An approximate average is given in the following table:

Carbonic acid	3·5
Carbonic oxide	27·5
Hydrogen	29·3
Oxygen	1·1
Nitrogen	38 6
	100·0

THE ELWELL-PARKER ACCUMULATOR.

A new accumulator has been recently brought out in England by Messrs. Elwell & Parker. The *Engineer* describes the method of making it as follows: Strips of sheet-lead nine inches wide and any convenient length, weighing two pounds to the square foot, are passed through a machine which first punches holes entirely through them and then impresses them with indentations, which act as distance-pieces to keep the layers of each plate apart. The holes secure a free circulation to the electrolyte. These strips are then rolled spirally into cylinders containing, in the small cells, three thicknesses of plate each, the joints being made secure by fusing with a soldering-iron, and an anode of much thicker lead being fused on at the same time. Each cell contains eight of these cylinders a quarter of an inch apart. The lead cylinders are first placed in a bath containing a dilute solution of nitric and sulphuric acid, and left there for twenty-four hours. The effect of this bath is to minutely honeycomb the lead plates, putting them into the most favorable condition for "formation" by the electric current. There is also formed upon the surface of the plates a deposit of sulphate of lead, the greater part of which is subsequently reduced to peroxide, part of it being first washed off. The plates, on being taken from the bath, are washed, and then placed in the ordinary dilute sulphuric acid solution in the cell. They are then charged in one direction for six hours with a current of 12 ampères, discharged in about three hours through ten Swan 45 volt, 20-candle lamps—twenty-two cells give 45 volts—and charged again in the reverse direction. They are then ready for use. There is then no sulphate visible, the peroxide plate being a rich, dark brown color, of smooth, hard crystalline appearance, and the negative plate presenting a clean surface of ordinary lead color. The cells are coupled by clamping the electrodes together. The plates or cylinders are retained in position by notched vulcanite frames underneath, and notched distance-pieces of the same material on the top, thus leaving the entire space between the plates and a space underneath them open for the free circulation of the electrolyte. The period occupied for the cutting up of the lead strips to the complete charging of the battery ready to send out is only forty-eight hours. Earthenware cells are generally used; but the company manufacturing under the patent also uses wood cells, coated inside with a composition of gutta-percha; these are preferable where strength and lightness are required. The quantity these cells will give out at an electro-motive force of two volts or rather more—same as the original Planté cell—is about forty ampère hours when sent from the works; that is, supposing an accumulator is required to give a current at an electro-motive force of 45 volts, twenty-two of these cells will give a current of 10 ampères for four hours before any of the cells "give out." But the capacity of the cell may be greatly increased by occasionally reversing the charging currents, as in the original Planté cell. The cells are packed in small cases of three cells, carpet being slipped between the plates. They seem to travel safely thus.

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UTILIZING BURNING CULM-PILES.

An interesting application of a patent analogous to those for utilizing the waste products of coke, recently taken out by Mr. H. L. Armour, and the property of the Jameson Coke Company, Limited, has just been made in the case of a pit-heap at Seaton Burn Colliery, in Northumberland. A pit-heap is a deposit for quantities of small coal and dust, for which, as a rule, no market can be found, as well as for shale and iron pyrites met with in working the coal. These heaps are generally burning, and in very many instances, give off so much smoke and dirt as to become a terrible nuisance to the neighborhood. This was the case at Seaton Burn; but by simply covering the heap with sand, and sinking a number of iron pipes connected with a main, in which a constant suction is maintained, all offense has been removed, and a stream of gas, yielding both oil and ammonia, is obtained. In this manner, a worse than valueless property has been converted into a profitable one, and, as the system is now in course of extension to large heaps at Kelvinside, near Glasgow, it is to be hoped that before long an end will be put to one of the greatest nuisances in colliery districts.

FURNACE, MILL, AND FACTORY.

The Iowa Barbed Iron-Works will be removed from Johnstown to Easton, Pa. The mills are running fourteen hours a day with heavy orders.

A large iron furnace is among the possibilities at Tyrone, Pa.

The Ohio Multiplex Boring Machine Company has been incorporated at Cleveland, Ohio, with a capital of $150,000.

The Pennsylvania & New York Railroad Company is building a new foundry at Sayre, N. Y. The main building is to be 124 by 63 feet, and over three hundred men will be employed.

The Deane Steam-Pump Company, of Holyoke, Mass., has removed its office and warerooms in Philadelphia from No. 43 South Fourth street, to No. 49 North Seventh street.

The Cummer Engine Company, of Cleveland, Ohio, will send one of its 150 horse-power automatic engines to the Louisville Exposition.

Calamining is the name of the new process for coating iron, introduced by Messrs. Everson, Macrum & Co., of the Pennsylvania Iron-Works, Pittsburg, who find it a very successful substitute for galvanizing.

The long-unused property of the New York Steam-Engine Company, at Worcester, Mass., with buildings, engines, etc., has been purchased by William Allen & Sons, of the Worcester Boiler-Works, and is to be fitted up for their occupancy.

The Keystone Iron-Works, of Reading, Pa., J. V. Craig & Son, proprietors, resumed work June 18th, after six months' idleness.

The Union Iron-Works, San Francisco, intend to erect extensive works during the summer, and will connect them with the railroad.

A firm in Lansingburg, New York, has nearly finished a "paper steamboat," for a Pittsburg company. The vessel is 20 feet long, can seat twenty-five persons, and will carry three tons. Its sheathing is a solid body of paper three-eighths of an inch thick. A bullet from a revolver, fired at the sheathing from a distance of only four feet, neither penetrated nor abraded it.

A telegram from Pittsburg to the daily newspapers says that Oliver Brothers and Phillips's lower mills, and several other mills at Pittsburg, will close July 1st for repairs. The stoppage will consume from four to six weeks, and is as welcome to the workmen as to the operators.

The Northeastern Steel-Works Company, Middlesborough, England, formed some twelve months ago, has practically begun operations, making its first experimental blow in one of its converters on Thursday, May 31st. They have four fifteen-ton converters. Messrs. Thomas & Gilchrist, the well-known inventors of the basic system of dephosphorizing ores, are members of this firm, which includes many of the leading metallurgists in Cleveland. The works are specifically designed for the manufacture of steel from Cleveland ore. The phosphorus contained in the iron of the first charge of the converter was between 3 and 4 per cent, and careful analyses of the newly-blown steel resulted in the discovery of only ·02 per cent, which is about one fourth of the quantity usually contained in steel made from the purest hematites. The machinery in the works is laid out with the view to making rails and billets, as well as slabs, etc., for plates of all descriptions and qualities. The probable output of the works, when in full operation, will be from two to three thousand tons per week.

A terrific explosion occurred on the morning of June 22d at blast-furnace No. 5 in the North Chicago Rolling-Mills. Thirty-five tons of molten iron were scattered in every direction. Two men were horribly burned, and will die. Sixteen men were more or less severely burned, but none, it is believed, seriously.

No. 2 furnace of the Thomas Iron Company, at Hokendauqua, has been blown out and will undergo thorough repairs. Five furnaces are now in blast at Hokendauqua. All of the seven blast-furnaces of the Bethlehem Iron Company, except No. 2, are in full blast, and are worked to their fullest capacity. No. 2, which was blown out for repairs several weeks ago, will, it is thought, be lighted in a few days. One thousand men have struck at the Bethlehem works.

The Lincoln Iron-Works, Lincoln, Mass., manufacturers of stone-mill and quarry machinery, are driven day and night to fill orders, mainly on gang-saws for the marble-producing mills. Orders are nearly filled for thirty gangs of these saws. The company also manufactures a heavy line of wood-working machinery, shafting, pulleys, and gearing. A large business is also done in rubbing-beds for marble mills, which is one of its principal specialties.

Twenty-five of the thirty-five blast-furnaces in the Mahoning and Shenango valleys, Ohio, are in operation, producing 2000 tons of metal per day.

A break last week at the bottom of Leesport Furnace, beneath the trough, caused the escape of about thirty tons of iron, which ran into the casting-house, and at one time threatened the destruction of the building by fire. Prompt action of the men, however, prevented any further damage.

During their usual shut-down this summer, the William Anson Wood mower and reaper works, at Youngstown, Ohio, contemplate enlarging their foundry, in order to increase their capacity for production.

The Missouri Malleable Iron Company, which recently increased its capital stock, is making arrangements to more than double its present capacity by building one or two more furnaces, putting in new machinery, and extending its foundry by putting up a new addition. These improvements will be completed some time in July, when the company expects to be able to meet promptly every order for malleables. Its foundry department is full of work.

Swede Furnace, near Bridgeport, Montgomery County, Pa., is to be put in blast again at an early day.

Citico Furnace, Chattanooga, Tenn., is about half finished. The chimney, which is completed, is 170 feet high. The furnace shell will be completed in a few days, and will be 69 feet high and 22 feet in diameter at the bosh. No less than 100 men are working at furnace.

The Laclede Fire-Brick Manufacturing Company is now operating 23 kilns, 5 of which are 24-foot ones. The retort department is crowded beyond precedent, the orders for this kind of goods exceeding by more than one hundred per cent those of any other season. Among the recent orders were one from the Springfield (Ohio) Gas-Works for the building of five benches of sixes, being the second order from that works; one from the Wheeling Gas-Works for the building of twelve benches; and another from the Cincinnati Gas-Works for 600,000 fire-brick.

At the Atlas Works, Pittsburg, the first plunger for No. 1 engine at the Negley's Run pumping-works has been cast. Last week, the furnace was charged with 14 tons of metal, but the plunger, when finished, will only weigh eight tons. The Atlas Works have the contract to replace all the defective castings in Nos. 1 and 2 pumps, embracing four plungers, four pump-barrels, four sections of valve-chambers, and two check-valves. When completed, the castings will have an aggregate weight of 275 tons.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following patents were issued under date of June 15th, 1883:

ARIZONA.

TUCSON DISTRICT.

Theodore F. White *et al.*, Silver Cable lode.

CALIFORNIA.

THE BODIE DISTRICT.

Nathan Rhine, Hirsh gold and silver mine.

HUMBOLDT DISTRICT.

Samuel Ambrose *et al.*, placer.

SAN FRANCISCO DISTRICT.

Samuel Baker, coal.

STOCKTON DISTRICT.

Heirs of A. M. Mitchell, deceased, Bonny placer mine. John Batten *et al.*, Bowling Green placer.

COLORADO.

CENTRAL CITY DISTRICT.

Theresa Jaeger, Little Emily lode. George W. Hall, Colorado Extension lode Edmund R. Marsh, O. and M. lode and mill-site. Alexander McLeod, Notaway lode. George A Reuter, Iron lode. J. P. Ward, Stella lode. Hal Sayr, Autocrat and Esperanza lodes. Francis G. Nagle, Gregory lode. Marshel Silverthorn, placer and Willow Creek placer. Julien Fountain, Independence lode.

DEL NORTE DISTRICT.

John R. Burrows *et al.*, Baker lode. William P. Linn, Rawley lode.

DURANGO DISTRICT.

IXL Tunnel Company, Tom Paine lode. Peter Fassbinder, Neptune lode American Midland Mining and Milling Company, Caribbean lode.

LAKE CITY DISTRICT.

Bessie Bascom Consolidated Mining Company, Little Rock and Little Chief lodes. Philip N. Nichols, Rob Roy lode. Oneida & Belcher Consolidated Mining Company, Belcher lode. Hugh J. Alexander, Dictator lode. C. E. Schoellkopf, Revenue lode. M. M. Engleman *et al.*, Lulu Carroll lode. John S. Hough *et al.*, Lilly Lode. Hennan Beckurts *et al.*, Uncle Sam lode. William E. Webb *et al.*, Benjamin Franklin lode.

LEADVILLE DISTRICT.

Roseville-Alta Consolidated Mining Company, Garfield and Roseville lodes. Toronto & New York Consolidated Silver Mining Company, Toronto lode. William J. Lynd, Valverde lode. William Lefman, Ohio Wave lode. Clifton Consolidated Mining Company, Edwin Forrest lode. Henry Frankle *et al.*, Laura Levy lode. G. T. McDonald *et al.*, Jay Gould lode. J. O. Hudnutt *et al.*, Whale and Ned lodes. Lennox Mining and Milling Company, May Day lode. T. J. Oliver *et al.*, Little Dick lode. Thomas R. Frazer, Chance lode. Franklin K. L. Bush, Commodore placer. Americus L. Pogue, Independence placer.

PUEBLO DISTRICT.

Bunker Hill Consolidated Mining Company of Colorado, Concord lode. Tellurium Milling and Milling Company, Poor Man lode. Edward Chambers, coal.

IDAHO.

BOISE CITY DISTRICT.

W. S. McCormick *et al.*, Point Lookout lode.

MONTANA.

HELENA DISTRICT.

Lewis Stettheimer *et al.*, Garfield and Silver Crown lode. Charles Schlesinger, Exile of Erin lode. Samuel Neel *et al.*, Pilot lode. Orlando B. Barber *et al.*, placer. Montana Copper Company, Hattie Harvey and Bully Boy lodes. Robert C. Walker *et al.*, placer.

NEVADA.

CARSON CITY DISTRICT.

Ferdinand S. Van Zandt, Lloyd lode.

UTAH.

SALT LAKE CITY DISTRICT.

Samuel Kahn *et al.*, Murphy lode. Phœnix Mining Company, Stanley lode. Carl R. Briggs, coal.

GENERAL MINING NEWS.

ARIZONA.

PECK DISTRICT.

BLACK WARRIOR.—Dispatches from the general manager state that the newly-purchased mill of this company has been started and is making a highly successful run. Two bars of bullion were shipped on the 26th inst.

CALIFORNIA.

MONOCOUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended June 16th shows: Ore crushed, 165·6 tons; average assay value of pulp, $33.33 per ton; of tailings, $4.50. West cross-cut, 1000 level, in 26 feet. North drift, same level, in 238 feet. North drift, 800 level, is 591 feet long. South drift from winze No. 6 at the 640 level is 181 feet long. Uprise No. 23 is up 33 feet. Winze No. 5, from the 780 level, is 53 feet deep.

STANDARD CONSOLIDATED.—The superintendent writes to the vice-president, under date of June 12th, as follows: Your letter of the 31st ultimo to William Willis, secretary, is at hand. The increase in our bullion shipments is on account of an improvement in the north stopes on the 500-foot level, and the discovery of some fair milling ore on the 1000-foot level. The south drift No. 2, 1000-foot level, which has been driven from the main east cross-cut a distance of 102 feet, shows the vein from five to seven feet wide. We are stoping from this drift, and although the ore is as yet rather low-grade, this is the most important development made below the 500-foot level, and it gives every indication of making an important ore-body. North drift No. 1, 1000-foot level, 400 feet east of the shaft, is in 164 feet, showing two feet of milling ore. The 1200-foot east cross-cut is in 287 feet, and is pushed ahead as fast as possible. There is no other change to report throughout the mine.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—On the return of Mr. Davis, work was resumed at the mine and mill.

GREEN MOUNTAIN.—The new mill is running steadily as usual. Some very good ore has lately been taken out in the upper levels, the yield of bullion showing a gratifying increase. In the tunnel, the ledge has improved very much in appearance during the past few days.

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CANADA.

It may be well, says a correspondent of the Montreal *Gazette*, to remind persons interested in mining in Manitoba and the Northwest territories, for the precious metals and for minerals other than coal, that the regulations in that behalf recently published by the Department of the Interior are not actually in operation, nor is it intended that they shall come into operation at present. It is the purpose of the department, we understand, to place these regulations before the public for some time, so that opportunity may be given for their full discussion and a chance for having them amended if shown to be necessary. It is safe to say that representations on the subject from any quarter would, if submitted to the department in the regular way, receive the most careful and respectful consideration.

MANITOBA.

ARGYLE.—The mine is worked steadily. The recent clean-up gave a return of some $25 per ton, with a good deal left in the tailings. Two Frue vanners are now going up to save these tailings.

PINE PORTAGE.—The mill has started up. The ore is said to be refractory, but will concentrate well and give good returns over cost of treatment.

WINNIPEG CONSOLIDATED.—Over eighty feet of drifts have been opened up, which show a body of high-grade ore. The small mill has not been running of late, as the superintendent found he was losing about 60 per cent, and all the work had to be done over again. They have ordered new grinding and amalgamating pans, which are manufactured at Winnipeg with exemplary slowness. With these in, it is expected that 85 or 90 per cent of the value of the ore wil be saved.

NEWFOUNDLAND.

The three most active copper mines are, as reported, the Tilt Cove, Bett's Cove, and Little Bay. Statistics for last year have not yet been received. The first of these mines opened was that of Tilt Cove, and up to the close of 1879, returns showed that the quantity of copper ore exported from this mine was nearly 50,000 tons, valued at $1,572,154. The value of the nickel ore exported from the same mine, at that date, was $32,740. From 1875 to 1879, the quantity of ore exported from Bett's Cove mine was 123,556, valued at $2,982,836. Little Bay mine was opened in August, 1878. At the close of that year, seven cargoes of ore had been shipped, amounting to 10,000 tons. In 1879, 19,2721 tons were sent to England. In 1880, the exportation reached 16,610 tons; and in 1881, 20,640 tons of ore. Last year's returns are not yet at hand; but it is understood that Little Bay mine increases in productiveness, and that the quantity of the ore improves the deeper the workings have gone.

QUEBEC.

Judge Caron, in the Superior Court, June 22d, gave judgment in the long-pending case of the Queen *vs.* the Delery Gold Mining Company, in favor of the defendant. This case was brought relative to the patent right of the company. The result of this judgment will doubtless cause a boom among the Beauce gold miners, and induce them to extend their operations.

COLORADO.

CLEAR CREEK COUNTY.

CASHIER.—Messrs. Maccie & Co. are working about 200 feet in from the entrance of the fourth adit on this well-known Sherman Mountain mine, on forty-six inches of mineral, which gave a mill-run from sixty-five sacks last week as follows: Total weight, 3723 pounds; running, first-class, 301 ounces per ton; second class, 152 ounces. Net receipts for the lot, after deducting mill charges, $452.31. Several parties of lessees are working in different parts of the mine.

DUMONT.—The lessees have struck six feet of good milling ore and twenty inches of solid smelting ore in the lower level on the Albro mine. This level starts in on the vein where it crosses the gulch, and is the deepest working on the whole lode. The Lee lode is worked by a shaft which is 86 feet deep, and shows a continuous streak of ore 16 inches thick. The Lincoln cross-cut tunnel, near town, has at last struck the California lode at a distance of 600 feet, having been obliged to run nearly 100 feet farther than was originally expected.

CUSTER COUNTY.

BULL-DOMINGO CONSOLIDATED.—This company has reorganized, and is hereafter to be known as the Bull-Domingo Mining Company. It has a capital stock of $200,000, divided into 200,000 shares of $1 each, unassessable.

DOLORES COUNTY.

SOUTH PARK.—This mine was located in 1879 by Houton, Costello, and Pulver, and was bonded some months ago by Colonel C. A. Jockmus and Hon. E. Pisko, of Denver, and W. J. Cox, of Rico. About 200 feet of tunnel had been run at the time the property was bonded. At the end of a 300-foot tunnel, ore was found in small quantities, and by further exploration the quantity increased rapidly. Top, bottom, and sides of several drifts, radiating from a common point at the extremity, disclose one deposit of manganese ore which mill-runs 334 ounces in silver per ton. Day and night shifts are now at work. A large ore-house is building at the entrance to the tunnel, and a wagon-road is under construction, to be completed in four days. The distance from Rico to this mine is about a half-mile, and the same distance from the mine to the Grand View smelter, where the ore is now shipped. Blasting is not even necessary, as the ore is so soft.

PUZZLE EXTENSION.—This mine has been producing ore in considerable quantities for a long time, and the Santa Clara mill has been treating it constantly. The mine is owned largely by the stockholders of the Santa Clara mill, who have profited largely by the purchase.

FREMONT COUNTY.

CANON CITY OIL COMPANY.—This company has located its well on Mr. Stump's farm, on Oil Creek, four miles northeasterly from town. This is the third working company now operating in this oil basin.

COAL, OIL, AND INVESTMENT COMPANY.—At about 200 feet below the first oil, and at a depth of 1435 feet, this company struck another vein of oil that is of lighter specific gravity, and which seems to be present in good quantities. It will now stop boring and put in the pumping machinery.

LAKE COUNTY.

Late Leadville exchanges contain the following:

The *Herald*, in its description of Colorado Gulch and Little Frying Pan Mining districts, located six miles west of Leadville, says that this section embraces the Sugar Loaf and surrounding mountains, forming a portion of the group of foot-hills situated at the base of Mount Massive. The districts show but one species of rock, and that is a coarse-grained granite, the Archæan rock underlying the Leadville sedimentary formations. As a consequence, an entirely different vein system from that to the east of Leadville is found in this district, and instead of nearly horizontal contact-veins, the country discloses veins which to all appearance are true fissures. The veins show few characteristics not met with in any mineral country under similar physical conditions. The greater number of the leads have a course nearly north and south, being parallel with the axis of the main range of mountains, and their dip is quite uniformly to the westward. The width of the veins varies, extending from two to twelve feet; sometimes presenting well-defined walls, and again the vein-matter and country-rock is imperceptibly blended, so that a trained eye can scarcely distinguish any line of demarkation. The vein-stone is a fine-looking quartz and decomposed gouge matter, carrying the base and precious metals as sulphides. Occasionally native silver is also disclosed, but this feature is rather the exception than the rule. The base minerals associated with the ores are iron, copper, lead, and zinc, usually as sulphides. The most prominent mines of the Colorado Gulch and Little Frying Pan districts are the following: Dinero, Gunnison, Consolidated Virginia, Laplander, Birdie R., Shields, Venture, and Welsh, having in the aggreate an estimated output of twenty or thirty tons a day, when all are working under favorable conditions. At present, considerable difficulty and delay are occasioned by surface water, which will be obviated in a short time when the sides of the mountains have been cleared of their winter's accumulation of snow. At present, while water is plenty, the product of the melting snows, the Frying Pan placer is actively and successfully worked. The gulching season here never exceeds two months, and during many years there is scarcely sufficient water for four or five weeks' work. This year, Mr. William Emery, the owner of the placer, begun work June 4th, since which time he has washed out quite a pit of fairly good pay-dirt, and is now preparing to make a clean-up. Last year, work was done equal to one hundred days, and the final clean-up yielded, for the season, $675. The results for this year are expected to be about the same. The ten-stamp chloridizing and amalgamating mill of the Shields Mining and Milling Company, located at the junction of Colorado and Little Frying Pan gulches, has been closed down since April 20th, but will start up again next week, having been assured ample ore from the large producers of the section.

AMIE.—The company in January, 1881, adopted a system of leasing out portions of its mining ground, which has since been pursued. In December, 1882, a fine ore-body was discovered from the No. 3 shaft workings, which in a few months yielded about $130,000, the company getting about 30 per cent royalty therefrom. There are now five leases on the property, from all of which the company is deriving a small royalty. The company is also itself working the No. 3 shaft. The workings of the northern part of the mine are said to be looking well and improving. In this portion of the mine, there yet remains a large territory of unexplored ground.

CLIMAX.—Little work has been done by this company during the past two years, and owing to the increase of its debt it was recently proposed to dissolve the company and settle up its affairs. All the property is now under lease, and work is done under five leases. Of these only one—covering No. 1 shaft—is now paying. It is stated that the company has, from royalties received, been able to pay its indebtedness, and now has a fair prospect of success. The Climax mine proper has but small territory, the claim for the greater part of its length being but forty feet wide. The claim widens toward the north and in the portion which is now showing the best. Much confusion has been occasioned regarding the Climax by the fact that the original Climax claim conflicted with other locations, the "Climax Contract," the "Montana," and the "Deer Lodge," embracing a portion of the original full claim as located. The Climax Contract and Montana have recently produced largely, and hence the impression has spread that the Climax itself had been producing a large quantity of ore. It is reported that there are strong indications that the north ore-chute of Fryer Hill, which yielded so largely in the Montana, also extends across the Climax. The lessees of the No. 1 shaft are making substantial improvements. Their drifts north extend into entirely unexplored ground. The Climax is under the same management as the Amie, and expenses are said to be kept very low.

COMIQUE.—In this mine, situated on the north side of Fryer Hill, and abandoned for several years past, a body of iron ore has been opened.

IRON SILVER.—The following statement shows the condition of this company June 16th:

Balance May 1st, 1883	$206,445.46
Product for May	127,108.64
	333,554.10
Expenses May month	82,741.19
Balance May 31st, 1883	250,812.91
Net product to June 15th, estimated	22,183.71
	272,996.62
Dividend June 16th, 1883	100,000.00
Balance in bank to date	$172,996.62

LONG & DERRY.—Work has started on this property, which has been idle for a year.

NELLIE S.—A strike of ore containing gold has been made in this mine, situated in Printer-Boy Hill.

TENDERFOOT.—This mine has been leased to Messrs. Slater & Leonard.

LARIMER COUNTY.

CARBONATE.—Work will soon be commenced. The tunnel is in 600 feet.

NORTH PARK & VANDALIA MINING AND SMELTING COMPANY.—This company will probably put up reduction-works this summer. It owns the Endomile, and has a large amount of ore on the dump.

RARUS & MAUD S. MINING COMPANY.—The directors of this company, organized some time since, have decided to push developments on their properties at once. They are now working a force of men, and the mines show up a fine body of mineral, which improves greatly with the development.

WOLVERINE.—This company has ordered a smelter, which will be put up some time this summer. The superintendent of the mine expects to increase his force of men on this mine soon to 150 men.

PITKIN COUNTY.

MANVILLE SMELTING COMPANY.—The parties who have for some time past been negotiating for the North Texas smelter have secured the same, and have organized a company under the above name. Preparations are making to blow in the smelter at once.

DAKOTA.

Ground has been broken for the railroad to connect the Portland and Trojan groups with the projected new mill on Spearfish, five miles distant. Work will be prosecuted as rapidly as possible.

ESTRELLA DEL NORTE.—The damage made by the recent floods does not amount to more than $1200. No serious delay in operation has been caused.

FAIRVIEW.—An interest in this mine has been disposed of to parties who will at once erect a mill on the property for the reduction of ores. This mine is one of the most extensively developed of the Central Hills.

FATHER DE SMET.—Report of superintendent from June 1st to 8th shows ore extracted from first, second, and third levels 1950 tons. Ore milled, 1950 tons. Golden Gate north header advanced 6 feet. Header in 131 feet. Report from June 7th to 15th shows ore extracted from first, second, and third levels, 2150 tons. Ore milled, 2150 tons. Golden Gate north header advanced 8 feet. Header in 139 feet. All development-work stopped; cause, scarcity of fuse.

GOLDEN SUMMIT.—A force of ten men is now at work at the mine. The main shaft is down 30 feet, and the breast 200 feet in extent. The mill is not in operation, owing to the bad condition of roads and absence of bridges. Every bridge has been washed away from Spring Creek.

GEORGIA.

CALHOUN.—Work is pushed on the flume-line, which is undergoing change to admit of beginning operations at a more favorable point. In consequence of this change of base, the forty-stamp mill is now idle. The new pump has arrived and will soon be in position.

CHICAGO & GEORGIA.—The twenty-stamp mill is now going up.

FINDLEY.—The true reason for the stoppage of work at this mine is said to be a reluctance on the part of a portion of the stockholders to bear their pro rata of the expense of doing certain dead-work which is considered necessary before the mine can again be made to pay.

GARNET.—Work at the mill will begin shortly.

IVEY.—The sixty-stamp mill is completed, and only awaits the completion of

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the flume-line and tubing to start up. A force is at work piping the cut, and as soon as this is brought to grade, the new flume will be constructed. The twenty-stamp mill is working on ore from the cut. The ditch is delivering about 200 inches of water, and increasing daily.

SINGLETON.—Work is pushed vigorously in all departments. The new twenty-stamp mill is running on full-time, as is also the old five-stamp mill near by. For some weeks past, a small force has been employed in driving a tunnel from the branch, to tap the vein at the lowest available point, and a few days since a vein, now believed to be the same, was cut. A mill-run of a few tons, just finished, gives very satisfactory results. An average sample from across the vein, including slates as well as the quartz, yielded by assay $3.97 per ton.

MEXICO.

A party of capitalists has examined the copper mines at Nocasari, Sonora. The final arrangements for the purchase of the property have been made, and the price agreed upon is stated to be $350,000. Mr. Lird, of the firm of Motler & Lird, San Francisco, who went with the party, is making estimates for the erection of two thirty-ton smelters at the mine.

A rich placer field is reported 90 miles east of the city of Chihuahua, comprising 3000 acres, with an average depth of 75 feet. The ores run low in silver, high in lead, but are in immense deposits. The property was recently sold to G. M. Shaw, of Socorro, New Mexico, who will work it on a large scale.

ENCINO.—Work at this mine, situated in Pachuca, has been stopped on account of the non-completion of the reduction-works now building by the company. When completed, mining will immediately begin.

SANTA EDUWIGES.—A large invoice of machinery for working this mine, situated in Chihuahua, has reached its destination. This mine is located in the famous Jesus Maria District, and has been worked with profit for over a century. The ore carries both gold and silver and runs three hundred ounces to the ton.

SANTA EULALIE.—The work on the buildings, mill, etc., of this company is progressing with great rapidity.

MICHIGAN.

The Marquette *Mining Journal* gives the following table, which exhibits, in gross tons, the total lake shipments of iron ore from upper peninsula ports the present season, up to and including June 20th, together with the amount shipped from the same ports during the corresponding period of last year:

Name of port.	1882.	1883.
Escanaba	525,748	306,029
Marquette	292,027	100,636
L'Anse	13,308	9,602
St. Ignace	7,499	.....
Total	838,582	416,268

DETROIT.—This mine, says the Marquette *Mining Journal*, is coming to the front rapidly as a steady and profitable producer. With wholly inadequate machinery, they are now raising between 60 and 70 tons a day, which product will be increased to at least 100 tons the coming week—just as soon as sufficient room is made at the bottom of the shaft for an increased force of miners. West of the most westerly pit, a shaft is going down in ore of very fine quality.

NONESUCH.—The managers have been engaged for some time in what turns out to be an impracticable metallurgical treatment of the peculiar deposit-matter afforded by the mine. The attempt to recover the copper in the rock by reducing it by means of rollers and then subjecting it to lixiviation and precipitation has been abandoned, and if mining operations are continued, the usual method of crushing and dressing in the district will be adopted.

PHŒNIX.—The largest creditors of this mining company, says the Houghton *Mining Gazette*, reside in the district and offer to work the mine for the purpose of paying off the local debts of the corporation, which chiefly consist of labor liens.

QUINCY.—The stamp-mill, after a thorough overhauling, has started up again. The mill was out of service about three weeks.

ROPES.—The first stamp-mill for gold mine use ever shipped to Lake Superior has arrived, and been hauled to this mine, three miles north of Ishpeming, where the building that is to hold it is all completed.

MISSOURI.

The people of Bates County, especially in the neighborhood of Rich Hill, are in a fever of excitement over the discovery of oil. It had been generally known that Beaumont & Foote have been sinking a well for oil; and about three weeks ago, there was a rumor that oil had been struck, but the rumor was then hushed up. Later reports stated that a public test of the well would be made June 26th, at three o'clock P.M. At that hour, there were fully three hundred persons on the grounds. The engine was started, and five barrels of the crude oil were drawn up. The well was sunk 600 feet, and the oil has risen 400 feet, and is pronounced by experts to be crude oil in its purest state. A company has been organized, and other wells will be sunk immediately. Great excitement prevails, and property is rapidly advancing in value. All the adjacent land had been quietly leased for a period of twenty years before the announcement was made that oil had been struck.

MONTANA.

DEER LODGE COUNTY.

The Philipsburg Mining District, in which little work has been done for some years, and in which little deep development has been going on lately, has entered upon a new lease of active life and is having a genuine boom. This fact is owing in a great degree to the recent developments on the Granite Mountain in tunnel No. 2. The tunnel has a total length of a little more than 1000 feet. The pay-ore was first encountered at a distance from the face of about 900 feet, from which point the ore has preserved a uniform width of three feet, increasing in many places to five for a length of 130 feet. Within a few days, 500 tons of $500 ore will be shipped to Cheltonham, near St. Louis, for reduction in the Harrison works.

LEWIS & CLARKE COUNTY.

One of the notable events of the coming Fourth of July will be the departure from Helena of a special train by the Northern Pacific, freighted with 1,000,000 pounds of Gregory and Wickes bullion, to Newark, N. J., arrangements to this effect having been consummated. The greater portion of this bullion is now stacked up at the depot. The Wickes works, which will soon start up again with increased capacity for the treatment of ores, will yield fully as much, and when the mines of Ten Mile, Red Mountain, and other neighboring districts are opened up, the Northern Pacific will find large business in the carrying trade of bullion.

NEVADA.

Late mail advices report as follows:

EUREKA CONSOLIDATED.—Affairs in the mine and shaft as usual. Our furnaces running, and producing as heretofore. Shut down No. 3 furnace on the 13th for repairs. Following is the prospect-work done during the week: Third level, uprise in quartzite, 20 feet; in all, 20 feet; Locan shaft, sunk this week, 15 feet; in all, 1194 feet.

HALE & NORCROSS.—The prospect is favorable, but in the hasty development the managers overlooked proper ventilation, the lack of which now delays work.

SUTRO TUNNEL.—The report for the week ended June 15th is as follows: Main tunnel and sub-drain between 18,724 and north lateral. Since last report, the miners employed on the drain have excavated 75 feet and cleared out and enlarged 165 feet more, and placed most of the boxes in position below the level of the track. Flow of water equal to 7,951,500 gallons per 24 hours. The following temperatures were taken: Tunnel entrance, air, 76 degrees; water, 114; shaft No. 1 east, 85; No. 1 west, 88; No. 2 east, 89; No. 2 west, 55; No. 3, 88; No. 4, 91; Combination shaft connection, 83; Osbiston shaft connection, 100; C. & C. shaft connection, 80.

UNION CONSOLIDATED.—It is the general belief that the Union Consolidated cross-cut at the 3000 level will prove a failure, although on the 2900 level feet of ore lay near the west walk.

NEW MEXICO.

The Atchinson, Topeka & Santa Fé Railroad has decided to build a branch from Socorro to the Magdalena Mountains, thirty miles west. One hundred workmen have begun work on the grade. Seventy-five men have begun work on Billings's smelter, which is to be one of two stacks with a capacity of 100 tons.

Silver City is the direct center of a large and important mining district which is located upon the surrounding hills. This includes the celebrated Bremen or 76 mine, 1½ miles distant, which has produced in the last few years nearly $2,000,000. The Sherman mine, one half-mile from Silver City, is also worked, and has furnished mill-runs of $250 per ton. Other mines are Two Ikes, Texas, Legal Tender, No Issue, Old Timer, and others. Just below the city are three stamp-mills, and a concentrator and a smelter are soon to be erected. The center of a large and prosperous mining district, of a great live stock and agricultural region, Silver City is also the county-seat of Grant County, the center of from thirty to forty mining districts, and the metropolis of the new Southwest. The most important mining districts tributary to Silver City and their distances from it are as follows: Silver Flat, one mile southwest; Chloride Flat, two miles west; and Pinos Altos, seven miles north.

NORTH CAROLINA.

Much attention is now directed to gold mines in this State, and an exhibition of the metal is to be made at Boston next autumn. Northern men are pouring into the State prospecting, and there are rumors of large finds. Large quantities of machinery, stamp-mills, etc., are arriving.

A recent report states that a company has been incorporated at Charlotte, with a capital of $2,000,000, for the purpose of conducting gold mining in the State on an extensive scale. The property of the company embraces twenty-two gold mines, varying in the value of their assays. Heretofore, it has cost about $2 for every dollar's worth of gold mined in North Carolina; but the new company claims to have a new process whereby it will save 95 per cent of the gold, and make it a paying business.

UTAH.

EMMA.—The drift from the 130-foot station is nearing the interception of the bottom of the incline run down from the Bay City tunnel until it was drowned. It is expected to strike it at or a little below the bottom. The drift is in vein matter. It is intended to continue the shaft to a greater depth, and at suitable intervals drift across the vein and then open levels. A level is to be run on the 130-foot. The machinery is said to be competent to do the work and take care of any probable amount of water. While the mine may be a wet one, it is not likely to be very wet, the tunnel catching and draining off all the surface-water.

FRISCO.—It is said there are in this mine two feet of galena ore that will go 110 ounces in silver and forty-five per cent lead. There are eighteen inches to three feet of ore in every place that is worked. Another shipment of ore will be made as soon as the snow gets out of the upper gulch.

FRISCO MINING AND SMELTING COMPANY.—At the Cave mine, the property of this company, a rich vein of three feet of ore has been recently struck, going 300 ounces of silver, 3 ounces of gold, and 25 per cent of lead. The richest ore lies above a vein of native sulphur, in some places two feet thick. The sulphur is mixed with gray carbonate, and is very rich. There are fully 11,000 feet of tunneling and drifting in the mine. The main tunnel is in 1300 feet. The mine is not shipping ore at present. The smelter is lying idle. Twenty men are employed, who are thoroughly prospecting the mine.

HORN-SILVER.—The old stacks have been demolished and the ground and part of the dump has been cleaned up. The result was a few car-loads of good bullion. The 600-level of this mine holds out well, the lowest workings, however, showing a tendency to run in copper.

MAMMOTH.—Much to the regret of all mining interests, says the Salt Lake *Tribune*, this great property at Tintic has finally settled into very bad shape. The projectors of the enterprise seem to have dropped it, for the present at least, and all hands seem determine to have a clean-up in the courts before any more real work is done.

MARDOCK REDUCTION-WORKS.—The Ogden *Pilot* states that these works are to be put in operation at Ogden.

ONTARIO.—Shipments have been resumed since the mill clean-up. The great tunnel from the mill to the mine is making swift progress, and is expected to be completed by September, when the pumping of water will be less troublesome for some time to come. During the spring freshets, the lower levels were in imminent danger of being drowned out.

SILVER REEF.

BARBEE & WALKER.—The mine is worked by Gillespie, Lund & Co., employing sixteen men. The mine has an incline shaft 500 feet deep. They are sinking a winze below the fifth level about thirty-five feet, having five feet of ore. Considerable stoping is doing on the third, fourth, and fifth levels. The ore is looking well, there being about 250 tons on hand. The mill is expected to start soon.

CHRISTY.—The company is working its mines steadily, showing great improvement in the quality of the ores. The five-stamp mill steadily pounds away, averaging about fifty pounds daily.

LEEDS.—At the Leeds mill, J. A. Turrill is working the tailings, and is meeting with success, turning out every six days a bar of bullion valued at $1200.

STORMONT.—The company is milling 1200 tons of ore monthly. It is working 50 men in the Savage, Buckeye, and Last Chance—all being worked through the same vertical shaft, 250 feet deep. The deepest workings are on an incline from the foot of this shaft at a depth of 175 feet; from this point, the fifth level extends north and south. The best body of ore lies at the south end of this level. This is a continuous body of ore that has been followed from the croppings down a distance of 750 feet. The present appearances are, that the quality and quantity of ore is getting better. Sinking is about to be commenced on the sixth level. The ten-stamp mill belonging to the company runs sixteen hours daily, milling sufficient ore to be worked by seven settlers and thirteen pans.

Under date June 18th, Superintendent Allen writes from Silver Reef: In winze 15, we are down 41 feet, and have good ore all the way, with an unusually well-marked hanging wall, a favorable indication for the continuation of ore. Assays from the face yesterday showed 26 inches of $140 rock.

WYOMING.

According to the local papers, the mines in Silver Crown District are now worked with an energy well worthy of Western enterprise. On some of them night and day shifts are employed. The owners have had much to contend with in the past, but their perseverance has even now well-nigh brought them their reward. While the ore in the main is of low grade, there are found rich "pay-streaks," some of which assay very high; and if the anticipations of those interested are realized, it is confidently expected that a smelter will be in operation in the district within the next year.

The new discovery located on the Rabbit Ear range of mountains is situated in Red Cañon, about ninety miles from Laramie, in a country which has never yet been prospected. Numerous assays and tests of the ore have been made, and it runs high in copper, and $16 in gold, and $5 silver. This is from the surface, comparatively; for no considerable depth has been reached. It is the intention to sink about six shafts of forty feet each on the two claims, and, if the mines then warrant it, a smelter will be put in. Six men are at work on the mines.

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Par Value.	Assessments. Total levied to date.	Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. June 23. H.	June 23. L.	June 25. H.	June 25. L.	June 26. H.	June 26. L.	June 27. H.	June 27. L.	June 28. H.	June 28. L.	June 29. H.	June 29. L.	Sales.	§
1	Advance M & M. Co.	Nevada	$15,000,000	150,000	$100	$547,500	March	1883	.50														S. F.
2	Albion, s. l.	Michigan	2,000,000	80,000	25	200,000	January	1883															B.
3	Allonez, c.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50														S. F.
4	Alpha Con., g. s.	Nevada	10,080,000	100,800	100	2,112,090	April	1883	.25														S. F.
5	Alta, s.	Nevada	5,000,000	500,000	10											.02						2,000	
6	Alta-Montana, g. s. l.	Montana	5,000,000	500,000	10																		
7	American Flag, s.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25														
8	Barcelona, g.	Nevada	5,000,000	200,000	25	*																	
9	Battle Creek																						
10	Bear Creek	California	300,000	300,000	1																		
11	Beauce																						S. F.
12	Bechtel Con., g.	California	10,000,000	100,000	100	185,000	January	1883	.10														S. F.
13	Best & Belcher, g. s.	Nevada	10,080,000	100,800	100	1,396,190	May	1883	.50														
14	Big Pittsburg, s. l.	Colorado	20,000,000	200,000	100	*																	
15	Black Jack, g.	California	250,000	100,000	2½																		
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	
17	Bonanza King, g. s.	California	1,000,000	10,000	100	*																	
18	Bondholder	Colorado	500,000	200,000	2½				.25														
19	Boston Con., g.	California	10,000,000	100,000	100	95,000	October	1882															
20	Boulder Con.	Colorado																.31	.30			2,100	
21	Bradshaw, s.	Arizona	2,250,000	225,000	10																		
22	Buckeye	Colorado	2,000,000	400,000	5	*																	
23	" preferred	Colorado																					
24	Bull-Domingo, s. l.	Colorado	10,000,000	200,000	50	*																	S. F.
25	Bullion, g. s.	Nevada	10,000,000	100,000	100	3,767,000	May	1883	.20														
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	
27	Calaveras, g.	California	500,000	500,000	1	*																	
28	Cal. W'r & M. Co., g.	California																		.85		100	
29	Caledonia, s. H., g.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15														
30	Catskill, s.	Nevada	1,500,000	300,000	5																	400	B.
31	Central Arizona, s.	Arizona	10,000,000	100,000	100					.30		.27		.30									
32	Chapparal	California																.03				200	
33	Cherokee, g.	California	1,500,000	150,000	10																		S. F.
34	Chollar, s.	Nevada	11,200,000	112,000	100	521,000	March	1883	.50													4,500	
35	Climax									.09	.08	.09		.08		.09	.08	.11	.10	.13			
36	Colorado Central, s.	Colorado	3,000,000	300,000	10																		
37	Columbia Con., g. s.	Nevada	5,000,000	100,000	50																	500	
38	Con. Imperial, g. s.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05			.07	.06										
39	Con. Pacific, g.	California	6,000,000	60,000	100	150,000	March	1883	.15														B.
40	Crescent, s. l.	Colorado	3,000,000	300,000	10	*																	
41	Crowell, g.	North Car.	500,000	500,000	1																		
42	Dahlonega, g.	Georgia	250,000	250,000	1	*								.03								200	
43	Dardanelles, g.	California	1,000,000	100,000	10																		
44	Decatur									.05		.05				.05				.05	.04	10,400	
45	Dunderberg, s.	Colorado	1,500,000	150,000	10	*																1,500	
46	Durango, g.	Colorado	500,000	500,000	1	*				.07						.06							
47	Eastern Oregon									.51	.48	.50	.48	.55	.49	.56	.52	.57	.56	.57	.55	10,900	
48	Elko Con., s.	Nevada					April	1883	.15	.31	.29	.29	.25	.25	.23	.24	.22	.22	.20	.20		12,900	
49	Empire, s.	Utah	10,000,000	100,000	100																		B.
50	Enterprise	Colorado																					
51	Eureka Con.	Nevada	10,000,000	100,000	100	650,000	June	1883	.20														
52	Fannie Barret, s.	Colorado																					
53	Globe Copper	Arizona																					
54	Gold Placer, g.	Colorado	5,000,000	200,000	25	*																1,500	
55	Goodshaw, g.	California	10,000,000	100,000	100	210,000	June	1883	.10	.04													
56	Granville, g.	North Car.	300,000	300,000	1	*																1,100	B.
57	Harlem M. & M. Co, g.	California								1.40				1.40		1.40		1.40					
58	Harshaw, s.	Arizona	10,000,000	100,000	100																		
59	Head Center, s.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20														
60	Hortense, s.	Colorado	2,000,000	200,000	10																		
61	Julia, g. s.	Nevada	11,000,000	110,000	100	1,405,000	April	1883	.10														
62	Kossuth, g. s.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15														
63	Lacrosse, g.	Colorado	1,000,000	100,000	10	*												.10				100	
64	Leviathan, s.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														
65	Lucerne, s.	Colorado	5,000,000	500,000	10	*																	
66	Mariposa pref., g.	California	5,000,000	50,000	100	1,687,500	December	1881															
67	" common, g.	California	10,000,000	100,000	100	1,975,000	February	1883	.25														
68	May Belle, g.	California	10,000,000	100,000	100	34,000	December	1881	.20														
69	Mayflower, s.	Colorado	10,000,000	100,000	100	*																	S. F.
70	Mexican, g. s.	Nevada	10,000,000	100,800	100	2,269,000	February	1883	1.00														
71	Michoacan Synd.	Mexico																					
72	Miner Boy, g. s. l.	Colorado	5,000,000	500,000	10	*																	
73	Miller	Nevada	5,000,000	200,000	25																		S. F.
74	Mono, g.	California	5,000,000	50,000	100	535,000	January	1883	.20														
75	Moose Silver, s.	Colorado	3,000,000	300,000	10	*																	
76	Moulton, g. s.	Montana	10,000,000	400,000	25	*																	
77	Nevada Syndicate																					200	
78	North Standard, g.	California	10,000,000	100,000	100	20,000	November	1881	.10	.10													
79	North Horn-Sil., s. l.	Utah		400,000																			S. F.
80	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00														
81	Old Dominion, c.	Arizona	3,000,000	300,000	10	*																	
82	Oriental	Nevada	2,000,000	200,000	10																	600	
83	Oriental & Miller, s.	Nevada	10,000,000	400,000	25							.15		.15									S. F.
84	Overman, g. s.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25														
85	Parnell													.45				.45	.42	.44	.43	2,500	S. F.
86	Potosi	Nevada	10,200,000	112,000	100	556,040	May	1883	.25														
87	Quartz Creek				100																		
88	Rappahannock, g.	Virginia		250,000		*				.09						.08				.08	.07	4,300	
89	Red Elephant, s.	Colorado	500,000	500,000	1	*																	
90	Retort M. & M. Co.	Colorado			10																		
91	San Pedro, g. s. l.	New Mex.		400,000																			
92	Silver Cliff, s.	Colorado	5,000,000	200,000	25	*								.16								200	B., P.
93	Silver Islet	Canada	1,000,000	40,000	25																		
94	Sonora Con.	Mexico								.23	.21			.20	.18			.10		.19		11,400	
95	South Bodie, g.	California		100,000		100,000	March	1882	.15														
96	South Bulwer, g.	California	10,000,000	100,000	100	195,000	May	1881	.25														
97	South Hite	California	10,000,000	100,000	100		January	1883	.05														
98	South Pacific	California			5																		B.
99	State Line, No. 1, s.	Nevada	200,000	200,000	1																		
100	" No. 2, s.	Nevada	5,000,000	200,000	25																		
101	" No. 3, s.	Nevada	5,000,000	200,000	25																		
102	" No. 4, s.	Nevada	5,000,000	200,000	25																		
103	" Nos. 1 and 4, s.	Nevada			25	*																	
104	" Nos. 2 and 3, s.	Nevada																					
105	Sullivan, g. s. l.	Maine	500,000	100,000	5	125,000	December	1882	.25														
106	Sutro Tunnel	Nevada		2,000,000		*																14,900	B.
107	Taylor-Plumas	California			10																		B., P.
108	Tioga, g.	California	10,000,000	100,000	100	285,000	October	1882	.10														
109	Tuscarora, s.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														
110	Unadilla, s.	Colorado	50,000,000	500,000	100	*																	
111	Union Con., g. s.	Nevada	10,000,000	100,000	100	1,620,000	May	1883	.50														
112	Utah, s.	Nevada	2,000,000	20,000	100	1,400,000	May	1883	1.00									5.00				200	
113	Vandewater	Nevada	20,000,000	200,000	100	*																	S. F.
114	Washington	Arizona	2,000,000	200,000	10																		
115	Whalen Copper	Nevada	2,500,000	100,000	25																		
116	Wide West																						
117	Willshire	California	250,000	50,000	5	*																	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 82,700. Total shares sold, 138,740.

an active business at steady prices; it sold from 19@21c.

The Leadville stocks record a moderate business at steady prices. Amie was quiet and a little weak, selling from 18@16c. Chrysolite was steady at $1.15, the sales amounting to 300 shares. Dunkin sold at 20c., and Hibernia at 4c. Iron Silver had a small business at steady prices, selling from $3@2.95. Leadville sold at 56c., with one transaction. Little Chief was quiet and a little weak, selling from 57@58c. Little Pittsburg declined from its strong prices of last week, selling from $1.10@99c., with a fair business. Climax showed a little strength and activity; it sold from 8@13c.

The Bodie stocks were quiet at weak prices. Bodie Consolidated sold from $1@98c. with a small business. Standard was quiet and strong, selling from $6.63@$7. Bulwer has been weak, under moderate transactions, selling from 85@75c. Goodshaw sold at 4c., and North Standard sold at 10c.

The favorites of the Tuscarora stocks were strong, while the low-priced stocks were generally weak. The business done in them was small. Belle Isle had a fair business at irregular prices, selling

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from 50@60@54c. Navajo showed considerable strength, selling from $2.35@$4.15, with a small business. Independence was quiet and strong, selling at $1. Grand Prize has levied an assessment of twenty-five cents, and was, in consequence, quite weak, selling from 30@12@16c., with small transactions. Argenta was quiet and weak, declining from 30@20c. Elko Consolidated has been active and weak, selling from 31@20c.

In the miscellaneous list, Alice was quiet and steady at $2.50. Caribou was steady at 13c., the transactions being small. Eureka Consolidated has been very strong, under a small business, selling from $4.90@$8. Horn Silver has gained some strength, under a fair business, and has sold from $6.63 @$7.75@$7.50. Northern Belle was quiet and strong to-day, selling from $6.88@$7. The company has passed its usual monthly dividend. Ontario, with a small business, has been irregular, selling from $26⅛@$27@$26¼. Robinson Consolidated records an active business at irregular prices; it sold from 50@61@56c., the business aggregating 15,200 shares. Sierra Grande was active and irregular, selling from $1.20@$1.45@$1.25. Silver King had a small business at steady prices, selling at $10.25. Stormont was quiet and strong, selling from 20@40c.

Alta-Montana has been quiet and weak at 2c. Bradshaw sold at 31@30c., with small transactions. Caledonia sold at 85c. Central Arizona was quiet and steady, selling from 27@30c. Decatur had a small business at steady prices, selling at 5@4c. Durango sold at 7@6c., the business being small. Eastern Oregon was active and strong, selling from 48 @57c., the transactions aggregating 10,900 shares. Harlem was quiet and steady at $1.40. Oriental & Miller sold at 15c. with a small business. Rappahannock sold from 9@7c. Sonora Consolidated had an active business at weak prices; it sold from 23@18@ 19c. Parnell is the name of a new stock dealt in for the first time this week; it was quiet and irregular at 45 @42@44c. The property of the company consists of twelve mining claims located on London Mountain, Mosquito District, Park County, Colorado, and is on the same mineral lode as the London Mining Company's property, which has proved quite valuable.

PIPE LINE CERTIFICATES.

The petroleum market opened very dull this week; and up to Thursday, the fluctuations were of a very quiet character, with a tendency to lower prices. On Thursday, there was an active spurt in the market, and the price closed stronger than for some days past. To-day, the price has been strong and the market active.

The news from the oil districts states that on Monday last the new Grandin No. 9 well was yielding 225 barrels a day, the Balltown No. 3 was flowing at the rate of twenty barrels an hour, and the Porcupine No. 6, after being torpedoed, was flowing at the rate of 150 barrels. Thursday, it was reported that the production of the Balltown District for the last twenty-four hours was 2504 barrels from twenty-two producing wells, against 2931 barrels on last Friday. There are six wells drilling and eleven rigs up and building in this district. With no permanent increase reported in the productiveness of the oil regions, the pipe line runs continue to exceed the deliveries, and to June 26th the figures are: Runs, 1,700,847 barrels; average per day, 65,417; deliveries, 1,534,222; average, 50,009; excess runs, 166,625 barrels; average per day, 6408 barrels. To-day's reports state that Balltown No. 7 well is flowing 80 barrels from the top sand; but owing to disputed ownership, it will not be opened at present. It is now stated that the monthly report will be more favorable than was expected, and that it will show a marked decline in developments. There are now only eight wells drilling in and around the Cooper tract, and the production is dropping rapidly.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
June	23....	$1.16⅞	$1.16⅞	$1.15½	$1.15⅝	1,438,000
	25....	1.15½	1.16¾	1.15½	1.16	1,495,000
	26....	1.16⅛	1.16⅝	1.15⅝	1.15⅞	1,142,000
	27....	1.15¾	1.16⅛	1.15½	1.15½	786,000
	28....	1.15½	1.17⅝	1.15¼	1.17⅝	2,423,000
	29....	1.18¾	1.18¾	1.17¾	1.17¾	2,226,000
Total sales.						9,510,000

DIVIDENDS.

The Lexington Mining Company, of Montana, has declared a dividend (No. 1) of twenty-five francs per share, payable July 1st, at the office of the Crédit Mobilier, 15 Place Vendôme, Paris, France.

The Oxford Gold Mining Company, of Nova Scotia, has declared a dividend of five per cent on the capital stock, payable June 25th.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF JUNE, AND FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of June.	Since January 1, 1883.
Atlantic, c.	Mich.		$80,000
Bassick, s.	Colo.	$100,000	200,000
Black Bear, G.	Cal.		6,000
Boston & Montana, G.	Mont.		10,000
Bulwer Consolidated, G.	Cal.		20,000
California, G.	Colo.		7,500
Calumet & Hecla, c.	Mich.		1,000,000
Carbonate Hill, s.	Colo.	10,000	50,000
Castle Creek, G.	Idaho.	3,000	18,000
Catalpa, s.	Colo.		30,000
Central, c.	Mich.		60,000
Christy, s. L.	Utah.		6,000
Colorado United, s.	Colo.		16,750
Contention, s.	Ariz.	62,500	375,000
Con. Gold M. Co. of Ga.	Ga.	4,000	24,000
Copper Queen, c.	Ariz.		250,000
Cosmopolitan.	Utah.		50,000
Crescent, c.	"	50,000	100,000
Deadwood-Terra, G.	Dak.		20,000
Father de Smet, G.	"		60,000
Gem, s.	Colo.		7,500
Glen, s.	"		3,000
Granite, s.	"		3,750
Hecla, s.	Mont.	15,000	90,000
Henriett, s	Colo.		27,000
Holyoke, G.	Idaho.	4,000	24,000
Homestake, G.	Dak.	50,000	300,000
Hope, s. c. L.	Mont.		12,000
Horn-Silver, s. L.	Utah.		600,000
Idaho, G.	Cal.	7,750	46,500
Indian Spring Drift.	"		1,000
Iron Silver, s. L.	Colo.	100,000	200,000
Jocuistita, s.	Mexico.		100,000
Kentuck, s.	Nev.	3,000	18,000
Leadville Consolidated, s.	Colo.		40,000
Navajo, G. s.	Nev.		125,000
Northern Belle, s.	"		100,000
Ontario, s. L.	Utah.		75,000
Osceola Consolidated, c.	Mich.		50,000
Oxford, G.	N. S.	5,000	20,000
Prussian, s. L.	Colo.		15,000
Quincy, c.	Mich.		240,000
Richmond, s. L.	Nev.		202,500
San Francisco, c.	Cal.		2,500
Shoshone, G.	Idaho.		6,000
Sierra Buttes, G.	Cal.		30,625
Sierra Grande, s.	New Mex.		400,000
Silver King, s.	Ariz.	25,000	150,000
Smuggler, s.	Colo.		9,000
Standard Cons., G.	Cal.	25,000	150,000
Total Wreck.	Ariz.		50,000
True Fissure, G. s. L.	Utah.	37,500	75,000
United Gregory, G.	Colo.		12,000
		501,750	$5,468,625

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. June 22.	June 23.	June 25.	June 26.	June 27.	June 28.
Albion						
Alpha	1¾	1¾	1⅞	1⅝	2	2
Alta	.50	.55	.50	.55	.45	.45
Bechtel						
Belcher	1⅛	1⅛	1¼	1⅛	1⅛	1¼
Belle Isle	.45	.45	.45	.45	.55	.50
Best & Belcher	4¼	4⅛	4⅛	4⅛	4⅛	4
Bodie	1	1	1	1	.90	.90
Bullion						
California	.20	.20	.20	.15	.10	.10
Challar	3⅞	2⅞	3¼	3	2⅞	3
Con. Virginia	.50	.50	.45	.50	.50	.45
Crown Point	1⅝	1¼	1⅝	1½	1¼	1¼
Elko Cons				.25	.25	.25
Eureka Cons.	5	6	7½	7¼	6½	5
Exchequer	.25	.30	.20	.20	.20	.20
Gould & Curry	2¾	2⅝	2¾	2¾	2½	2¼
Grand Prize	.25	.20	.05	.10	.10	.10
Hale & Norcross	5⅝	6⅞	6½	5⅞	6¼	
Independence	.35		.65	.70	1	.85
Martin White			6⅞	6	5	5
Mexican	2	2¾	3¼	3	2⅞	2¾
Mono						
Mount Diablo		3	3¼	3½	3¼	
Navajo	2¼	2¼	2¾	3	4⅛	3⅛
Northern Belle	6½	6⅝	6½	6¾	6¾	6⅝
North Belle Isle	.45			.35	.45	
Ophir	2¾	2⅛	2¾	2¾	2⅛	2⅛
Overman						
Potosi	1¼	1¼	1⅜	1⅜	1¼	1¼
Savage	2¼	2⅛	2¼	2	1⅞	1⅞
Scorpion						
Sierra Nevada	3⅞	3⅝	4½	3⅝	3¼	3⅝
Silver King		10⅜	10	10		
Tip-Top	.40		.40	.40		
Union Cons.	4⅝	4¾	5⅝	4⅝	4⅜	4¼
Wales Cons.						
Yellow Jacket	3¾	3¾	4	3⅞	3¾	3⅝

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, June 28.

The market for copper stocks continues to rule extremely dull and inactive, the sales for the week hardly amounting to a respectable day's work in ordinary times. There is no pressure to sell stock, neither are there any orders to buy, and consequently business lags, and brokers' commissions are few and far between. Calumet & Hecla sold at $242, at which price any offered is taken. Quincy declined from $49@$48, while Osceola advanced from $19½@ $21, but subsequently declined to $20, at which it is freely offered. There were no sales of Franklin, and only 200 shares of Pewabic sold at $31½@$32, buyer 60. The latest report from the Pewabic is to the effect that a mass of copper of about twenty-five tons was thrown into the opening last week. At the Quincy, the stamp-mill has resumed operations, and the product for June will be fully up to the average output.

The silver stocks are more active, and at the Mining Exchange, there seems to be a revival of the old-time vigor under the lead of Bowman Silver Mining Company, which is the card now, and which fluctuates enough to satisfy the most ardent speculator. The stock closed last week at 42c., from which it declined to 27c. Subsequently it advanced again to 39c., closing yesterday quite strong at 37@38c. This morning, a flood of stock coming on the market sent the price back again to 27@28c. The desire on the part of the shorts to cover strengthened the market, and it closed quite steady at 31@32c. Massachusetts & New Mexico, which has been dull and inactive at 7c., also felt the influence of the better market, and advanced to 9c., at which price about 20,000 shares were marketed. The prospects of the company are more encouraging, and it is quite reasonable to expect the stock to advance to much higher figures. Catalpa has been fairly active; advancing during the week from 60@67½c., with a decline later to 62½c. Sullivan sold at $1⅞@$2. Silver Islet declined to $3; and San Pedro sold at 40c.

3 P.M.—The market was dull this afternoon. A single share of Calumet & Hecla sold at $240. San Pedro declined to $32½. Franklin, $10 bid. Pewabic, $32¼ bid. Quincy offered at $48. Atlantic offered at $12, no bid. Osceola offered at $20. Huron, $1¼ bid. National, $1⅛ bid. Silver Islet, $3 bid. Sullivan, $1½@$1⅞. San Pedro, 30c. bid. Bonanza, $2⅛@$2¼.

BULLION MARKET.

NEW YORK, Friday Evening, June 29.

The rise in the exchanges in India, which caused the recent advance in silver in London, has been lost within a few days, and the market has receded, as shown by the figures of the annexed table, and may be regarded as in suspense for the present.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
June 23	50¾	110¾	June 27	50⅛	110⅛
25	50 11-16	110¾	28	50 7-16	110⅛
26	50 9-16	110½	29	50 7-16	110⅛

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended June 29th, as compiled from various sources, amounted to $138,500, as against $131,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,830,213.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended June 23d	$351,100
Corresponding week last year	1,447,052
Since January 1st, 1883	6,405,704
Corresponding period last year	34,295,437

Imports.

Week ended June 23d	$104,240
Corresponding week last year	46,764
Since January 1st, 1883	6,893,465
Corresponding period last year	1,915,406

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £346,000 bullion, and the proportion of its reserve to its liabilities was raised from 41 to 41 5-16 per cent, against 43 per cent at this date last year. June 28th, the bank made a further gain of £75,000 bullion on balance. The weekly statement of the Bank of France shows losses of 1,154,000 francs gold and 1,144,000 francs silver.

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BOSTON MINING STOCKS.

	June 22.		June 23.		June 25.		June 26.		June 27.		June 28.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Amie													
Atlantic													
Astec													
Bodie Con													
Bonanza D									2.12½	2.06¼			200
Bowman Sil	.38	.30	.30	.28	.29	.27	.39	.35					8,600
Bruns. Ant													
Bulwer													
California					.25								*200
Cal. & Hec									242		242	240	47
Catalpa	.65	.60	.65				.60		.65	.60	.65	.62½	6,450
Central Ariz													
Climax							.09						2.0
Co. Virginia													
Copper F'lls													
Copperop													
Crescent			.28										100
"Cusi"													
Decatur													
Deer Isle			.05										500
Denver City													
Douglas			1.00				1.00						200
Duncan													
Dunkin													
Empire			.20										100
Eureka Con													
Franklin	10.25												20
Hancock G													
Harshaw					.50		.50						350
Huron													
Independ'ce													
Indian Q'n													
Mammoth	.05						.05						400
Mass. & N.M	.08	.07	.08		.09		.09						60,515
Milton													
Napa													
National													
North. Belle													
Ontario													
Osceola	21.00	20.00			20.00		20.00				20.00		71
Penn-Breck													
Pewabic											3.50		200
Pine Tree							.13						1,000
Plymouth													
Quincy			45.63	43.25					48.00		48.00		130
Ridge													
Robinson													
San Pedro									.40		.37½	.32½	600
S'ra Nevada													
S'ra Grande													
Silver Islet	3.50								3.00				110
Silver King													
Simpson Gd													
So. Pacific													
Standard													
Sullivan					2.00	1.88							1,400
Sutro Tun			.22		.21		.22	.21					1,200
Sycamore					.45	.25							2,900
Twin Lead	.13	.12	.14	.13	.14		.15	.14					18,300
Vizina													

PHILADELPHIA MINING STOCKS.

	June 22.		June 23.		June 25.		June 26.		June 27.		June 28.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.20	.18	.28	.20	.22	.20	.22		.23		.28		63,500
Arizona So					.45				.45				1,000
Battle Mt													
Buena					.01								100
California													
Calista													
Chrysolite													
Cincinnati	.11	.10			.11	.09	.12	.11	.12				15,715
Comprom'e	.20		.22								.19	.18	5,000
Contention													
Con. Virg													
Dauntless													
Del Monte													
Denver City	.15	.14	.14						.15				1,900
Eureka													
Girard							.05						1,700
Governor													
Grand Uni'n			.18				.20	.16	.21	.18	.19	.18	25,400
Green Mt													
Gunnison	.42½	.40	.40						.42½		.42½	.40	9,300
Homestake													
Horn Silver													
Iowa Gulch	.10		.10		.11	.10	.12	.11	.12		.12	.11	55,500
Iron Silver													
King Bul'on													
Ledger Con													
Little Dia'd													
Little Maud													
Little Pitts													
L'g & D'y H													
Montana													
Mt. Sheridan	.04				.04				.04				8,300
Navajo													
North'n B'l													
Orion					.04								225
Orion Pref													
Palmetto E.	.02												5,000
Pembina			.14								.15		1,500
Penn-Breck	.11	.09	.10		.11	.10	.11	.10	.11	.09	.12	.11	26,700
Permanent							.02		.02				4,000
Pizarro													
Pizarro Ex													
Potosi													
Rara Avis													
Rara Avis E.	.09		.09		.09		.09		.09		.09		8,600
Record													
Rico Pion'r													
Sierra Apac	.30		.30		.30		.30						5,200
Sierra Bella	.70	.67½	.70	.65	.65		.60				.61		3,600
Sierra G'nde	1.13		1 17½	1.15	1.25	1.20	1.42½	1.25	1.25	1.12½	1.25	1.17½	19,750
Sierra Nev													
Silver Cord							1.70						300
Silver King													
Sil'r Plume	.02		.02				.02						7,000
Sonora Con													
Standard													
Sultana	.04												1,000
Sutro Tun'l													
Tombstone	.87½		.90	.87½	.92½	.90	.95				1.00	.97½	9,300
Victor			.02						.02				5,200
Yale Mt													

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of May.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$320,419
*Alta-Montana, G. L. S.	"		§10,625
*Belmont	"		17,775
Bodie, G. S.	Cal	9,248	100,590
Bodie Tunnel, G.	"	6,128	51,447
*Bonanza King, G.	"		199,077
*Boston & Montana, G.	Mont		72,318
*Central Arizona, S.	Ariz		35,845
*Christy, S.	Utah		92,654
*Chrysolite, S. L.	Colo	§45,413	192,971
Cons. Bobtail	Colo		18,723
*Contention, S.	Ariz		383,014
Crescent, G.	Cal		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		120,231
*Derbec Blue Gravel, G. S.	Cal	12,885	44,729
Evening Star, S. L.	Colo		47,061
*Father de Smet, G.	Dak	25,120	153,105
*Frisco M. and S. Co., G. S. L.	Utah		§77,084
Gunnell, S.	Colo	13,772	58,828
*Head Center Cons.	Ariz		6,865
*Head Center and Tranquillity	Ariz		18,486
*Hecla Cons., G. S.	Mont		234,984
*Homestake, G.	Dak		330,060
*Hope, S	Mont	21,389	41,963
Horn-Silver, S. L.	Utah	228,000	1,283,000
Idaho, G.	Cal		85,642
*Independence, G. S.	Nev		34,722
Iron Silver, S. L.	Colo	127,109	503,831
*Kentuck, G. S.	Nev		8,237
*Lexington, S.	Mont	109,629	530,833
*Little Pittsburg, S. L.	Colo		22,873
*Marguerite, G.	Cal		33,200
*Martin White, G. S	Nev		136,317
Morning Star, S. D	Colo		84,428
*Moulton, G. S.	Mont		123,288
Mount Diablo	Nev	52,233	127,311
*Navajo, G. S.	"		281,626
*North Belle Isle	"	45,510	1,953
Northern Belle, S.	"		388,525
*Ontario, S. L.	Utah		807,695
*Oxford, G.	N. S.	6,855	28,179
*Phœnix, G	S. C.		†3,666
*Pinal Cons., S. L.	Ariz	25,540	163,400
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		101,241
Standard, G.	Cal	71,313	442,796
Star, S.	Nev		27,095
*Stormont, S.	Utah	21,377	95,658
Syndicate, G.	Cal	5,987	20,073
Tintic M. and M. Co.	Utah		7,632
*Tip Top, S.	Ariz		‡22,983
*Tombstone, G. S.	"	76,600	‡322,830
Wyoming Cons	Cal		31,541
Yellow Jacket, S.	Nev	30,191	183,064
Total amount of shipments to date			$8,684,864

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, June 29.

Copper.—Beyond trifling sales of a jobbing character, there is nothing to report. Lake is nominally 18⅛@18¼c., and other brands 14@14⅛c. England cables, f. o. b., Chili Bars, £64 10s.; and Best Selected, £70; prices, therefore, being very well maintained there.

Tin.—*Business is picking up.* There is a good jobbing demand, and the spot stocks are concentrating in a few strong hands. We quote spot Straits and Malacca, 21⅛c.; Australian, 21⅝@21¾c., with sales at 21⅝c.; Banca, 22c.; and Lamb & Flag, 21¼c.

Lead.—Our market has remained dull and featureless. It seems that manufacturers have pretty well supplied themselves by purchases for future delivery, and the fear is expressed that stocks may accumulate here unduly. The business in Refined lead for the year thus far has been exceptionally light in the East. Spot lead is freely offered at 4·40c.

We note sales of about 500 tons of Common and some Refined, for August delivery, at 4·40c, 4·42½c., and 4·45c.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is unchanged. We quote refined 4·13c. Of Hard lead, there have been no sales; it is quoted nominally at 4·12½c. Refined is offered at 4·15c. for July delivery.

Messrs. Everett & Post send us the following dispatch:

There has been considerably more inquiry for both Hard and Soft lead, and though only little business has been done, sellers ask a slight advance. Sales aggregate 650 tons of Common and Refined at 4·15c. and 4·20c. We close nominally 4·17½c. and 4·20c.

Spelter.—The market continues dull, with little business transacting. Quotations are nominally 4·50 @4·60c. for good ordinary Domestic.

Antimony.—The feeling is a trifle better, notably so far as Cookson's is concerned, which we quote 10½ @10⅝c., while Hallett's is less firm at 9½@9⅝c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 29.

American Pig.—The improvement in the standard grades of foundry pig noted in our last has gained in strength, and the best brands of No. 1 are now held at $23@$23.50 for delivery in September and October. We may note, as showing an increasing interest in the Metal Exchange, that there were sold there to-day 800 tons of No. 1 Pig at $23 and $23¼ for September delivery, and $23½ for October delivery. Furnace agents report sales of upward of 8000 tons, the bulk of it Thomas No. 2 and Forge, at $20 and $19. The Thomas Iron Company now declines to sell even to regular customers at former figures, and quotes $20 and $22 now for No. 2 and No. 1 Foundry. The heroic cure, against which there were so many vehement protests, has brought a healthier tone into the market much earlier than it would have been reached by a lingering period of gradual weeding out of the weak elements. Thus far, the improvement is confined to No. 1, which we quote $21@$23 good to choice grades, spot cash at tidewater. No. 2 is worth $18.50@$20 and Gray Forge $18@$19.50. Bessemer Pig is quiet at $21 asked, foreign cables being 50@51s. Spiegeleisen is dull and quiet, with quotations at $31.50@$32 for 20 per cent, $47@$48 for 40 per cent, and $25.50@$26 for 10 to 12 per cent.

Scotch Pig.—Business here has been of a restricted character, though there is a more hopeful feeling, in sympathy with the better tone in the higher grades of American pig. The arrivals continue at the average scale, about 1000 tons per week, while freights are firm at 7s. 6d.

At the Exchange, the following cable quotations were received yesterday: Coltness, 60s.; Langloan, 59s. 6d.; Summerlee, 57s. 3d; Gartsherrie, 57s. 6d.; Glengarnock, at Ardrossan, 54s.; and Eglinton, at Ardrossan, 48s. Warrants to-day were 47s. We quote here, all ex ship, Coltness, $24@$24.50; Langloan $24; Summerlee, $23.50@$24; Gartsherrie, $23.50 @$24; Glengarnock, $22; and Eglinton, $21.

Rails.—During the week, one order has been placed of 10,000 tons at $37.50 at mill, and another order for the same amount is on the market, both we understand, for fall and early winter delivery, for which

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$37.50@$38 may be considered the ruling quotation, though some buyers seem unwilling to go so high. For summer delivery, a few small lots may be placed at $38@$38.50 at mill. England cables £4 15s.@ £4 17s. 6d.

Old Rails.—The market is quiet and dull, with bids at $21@$21.50 for Ts.

Scrap.—We have no business of consequence to report, the market remaining dull at $22.50@$23 for No. 1, ex ship.

Philadelphia. June 29.

The situation of the Eastern Pennsylvania iron trade has not improved during the past week, on account of the closing of the season and the indisposition of large buyers to enter into any contracts for summer or fall requirements. There are no special causes depressing the market, but a wholesome conservatism prevails in iron-trade circles, growing out of the happenings of the past sixty days. Things have not gone exactly as was expected. If the necessary restriction of output takes place, those who stay to enjoy the trade will find no trouble in maintaining remunerative rates; but should all conclude to stay and divide the business, there will be a vigorous and unhealthy competition, which will for a while retard demand, rather than stimulate it. The full output in the West is the chief disturbing factor in the iron trade. The manufacturers of specialties there possess some advantages which enable them to crowd down the plain bar manufacturers East on prices. The fraternal feeling generated in consequence of this operation of competitive forces is not overwhelming. Leading manufacturers, in summing up the half-year's work, say that, on the whole, it has been as good as the average of six or seven years past, and that the indications for the midsummer and fall trade are satisfactory to them. There is a fair run of orders. Prices have been well maintained. The demand is widening, and there are no special reasons for anticipating any sudden breaking-up of the favorable conditions surrounding the trade. To what extent restriction may become necessary is a problem which will be determined in a few weeks. Meanwhile, bar mill men will repair, take stock, settle up, and wait to see what will be developed. Unless iron can be made at present cost and sold at present prices, there will be no strong inducement to begin soon. A great deal of Bar iron has been selling within a few days in a small way, at 2·10@2·15c., and only the finest makes command more. The storekeepers report a fair run of retail trade. Country mills are, in some cases, short of orders, and hence the competition referred to. Others have some orders for car iron, which will last them a few weeks. The railroad requirements are a strong support to the trade, and a good deal of iron for such purposes will be needed before winter. Inquiries have been made for 100-ton lots for July and August, but in most instances heard of, nothing was consummated, as manufacturers see no room for further concessions so far ahead.

Pig-Iron.—Brokers are not doing much excepting in No. 1 Foundry. This is scarce, and the special brands seem to be either sold up or virtually contracted for by regular customers. The limit of prices is about $20@$23.50 at shipping port, although in some few cases less and more have been taken. The supply of No. 1 is short in makers' hands, and consumers seem to have permitted stocks to run unnecessarily low, and the makers think they will pay the penalty before the summer is over, as the output is not as great as in cold weather. No. 2 has been the football of the market for some weeks, and is now developing more strength, reflected on it by the greater firmness of No. 1. Foreign irons are not worthy of a line this week.

Plate and Tank Iron.—The business in sight for July, if secured, will satisfy the successful competitors for a few good lots of iron. As a general thing, plate is bought in small lots, on account of the notion of buyers and contractors that present prices are not the lowest. Tank ranges from 2·30@2·40c.; Shell, 3@3·25c.; Flange, 4@4·10c.

The boat-yards and ship-yards and some locomotive-works have been making inquiry for a good deal of iron to be delivered through the summer.

Structural Shapes.—Quotations are, for Angles, 2·4[illegible]c.; Beams and Channels, 3·20c., with concessions on heavy orders, which are rare. The situation at the mills is satisfactory, and a busy summer is assured. Inquiries for a few large lots are on the market, but will not be placed until after next week.

Sheet-Iron.—All the sheet-iron manufacturers are busy, and some of them have gathered up enough orders to last them over summer. Consumptive requirements are large enough for the capacity, and hence makers say that prices will remain about where they are. Card rates are 4@4½c., though retail lots command a little more. Large orders are taken at less. Galvanized is 40 per cent off for best, and 35 for next best. Shipments for the last few days have been unusually large.

The hardware trade is doing very little at present outside of the usual season goods, which are in active demand.

The discounts on wrought pipes are 70 per cent, and on tubes, 57½@60, and large manufacturers report business mostly of a retail character.

Old material is without any activity. Steel rails are firm on reported quotations, and, after the turn of the season, manufacturers look for large orders for winter delivery. Cargo Scrap, $23; English Tees, $22, without sale; Double-Heads, $25@$26; Selected Scrap, $24.

Pittsburg. June 28.

The undertone of the Western Pennsylvania iron market is less satisfactory than last week. Leading manufacturers, interviewed with reference to the prospects of the trade, express the opinion that there is very little improvement to be hoped for, as long as the present output is maintained; that the policy of full production is at variance with the interests of the iron trade; and that a reaction will take place, sooner or later. Business is dull in all departments. Current requirements have been restricted, and transactions with reference to future requirements are extremely rare. Something of the nature of a shut-down is believed to be necessary, and this will be inaugurated next week, by the going out for the repairs incident to the season. The local furnaces supply the mill requirements, and stocks are accumulating at the valley furnaces. A further restriction in the output of both furnaces and mills must take place.

Gray Forge Iron, lake ore, $17; Bessemer, $21.50; No. 2 Refined, $18.50; White and Mottled, $16@$17. Muck Bar is extremely dull at nominally $34. Some mills on Merchant Iron have stopped, and some will shut down in a few days. Ordinary quotations are 1·90@2c., but sales have been made as low down as 1·75c. in occasional cases. Shipments of nails have been made from Pittsburg and Wheeling. Stocks are light, and prices firm at $2.90@$3. Steam Pipes are 70 and 10; Boiler Tubes, 55 and 5. Oil-well Casing, 45@50c. per foot. Heavy shipments of Steel Rails are made by river, and new orders are coming in at $38.50. Old Rails are in active request, and are selling freely at $22.50@$25. Scrap is without any activity whatever. The trade is at a standstill, and nothing but a general rest will improve prices.

Cleveland. June 26.

We have nothing special to note for the past week, the situation remaining about the same. While there is no real advance in prices, the tendency is upward. Western furnaces very generally expect to blow out; this would undoubtedly in a measure help Eastern furnaces. There has been more ore sold for the past week than for a corresponding period for some time. We quote:

No. 1 Bessemer	$21.00@$22.00
" 1 Foundry, all ore	20.00@ 21.00
" 1 Foundry, cinder mixture	19.00@ 20.00
" 1 Soft Foundry	20.00@ 21.50
" 1 Open Silvery	19.50@ 20.00
Mill irons	18.00@ 19.00
4 months f. o. b. cars furnaces.	
Nos. 1 and 2 Charcoal	$24.00@$26.00
" 3, 4, 5, and 6 Charcoal	25.00@ 26.50
Hanging Rock Charcoal	23.00@ 25.00
Strictly Cold-Blast Charcoal	25.00@ 30.00
4 months f. o. b. cars Cleveland.	
Bessemer ores	$7.00@$8.00
Hematite ores	5.00@ 6.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 29.

Anthracite.

There is some activity shown by commission men and dealers to secure coal at present prices, and some of the companies report heavy sales. In other quarters, the market is quiet. There is little doubt now that the advance noted previously will be asked, but it remains to be seen whether it will be generally secured.

The following figures will be of interest to the trade as showing what wide differences exist among some of the companies in promptly shipping their coal:

Port Richmond, Philadelphia & Reading Railroad.

	Tons.
Shipments to November 30th, 1882	2,017,896
Of which wheeled (41 per cent)	841,805

Perth Amboy, Lehigh Valley Railroad.

	Tons.
Shipments to November 30th, 1882	1,791,755
Of which wheeled (19·57 per cent)	350,631

Port Johnson, Lehigh & Wilkes-Barre Coal Co.

	Tons.
Shipments to November 30th, 1882	1,417,662
Of which wheeled (9 per cent)	129,274

South Amboy, Lehigh Pier, Pennsylvania Railroad.

	Tons.
Shipments to November 30th, 1882	486,614
Of which wheeled (40·3 per cent.)	196,158

South Amboy, Wyoming Pier, Pennsylvania Railroad.

	Tons
Shipments to November 30th, 1882	347,323
Of which wheeled (32·3 per cent.)	112,019

Harbor freights show a tendency to stiffen, while Eastern freights are less strong.

Bituminous.

There is nothing of interest to report. Current business is still remarkably slack, and concessions appear to be freely made.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended June 23d and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co..	99,563	1,702,682	84,172	1,539,120
D. L. & W. RR. Co.	122,428	2,139,497	107,431	2,014,921
Penna. Coal Co.....	37,605	600,738	38,378	581,205
L. V. RR. Co.....	39,986	505,529	19,290	512,000
P. & N. Y. RR. Co..	4,403	93,805	4,189	95,184
C. RR. of N. J.....	56,048	1,147,785	59,396	1,093,045
Penna. Canal Co....	14,521	151,047	15,392	173,287
North & West Br. RR.	7,302	216,355	.....	.....
	381,856	6,557,438	328,248	6,008,762
Lehigh Region.				
L. V. RR. Co.....	116,291	2,217,080	117,131	2,171,322
C. RR. of N. J.....	62,148	1,059,302	55,340	996,574
S. H. & W. B. RR..	1,783	23,680	.....	20,000
	180,222	3,300,062	172,471	3,187,896
Schuylkill Region.				
P. & R. RR. Co.....	181,762	3,138,081	175,939	2,922,568
Shamokin & Lykens Val.....	34,874	624,543	29,252	546,017
	216,636	3,762,624	205,191	3,468,585
Sullivan Region.				
St Line&Sul.RR.Co.	1,677	29,117	1,627	27,070
Total	780,391	13,649,241	707,537	12,692,313
Increase.....	.....	2,956,928	.....	.....
Decrease.....	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878	7,212,065 tons.
" " " " 1879	12,033,998 "
" " " " 1880	10,321,876 "
" " " " 1881	12,577,684 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 330,060 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended June 23d:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	4,617	42,860	29,075
Coal for shipment at South Amboy	21,127	390,842	372,999
Coal for distribution	17,392	374,414	332,862
Coal for company's use	2,868	70,400	61,340
Total	45,004	878,516	796,876
Increase	.....	81,640	.....
Decrease	.....	.....	.....

The Transportation of Coke over the Pennsylvania Railroad for the week ended June 23d and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	526	49,426
West Penn. RR.	2,003	51,413
Southwest Penn. RR	42,742	988,194
Penn. & Westmoreland Region, Pa. RR	4,066	110,196
Pittsburg, Penn. RR	31	454
Snow Shoe (Clearfield Region)	489	9,971
Total	49,857	1,189,654

Horsford's Acid Phosphate,

A Reliable Article.

Dr. E. CUTTER, Boston, Mass., says: "I found it to realize the expectations raised, and regard it as a reliable article."

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Bassick Mining Co., Colo.
Belcher Mining Co., Nev.
Belle Isle Mining Co., Nev.
Birdseye Mining Co., Cal.
Black Bear Mining Co., Cal.
Bodie Consolidated Mining Co., Cal.
Bonanza Development Mining Co., Mont. [Mont.
Boston & Montana Mining Co.,
Breece Mining Co., Colo.
Bulwer Mining Co., Cal.
California Mining Co., Nev.
Calumet & Hecla Mining Co., Mich.
Carbonate Hill Mining Co., Colo.
Caribou Consolidated Mining Co., Colo.
Carolina Queen Mining Co., N. C.
Castle Creek Mining Co., Idaho.
Catalpa Mining Co., Colo.
Central Mining Co., Mich.
Christy Mining Co., Utah.
Chrysolite Mining Co., Colo. [Ga.
Consolidated Bobtail Mining Co.,
Consolidated Gold Mining Co., Ga.
Consolidated Virginia Mining Co., Nev.
Contention Mining Co., Ariz.
Copper Queen Mining Co., Ariz.
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Crown Point Mining Co., Nev.
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Excelsior Mining Co., Cal.
Father de Smet Mining Co., Dak.
Findley Mining Co., Ga.
Franklin Mining Co., Mich.
Freeland Mining Co., Colo.
Fresno Enterprise Mining Co., Cal.
Gem Mining Co., Colo.
Glass-Pendery Mining Co., Colo.
Glen Mining Co., Colo.
Gold Stripe Mining Co., Cal.
Gould & Curry Mining Co., Nev.
Grand Central Mining Co., Ariz.
Grand Prize Mining Co , Nev.
Granite Mining Co., Colo.
Great Eastern Mining Co., Dak.
Great Western Mining Co., Cal.
Green Mountain Mining Co., Cal.
Hale & Norcross Mining Co.. Nev.
Hall-Anderson Mining Co., N. S.
Hecla Consolidated Mining Co., Mont.
Henriett Mining Co., Colo.
Hibernia Mining Co., Colo.
Holyoke Mining Co., Idaho.
Homestake Mining Co., Dak.
Hope Mining Co., Mont.
Horn-Silver Mining Co., Utah.
Howell Mining Co., Ariz.
Hukill Mining Co., Colo.
Idaho Mining Co., Cal.
Independence Mining Co., Nev.
Indian Queen Mining Co., Nev.
Inyo Mining Co., Cal.
Iron Silver Mining Co., Colo.
Jocuistita Mining Co., Mex.
Kentuck Mining Co., Nev.
La Plata Mining Co., Colo.
Leadville Mining Co., Colo.
Leeds Mining Co., Utah.
Little Chief Mining Co., Colo.
Little Pittsburg Mining Co., Colo.
Marguerite Mining Co., Cal.
Martin White Mining Co., Nev.
Minas Nuevas Mining Co., Mex.
Morning Star Mining Co., Colo.
Mount Diablo Mining Co., Nev.
Mount Pleasant Mining Co., Cal.
Napa Mining Co., Cal.
Navajo Mining Co., Nev.
New York Hill Mining Co., Cal.
New York & Colorado Mining Co., Colo.
North Belle Isle Mining Co., Nev.
Northern Belle Mining Co., Nev.
Ontario Mining Co., Utah.
Ophir Mining Co., Nev.
Osceola Mining Co., Mich.
Oxford Mining Co , N. S.
Pleasant Valley Mining Co., Cal.
Plumas Mining Co., Cal.
Plymouth Mining Co., Cal.
Polonia Mining Co., Colo.,
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Quincy Mining Co., Mich.
Renfrew Mining Co., N. S.
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Robert E. Lee Mining Co., Colo.
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Sierra Nevada Mining Co , Nev.
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Silver Cord Mining Co., Colo.
Silver King Mining Co., Ariz.
Silver King Mining Co., Colo.
Smuggler Mining Co., Colo.
Socorro Mining Co., N. M.
South Yuba Mining Co., Cal.
Spring Valley Mining Co., Cal.
Standard Mining Co., Cal.
St. Joseph Mining Co., Mo.
Tip Top Mining Co., Ariz.
Tombstone Mining Co., Ariz.
True Fissure Mining Co., Utah.
United Gregory Mining Co., Colo.
United Gold Mining Co., Colo.
Vizina Mining Co., Ariz.
Yellow Jacket Mining Co., Nev.
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Advance Mining and Milling Co.
Albion Mining Co., Nev.
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Alta Mining Co., Nev.
Alta-Montana Mining Co., Mont.
American Flag Mining Co., Colo.
Barcelona Mining Co.. Nev.
Battle Creek Mining Co.
Bear Creek Mining Co., Cal.
Beauce Mining Co.
Bechtel Consolidated Mining Co., Cal.
Best & Belcher Mining Co., Nev.
Big Pittsburg Mining Co., Colo.
Black Jack Mining Co., Cal.
Bonanza Chief Mining Co., Mont.
Bonanza King Mining Co., Cal.
Bondholder Mining Co., Colo.
Boston Consolidated Mining Co., Cal.
Boulder Consolidated Mining Co., Colo.
Bradshaw Mining Co., Ariz.
Buckeye Mining Co., Colo.
Bull-Domingo Mining Co., Colo.
Bullion Mining Co., Nev.
Bye and Bye Mining Co., Ariz.
Calaveras Mining Co., Cal.
Calaveras Water and Mining Co., Cal.
Caledonia Mining Co., Dak.
Castle Creek Mining Co , Idaho.
Catskil Mining Co., Nev.
Central Arizona Mining Co., Ariz.
Chapparal Mining Co., Cal.
Cherokee Mining Co., Cal.
Chollar Mining Co., Nev.
Climax Mining Co , Colo.
Colorado Central Mining Co., Colo.
Columbia Consolidated Mining Co., Nev.
Consolidated Imperial Mining Co., Nev. [Cal.
Consolidated Pacific Mining Co.,
Crescent Mining Co., Colo.
Crowell Mining Co., N. C.
Dahlonega Mining Co., Ga.
Dardanelles Mining Co., Cal.
Decatur Mining Co.
Dunderberg Mining Co., Colo.
Durango Mining Co., Colo.
Eastern Oregon Mining Co.
Elko Consolidated Mining Co., Nev.
Empire Mining Co., Utah.
Enterprise Mining Co., Colo.
Exchequer Mining Co , Nev.
Fannie Barret Mining Co., Colo.
Globe Copper Mining Co., Ariz.
Gold Placer Mining Co., Colo.
Goodshaw Mining Co., Cal.
Granite Mountain Mining Co., Mont.
Granville Mining Co., N. C.
Harlem Mining and Milling Co., Cal.
Harshaw Mining Co., Ariz.
Head Center Mining Co., Ariz.
Hortense Mining Co., Colo.
Julia Mining Co , Nev.
Kossuth Mining Co., Nev.
Lacrosse Mining Co., Colo.
Leviathan Mining Co., Nev.
Lucerne Mining Co., Colo.
Mariposa Mining Co., Cal.
May Belle Mining Co., Cal.
Mayflower Mining Co., Colo.
Mexican Mining Co., Nev. [Mex.
Michoacan Syndicate Mining Co.,
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Miner Boy Mining Co., Colo.
Mono Mining Co., Cal.
Moose Mining Co., Colo.
Moulton Mining Co., Mont.
Nevada Syndicate Mining Co.
North Standard Mining Co., Cal.
North Horn-Silver Mining Co., Utah.
Noonday Mining Co., Cal.
Old Dominion Mining Co., Ariz.
Oriental Mining Co., Nev.
Oriental & Miller Mining Co., Nev.
Overman Mining Co., Nev.
Parnell Mining Co.
Potosi Mining Co., Nev.
Quartz Creek Mining Co.
Rappahannock Mining Co., Va.
Red Elephant Mining Co., Colo.
Retort Mining and Milling Co., Colo.
San Pedro Mining Co., New Mex.
Silver Cliff Mining Co., Colo.
Silver Islet Mining Co., Can.
Sonora Consolidated Mining Co., Mexico.
South Bodie Mining Co., Cal.
South Bulwer Mining Co., Cal.
South Hite Mining Co., Cal.
South Pacific Mining Co., Cal.
State Line Mining Co., Nev.
Sullivan Mining Co., Me.
Sutro Tunnel Co., Nev.
Taylor-Plumas Mining Co., Cal.
Tioga Mining Co., Cal.
Tuscarora Mining Co., Nev.
Unadilla Mining Co., Colo. [Nev.
Union Consolidated Mining Co.,
Utah Mining Co., Nev.
Vandewater Mining Co., Nev.
Washington Mining Co., Ariz.
Whalen Copper Mining Co., Nev.
Willshire Mining Co., Cal.

BOSTON STOCKS.

Allouez Mining Co.
Amie Mining Co.
Atlantic Mining Co.
Aztec Mining Co.
Bodie Consolidated Mining Co.
Bonanza Development Mining Co.
Bowman Silver Mining Co.
Brunswick Antimony Mining Co.
Bulwer Mining Co.
California Mining Co.
Calumet & Hecla Mining Co.
Catalpa Mining Co.
Central Arizona Mining Co.
Climax Mining Co.
Consolidated Virginia Mining Co.
Copper Falls Mining Co.
Copperopolis Mining Co.
Crescent Mining Co.
"Cusi" Mining Co.
Decatur Mining Co.
Deer Isle Mining Co.
Denver City Mining Co.
Douglas Mining Co.
Duncan Mining Co.
Dunkin Mining Co.
Elko Consolidated Mining Co.
Empire Mining Co.
Eureka Consolidated Mining Co.
Franklin Mining Co.
Gila County Mining Co.
Hancock Gold Mining Co.
Harshaw Mining Co.
Horn-Silver Mining Co.
Huron Mining Co.
Independence Mining Co.
Indian Queen Mining Co.
Little Pittsburg Mining Co.
Mammoth Mining Co.
Massachusetts & New Mexico Mining Co.
Milton Mining Co.
Napa Mining Co.
National Mining Co.
Northern Belle Mining Co.
Ontario Mining Co.
Osceola Mining Co.
Penn-Breckenridge Mining Co.
Pewabic Mining Co.
Pine Tree Mining Co.
Plymouth Mining Co.
Quincy Mining Co.
Ridge Mining Co.
Robinson Mining Co.
San Pedro Mining Co.
Sierra Grande Mining Co.
Sierra Nevada Mining Co.
Silver Islet Mining Co.
Silver King Mining Co.
Simpson Gold Mining Co.
South Pacific Mining Co.
Standard Mining Co.
Sullivan Mining Co.
Sutro Tunnel Co.
Sycamore Mining Co.
Twin Lead Mining Co.
Vizina Mining Co.

PHILADELPHIA STOCKS.

American Consolidated Mining Co.
Argent Mining Co.
Arizona Southern Mining Co.
Aztec Mining Co.
Battle Mountain Mining Co.
Buena Mining Co.
California Mining Co.
Calista Mining Co.
Chrysolite Mining Co.
Cincinnati Mining Co.
Compromise Mining Co.
Contention Mining Co.
Consolidated Virginia Mining Co.
Dauntless Mining Co.
Del Monte Mining Co.
Denver City Mining Co.
Eureka Mining Co.
Girard Mining Co.
Governor Mining Co.
Grand Union Mining Co.
Green Mountain Mining Co.
Gunnison Mining Co.
Homestake Mining Co.
Horn-Silver Mining Co.
Iowa Gulch Mining Co.
Iron Silver Mining Co.
King Bullion Mining Co.
Ledger Consolidated Mining Co.
Little Diamond Mining Co.
Little Maud Mining Co.
Little Pittsburg Mining Co.
Long & Derry Hill Mining Co.
Montana Mining Co.
Mount Sheridan Mining Co.
National Mining Co.
Navajo Mining Co.
Northern Belle Mining Co.
Orion Mining Co.
Orion Preferred Mining Co.
Palmetto Extension Mining Co.
Pembina Mining Co.
Penn-Breckenridge Mining Co.
Permanent Mining Co.
Pizarro Mining Co.
Pizarro Extension Mining Co.
Potosi Mining Co.
Rara Avis Mining Co.
Rara Avis Extension Mining Co.
Record Mining Co.
Rico Pioneer Mining Co.
Sierra Apache Mining Co.
Sierra Bella Mining Co.
Sierra Grande Mining Co.
Sierra Nevada Mining Co.
Silver Cord Mining Co.
Silver King Mining Co.
Silver Plume Mining Co.
Sonora Consolidated Mining Co.
Standard Mining Co.
Sultana Mining Co.
Sutro Tunnel Mining Co.
Tombstone Mining Co.
Victor Mining Co.

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THE United States Association of Charcoal Iron-Workers will hold its next meeting at Detroit, Mich., beginning August 13th.

MR. SYDNEY GILCHRIST THOMAS, the inventor of the basic process, sailed for England to-day, after a very brief stay in this country. He has been traveling in India and Australia for his health.

THE thirty-second meeting of the American Association for the Advancement of Science will be held at Minneapolis, Minn., from August 15th to August 21st. Hon. GEORGE A. PILLSBURY is chairman and Prof. N. H. WINCHELL secretary of the local committee.

WE print elsewhere an abstract of a paper by Mr. PARKER, of Lloyd's, on steel castings for ship-building purposes, which apparently closely reflects the opinions held by the most prominent steel-makers and metallurgists abroad on the important subject of casting steel. In our own country, in a quiet way, considerable progress has been made during the past few years ; and for a great number and variety of purposes, steel cast directly into the form in which it is to be used has found a ready application. Any one acquainted with the valuable properties of steel, and knowing the cost of shaping it by machine tools into the desired form, will fully appreciate what a great end those who are devoting attention to this subject are working for. There are two obstacles which must be overcome : the first to produce dense castings free from blow-holes and other defects ; and the second, to give them at once a finish that will approach the smoothness of good iron castings. Success in meeting the latter and, to some extent, the former requirement hinges upon the selection of a suitable material for the mold. The earlier methods of making steel castings were those of REPEE, who sold his patent to the VICKERS, of Sheffield, England, and of HAINSWORTH, of Pittsburg, under whose patents a number of establishments in this country are working. The first consists in making molds from old clay crucibles, pulverized, with an addition of twenty per cent of black-lead, baking them in a furnace, and coating them with coal-tar, the steel being poured into them while still hot. The principal objection to the Repee process and to all other molds in which carbon is largely used, is, that it is impossible to make castings of soft steel. As soon as the hot metal comes into contact with molds made of such mixtures, it absorbs a portion of the carbon. The Repee castings, too, are not smooth, and require considerable grinding and chiseling, or "fettling," as it is called in England ; and though all such castings must be annealed before use, their surface nevertheless lacks ductility. With a view to remedying these defects, Mr. GEORGE COWING, of Cleveland, a number of years ago made a series of experiments at the Otis & Cleveland Rolling-Mill Company's steel mills, during the course of which two points of importance were brought out. It was found that the ordinary molding materials would not stand the heat of liquid steel without fluxing more or less, so that the castings produced were always heavily coated with scabs and slag, and were filled with blow-holes caused by the impossibility of allowing the gas to escape through the walls of the mold. Mr. COWING found that the best material meeting these objections was one which contains a maximum amount of silica and an immense quantity of substances capable of causing fluxing. He uses the purest quartz or sand, roasts it, and stamps it to an almost impalpable powder ; and in order to permit handling the mold, moistens it with thin glue-water to the temper of ordinary molding-sand.

Experience in nearly all of the large works of the United States and several of the most noted establishments of England, during the past four years, has thoroughly demonstrated that solid and smooth castings can be made in the Cowing silica molds from any grade or variety of steel. Castings have been made in these molds from Bessemer, Siemens-Martin, and crucible steel. At the Otis works in Cleveland, mild steel having but one tenth per cent of carbon has been cast in them into articles that have been bent double without annealing. Liquid steel of this character is the hottest metal known to metallurgy ; and yet it apparently makes no impression on the silica molds, the castings coming out of the sand bright and so clean that no work is required on them, further than a good brushing. We understand that at the present time twenty-three of the largest steel plants in the United States are making steel under the Cowing patent, and two special plants are now going up to make castings by this method : one, by Messrs. JOHN ROACH & RYDER on the Delaware, and another, of which Mr. S. T. WELLMAN, of Cleveland, is at the head, at Alliance, Ohio. Messrs. ROACH & RYDER intend to use the process largely in making heavy castings to take the place of forgings, such as armor plates, shafts, cranks, etc., for vessels.

It will be seen, therefore, that American engineers and iron-masters have not been idle, and that they are fully awake to the difficulties of the problems presented, and are rapidly progressing toward the attainment of this important end.

EDITORIAL CORRESPONDENCE.

The New Rocky Mountain Line.

Having just made the trip from Salt Lake City to this place by the Denver & Rio Grande line, I can not write you on any other subject at present. There is not in the world a railroad journey of thirty hours so filled with grand and beautiful views. I should perhaps qualify this statement by deducting the hours of darkness ; yet this is really a fortunate enhancement of the traveler's enjoyment : it seems providential, that there is one part of the way, just long enough and uninteresting enough to permit one to go to sleep without the fear of missing any thing sublime. Leaving Salt Lake City at noon, we sped through the fertile and populous Jordan Valley, past the fresh and lovely Utah Lake, and up the valley of Spanish Fork. All the way, the superb granite walls and summits of the Wahsatch accompanied us on the east, while westward, across the wide valley, were the blue outlines of the Oquirrh range. One after another of the magnificent cañons of the Wahsatch we passed, their mouths seeming mere gashes in the massive rock, but promising wild and rugged variety to him who enters—a promise which I have abundantly tested in other days. Parley's Cañon, the Big and Little Cottonwood, and, most wonderful of all, the cañon of the American Fork, form a series not inferior to those of Boulder, Clear Creek, the Platte, and the Arkansas, in the front range of the Rockies.

Following Spanish Fork eastward so far as it served our purpose, we crossed the divide to the head-waters of the South Fork of Price River, a

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tributary of Green River. It was a regret to me, in choosing this route, that I should miss the familiar and beloved scenery of Weber and Echo cañons—the only part of the Union Pacific road which tempts one to look out of the car-window, unless one may be tempted by the boundless monotony of the plains or the chance of a prairie-dog. Great was my satisfaction, therefore, to find that this part of the new road, parallel with the Union Pacific, but a hundred miles farther south, traverses the same belt of rocks, and exhibits them in forms not less picturesque. Castle Cañon, on the South Fork of the Price, is the equivalent of Echo Cañon, and its equal or superior in every thing except color. The brilliant red of the Echo cliffs is wanting. The towers and walls of Castle Cañon are yellowish-gray. But their forms are incomparably various and grotesque—in some instances sublime. The valley of Green River at this point is a cheerless sage-brush desert, as it is farther north. To be sure, this uninviting stream, a couple of hundred miles farther south, having united with the Grand, and formed the Rio Colorado, does indeed, by dint of burrowing deeper and deeper into the sunless chasms, become at last sublime. But here it gives no hint of its future somber glory. I remained awake till we had crossed Green River, to make sure that no striking scenery should be missed by sleep. But I got nothing for my pains except the moonlight on the muddy water; and next time, I shall go to bed comfortably, proving to the conductor that I am a veteran and not a tender-foot.

In the morning, we breakfasted at Cimarron, having in the interval passed the foot-hills of the Roan Mountains, crossed the Grand, and ascended for some distance the Gunnison, a tributary of the Grand, the Uncompahgre, a tributary of the Gunnison, and finally a branch, flowing westward, of the Uncompahgre. A high divide at the head of the latter was laboriously surmounted; and then, one of our two engines shooting ahead and piloting us, we slid speedily down to Cimarron. It is in such descents that the unaccustomed traveler usually feels alarmed. But the experience of the Rio Grande Railroad people is, that derailment is likely to occur on up-grades, and almost never in going down.

From this point, comparison with the Union Pacific line in the matter of scenery ceases. As every body knows, that road crosses the Rocky Mountains proper in a pass so wide and of such gradual ascent that the high summits are quite out of sight. If it were not for the monument to the AMESES, there would be nothing to mark the highest point. For all the wonderful scenery on the Rio Grande road, between Cimarron and Pueblo, the Union Pacific in the same longitudes has nothing to show. From an artistic stand-point, one road has crossed the ranges at the most tame and uninteresting point that could be found, and the other at the most picturesque.

At Cimarron, the road again strikes the Gunnison, and plunges into the famous Black Cañon. In length, variety, and certain elements of beauty, such as forest-ravines and waterfalls, this cañon surpasses the Royal Gorge of the Arkansas. There is, however, one spot in the latter (I mean, of course, the point where the turbulent river fills the whole space between walls 2800 feet high, and the railroad is hung over it) which is superior in desolate, overwhelming grandeur to any thing on the Gunnison. Take them all in all, it is difficult to say which is the finer. I have usually found the opinion of travelers to favor the Gunnison Cañon. But why need the question be solved at all? This one matchless journey comprises them both; and he who was overwhelmed in the morning by the one, holds his breath in the afternoon before the mighty precipices of the other. To excuse myself from even hinting such folly as a comparison of scenery, I will merely remark that these two cañons are more capable of a comparison than different scenes usually are; for they belong to the same type—deep cuts in crystalline rocks.

Between them come the Marshall Pass (nearly 11,000 feet above sea-level) over the continental divide, and the Poncha Pass, over the Sangue di Cristo range. This range contains Harvard, Yale, Princeton, Elbert, Massive (the peak opposite Leadville), and other summits exceeding the altitude of 14,000 feet. To the east of it is the valley of the Arkansas, into which and down which we pass, and so through the Royal Gorge to Cañon City and Pueblo, where we arrive before dark on the day after leaving Salt Lake.

Salt Lake, the Jordan Valley, Utah Lake, the Wahsatch, Castle Cañon, the Black Cañon of the Gunnison, Marshall Pass, Poncha Pass, the Arkansas Valley, the Royal Gorge—what a catalogue for so brief a journey! No wonder every body who has made it is "wild about it." If enthusiastic urgency of recommendation from every passenger has any influence (and I know it has a great deal), this road will continue to be, as it is at present, crowded with tourists. It furnishes a delightful route for those who wish on the overland journey to see Denver (as who does not?) and to visit Colorado Springs and Manitou. All this can be done *en route*, without retracing the steps.

I ought to add that a minor but highly important and agreeable surprise of this trip was the safety and comfort of it. The road-bed is excellent, and laid with steel throughout. The Pullman narrow-gauge sleepers are pretty and comfortable. The officers and servants of the company are extraordinarily attentive—a case of new brooms, perhaps: if so, may they never grow old! And finally, the eating-stations and the meals served in them are better than those on the Union Pacific, and incomparably better than those on the Central Pacific. The Denver & Rio Grande managers have pursued an admirable policy in this particular. They have erected handsome buildings for their eating-stations, and let them rent free to caterers, on the sole condition of excellence in housekeeping, purveying, cooking, and service. Failure in this respect involves summary forfeiture of lease. And finally, they have appointed a competent inspector to have charge of this particular department.

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DENVER, June 21, 1883.

STEEL CASTINGS IN PLACE OF IRON AND STEEL FORGINGS.*

It is well known by those who have the management of steamships, and the responsibility of keeping them in efficient working order, that large forged stern frames and rudder frames, as now made, are seldom absolutely sound. Numbers of cases of these forgings having failed when put to work come under our notice, and afford sufficient evidence of the necessity of some improvement being made; while the mortality of wrought-iron crank-shafts belonging to the mercantile marine of this country is excessive. Now, if these parts of steamships and marine engines can be cast sound, solid, thoroughly homogeneous, and free from internal strain, and at the same time possessing the requisite strength and ductility, it will be a great advantage for engineers and ship-builders, and eventually also for ship-owners, to adopt this material for these purposes.

At present, however, the subject of solid steel castings of these forms is somewhat in its infancy, and it is but natural that much doubt and suspicion should be found to exist in the minds of many who for the first time approach the question, just as, some four or five years ago, great distrust was manifested in many quarters as to the reliability and suitability of mild steel for plates, angles, and rivets for shipbuilding and marine boiler-making. The hesitation in adopting the new material was doubtless strengthened by the many cases of mysterious fractures, and the instances of excessive corrosion brought forward to show the unwisdom of changing from iron to steel; but these doubts no longer exist, and the superiority of mild steel over iron for the principal structural parts of a ship is now freely acknowledged. In proof of this, I may mention that last year there were no less than 73 large steamships built of steel, with a tonnage of about 143,000; that 116 vessels, with a total tonnage of 216,784, were building of steel in January last; and that at the present time, there are more than six times as many marine boilers making in this country of mild steel as there are making of iron.

During the past twelve months, several applications have been made, by various firms, to the society which I have the honor of serving, for its approval of the use, in vessels classed by Lloyd's Register, of steel castings for such purposes as stems, stern-frames, rudders, tiller-quadrants, and other parts of vessels, and also for crank-shafts, levers, link-blocks, and other portions of marine engines, these parts having usually been made of wrought-iron. Before coming to any decision on the matter, the committee of Lloyd's Register decided to fully investigate, first, the physical properties of the material intended to be used, such as its strength to resist various kinds of strain, its ductility, the homogeneity and soundness of casting of such forms as were desired to be used, and also as to whether the processes by which these castings were made and the raw materials employed were such as would be reasonably expected to secure certainty as to the results obtained; and finally, to consider what tests it would be practicable to use to determine the quality of the material after the castings have been made. With this object in view, visits were made to the three firms in this country who proposed making these large steel castings, and the views were elicited of those gentlemen who have had practical experience with these castings, as well as those who have been actively engaged in heavy forgings for shaftings and complicated parts of machinery. Subsequently, also, visits were made to the works of, and consultations held with, the principal steel-makers in France, a country where, up to the present time, much greater attention has been bestowed upon such matters than in our own. Tests were also made, not only upon samples of the material cut out of castings, but also upon castings themselves, and similar tests were conducted upon samples of forged iron and forged steel. The result is, that structures can be made of cast-steel quite as fit for the purpose intended as those usually constructed of wrought-iron, and that they can, at the same time, be made in such a manner as to avoid the uncertainty inevitably associated with large iron forgings, owing to the large number of weldings necessitated in them.

Although there is no doubt that very successful steel castings have been made by each of the three makers referred to as being engaged in this trade, namely, Messrs. Jessop & Sons, of Sheffield, Messrs. Spencer & Sons, of Newburn-on-Tyne, and the Steel Company of Scotland, of Glasgow, it is strange that such diverse opinions and practices prevail at these works, and perhaps equally strange that such opposite opinions are held upon the question of large forgings, both in iron and steel, experience of which has been obtained from the practice of many years.

At the works of Messrs. Jessop, for instance, the opinion is held, and

* Abstract of a paper read by Mr. William Parker, of Lloyd's Register of Shipping, before the British Iron and Steel Institute.

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the practice is in accordance with this opinion, that, in order to insure a definite composition of the material with the precision which is necessary, and to obtain thorough homogeneity throughout a large casting, it is absolutely necessary to melt the steel in crucibles. The material put into each crucible having a definite composition, it is claimed that the resulting fluid steel remains of identically the same composition; while the opinion is held that, if steel is melted in large masses in a Siemens furnace, although the resulting metal may be sufficiently homogeneous for plate purposes, it is not sufficiently so for many structures where absolute homogeneity and freedom from internal molecular strains are required in every part. At the other works, on the contrary, the opinion is held that homogeneity may be obtained in metal melted in Siemens furnaces. Messrs. Spencer & Sons use both crucibles and open-hearth furnaces to melt their steel, the size of the castings being their only guide in this matter, and they find absolutely no difference as to the material, whichever process is used; while the Steel Company of Scotland uses the open-hearth furnaces for every purpose. Messrs. Jessop and Messrs. Spencer both seem to hold the opinion that the requisite composition of the resulting steel, to insure not only strength and ductility, but also solidity and soundness, can be obtained by careful attention to the materials employed. At the works of the Steel Company of Scotland, however, the process is essentially that known as the Terre-Noire. The metal is melted in an open-hearth Siemens furnace, a bath being formed of a mixture of manganiferous pig-iron and steel scrap by melting these materials together. Successive additions of hot steel scrap are then made, until the bath contains a sufficiently low amount of carbon to give the resulting product the hardness desired. There is then added an amount of an alloy called silicide of manganese, which insures the solidity of the steel and its freedom from blow-holes, the metal being finally tapped into a ladle, and run into molds in the usual manner. Throughout the operation, the greatest care is taken to prevent oxidation of the metal as far as possible. No ore is used, as the company, being a large maker of steel plates, always has available a large quantity of mild steel scrap of definite composition. The plan of using a compound of iron, manganese, and silicon, as is always done at these works in place of the older method of using glazed iron—which is iron and silicon without any manganese—is held to be preferable for the following reason: When glazed iron—or iron and silicon—alone is used, a portion of the silicon is oxidized by the small amount of oxygen which the metal has taken up, forming a silicate which is very difficult of fusion even at a steel-melting heat; consequently, a certain amount of slag is left intimately mixed with the iron, and metal thus made is composed of particles of metal separated from each other by a very thin coating or film of slag. This renders the resulting metal very "short" and brittle, and no amount of subsequent annealing completely rectifies it. On the other hand, when an alloy of silicon, iron, and manganese is used, a compound slag is formed, into the composition of which the manganese enters; this is very fusible at a steel-melting heat, and rapidly rises to the surface of the metal, leaving the metal itself perfectly free from slag.

Whichever process is used for obtaining the molten steel, great difficulties have to be overcome in successfully making castings of any but the simplest forms. The high temperature required in order to give the metal sufficient fluidity necessarily causes the castings to have a large contraction, which not only is a great cause of "piping," since steel castings can not be "fed" like other castings, but, in order to prevent fracture of the casting while in the mold, great judgment is required in making the mold sufficiently fragile to yield under the contraction strain, and at the same time to give it a sufficiently rigid surface, and make it sufficiently strong to withstand the wash and pressure of the metal while it is fluid. The temperature, too, is so high that it is difficult to find a material suitable for facing the molds, refractory enough to withstand the temperature, and at the same time avoiding chemical action on the metal used. When the casting is satisfactorily obtained, great differences of opinion are held as to the necessity for or the utility of annealing. At Messrs. Jessop's, the opinion is held that the careful cooling of the original casting, so as to insure a uniform cooling throughout, is the only means of insuring molecular equilibrium and freedom from internal strain, and that any subsequent heating must necessarily be far from uniform, the outer and thinner portions being first heated, and that this want of uniformity of temperature produces molecular strains in the material, which subsequent cooling, however carefully performed, can not entirely remove. All other steel-makers, however, consider that the cooling which takes place in the mold can not be so uniformly performed as to leave the casting free from molecular strains; while even if this could be done, the rigidity of the mold itself must necessarily create some molecular strains, and they consider that the only way in which these strains can be set at rest is by careful annealing. The annealing process here meant is not a decarburizing one, no chemical change being produced in the material; but it consists of slowly and uniformly raising the temperature of the casting to a bright-red heat, keeping it at that temperature for a length of time, dependent upon the form and dimensions of the casting, and then slowly and uniformly cooling it.

M. Pourcel, of Terre-Noire, attaches great importance, not only to annealing, but also to tempering castings in oil, in order to give them a greater degree of ductility. He contends that the metal in castings, especially those of a complex character with abrupt terminations and changes of form cast in a sand mold, can not be of a uniform nature. In castings comprising various degrees of thickness, the thin sections of metal must cool more rapidly than the thick ones; and besides setting up strains, this varying rate of cooling causes a difference of crystallization in the various parts, and that to such an extent that uniform crystallization and molecular equilibrium in such castings can not be entirely obtained by merely annealing, which is effectual for this purpose in ordinary plain castings. Tempering, or in other words, cooling the castings in oil is, however, very beneficial. The first application entirely transforms the large crystalline grain of the metal into a finer and more homogeneous grain, while each successive repetition still further adds to its homogeneity, tenacity, and ductility. As an illustration of this, I had four specimens cut from a casting made at Terre-Noire, and tested under my own supervision. The first specimen, in the same condition as when cut from the casting, broke with a tensile stress of 32·07 tons per square inch and an elongation of 16 per cent in a length of 5 inches; the next specimen, which was annealed, broke at a stress of 33·7 tons per square inch with an elongation of 17 per cent; the third specimen was annealed and tempered in oil, and broke at a stress of 38·6 tons per square inch, having an elongation of 17 per cent; and the fourth specimen, which was twice tempered in oil, broke with a stress of 41·1 tons per square inch, with an elongation of 15 per cent. The specimens can be seen on the table, and on examination of the fractures it will be observed that the structure of the material is very much closer and finer after each annealing and tempering.

It must be remembered that the molecular strains induced through irregular cooling are not peculiar to steel; they occur in all castings; and although in brass and gun-metal castings the ductility of the metal is sufficiently great in comparison with the contraction in cooling to warrant these strains being practically ignored, yet in cast-iron the want of ductility is such that complicated castings are probably never made without being "drawn," while it is absolutely impossible to cast many forms in iron; and even with all the ingenuity obtained from long experience, it is not by any means uncommon for large cylinders and other marine engine castings to be actually fractured in parts before being taken out of the mold. Even in forgings, these strains are sufficiently severe to cause actual rupture in cooling; for instance, the cavities or so-called flaws often found in the center of large couplings forged with shafts are due to the fact that the outer portion of the coupling first cools and becomes comparatively unyielding; and in the subsequent cooling, the contraction of the inner portion being prevented from taking place radially by the strong cold outer portion, draws the metal asunder at or near the center.

THE CONSUMPTION OF CHEMICALS BY THE ALIZARINE INDUSTRY.

There is a strong movement on foot in England to manufacture the alizarine required by the dyers and calico-printers of England and Scotland. Mr. Joan Levinstein, in a paper before the Society of Chemical Industry, estimates the consumption of all countries at about 9000 tons per annum. For the production of 9000 tons of artificial 20 per cent alizarine, there are required somewhere about 3000 tons of from 55 to 60 per cent anthracene; from 3000 to 4000 tons of bichromate of potash (in this estimate there is no allowance made for the regeneration of the chromates); 18,800 tons of rectified sulphuric acid, or correspondingly less when muriatic acid is used for precipitating the alizarine; from 2000 to 3000 tons of from 45 to 50 per cent anhydrous fuming sulphuric acid; 10,000 tons of 70 per cent white caustic soda (this includes the necessary quantity of carbonate); and from 450 to 500 tons of chlorate of potash.

PEROXIDE OF HYDROGEN AND ITS INDUSTRIAL APPLICATION.

Oxygenated water, a common name for peroxide of hydrogen, has attracted within the last few years a good deal of attention, and it has been successfully employed for several useful purposes, such as the bleaching of tussah silks, the bleaching of ostrich feathers, etc., and is recommended for other applications. However, until some time ago, there was always a difficulty in getting the product in sufficient quantity and at such a price and strength that it could be used on an industrial scale. This difficulty seems to have been now removed, or rather to be on the point of being removed, by the attention which is paid by several manufacturers to the preparation of this useful product. It is stated that Mr. P. Ebell, of Pfungstadt, near Darmstadt, has succeeded in preparing economically a product pure, stable, and of constant strength, and capable of being easily transported to long distances, and to be kept for years without losing its bleaching properties. If, however, the temperature does not go above 30° C., it is kept in a dark place. Among other applications of this product, that of the decoloration of animal fibers is the most important, as it does not contain some of the disadvantages of other bleaching agents. For wool and silk, it is advisable, before bleaching, to cleanse the materials thoroughly, so as to eliminate all the greasy substances and impurities. For this purpose, Mr. Ebell recommends a bath in a solution of five parts carbonate of ammonia to 100 of water, this bath being followed by a soaping and thorough washing with water. The bleaching itself is performed either by immersing the materials in the solution of oxygenated water, and left there at a temperature of from 20° to 30° C., until the decoloration is complete, or the materials are impregnated, when they were wrung out and exposed in a room heated to about 20° C., where they are left to dry. In order to insure an even bleaching, it is well to agitate the materials by means of a mechanical arrangement. Hair is bleached by immersion in oxygenated water for a couple of days, the material having been previously cleansed by means of five per cent carbonate of ammonia and well washed with water. For bleaching ostrich feathers, almost the only decolorizing agent used nowadays is the peroxide of hydrogen. The feathers are cleaned first in a bath at 20° C., with from two to three per cent of carbonate of ammonia, for about twelve hours, by moving from time to time; they are then removed and washed, first with tepid soap-water, and afterward rinsed with fresh water. The bleaching bath of hydrogen peroxide is rendered slightly alkaline, and the feathers are immersed for two days, then rinsed with water, which must not contain any lime, and then dried at the ordinary temperature by a current of air, otherwise with still air the feathers would take a horny feeling and appearance. Ivory, bone, and wax can also be bleached by means of the peroxide of hydrogen. While Germany is starting the manufacture of this bleaching agent on a fairly large scale, English chemists do not remain idle in this field, and, in fact, attempts are now making in the English alkali district to produce on a very extended scale not the hydrogen peroxide but a product capable of giving the same results, namely, calcium peroxide. Mr. Ludwig Mond has taken out patents for commercially producing calcium peroxide. He proposes to first produce peroxide of barium, which is decomposed under pressure by means of carbonic acid and water into barium carbonate and hydrogen peroxide. The carbonate of barium thus formed, after separation from the liquor, is used again for the production of the peroxide of hydrogen, while, by adding milk of lime to the liquor, hydrated peroxide of calcium is precipitated, and forms the commercial product. This material, if brought on the market at a low price, will no doubt find many very useful and extended applications in the industrial arts, and especially for bleaching purposes.

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It is well known by those who have the management of steamships, and the responsibility of keeping them in efficient working order, that large forged stern frames and rudder frames, as now made, are seldom absolutely sound. Numbers of cases of these forgings having failed when put to work come under our notice, and afford sufficient evidence of the necessity of some improvement being made; while the mortality of wrought-iron crank-shafts belonging to the mercantile marine of this country is excessive. Now, if these parts of steamships and marine engines can be cast sound, solid, thoroughly homogeneous, and free from internal strain, and at the same time possessing the requisite strength and ductility, it will be a great advantage for engineers and ship-builders, and eventually also for ship-owners, to adopt this material for these purposes.

At present, however, the subject of solid steel castings of these forms is somewhat in its infancy, and it is but natural that much doubt and suspicion should be found to exist in the minds of many who for the first time approach the question, just as, some four or five years ago, great distrust was manifested in many quarters as to the reliability and suitability of mild steel for plates, angles, and rivets for shipbuilding and marine boiler-making. The hesitation in adopting the new material was doubtless strengthened by the many cases of mysterious fractures, and the instances of excessive corrosion brought forward to show the unwisdom of changing from iron to steel; but these doubts no longer exist, and the superiority of mild steel over iron for the principal structural parts of a ship is now freely acknowledged. In proof of this, I may mention that last year there were no less than 73 large steamships built of steel, with a tonnage of about 143,000; that 116 vessels, with a total tonnage of 216,784, were building of steel in January last; and that at the present time, there are more than six times as many marine boilers making in this country of mild steel as there are making of iron.

During the past twelve months, several applications have been made, by various firms, to the society which I have the honor of serving, for its approval of the use, in vessels classed by Lloyd's Register, of steel castings for such purposes as stems, stern-frames, rudders, tiller-quadrants, and other parts of vessels, and also for crank-shafts, levers, link-blocks, and other portions of marine engines, these parts having usually been made of wrought-iron. Before coming to any decision on the matter, the committee of Lloyd's Register decided to fully investigate, first, the physical properties of the material intended to be used, such as its strength to resist various kinds of strain, its ductility, the homogeneity and soundness of casting of such forms as were desired to be used, and also as to whether the processes by which these castings were made and the raw materials employed were such as would be reasonably expected to secure certainty as to the results obtained; and finally, to consider what tests it would be practicable to use to determine the quality of the material after the castings have been made. With this object in view, visits were made to the three firms in this country who proposed making these large steel castings, and the views were elicited of those gentlemen who have had practical experience with these castings, as well as those who have been actively engaged in heavy forgings for shaftings and complicated parts of machinery. Subsequently, also, visits were made to the works of, and consultations held with, the principal steel-makers in France, a country where, up to the present time, much greater attention has been bestowed upon such matters than in our own. Tests were also made, not only upon samples of the material cut out of castings, but also upon castings themselves, and similar tests were conducted upon samples of forged iron and forged steel. The result is, that structures can be made of cast-steel quite as fit for the purpose intended as those usually constructed of wrought-iron, and that they can, at the same time, be made in such a manner as to avoid the uncertainty inevitably associated with large iron forgings, owing to the large number of weldings necessitated in them.

Although there is no doubt that very successful steel castings have been made by each of the three makers referred to as being engaged in this trade, namely, Messrs. Jessop & Sons, of Sheffield, Messrs. Spencer & Sons, of Newburn-on-Tyne, and the Steel Company of Scotland, of Glasgow, it is strange that such diverse opinions and practices prevail at these works, and perhaps equally strange that such opposite opinions are held upon the question of large forgings, both in iron and steel, experience of which has been obtained from the practice of many years.

At the works of Messrs. Jessop, for instance, the opinion is held, and

* Abstract of a paper read by Mr. William Parker, of Lloyd's Register of Shipping, before the British Iron and Steel Institute.

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the practice is in accordance with this opinion, that, in order to insure a definite composition of the material with the precision which is necessary, and to obtain thorough homogeneity throughout a large casting, it is absolutely necessary to melt the steel in crucibles. The material put into each crucible having a definite composition, it is claimed that the resulting fluid steel remains of identically the same composition; while the opinion is held that, if steel is melted in large masses in a Siemens furnace, although the resulting metal may be sufficiently homogeneous for plate purposes, it is not sufficiently so for many structures where absolute homogeneity and freedom from internal molecular strains are required in every part. At the other works, on the contrary, the opinion is held that homogeneity may be obtained in metal melted in Siemens furnaces. Messrs. Spencer & Sons use both crucibles and open-hearth furnaces to melt their steel, the size of the castings being their only guide in this matter, and they find absolutely no difference as to the material, whichever process is used; while the Steel Company of Scotland uses the open-hearth furnaces for every purpose. Messrs. Jessop and Messrs. Spencer both seem to hold the opinion that the requisite composition of the resulting steel, to insure not only strength and ductility, but also solidity and soundness, can be obtained by careful attention to the materials employed. At the works of the Steel Company of Scotland, however, the process is essentially that known as the Terre-Noire. The metal is melted in an open-hearth Siemens furnace, a bath being formed of a mixture of manganiferous pig-iron and steel scrap by melting these materials together. Successive additions of hot steel scrap are then made, until the bath contains a sufficiently low amount of carbon to give the resulting product the hardness desired. There is then added an amount of an alloy called silicide of manganese, which insures the solidity of the steel and its freedom from blow-holes, the metal being finally tapped into a ladle, and run into molds in the usual manner. Throughout the operation, the greatest care is taken to prevent oxidation of the metal as far as possible. No ore is used, as the company, being a large maker of steel plates, always has available a large quantity of mild steel scrap of definite composition. The plan of using a compound of iron, manganese, and silicon, as is always done at these works in place of the older method of using glazed iron—which is iron and silicon without any manganese—is held to be preferable for the following reason: When glazed iron—or iron and silicon—alone is used, a portion of the silicon is oxidized by the small amount of oxygen which the metal has taken up, forming a silicate which is very difficult of fusion even at a steel-melting heat; consequently, a certain amount of slag is left intimately mixed with the iron, and metal thus made is composed of particles of metal separated from each other by a very thin coating or film of slag. This renders the resulting metal very "short" and brittle, and no amount of subsequent annealing completely rectifies it. On the other hand, when an alloy of silicon, iron, and manganese is used, a compound slag is formed, into the composition of which the manganese enters; this is very fusible at a steel-melting heat, and rapidly rises to the surface of the metal, leaving the metal itself perfectly free from slag.

Whichever process is used for obtaining the molten steel, great difficulties have to be overcome in successfully making castings of any but the simplest forms. The high temperature required in order to give the metal sufficient fluidity necessarily causes the castings to have a large contraction, which not only is a great cause of "piping," since steel castings can not be "fed" like other castings, but, in order to prevent fracture of the casting while in the mold, great judgment is required in making the mold sufficiently fragile to yield under the contraction strain, and at the same time to give it a sufficiently rigid surface, and make it sufficiently strong to withstand the wash and pressure of the metal while it is fluid. The temperature, too, is so high that it is difficult to find a material suitable for facing the molds, refractory enough to withstand the temperature, and at the same time avoiding chemical action on the metal used. When the casting is satisfactorily obtained, great differences of opinion are held as to the necessity for or the utility of annealing. At Messrs. Jessop's, the opinion is held that the careful cooling of the original casting, so as to insure a uniform cooling throughout, is the only means of insuring molecular equilibrium and freedom from internal strain, and that any subsequent heating must necessarily be far from uniform, the outer and thinner portions being first heated, and that this want of uniformity of temperature produces molecular strains in the material, which subsequent cooling, however carefully performed, can not entirely remove. All other steel-makers, however, consider that the cooling which takes place in the mold can not be so uniformly performed as to leave the casting free from molecular strains; while even if this could be done, the rigidity of the mold itself must necessarily create some molecular strains, and they consider that the only way in which these strains can be set at rest is by careful annealing. The annealing process here meant is not a decarburizing one, no chemical change being produced in the material; but it consists of slowly and uniformly raising the temperature of the casting to a bright-red heat, keeping it at that temperature for a length of time, dependent upon the form and dimensions of the casting, and then slowly and uniformly cooling it.

M. Pourcel, of Terre-Noire, attaches great importance, not only to annealing, but also to tempering castings in oil, in order to give them a greater degree of ductility. He contends that the metal in castings, especially those of a complex character with abrupt terminations and changes of form cast in a sand mold, can not be of a uniform nature. In castings comprising various degrees of thickness, the thin sections of metal must cool more rapidly than the thick ones; and besides setting up strains, this varying rate of cooling causes a difference of crystallization in the various parts, and that to such an extent that uniform crystallization and molecular equilibrium in such castings can not be entirely obtained by merely annealing, which is effectual for this purpose in ordinary plain castings. Tempering, or in other words, cooling the castings in oil is, however, very beneficial. The first application entirely transforms the large crystalline grain of the metal into a finer and more homogeneous grain, while each successive repetition still further adds to its homogeneity, tenacity, and ductility. As an illustration of this, I had four specimens cut from a casting made at Terre-Noire, and tested under my own supervision. The first specimen, in the same condition as when cut from the casting, broke with a tensile stress of 32·07 tons per square inch and an elongation of 16 per cent in a length of 5 inches; the next specimen, which was annealed, broke at a stress of 33·7 tons per square inch with an elongation of 17 per cent; the third specimen was annealed and tempered in oil, and broke at a stress of 38·6 tons per square inch, having an elongation of 17 per cent; and the fourth specimen, which was twice tempered in oil, broke with a stress of 41·1 tons per square inch, with an elongation of 15 per cent. The specimens can be seen on the table, and on examination of the fractures it will be observed that the structure of the material is very much closer and finer after each annealing and tempering.

It must be remembered that the molecular strains induced through irregular cooling are not peculiar to steel; they occur in all castings; and although in brass and gun-metal castings the ductility of the metal is sufficiently great in comparison with the contraction in cooling to warrant these strains being practically ignored, yet in cast-iron the want of ductility is such that complicated castings are probably never made without being "drawn," while it is absolutely impossible to cast many forms in iron; and even with all the ingenuity obtained from long experience, it is not by any means uncommon for large cylinders and other marine engine castings to be actually fractured in parts before being taken out of the mold. Even in forgings, these strains are sufficiently severe to cause actual rupture in cooling; for instance, the cavities or so-called flaws often found in the center of large couplings forged with shafts are due to the fact that the outer portion of the coupling first cools and becomes comparatively unyielding; and in the subsequent cooling, the contraction of the inner portion being prevented from taking place radially by the strong cold outer portion, draws the metal asunder at or near the center.

THE CONSUMPTION OF CHEMICALS BY THE ALIZARINE INDUSTRY.

There is a strong movement on foot in England to manufacture the alizarine required by the dyers and calico-printers of England and Scotland. Mr. Joan Levinstein, in a paper before the Society of Chemical Industry, estimates the consumption of all countries at about 9000 tons per annum. For the production of 9000 tons of artificial 20 per cent alizarine, there are required somewhere about 3000 tons of from 55 to 60 per cent anthracene; from 3000 to 4000 tons of bichromate of potash (in this estimate there is no allowance made for the regeneration of the chromates); 18,800 tons of rectified sulphuric acid, or correspondingly less when muriatic acid is used for precipitating the alizarine; from 2000 to 3000 tons of from 45 to 50 per cent anhydrous fuming sulphuric acid; 10,000 tons of 70 per cent white caustic soda (this includes the necessary quantity of carbonate); and from 450 to 500 tons of chlorate of potash.

PEROXIDE OF HYDROGEN AND ITS INDUSTRIAL APPLICATION.

Oxygenated water, a common name for peroxide of hydrogen, has attracted within the last few years a good deal of attention, and it has been successfully employed for several useful purposes, such as the bleaching of tussah silks, the bleaching of ostrich feathers, etc., and is recommended for other applications. However, until some time ago, there was always a difficulty in getting the product in sufficient quantity and at such a price and strength that it could be used on an industrial scale. This difficulty seems to have been now removed, or rather to be on the point of being removed, by the attention which is paid by several manufacturers to the preparation of this useful product. It is stated that Mr. P. Ebell, of Pfungstadt, near Darmstadt, has succeeded in preparing economically a product pure, stable, and of constant strength, and capable of being easily transported to long distances, and to be kept for years without losing its bleaching properties. If, however, the temperature does not go above 30° C., it is kept in a dark place. Among other applications of this product, that of the decoloration of animal fibers is the most important, as it does not contain some of the disadvantages of other bleaching agents. For wool and silk, it is advisable, before bleaching, to cleanse the materials thoroughly, so as to eliminate all the greasy substances and impurities. For this purpose, Mr. Ebell recommends a bath in a solution of five parts carbonate of ammonia to 100 of water, this bath being followed by a soaping and thorough washing with water. The bleaching itself is performed either by immersing the materials in the solution of oxygenated water, and left there at a temperature of from 20° to 30° C., until the decoloration is complete, or the materials are impregnated, when they were wrung out and exposed in a room heated to about 20° C., where they are left to dry. In order to insure an even bleaching, it is well to agitate the materials by means of a mechanical arrangement. Hair is bleached by immersion in oxygenated water for a couple of days, the material having been previously cleansed by means of five per cent carbonate of ammonia and well washed with water. For bleaching ostrich feathers, almost the only decolorizing agent used nowadays is the peroxide of hydrogen. The feathers are cleaned first in a bath at 20° C., with from two to three per cent of carbonate of ammonia, for about twelve hours, by moving from time to time; they are then removed and washed, first with tepid soap-water, and afterward rinsed with fresh water. The bleaching bath of hydrogen peroxide is rendered slightly alkaline, and the feathers are immersed for two days, then rinsed with water, which must not contain any lime, and then dried at the ordinary temperature by a current of air, otherwise with still air the feathers would take a horny feeling and appearance. Ivory, bone, and wax can also be bleached by means of the peroxide of hydrogen. While Germany is starting the manufacture of this bleaching agent on a fairly large scale, English chemists do not remain idle in this field, and, in fact, attempts are now making in the English alkali district to produce on a very extended scale not the hydrogen peroxide but a product capable of giving the same results, namely, calcium peroxide. Mr. Ludwig Mond has taken out patents for commercially producing calcium peroxide. He proposes to first produce peroxide of barium, which is decomposed under pressure by means of carbonic acid and water into barium carbonate and hydrogen peroxide. The carbonate of barium thus formed, after separation from the liquor, is used again for the production of the peroxide of hydrogen, while, by adding milk of lime to the liquor, hydrated peroxide of calcium is precipitated, and forms the commercial product. This material, if brought on the market at a low price, will no doubt find many very useful and extended applications in the industrial arts, and especially for bleaching purposes.

BESSEMERIZING COPPER MATTE.

The following letter, addressed by Dr. Percy to Dr. Raymond, has been delayed in publication by the absence of the latter in the West:

TO THE EDITOR:

SIR: In the last number of the ENGINEERING AND MINING JOURNAL which I have received (dated May 5th, 1883), I have read the correspondence concerning what is termed "Bessemerizing Copper Matte." In the first letter, it is stated that the first attempts were made in Russia in 1867. I send you by this post the specification of a patent for this process granted in 1856 to my old friend, Mr. Keates, one of our most experienced copper-smelters. It is remarkable how much seems either to be forgotten or ignored by some modern inventors.

I remain, very truly yours, JOHN PERCY.

HOUSE OF COMMONS, LONDON, May 18, 1883.

The patent of William Keates, of Liverpool, to which Dr. John Percy, the distinguished metallurgist, refers, is dated September 4th, 1856; and the invention is described substantially as follows:

The ore or other cupriferous material is first smelted to a regulus, and then introduced into a special furnace, in which, during or after fusion, currents of air, artifically heated if desired, are either forced at high pressure through the molten mass, or directed upon its surface.

The apparatus shown in the appended drawings is a reverberatory furnace, with four tuyeres at the corners, and two doors (besides the door of the fire-chamber), one at the end opposite the fire, for the withdrawal of slags, and the other on one side for charging. On the other side, not exactly opposite the charging-door, is the tap-hole, through which the coarse copper is run out into sand-beds. The patentee, with the usual comprehensiveness of his class, claims any other form of furnace or means of introducing the desulphurizing currents of air. On the details of the process, the following information only is vouchsafed:

"The general *modus operandi* is as follows, but may be varied to suit the convenience of special circumstances: The regulus or matte being introduced into the furnace in any of the usual modes, the apertures are closed and the fire urged until the regulus has nearly attained the fusing-point; the blast is then turned on and the heat of the furnace increased to effect a perfect fusion while subject to the operation of the blast. This process is continued (occasionally removing the slag or scoria formed during the operation) until the whole of the copper becomes metallic, when it is tapped out of the furnace into sand or other molds prepared for its reception. If found more convenient for the purposes of the smelting-works or manufactory, the contents of the furnace may be tapped out when only partially desulphurized, and again submitted to this process, or refined in the usual manner."

As to the tuyeres, Mr. Keates declares that he uses, where iron would not stand, fire-clay or "composition," either in cylindrical tubes, or square or octagonal blocks traversed by a cylindrical cavity, the latter being glazed, and the tubes or blocks joined with socket-joints and luted with fine fire-clay. These are built into the walls and under the sole of the furnace, thus forming an integral part of the structure. *

A REPLY TO MR. C. A. STETEFELDT.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My old friend, Mr. C. A. Stetefeldt, of New York City, has seen fit to criticise, in the issue of this paper of June 16th, 1883, a report of mine, made some time ago, to the owners of the Mount Cory mine in Nevada. He does not limit himself to professional criticism, as he properly should, but indulges in personalities. He charges that I never built or ran a Stetefeldt furnace, and consequently, in his opinion, I do not know what a Stetefeldt furnace is, nor what it can do. My answer to this charge is, that Mr. Stetefeldt is forgetful of the fact, that at least one, and often several Stetefeldt furnaces have been in constant operation at one or more places on this coast for a long time; that they were open to inspection and study, if indeed any study were required to understand his furnace; that its results are matters of record; that various publications discuss the Stetefeldt furnace; and that last, but not least, Mr. Stetefeldt himself has done all he could, true to the nature of a patentee, to disseminate knowledge of the Stetefeldt furnace and what it can do, throughout this country at least, both by pamphlets and verbal discussions. I suppose this disposes of Mr. Stetefeldt's charge as to my ignorance of a Stetefeldt furnace. I will add, however, as a parting conclusion, that if an extensive experience in running the furnace is required in order to understand it, then the furnace is less recommendable than I supposed it was, and Mr. Stetefeldt himself can not be the best Stetefeldt furnace man.

In the same ungenerous mood, he charges me with limited experience in amalgamation, because I have had charge of a tailings mill in Dayton, Nevada. Generally, amalgamation consists in a few simple operations, and when it ceases to be that, when the "chemicals," from bluestone down to snuff, fail to produce satisfactory results, the ore is pronounced to be of a refractory character. If there were any particular difficulty in amalgamation to be overcome, and hence more skill were required in one case than in another, naturally the tailings amalgamator, so much despised by Mr. Stetefeldt, would be the more skillful amalgamator; for if successful, he extracts that which the ore amalgamator could not take out. Now, if raw amalgamation, to which I have referred so far, is not much of a trick, amalgamation of roasted ore is still less so, for obvious reasons. The tailings mill I did run at Dayton was a success; it treated 300 tons of tailings per day, and its owner grew rich on it. Besides all this, amalgamating mills have been numerous for a long time on this coast; they were always open to inspection, and their results matters of record.

Mr. Stetefeldt charges me with having formulated general laws for metallurgists to be guided by in the future. This is not so, although, I must say, it is never too late for any one to learn. Whatever I did say in that report was simply intended for a private party, and was said of a particular kind of ore.

Mr. Stetefeldt seems to be ignorant of various facts concerning this report of mine, and labors under a misconception of what I say in it. To enlighten him, if I can, I beg to submit the following statement and reports, to wit:

Some time ago, I was employed to determine the most feasible plan for working Mount Cory ore. This ore consists of quartz as gangue, the silver-bearing minerals being galena, zinc-blende, native silver, fahlore, copper and iron sulphides; the gangue in the ore amounting to from 85 to 95 per cent. Crushing and chloridizing, roasting, with subsequent amalgamation or leaching, were what I determined would be the most favorable for working the ore. Stamps have heretofore been almost the universal means for crushing under similar circumstances, roasting and amalgamation the subsequent treatment. Since there were opportunities to practically test the ore by either stamps or Krom rolls, the Stetefeldt furnace or cylinder furnaces, amalgamation or leaching, we availed ourselves of these opportunities. In all cases, the tests were not made under my supervision alone, but also under the supervision of the respective superintendents and foremen of the mills, all gentlemen whom I have the pleasure of knowing as efficient officers, and all of whom have the experience so highly valued for once by Mr. Stetefeldt. When the test was made in the Northern Belle mill, I was not even present. Mr. Belding, who conducted the test, has, however, all the experience Mr. Stetefeldt possibly can desire him to have. The test in the Geddes & Bertrand mill was conducted in the presence of Mr. Eckart, the mechanical engineer of the Mount Cory mill, the superintendent and foreman of the mill, and myself. Below will be found the results as obtained in each mill. My conclusions were drawn from these results, and I should be pleased to know what kind of a plant Mr. Stetefeldt would have recommended if he had been in my position. The ore used for the tests was practically of the same kind and character. It is true, Mr. Belding has used only one ton of Mount Cory ore to make his test with, although I had recommended to treat ten tons at least; yet Mr. Belding has such extensive experience with the Stetefeldt furnace and pan-work that, considering Mr. Stetefeldt's valuation of experience, he will hardly find fault with Mr. Belding's proceeding. The reports speak for themselves and are as follows:

STAMPS, STETEFELDT FURNACE, AND AMALGAMATION.

OFFICE OF NORTHERN BELLE MILL AND MINING CO.,
BELLEVILLE, NEV., March 21, 1883.

A. G. MCKENZIE, *Sup't Mount Cory Mining Co.:*

DEAR SIR: Two thousand and eighty pounds of your second-class ore were received in due time, crushed, roasted, and amalgamated, with the following results:

The crushing was at the rate of 44 tons per twenty-four hours, with 20 stamps of 1000 pounds each, dropping 8 inches, 96 times per minute.

The value per ton was $43.79. Loss in roasting, 5 per cent of weight, and 9 per cent of value. Loss in tailings, 14 per cent of value, making a total loss (after deducting 19 per cent—estimated mechanical loss between furnace and tailings) of 24 per cent in value, or a yield of 76 per cent. Fractions have been omitted in my calculations.

This I consider good work for the grade and character of the ore. More experience would, without doubt, improve this materially.

I am satisfied that the Stetefeldt furnace will handle such ore successfully, while the cost of reduction ought not to exceed $10 per ton, with wood at $5 per cord and salt at $20 per ton.

The fineness of bullion from this test will be forwarded by next mail; the amalgam appears to be of fair grade. Yours truly,

WILLIAM F. BELDING.

BELLEVILLE, NEVADA, March 22, 1883.

A. G. MCKENZIE, *Sup't Mount Cory Mining Co., Hawthorne, Nevada:*

DEAR SIR: The fineness of bullion produced from your ore is 786, the base being copper. Yours truly, WILLIAM F. BELDING.

WORKING TEST AT BERTRAND MILL.

G. R. WELLS: SAN FRANCISCO, April 27, 1883.

DEAR SIR: Below please find results of the recent working of three charges of Mount Cory ore at the Bertrand mill, Geddes, Nev., and my opinion, to wit:

ROLLS.

Lot 1.—18,200 pounds—9 1/10 tons of Mount Cory ore—and 1820 pounds of salt were crushed by a crusher and two sets of rolls through a No. 20 screen, in 4 hours and 17 minutes. The resulting pulp was a rather coarse material, but it roasted pretty well, as was subsequently ascertained. Thus the crushing capacity for Mount Cory ore of said mill is nearly 50 tons of ore and 5 tons of salt per twenty-four hours, all crushed through a No. 20 screen.

Lot 2.—7201 pounds of Mount Cory ore and 1080 pounds of salt were crushed by the same machinery through a No. 30 screen, in 3 hours 52 minutes. Thus the crushing capacity of said mill for Mount Cory ore and 15 per cent salt, for the time being, and crushing through a No. 30 screen, was at the rate of 22 1/2 tons of ore and 2 1/4 tons of salt.

The machinery consisted of one crusher, two pairs of rolls, elevator, screens, etc. The crusher and first pair of rolls (roughing rolls) were out of order, being in a worn-out condition; the second pair of rolls (finishing rolls) were in first-class condition, having been provided with new steel rings only three weeks ago. Under the circumstances, said finishing rolls had to do most of the work, I should say about two thirds of it, while the crusher and roughing rolls together, perhaps, performed one third. Taking this assumption for a fact, one pair of rolls will crush say 15 tons through a No. 30 screen in twenty-four hours, or two sets 30 tons, three sets 45 tons, etc. The latter pulp (crushed through a 30 screen) was still much coarser than a dry stamp battery will crush through a like screen, owing to the different manner of screening the pulp in each case compared with the other.

If, then, a certain number of stamps crush nearly 45 tons of Mount Cory ore through a No. 30 screen, as was done at the Northern Belle mill said number of stamps do more than three sets of rolls would; that is to say, said number of stamps would be preferable to three pairs of rolls when fine pulp is required, and *vice versa* when not. For roasting in a Stetefeldt furnace and subsequent amalgamation, or amalgamation in any case, finely-divided pulp is required, while for purposes of leaching, a coarse material is just as good, and even preferable, for which reasons stamps, Stetefeldt furnaces, and amalgamating pans should go together, and rolls, cylindrical roasting-furnaces, and leaching tubs also.

ROASTING-FURNACES.

The roasting-furnaces, four in number, are of what is called the Brückner style, simplified. They have a capacity of about 12 1/2 tons of Mount

Cory ore, will need about 5 per cent of salt, using 2½ cords of nut-pine wood each. That is to say, the four furnaces can roast about 50 tons in twenty-four hours with 10 cords of wood, requiring the attention of 8 men in 12-hour shifts in the twenty-four hours. There are three roasters on each shift, 6 per twenty-four hours, and 2 dustmen during the day shift. A Stetefeldt furnace of the same capacity these four furnaces possess will use about 5 cords of wood, 5 per cent salt, and 3 men in 8-hour shifts in the twenty-four hours, the Stetefeldt furnace not requiring any power to drive it except his elevator and screen, which is very little compared with the power to drive these four furnaces, each of which requires from 4 to 6 horse-power all the time. All these facts speak in favor of the Stetefeldt furnace. But, at the same time, the Stetefeldt furnace requires finely-divided pulp, and to obtain it stamps are necessary, which stamps are certainly more expensive in every way than rolls, and, after roasting such fine pulp, amalgamation must follow, which again is in every respect more expensive than leaching.

LIXIVIATION.

There are 24 leaching-tubs at the Bertrand mill, and since Mount Cory ore will leach in about forty-eight hours in charges of from 4½ to 5½ tons, said mill could leach about 50 tons in twenty-four hours. We leached three different charges of Mount Cory ore. The first was finished in 60 hours, the second in 40 hours, the third in 48 hours. The tailings showed respectively 3·63 ounces, 4·80 ounces, and 2·62 ounces per ton. I can hardly believe that amalgamation will give lower tailings, nor that the Stetefeldt furnace will lose less silver in roasting. A comparison with Mr. Belding's reports will show the differences between lixiviation and amalgamation tailings, and the same will be shown by the four sacks of roasted Mount Cory ore shipped, from the second and third charges of these trials.

Should there be no difference in tailings from amalgamation and lixiviation, then the latter is preferable to the former, because a lixiviation plant is cheaper than an amalgamation plant, and the cost of operating them is in favor of lixiviation also.

ROASTING AND LIXIVIATION RESULTS IN FIGURES.

Charge I.—Ore from all the tunnels excepting "E."

Weight of charge	10,130	pounds	@ 38·64 ounces per ton	= 195·71	ounces.
Less flue-dust	340	"	@ 19·53 " "	= 3·32	"
Net charge	9,790	"	@ 39·30 " "	= 192·39	"
Ten per cent salt	1,077	"			
Net ore	8,713	"	@ 44·10 "	$57 per ton in silver.	
Weight of roasted charge	8,970	"	@ 39·50 "	per ton = 177·15 ounces.	
Weight of tub tailings (91 per cent and 9 per cent)	8,162	"	@ 3·63 " "	= 14·81	"
Therefore, leached out or obtained in sulphides, that is, bullion				162·34	"

We therefore have:

Bullion	162·34 ounces	= 84·3	per cent.
Loss in roasting	15·24 "	= 7·9	"
" tailings	14·81 "	= 7·8	"
	192·39 "	= 100·00	"

Not considering the loss in roasting, part of which no doubt, is flue-dust, remaining in the dust-chambers; and beginning with the roasted charge, as many mills do, we have:

8970 pounds charge @ 39·50 per ton	177·15 ounces.
Loss in tailings	14·81 "
Obtained in bullion (sulphides)	162·34 "

Which is equal to having obtained 91·6 per cent in bullion, and loss 8·4 per cent in tailings.

Charge II.—Ore from all tunnels except "E."

Weight of charge	9,890	pounds	@ 46·66*	= 230·73	ounces.
Less flue-dust	125	"	@ 34·11	= 2·11	"
Net charge	9,765	"		228·62	"
Less 10 per cent salt	868	"			
Net ore	8,897	"	@ 51·3 or $66.31 per ton.		
Weight of roasted charge	8,966	"	@ 41·65	= 186·71	ounces.
Sacked for amalgamation	240	"	@ 41·65	= 5·00	"
Net weight of charge worked	8,526	"		181·71	"
Tub tailings (91 per cent and 9 per cent)	7,758	"	@ 4·80	= 18·61	"
Obtained in sulphides (bullion)				163·10	"
Obtained in bullion				73·3	per cent.
Apparent loss in roasting				18·4	"
Loss in tailings				8·3	"
				100·00	per cent.

Or, if the roasted ore alone is taken to start with, we have 89·7 per cent bullion obtained, and 10·3 per cent lost in tailings.

Charge III.—Ore of tunnels C and D only. It was treated more carefully than the former two charges, and is therefore a fairer test to show what can be done by lixiviation, etc., with Mount Cory ore.

Weight of Charge III	8,282	pounds	@ 30·67 ounces	= 126·80	ounces.
Added flue-dust I	340	"	@ 19·53 "	= 3·32	"
" " II	125	"	@ 34·11 "	= 2·11	"
Total charge	8,747	"		132·23	"
Less 15 per cent salt	1,081	"			
Less flue-dust	32	"		0·42	"
Net ore	7,634	"	@ 34·7 ounces	= 132·81	"
Weight of roasted charge	8,411	"	@ 30·03 "	= 126·27	"
Sacked for amalgamation	242	"	@ 30·03 "	= 3·63	"
Net charge worked	8,169	"		= 122·64	"
Tub tailings (88 per cent and 12 per cent)	7,188	"	@ 2·62 ounces	= 9·41	"
Sulphides obtained (bullion)				113·23	"
Obtained in bullion				87·7	per cent.
Loss in roasting				5·0	"
" tailings				7·3	"
				100·00	per cent.

Or, if we start with the roasted ore, we have obtained 92 per cent in bullion, and lost 8 per cent in the tailings.

* This roll sample is unreliable, owing to a mistake having been made in sampling, which, when discovered, could not be rectified any more.

RECOMMENDATIONS FOR MOUNT CORY PLANT.

Taking these results, as a whole, I would recommend rolls, cylindrical furnaces, and leaching as against stamps, Stetefeldt furnaces, and amalgamation. A Stetefeldt furnace, as stated before, will work cheaper than a cylindrical furnace, and either cheaper than all the rest of known furnaces; but rolling ore and leaching it is cheaper than stamping and amalgamating it. The running cost in either case, I think, will be alike, but the cost of the plant with rolls, cylindrical furnaces, and leaching vats is cheaper than stamps, Stetefeldt furnace, and pans.

Respectfully yours, ALBERT ARENTS.

Mr. Stetefeldt says in his article, at about the 40th line from the beginning: "So far, the conclusions of Mr. Arents have my earnest support. When, however, he proceeds to wipe the Stetefeldt furnace out of existence with a stroke of his pen, it is," etc. What an unnecessary scare he allowed himself to get into! I do not wish to rob the Stetefeldt furnace of its merits, as any body may plainly see who reads my report with an unprejudiced eye, nor the Stetefeldt Company of its income by way of royalties. I have always considered the Stetefeldt furnace a valuable apparatus for purposes of chloridizing, from the record it has made; but I know of no case where said furnace has treated ores so coarse as not to pass a forty screen. Now, I desire to roast the Mount Cory ore in a much coarser state than that just mentioned, and do not feel inclined to build a Stetefeldt furnace for that purpose, because I am not sure but I might find, in starting up, that coarsely-crushed ore, ore that was crushed through a 16 or 20 screen, would fall so quickly through the shaft of the Stetefeldt furnace that it might reach the bottom before all its sulphur even is oxidized. I do not mean to say that the Stetefeldt furnace can not roast such material; but I do mean to say that I can not afford to experiment in this direction for the benefit of the Stetefeldt Company, when said company does not pay the expenses. Let Mr. Stetefeldt demonstrate by actual current work that this furnace does roast much coarser material than it heretofore has been roasting, and I shall be the first person to advocate its use for the purpose.

Mr. Stetefeldt's "analysis" of a small portion of my report, which he calls "the two rules of Mr. Arents," is any thing but just and sensible, because he interprets the portion first to suit his own purpose and then attempts to refute his own interpretation. This part of his article deserves no answer; yet, to gratify his desire for a reply, I will answer it. He makes four divisions:

1. He attempts to prove that Krom steel rolls will produce very finely-divided material up to dust. As far as the latter material is concerned, I bear testimony myself that Krom's rolls produce plenty of dust; for I never was in as dusty a place, the cooling-floor of the Stetefeldt furnace in the Northern Belle mill excepted, as the Bertrand mill roll-room is. That would be a sufficient proof, I suppose, for Mr. Stetefeldt to know that Krom's steel rolls produce pulp of any desired fineness for practical purposes, but it is not for me. On closer inspection and inquiries, I found that Krom's steel rolls, excellent as they are in every respect in comparison with all other rolls, which in course of time came under my observation, suffer from the same evil other rolls suffer from, namely, from uneven wear on the surface of the rolls. The consequence is, that the rolls, after a certain time, become grooved, like all other rolls. They may be turned off, as a matter of course; but during the time from one turning off to another, grooves of more or less extent will exist, which will prevent the rolls of proper capacity from practically and economically crushing ore to such fineness as is required for amalgamation or as dry crushing batteries usually produce. Of course, when I say this, I have two, or at most three, sets of rolls in view. I am, however, of opinion, that by increasing the number of sets of rolls, and forcing each set to crush all ore to a certain given and uniform size by providing each set with a screen of its own, the screens decreasing in size of mesh up to the finishing rolls, Krom's rolls will economically crush to any desired fineness; for at all events, the grooves in any set of rolls can never be as deep as the largest sized pieces of rock fed to it are in diameter. Each succeeding set of rolls will thus receive finer material for renewed crushing than its preceding set received, and each set receiving uniform material at all times, the grooves on each succeeding set will therefore be less deep. We have it thus in our power, in spite of the evil mentioned, to make Krom's rolls, or in fact any rolls arranged in the manner indicated, crush to any desired fineness without turning off. But a large number of sets of Krom's rolls, as required for such an arrangement, have a tremendous capacity, and are very expensive and therefore undesirable for the Mount Cory mill. I find by experiments that two or three sets of rolls crushing through a 20 or 30 Krom screen will do better than stamps; but beyond that fineness, stamps are preferable, according to Mr. Belding's results.

2. I wish to state that, when I speak of finely-divided pulp, I mean such pulp as is generally used in amalgamation and in Stetefeldt furnaces; that is, pulp crushed through a 30 or 40 screen. Just such finely-divided pulp as I state in my report is necessary for amalgamation, Mr. Stetefeldt himself bears testimony to. Such pulp is necessary on account of settler work, as he correctly states. Very well, what does Mr. Stetefeldt want? Is settler work not a part of the process of amalgamation, of which I speak in my report?

3. I wish to state that the chief silver-bearing mineral in the Mount Cory ore is its galena, a galena highly argentiferous. When that is roasted and chloridized, each particle of galena becomes practically a small mass of sulphate of lead, intimately mixed with chloride of silver. Both substances probably form a fused or semi-fused mass, hard to dissolve. At any rate, it is an established fact that the leaching of Mount Cory ore is a slow process in comparison with leaching in other localities. Leaching ore is dissolving solid material in an aqueous medium, and I take it to be an established principle, learned by experience in thousands of cases, that the dissolving of any thing does not practically take place unless motion between the dissolvent and the substance to be dissolved takes place; and furthermore, that the more vigorous the motion is, the more energetic is the dissolution. Now, if this is so, it follows that the liquor intended to dissolve the silver should pass very freely indeed through the mass of roasted ore. A speedy and copious percolation of the liquor, weak as it may be, should take place, in which conclusion I am supported by practical experience. I have furthermore experimented in my laboratory with Mount Cory ore in regard to leaching, and found that, the finer the ore was, the slower was the filtering and

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the extraction thereby of both silver and lead. When I say, then, in my report, that, "after roasting such fine pulp, amalgamation must follow," it is plain that I mean that, although leaching finely-crushed pulp is possible, it is at the same time inexpedient, at least with Mount Cory ore, and that then amalgamation is preferable.

Had I written a scientific dissertation on the subject instead of a simple report, I should have made the above explanations and perhaps a good many more; but in a report to parties who are simply interested to know, as I understand them, how to turn their ore to the most profitable account, theoretical explanations are out of place. Such explanations, under such circumstances, may accord with Mr. Stetefeldt's methods, but not with mine.

4. Mr. Stetefeldt treats of his greatest grievance, to wit: I don't believe that a Stetefeldt furnace can roast ore coarsely crushed. I have already mentioned this point above; but I will say once more here, how glad I shall be to learn that the Stetefeldt furnace can accomplish this feat. But before I shall be sure of its ability to do it, I wish to have it demonstrated in an unmistakable manner. Mr. Russell's experiments in this direction are interesting; but I was till now not aware of them, and I wish to see them first verified by current work.

Now as to the economical question, the only one of practical interest. I will state that the cost of treating a ton of ore is at the Bertrand mill thirty per cent cheaper than at the Northern Belle mill, although the latter mill is crowded to its utmost capacity, and treats more ore, and effectively treats it, than any other mill of its size I know of. It is true, labor and wood are dearer at the Northern Belle mill than at the Bertrand mill; but both are of better quality too at the Northern Belle mill. Yet I have been very liberal to the side where the Stetefeldt furnace works; for I have called cost of treatment of Mount Cory ore even in each case; and when I recommend the treatment of Mount Cory ore by rolls, cylindrical furnaces, and leaching, I do it only on the score of cheaper plant. Respectfully yours, ALBERT ARENTS.

ALAMEDA, CAL., June 26.

THE WORKING OF STRONTIAN IN SICILY.

The recent introduction of strontian into the manufacture of tuyeres has given considerable importance to this mineral, which is comparatively scarce. Besides the deposits in Westphalia, those of Sicily are rather extensive, as to the working of which the *Chemiker-Zeitung* gives the following details: "The *celestine*, or sulphate of strontian, is found at Favara, near Girgenti, in the strata of the lower Miocene rocks, which in Sicily generally contain sulphur. These strata consist of limestone, calcareous marl, and gypsum, in the midst of which the sulphur is disseminated, generally in the form of fine powder, and more rarely in nodules the size of a pea or nut. At Favara, sulphur is not present to any great extent, but is partly replaced by sulphate of strontian. The upper strata of the rocks, which are mainly horizontal, are decomposed by the action of the air; the light mineral particles are carried along by water, while the *celestine*, which is heavier, and therefore less liable to be carried away, remains in blocks on the surface. In appearance, it differs but little from the limestone with which it is associated; but it is easily distinguished by its greater specific gravity (3·9), on account of which it has received the local name of *cuchiommo*, from *come piombo* (like lead). The ore is at present only worked open-cast at Favara, no regular mine workings having yet been attempted. The inhabitants of the region lead it down to the railroad stations at Girgenti or Palermo, where it is bought by merchants at 35 lire (28s.) a ton. At Porto Empedode, it is screened, to free it from the gangue, and then shipped for Hamburg and other ports. In 1880, only 1000 tons were exported; but in 1881, the production increased to 4000 tons. Works are now going up at Rosslau, in Alsatia, for the conversion of the Sicilian ore into caustic strontian and carbonate of strontian, this latter (strontianite) not being found in Sicily."

LOADS AND STRAINS ON HOISTING ROPES.

Mr. W. Silver Hall, of Derby, England, writing to the *Engineer*, gives the following interesting facts, and makes suggestions which in many instances American engineers would do well to follow:

Some years since, I had a winding rope broken about three feet above the cap, in the act of raising the loaded cage from the props; in fact, the cage was raised, and fell about two and a half feet, as nearly as could be estimated. The weight of cage, tub, coal, and chains, with the cap and piece of broken rope, would be 75 or 76 cwt.; the weight of rope suspended in the shaft, 32 cwt.; total, 108 cwt. The rope was a flat one, of iron wire, tapering from 4¼ inches to 4¼ inches wide, giving a breaking strain of 60 tons and 50 tons, and a safe working load of 186 cwt. and 112 cwt. at the upper and lower ends respectively. It had only been in use a few weeks, and there was no sign of any flaw at the point of rupture. After the torn end was cut off, and the rope re-capped, it continued to do its work satisfactorily for the full average life of the ropes at that pit. The engine, although a single-cylinder one, was remarkably easy to handle, and the engine-man one of the steadiest and most skillful that I have known. The rate of winding, though smart, was not excessive, the run of 202 yards being made in 30 seconds, and the three-decked cage changed in 30 seconds; or, allowing for occasional delays, say 55 runs per hour.

At first sight, the rope might have been expected to break at the top end, where the actual weight to be lifted was nearly 80 per cent of the theoretical safe working load, rather than at the bottom end, where the weight was only 68 per cent of the theoretical safe load; but when it is remembered that the 32 cwt. of rope is already in rapid ascending motion before the "snatch" comes to start the 76 cwt. of cage, etc., into motion, it is apparent not only that the rope actually did break where the severest strain came upon it, but also that that strain is very much nearer to the actual breaking strain than is commonly supposed.

A mere record of facts, such as the above, is not of much value unless it leads to the suggestion of some improvement in the appliances, or in the method of using them, calculated to obviate similar accidents in the future. One such suggestion, and the most obvious, is the substitution steel for iron ropes, giving, with a rope of the same weight, an increased strength of some 50 per cent; but of course at a considerably increased cost. To employ a stronger and, consequently, heavier iron rope, would have the effect of striking an up-hand blow with a heavier hammer than before. Again, it is doubtful whether, for pits of moderate depth, the advantages obtained by a tapered rope are not purchased too dearly by the weakness at the bottom end, where, as we have already seen, the greatest strain comes at the moment of starting. Now, where the suspended weight of rope is counterbalanced by a tail rope—which, as I pointed out at the Leeds meeting of the Institution of Mechanical Engineers, in August last, can probably be economically applied in cases where the depth does not exceed 500 yards or thereabouts—the weight on the rope is constant at any stage of the winding and, consequently, a parallel rope is the right thing.

But perhaps the most important point of all is to diminish, as far as possible, the dead-weight snatched at by the rapid starting of the engine, and this can only be done by using the lightest possible trams and cages. In the instance above given, if the cage had been of steel, instead of iron, its weight might probably have been reduced 30 per cent or more—and I could point out instances where a much greater reduction has actually been effected—thereby reducing the total weight to be snatched at, that is, coal, tubs, cage, and chains, by about 12 per cent. But while cages are only too often considered as a convenient stock job, on which the colliery smith may advantageously employ the olds and ends of his time, and expend such bars of iron as he happens to have no other use for; while they are too often commenced, continued, and finished without any harmonious design or plan, but by the addition of one part after another, each fulfilling its own object, and adding to the total weight, but not contributing to the aggregate strength of the structure; while some of the parts most severely strained are too often weakened by injudiciously placed bolt or rivet-holes, and when they fail are replaced by stouter bars and bigger rivets, the result can scarcely be satisfactory in any respect, and least of all where lightness is desired. Perhaps the next attempt is made in steel, with a result more disappointing than ever, and that ill-used material, as I have too often found when advocating its use, is for ever discredited in the eye of the disgusted proprietor.

As there is no difficulty in making a properly designed steel cage which for any given weight of coal to be lifted shall be from 25 to 50 per cent lighter, and shall cost no more than an iron one, it is surely time that the state of things which I have endeavored to describe, and which, as every mining inspector knows, is only too common, should cease to exist.

GLASS-BLOWING BY COMPRESSED AIR.

Engineering describes a process for dispensing with mouth-blowing in glass manufacture, which has been in use at the Clichy Glass-Works of MM. Appert, in Paris, since 1879. The first in France to employ compressed air for glass-blowing was probably an *ouvrier* named Baccarat, who, in 1824, invented a small mechanical blower. Appert's apparatus is capable of blowing the largest pieces of glass; and it is extremely valuable from a humane point of view, as it prevents those maladies of the glass-blower which arise from forced expiration, and breathing hot dry air. The apparatus, as described to the French Academy of Sciences, consists of two conjugate compressors put in action by the shafting of the works, and storing compressed air in reservoirs sufficient to serve twelve hours. It is distributed to the blowing apparatus by pipes with cocks, and controlled by a pressure regulator. In the Clichy works, the air is employed under three pressures—one of 42 pounds per square inch, one of 14 pounds per square inch, and one of 2·85 pounds per square inch. The last pressure serves for the construction of goblets, jugs, etc., lighting-lamps, bottles, and so on. The air is supplied to the glass by giving it an axial rotation similar to that of the blow-pipe. The latter is fitted with a stop-cock by which the workman can regulate the air supply. The glass is rotated either on horizontal or vertical axes, to suit the class of work. As the preacquired habits of the workmen have been consulted in this new apparatus, they readily become used to it. The new machines enable the manufacturers to dispense with a number of the children formerly employed in this injurious work.

PHOSPHORUS IN NICKEL.—Pure nickel, after melting and casting, generally holds a greater or less quantity of oxygen in combination, and the metal is brittle. To hinder the injurious effects of the oxygen, it is necessary to incorporate in the melted nickel some substance which has a strong affinity for oxygen, and also for the nickel itself. According to the *Comptes Rendus*, M. J. Garnier finds that phosphorus serves both of these purposes very satisfactorily, producing effects analogous to those of carbon in iron. If the phosphorus does not exceed three tenths of one per cent, the nickel is soft and very malleable; above this quantity, the hardness increases at the expense of the malleability. Phosphorized nickel, when alloyed with copper, zinc, or iron, gives results which are far superior to those that are obtained from the same nickel when not phosphorized. By means of the phosphorus, Garnier has been able to alloy nickel and iron in all proportions, and always to obtain soft and malleable products. The contradictions of illustrious chemists are thus explained, some saying that such alloys were brittle, others that they were malleable. The latter had alloyed the nickel to phosphorized iron.

THE TRANSPORTATION OF EXPLOSIVES.—In commenting editorially on the report of the British Inspectors of Explosives, the *Ironmonger* says: In respect to the packing and conveyance of explosives, a curious case is cited in support of the contention that packages containing dynamite must be thoroughly water-proof. This was a case in which a cart containing dynamite of foreign make, while conveyed across the Duddom Sands from Millom to Dalton, stuck fast in a quicksand, and the water caused the nitro-glycerine to exude to such an extent that the dynamite had to be blown up on the sands. The inspectors, again, condemn the "false policy" of the railroad companies in refusing to carry various explosives under any conditions, as leading to surreptitious conveyance of the prohibited articles, and they cite an example in which 300 pounds of blasting gelatine were conveyed by a passenger from Newcastle to London by passenger train, then across London by cab, and again by rail to Whitstable. This "handy little earthquake," it may be remarked, was conveyed, for the most part, in a second-class smoking-carriage!

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FURNACE, MILL, AND FACTORY.

The following is a partial list of the awards for the best displays at the Chicago Exhibition: Logging and mining locomotive, gold medal, H. K. Porter. Locomotive involving important new principles, gold medal, Philadelphia & Reading Railroad Company. Steam gauge, silver medal, Ashcroft Manufacturing Company. Wire cloth, bronze medal, Clinton Wire Cloth Company. Boiler rivets, bronze medal, Hoopes & Townsend. Locomotive steel forgings, gold medal, Midvale Steel Company. Locomotive and car iron forgings, silver medal, Wilson, Walker & Co. Pressure gauge, silver medal, Yale & Towne Manufacturing Company. Coal, ore, or gravel dump-car, silver medal, U. S. Car Company. Steel axle (master car-builders' standard) silver medal, Midvale Steel Company. Iron axle (master car-builders' standard), silver medal, Pittsburg Forge and Iron Company. Spring (elliptic), gold medal, A. French & Co. Springs (bearing), silver medal, A. French & Co. Springs (buffer or draw), bronze medal, French Spiral Spring Company. Steel tire for car wheels, gold medal, Midvale Steel Company. Steel tire combination wheel, gold medal, Allen Paper Car Wheel Company. Iron working tools (power), not less than six in number, grand gold medal, Pratt & Whitney Manufacturing Company. Axle-turning machinery, silver medal, Machine Tool-Works. Car-wheel boring and turning-machine, gold medal, Machine Tool-Works. Six-spindle drilling-machine, silver medal, Niles Tool-Works. Hydraulic wheel press, silver medal, Machine Tool-Works. Wheel-grinding or trueing machine, silver medal, Chilled Car-Wheel Grinding Company. Iron planing-machine, silver medal, Machine Tool-Works. Iron crank-shaping machine, silver medal, Pratt & Whitney Manufacturing Company. Screw-cutting engine lathe, silver medal, William Sellers & Co. Upright drilling-machine, silver medal, William Sellers & Co. Radial drilling-machine, silver medal, Machine Tool-Works. Bolt-heading machine, silver medal, National Machinery Company. Bolt forging machine, silver medal, National Machinery Company. Bolt and screw cutting machine, silver medal, National Machinery Company. Set-screw machine, silver medal, Pratt & Whitney Manufacturing Company. Power hammer, silver medal, Machine Tool-Works. Power punch and shears, silver medal, Hercules Iron-Works. Planer chuck, silver medal, Pratt & Whitney Manufacturing Company. Universal and independent chuck, over twelve inches in diameter, silver medal, E. Horton & Son. Universal lathe chuck, twelve inches and under, silver medal, E. Horton & Son. Assortment of lathe chucks, silver medal, E. Horton & Son. Assortment of planer chucks, silver medal, E. Horton & Son. Display of emery grinding machinery, silver medal, Northampton Emery Wheel Company. Display of machinist's vises, silver medal, Fisher & Norris. Display of taps and dies, silver medal, Pratt & Whitney Manufacturing Company. Nut-tapping machine, silver medal, Shumway, Burgess & Co. Drill-grinding machine, silver medal, William Sellers & Co. Slotting machine, silver medal, Machine Tool-Works. Driving-wheel lathe, gold medal, William Sellers & Co. Shafting, gold medal, Jones & Laughlins. Hanger, bronze medal, Jones & Laughlins. Pulley, bronze medal, Jones & Laughlins. Flue welding device, bronze medal, Hartz & Fix. Portable power drill, bronze medal, Thomas H. Dallet & Co. Spring tester, silver medal, Tinius Olson & Co. Display of tools for repairing locomotives, silver medal, Flanders Machine-Works. Hot-air pumping-engine, silver medal, C. H. Delamater & Co. Machine for testing strength of metals, gold medal, Fairbanks, Morse & Co. Vertical boring-mill, silver medal, William Sellers & Co. Horizontal boring-machine, silver medal, William Sellers & Co. Steel and iron rails and track goods, grand gold medal, Cambria Iron Company. Track bolt and nut, bronze medal, Hoopes & Townsend. Track bolt-washer, bronze medal, Pratt Manufacturing Company. Car-wheel iron, gold medal, Barnum, Richardson & Co. Flanging iron, silver medal, Eureka Iron Company. Boiler plate (iron), silver medal, Eureka Iron Company. Display iron ores, gold medal, Barnum, Richardson & Co. Steam-pump for water station, gold medal, Fairbanks, Morse & Co. Hand pump for water station, bronze medal, Fairbanks, Morse & Co. Hydraulic ram, bronze medal, J. B. Clow & Son. Track scale, gold medal, Fairbanks, Morse & Co. Platform scale, silver medal, Fairbanks, Morse & Co. Rubber belting, silver medal, Hamilton Rubber Company. Surveyor's transit, silver medal, W. Jordan & Son. Surveyor's field glass, bronze medal, L. Manasse. Display of surveyor's instruments, gold medal, Keuffel & Esser. Variety of engineer's drawing tools, bronze medal, L. Manasse. Engineer's level, bronze medal, W. Jordan & Son. Engineer's barometer, bronze medal, L. Manasse. Set of engineer's railroad curves, bronze medal, Keuffel & Esser. Leveling rod, bronze medal, Keuffel & Esser. Prismatic compass, bronze medal, L. Manasse. Tube welding machine, bronze medal, Manning, Maxwell & Moore. Cupola, silver medal, Colliau Furnace Company. Malleable iron castings, bronze medal, Cleveland Malleable Iron Company. Fire-clay brick, bronze medal, Denver Fire-Brick Company. Power blower, silver medal, Boston Blower Company. Power pressure blower, silver medal, Wilbraham Brothers. Portable forge, bronze medal, Buffalo Forge Company. Hand blower, bronze medal, Buffalo Forge Company. Cold-pressed nut, silver medal, Hoopes & Townsend. Display of nuts, bolts, rivets, etc., gold medal, Hoopes & Townsend. Copper boiler and flues, silver medal, American Tube-Works. Seamless copper pipe, silver medal, American Tube-Works. Seamless brass pipe, silver medal, American Tube-Works. Elevator buckets, bronze medal, B. F. Gump. Rawhide belting, silver medal, Chicago Rawhide Manufacturing Company. Cotton belting, silver medal, Gandy Belting Company. Boiler and pipe covering, silver medal, Shields & Brown. Hot pressed nut, silver medal, J. H. Sternburgh.

The Wetherill Steel Casting Company has been organized at Chester, Pa., with $500,000 capital stock, and will build steel-works in that town.

An iron draw is about to be shipped from Paterson, N. J., to the Northern Pacific Railroad for a bridge over the Snake River, Oregon, which is said to be the longest and heaviest double-track draw ever built, being 345 feet long and weighing 450 tons. Another, to span the Willamette River, Oregon, is to be 390 feet long and made mostly of steel. The cost of this will be in the neighborhood of $90,000.

The business of the Jarvis Furnace Company and the New England agencies of the Korting injector, Armington & Sims Company engines, Sheffield grate-bars and Schuttee & Goehring's jet instruments, will in the future be conducted by a stock company organized under the State laws of Massachusetts, with a capital of $100,000. This company will do business under the name and style of the Jarvis Engineering Company. It will not only take charge of the old agencies, but it will do a general engineering and contracting business in putting in steam plants for all kinds of manufacturing purposes. Mr. K. M. Jarvis, of Boston, will be president; A. F. Upton, of Boston, treasurer and general manager. The directors will be K. M. Jarvis, A. F. Upton, L. B. Wright, Boston, Mass.; H. A. Glasier, Springfield, Mass.; F. H. Pond, St. Louis, Mo.; and J. A. Grant, secretary and clerk.

Broad & Ewer, Progressive Iron-Works, are getting well established in their new shops, Nos. 251 to 255 Greenpoint avenue, Brooklyn, N. Y. They are at present building six of the Parson & Northey grinders and amalgamators for precious ores, each of which is to be complete, with steam-engine for driving. This company also manufactures the Van Dyke water-tube boiler.

At Worcester, Messrs. C. Stewart & Son are making and have orders for steel boilers from more than a dozen different places in and out of New England. They use the "Nashua" brand of steel, made at Nashua, N. H., which is stamped 60,000 pounds tensile strain, and equal to the best.

The Russell Hardware Company, with Charles T. Russell as president and $150,000 capital, is going into business at Higganum, Conn. It will employ from 50 to 75 men, and controls a number of valuable patents.

The cylinder-head of one of the large engines at Graff, Bennett & Co.'s Millvale mill blew out last week.

The large sewing-machine factory at Downingtown, Chester County, Pa., has been bought by Philadelphia parties, and is to be converted into extensive stove-works.

The Helmbacher Forge and Rolling-Mills Company, of St. Louis, has added another hammer to its works, which makes its plant now six hammers. It has also put in a new 75-ton testing-machine.

Messrs. Osgood & Co. are building some new spelter furnaces at their Bergen Port works.

GENERAL MINING NEWS.

ARIZONA.

GRAHAM COUNTY.

A discovery of galena ore was recently made in a claim half a mile south of the Detroit copper mines. The croppings are well defined and can be traced for a long distance. The formation is lime. A shaft was sunk on the vein six feet in depth, an assay of the ore going 40 ounces silver. The vein, which is narrow on top, promises to widen as depth is attained.

At a point about thirty miles from Clifton, between Eagle Creek and Blue River, a party has located a number of claims, the ore from which is sulphurets, and carries gold that can be seen with the naked eye. After making these locations, the party journeyed eastward, and prospected the range bordering the Blue to the westward. Here they made four locations, the samples of the ore brought in being sulphurets and yellow chlorides. The formation is quartzite an porphyry.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

The reports from the leading mines of this district show no important change. The usual amount of development-work has been done, and the production remains as usual.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GOLD STRIPE.—During the past week or more, ore-hauling to the mill has been steadily going on. The dump is now pretty well filled up, and the mill will probably be started up in a few days.

SIERRA COUNTY.

MARGUERITE.—The mine is steadily improving.

RAINBOW.—It is stated that this property has been sold. The company intends to begin the work of running a new tunnel this season. This tunnel will be run from Kanaka Creek, and will tap the ledge in 2500 feet. Burleigh drills will be used, and the work will be pushed ahead as rapidly as possible.

SIERRA BUTTES.—A force of men is engaged in excavating for the foundation of the new mill to be erected on the river by this company.

CANADA.

PROVINCE OF NOVA SCOTIA.

A dispatch from Halifax says that a cablegram from London announcing the formal decision of the Judicial Committee of the Privy Council sustaining the appeal of C. F. Mott and others in relation to the Salmon River gold mines was received July 2d by the appellants.

CENTRAL AMERICA.

NEW YORK & HONDURAS-ROSARIO.—The official reports from the mines of this company continue very favorable. All the headings in the Rosario mine are said to be in good ore. East of the main shaft, between the fourth and fifth levels, the superintendent reports ready for extraction a solid body of ore 75 feet long and 100 feet deep (the vein averaging 3 feet thick), estimated to contain about 2000 tons of rich ore. The New York still shows the bonanza ore previously reported. The explored body is now 300 feet long, and the ore is of uniform grade. The headings of the two cross-cuts are in good ore, though not so rich as that of the main body. The tunnel intended to connect the New York and American mines will be completed in a short time and will facilitate considerably the extraction of ore from these two mines. The Matraca and Encinos are in the same body of rich ore, but none of the ore has been extracted for want of room on the dumping-grounds. After serious and unexpected delays, the new mill is running. The pans save eighty per cent of the bullion. Bullion valued at $1800, the result of a few broken days' run, has been received in this city, and more bullion is expected by the company per next steamer.

COLORADO.

CLEAR CREEK COUNTY.

GOLD LEAF.—This property was first discovered over a year ago, and was purchased by the present owners, who traced the lode by open cuts from three to six feet in depth and from twenty to thirty feet in length on the surface. The ore prospected so well in panning that several tons were sent to various points to be treated by both smelting and free milling. The proceeds of the ore paid nearly the entire expense. There are now a number of drifts, and an incline shaft on the vein to a depth of 90 feet, and it is still driven ahead. This incline is started near the apex of the hill. About 150 feet below, another drift is running, which will strike the incline at a depth of 150 feet. A stamp-mill, with grinding-pans and settlers to work the ore, is now in course of erection at the mine. The machinery is upon the ground, the frame of the mill is up, and the workmen are inclosing it as fast as possible. Fine ore was gathered from three different places on the vein, which panned out surprisingly rich. The mill is expected to be in readiness by the middle of July. But one battery will be put in at present, and extensions made as the property may demand. This property consists of three claims, being 4500 feet in length by 150 feet in width. The ore is a decomposed quartz, with a heavy seam of iron stain and rust, in places fully five feet in thickness. Only development-work has been done, yet there are hundreds of tons on the surface awaiting the completion of the mill.

MOLINE.—The tramway is completed. It is 2500 feet long, and has twenty-two stations. At each end is a horizontal wheel, around which the endless cable passes. Fifty buckets are attached at intervals of 100 feet. Each carries from 100 to 150 pounds. An entire revolution is made in less than forty minutes, so that two and a half tons are moved at each revolution. Forty tons can be easily trammed in ten hours, and this can be increased by adding buckets up to the sixteen-ton capacity of the cable. The whole affair has been invented and built in the past three months.

MONTREAL.—In order to work the property more successfully in the future, it was considered advisable to work it through a tunnel or adit on the vein, which has been run 300 feet and gained a depth of 150 feet. The mineral showing is well, and a shaft is sinking.

PERKINS TUNNEL.—The recent rich gold strike has been sold for $10,000. Development-work will be started immediately.

GUNNISON COUNTY.

BULLION KING.—A company has been organized, with a capital of $150,000, 15,000 shares, at $10 per share. Machinery has been ordered, and as soon as it is ready, work will be begun to sink the incline shaft one hundred feet deeper.

FOREST QUEEN.—A contract has been entered into with the Rose & Reed Milling Company, by which the latter takes all the ore produced.

LAKE COUNTY.

Late Leadville exchanges contain the following:

ADLAIDE.—The lessees have opened up a large body of ore. The parties are working the mine through No. 2 shaft. The mine at present shows a ten foot

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face of ore, and, with increased hoisting capacity at the No. 2 shaft, the lessees should be able to make an output of twenty or thirty tons of ore a day. The mineral is stated to be of very fair grade, and will net the company a good profit.

ALLEGHANY CONSOLIDATED.—The southern portion of this property has been leased to Messrs. Sanderson & Abbott, of Denver, for one year. The lease embraces the Right Angle and Rarus shafts. Machinery has already been ordered, and work will begin at once.

BROOKLAND.—Shipments have been resumed.

COLONEL SELLERS.—Shipments are very light at present, and will continue so probably until the litigation is ended. The new body of carbonates recently found is showing up well.

IRON HAT.—The lessees are meeting with good success. During the past month, they shipped about 250 tons of ore, while their property now shows fair resources. The lessees sunk a new shaft on this mine, which adjoins the Iron mine, when the lease was awarded them, and at twenty-eight feet encountered the contact. Pursuing exploration-work, mineral of paying quality was soon after encountered, and regular shipments followed. A second shaft has since been sunk to a depth of fifty feet, and drifting begun.

LA PLATA.—For the past year, this mine, the property of the La Plata Mining and Smelting Company, has averaged a daily production of thirty tons, including Sundays, and at present the property is turning out about fifty tons a day. The product of the mine is of fair quality, and particularly desirable as a smelting ore on account of the large percentage of lead and iron that it carries. The most extensive resources of the mine are large bodies of ore situated in the limestone. Very fine ore-faces are also presented in the extreme southern portion of the property, where developments are on a lime roll, and there are prospects of opening a large chute of ore within a short distance.

LITTLE ELLEN HILL.—A large amount of work is doing on the mines of Little Ellen Hill, and scarcely a shaft can be found in this section that is not working. Considerable ore is also taken out, and at all times of the day ore teams can be seen on the road between the mines of the hill and the smelters in Big Evans and California gulches. The mineral resources of Little Ellen Hill are fully as extensive as those of any other section of the Leadville District, and it is only due to the low grade of the ores, which prevented their profitable shipment until within the past year, that the mines are not as extensively worked as those of Carbonate or Iron Hill. Now, however, all of the properties are working large forces, and extensive ore-shipments are made which return very fair net profits. Among the most prominent are the Little Ellen, owned by the American Mining and Smelting Company, the Opulent, and the Virginius mine.

RUBY.—Three fourths of this mine were recently sold for $60,000. The purchasers have organized a company, to be known as the Savannah Mining Company. Operations on the property are to be commenced at once.

PARK COUNTY.

The Fairplay Sampling Works, owned by the Van Dusen Brothers, having recently put in new and improved machinery, are running to their full capacity and giving universal satisfaction.

LONDON.—The new twenty-stamp mill has been running very successfully. The ore being mostly free-milling gold quartz, the pulp is run off over plates, which process is supposed to work well so far as the saving of gold is concerned, although no reliable tests have yet been made. The battery samples of the quartz run under the stamps returned $48 in gold and $12 in silver to the ton. At present, the tailings are run into tanks, but experiments are now going on, and as soon as a conclusion can be arrived at as to the proper concentrating machinery to be used, concentrators will be put up, and the silver and also the gold escaping over the plates will be saved in this process. The mill is a few miles below the mine, and is connected by a railroad. At the end of the track, an automatic tramway forms the connection between the railroad cars and the mine, thus avoiding any second handling of the ore from the time it leaves the stopes until it reaches the self-feeders in the mill. The mine contains about 4500 linear feet of drifts, winzes, and rises. About forty men are employed.

PITKIN COUNTY.

THORNBURG.—This company, recently organized, has purchased the Mineral Farm mine and several other properties in its vicinity. Work has already begun and about fifty men are employed.

SUMMIT COUNTY.

BELDEN.—The prospects of the mine are favorable; the production is increasing; and as soon as the tramway, which is going up from the mine to the railroad, is finished, shipments will regularly be made.

KEYSTONE BULLION.—The smelter has been doing well during the experimental work of the past four weeks. All the concentrating machinery is operating satisfactorily. The large amounts of concentrating ore in this district will find a market at Breckenridge until works are erected at the different mines.

RED PEAK MINING DISTRICT.

This district, opened about two years ago, is showing considerable activity, and the season begins with the promise of resulting in numerous valuable developments. The district embraces an area about thirty miles in circuit, including the North, Middle, and South Willow creeks, also Rock and Gore creeks. A large number of veins have been discovered, and on an average have been found to contain very high-grade ores. Developments up to the present time are limited. The pay-streaks in the veins are also small, but much is expected of future development-work. The principal mines are right on the naked peak. Among them are the following: Boss Tweed, Silver Vault, Defiance (continuation of the Silver Vault), Lost Boy, Anglo-Saxon, Highland Chief, Black Prince, Comet, Lady Godiva, Silver Mint, D. S. lode, Scarff lode, Ackermann, and Ruby Elva.

The Cañon lode, on the south slope of Red Peak, is a vein measuring from six inches to four feet of quartz, with chunks of native silver weighing from a quarter of an ounce to six ounces. One small seam carries oxide of iron with native silver in small grains and wire.

DAKOTA.

CALEDONIA.—The superintendent reports, June 17th: Ore produced, 985 tons. Gold bar shipped, $14,500. The winze has advanced 8 feet, making a total of 140 feet (100 feet vertical). We have begun enlarging the bottom of the winze to put the pumps in place and are getting ready to start cross-cutting. The mine in general is looking well and the machinery at the mill is running excellently.

FATHER DE SMET.—The superintendent's report for the week ended June 22d shows: Ore extracted from first, second, and third levels, 1950 tons; ore milled, 1950 tons. Golden Gate north header in 146 feet.

RICHMOND.—The company is running three shifts on two drifts from the bottom of its shaft. One, the east drift, is in solid ore of a very fine grade. Twenty men are at work.

GEORGIA.

BARLOW.—During the past week, the Howland mill has been set up, and will soon be started for a trial run.

CHESTATEE.—Forty stamps are run by day and twenty on the night shift.

FISH TRAP.—Two veins have been opened during the past week, the specimens showing free gold. The mill is again running on full-time.

GARNET.—The twenty-stamp mill now erecting on this company's property is almost completed. The building is of sufficient size to admit of the addition of another twenty stamps, which are to be added if developments warrant.

KEYSTONE.—According to the Dahlonega *Signal*, proceedings for foreclosure have been instituted; and in consequence, this property, which gives so much promise, must remain idle for an indefinite length of time.

LOUD.—A small force only is employed at this mine, and but little more than prospect-work is done.

IDAHO.

COLUMBIA & BEAVER.—The company's mill has started up on custom ore, of which there are several hundred tons at the Pilgrim, Columbia & Beaver, Silver King, and Bidwell mine-dumps. The mill men intend to charge $35 a ton for reduction, and will guarantee a yield of 90 per cent.

PHILADELPHIA MINING AND SMELTING COMPANY.—The additional buildings which have been in course of construction during the past six weeks at this company's works at Ketchum are nearly completed. They consist of two main buildings, the one 200 feet long by 50 wide, the other 60 by 60. Two new furnaces have been shipped. They will be blown in as soon as they are put in place. These, in addition to the two stacks already in operation, will give a smelting capacity of 180 tons per day.

MEXICO.

One of the greatest needs of Mexico at the present day, says the *Financier*, is the establishment of works in various parts of the country, upon an extensive scale and with the most approved modern appliances, for the reduction of the precious minerals. There is no better opening afforded to American capitalists for good investment, with large and absolutely certain returns, than by meeting this demand. It is said that during the past two or three years, over $10,000,000 of American money have been invested in mines in this country. Many large mines, of course, have their own reduction-works; but these are of little benefit to mining at large, since they are generally kept busy in reducing their own ores, and have not the capacity to accommodate custom-work.

The finest quality of white, mottled, and vari-colored marble is found in the great marble quarries near the city of Chihuahua.

BATOPILAS.—The company is putting up a new twenty-five-stamp mill and another roasting-furnace.

MAPIMI.—The experience of this company, in Northeastern Durango, with its new machinery, shows that modern facilities greatly increase the yield of the ore. With the old Mexican methods, the yield averaged $32 to the ton, but now the average is much greater. The new route of the Mexican Central Railroad will pass almost close to the mines.

NORTH MEXICAN MINING AND MILLING COMPANY.—This company has been organized to work the Hilo, Guadalupe, Ladero mines in Sonora. The ore carries chiefly silver. The mines are more or less developed. A stamp-mill and machinery are on the ground.

SANTA EULALIA.—Major Charles Hitchens has obtained the right to work over the slag. The company is pushing its development of the old mines vigorously. The new reduction-works near the railroad will be among the most complete in Mexico.

MICHIGAN.

The Marquette *Journal* gives the following table, which exhibits, in gross tons, the total lake shipments of iron ore from upper peninsular ports the present season up to and including June 27th, together with the amount shipped from the same ports during the corresponding period of last year:

Name of port.	1882.	1883.
Escanaba	525,748	362,723
Marquette	292,027	116,927
L'Anse	13,308	12,521
St. Ignace	7,499	.....
Total	838,582	492,171

Showing a decrease of 346,411 gross tons.

The hydraulic company which is now engaged to use the water-power at Little Quinnesec Falls, on the Menominee River, for driving the mining machinery of the Chapin and Ludington mines, about two miles distant, is hailed by local papers as a great enterprise.

ISHPEMING IRON COMPANY.—The company intends commencing work on its possessions in Marquette County in the near future. It possesses some valuable mineral-bearing tracts that will doubtless prove worth developing. A diamond drill will be employed in the search.

PENINSULA.—Machinery for exploratory work on the Pewabic lode is getting into place by this company, and sinking will soon be commenced. It is the intention to sink about 200 feet and thoroughly explore the main lode by drifting, as well as to determine the location, by cross-cutting, of branches or lateral deposits such as are found at the Quincy.

MINNESOTA.

MINNESOTA IRON COMPANY.—At the Breitung mine, one of this company's properties, about 3000 tons of ore have been mined and put in a stock-pile. This was taken out in the course of explorations made to determine the extent of the deposit. Considerable ore has been mined in the course of explorations made on other properties owned by this company, although no regular mining work has yet been attempted.

MISSOURI.

SUNNYSIDE.—This mine has been leased at a royalty of ten per cent. The lessee has sunk a shaft 35 feet deep, and the last 17 feet cut is a solid body of ore. A drift has been started from the bottom of a shaft, and the men are now cutting it. The water is light and easily managed. A lively excitement has sprung up already, and seven or eight shafts have been started down during the past week.

MONTANA.

GALLATIN COUNTY.

An important discovery of mineral has lately been made in the Emerson Mining District, just across the Jefferson River and about twenty-five miles west of Bozeman. The discovery can not properly be called a recent one, as a claim was staked off there thirteen years ago. But this spring, several miners went to prospecting the district, and the result is, some thirty locations have been made. The ore carries gold, silver, and copper, the latter predominating. Assays of the latter metal have given from 18 to 70 per cent, and as high as 240 ounces of silver have been received. The veins are about eight feet wide and have one well-defined wall, the other being somewhat broken and irregular. As there is not a twenty-foot shaft in the district, but little can be said.

HENRY VILLARD.—This company's property is opening up well. The gravel is 100 feet deep in some places.

SILVER BOW COUNTY.

PARROTT MINING AND SMELTING COMPANY.—At the annual meeting of the stockholders, held at Butte recently, the following directors were re-elected for the ensuing year: T. Hauser, A. M. Holter, and A. F. Migeon. Thomas Wallace was elected president; Franklin Farrell, managing director; and E. J. Gaylord, superintendent, secretary, and treasurer. A. F. Migeon, under whose superintendency the Parrott works were built and have since been operated, was, at his earnest solicitation, permitted to retire from the arduous duties of superintendent, a position which he is understood to have retained during the past year only under protest. The company starts on its new year in better shape than ever before, and will show good results before another election is held.

NEVADA.

The Peavine District, near Rome, at one time promised to be an important mining camp; but after a good deal of money had been expended, the place was abandoned. The *Gazette* says the ore is rich but rebellious.

DAY.—The lower levels of this mine have greatly improved during the

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week. The large cave of ore recently struck has been sunk on to the depth of twenty feet.

ELKO CONSOLIDATED.—A twenty-foot ledge has been recently struck in the tunnel running in the ground lately purchased from the New York Company, but which has let it lie idle for years. The point at which the strike was made is 400 feet below the surface, and a considerable distance beyond the lead originally worked, which was left behind in the tunnel. The vein is 20 feet wide, of solid galena, and yielding from 45 to 49 per cent lead. It is estimated that at least 500 tons of such ore are now on the dump, and large quantities are in sight in the mine. In the mean time, a new and substantial furnace will be erected on the ground now occupied by the old one built by the Eastern Company years ago. It will be put in place immediately after the arrival of the necessary machinery, which is now on the way from the East.

LIMESTONE.—Work has just begun on this property at Bullion. There are 10 inches of high-grade galena and carbonate ore going straight down into the lime. The progress is eagerly watched. The Battle Mountain folks are talking of building a wagon-road to the Limestone Company's mines, in order to get shipments of ore for their new furnaces to run on.

MEADOW VALLEY.—A strike has been made in the old Fitzhugh tunnel. The ledge has been sunk on about six feet from the bottom of the tunnel, and is nearly four feet in width from wall to wall at the place where work was then going on. Some five tons of this ore were sent to the Dry Valley mill, and the pulp-assay went $44 in silver and $6 in gold, the total pulp-assay being $50. This discovery is nothing new. The workings of the mine show this. The ore above this point was all extracted years ago. The ore had all been extracted down to the tunnel level in early days, then becoming low grade, it was abandoned.

RUBY HILL TUNNEL.—The tunnel is in 304 feet, and a contract is about to be let to run 100 feet more. After passing through the iron seam 270 feet in, nothing else of a noteworthy character in the formation has been encountered. The ventilation continues to keep the air fresh and sweet.

SILVERADO.—The dump of ore belonging to this company, which came out of the property formerly known as the Rescue mine, has been leased. At the time the old company worked the mine, none but very high-grade ore was shipped.

UTAH.

SAMPSON.—Reports show that on the 20th of June ten tons of first-class ore netted at Park City $1100, and 20 tons of second-class ore netted $800. Work on the new shaft is advancing rapidly under the contract. Owing to the large quantity of surface water, work had been retarded, but now it is pushed forward. The shaft has reached a depth of 75 feet, and is sinking at the rate of about 3 feet daily. No more shipments of ore will be made until the shaft is down 200 feet, as the expense of extraction will then be much reduced.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED JUNE 5TH, 1883.

278,685. Tuyere for Blast-Furnaces. John H. Cremer, Chicago, Ill.
278,731. Manufacture of Charcoal. Henry M. Pierce, Grand Rapids, Mich.
278,737. Utilizing the Phosphorus and Iron of Forge-Cinder. Jacob Reese, Pittsburg, Pa.
278,738. Method of Dephosphorizing Metal by the Bessemer Process. Jacob Reese, Assignor to the Bessemer Steel Company (Limited), Philadelphia, Pa.
278,801. Rock-Breaker. Bertram F. Kramer, Charleston, S. C.
278,813. Draught Regulator for Locomotive and other Furnaces. Horace W. Norwood, Philadelphia, Pa., Assignor to the Norwood Spark Preventive and Smoke-Consuming Company, Camden, N. J.
278,816. Method of Producing Golden Sulphuret of Antimony. Charles E. Parsons, Assignor to the Brunswick Antimony Company, New Brunswick, Can.
278,859. Ore-Roasting Furnace. William Black, South Shields, and Thomas Larkin, East Jarrow, County of Durham, England.
278,861. Apparatus for Amalgamating Ores. Elias Bollinger, Louisville, Md.
278,889. Method of and Apparatus for Heating the Gaseous Fuel of Furnaces. John H. Cremer, Chicago, Ill.
279,032. Hand Drilling-Machine. George W. Smith, Boston, Mass.
279,089. Lining for Iron and Steel Furnaces. Edward L. Ford, Lyons, N. Y.
279,099. Apparatus for the Continuous Distillation, Sublimation, or Roasting of Solid Materials. Fritz Lürmann, Osnabrück, Germany.

GRANTED JUNE 12TH.

279,122. Gold-Washer. Charles S. Betts and Harry E. Wilson, Salt Lake City, Utah.
279,146. Stone Breaking and Crushing Machine. Philetus W. Gates, Chicago, Ill.
279,147. Stone Breaker and Crusher. Philetus W. Gates, Chicago, Ill.
279,157. Compound for Furnace-Linings and Fire-Brick. James Henderson, Bellefonte, Pa.
269,164. Ore-Concentrating Apparatus. Charles B. Hitchcock, Indianapolis, Ind.
279,264. Coal and Ore Carrier and Transmitter. Frank Murgatroyd, Cleveland, O.
279,319. Amalgamator. Abel H. Bliss, Chicago, Ill., Assignor of one half to Sylvanus L. Tripp, same place.
279,331. Steam-Boiler Setting and Furnace. Thomas R. Butman, Cleveland, O.
279,473. Manufacture of Steel by the Open-Hearth Process. William A. O. Wuth, Pittsburg, Pa.
279,503. Miner's Lamp. Edward K. Rollins, Scranton, Pa.

GRANTED JUNE 19TH.

279,519. Turbine Water-Wheel. Cornelius Barnhart, Walker Valley, N. Y.
279,596. Process of Obtaining Purified Iron in the Bessemer Basic Process. Jacob Reese, Pittsburg, Pa.
279,640. Dry-Ore Separator. Miles B. Dodge, San Francisco, Cal.
279,641. Separator for Wet Ores. Miles B. Dodge, San Francisco, Cal.
279,652. Device for Turning Fly-Wheels of Engines, etc. Patrick P. Kilcullen, St. Louis, Mo.
279,666. Radiator for Furnaces. Dwight S. Richardson, Brooklyn, N. Y.
279,679. Pumping-Engine. James Waters, Minneapolis, Minn.
279,761. Coal-Crushing Roller. John H. Hosie and James P. Hosie, Scranton, Pa.
279,788. Coal and Ore Carrier and Transmitter. Frank Murgatroyd, Cleveland, O.
279,796. Process of Coking Coal-Dust for Manufacturing Fuel Gas. James W. Pittinos, Philadelphia, Pa.
279,834. Drilling-Machine. James C. Smith, The Dalles, Oregon.
279,840. Retorting Amalgam. Carl A. Stetefeldt, New York City.

GRANTED JUNE 26TH.

279,947. Process of Purifying Iron by Means of Fluorides and Condensing the Gaseous Products therefrom. James Henderson, New York City, Assignor, by mesne assignments, to Charles G. Francklyn, same place.
279,962. Mining Tool. Thomas A. Mayes, Philipsburg, Pa.
279,969. Coal-Burning Furnace. Arthur G. Moore, Winton Place, and John W. Rahn, Cincinnati, O.
279,970. Chill for Metallurgic Furnaces. John Morrison, Pittsburg, Pa.
279,981. Turbine Water-Wheel. Joseph Raab, Dayton, O.
279,983. Ore-Crusher. William S. Sharpneck, Denver, Colo., Assignor of two thirds to H. N. Nichols, North Platte, Neb.
279,995. Amalgamator. Thomas Walker, Philadelphia, Pa.
280,001. Turbine. Abijah Woodward, Keene, N. H.
280,014. Coal-Elevator. Stephen V. Cook, Toledo, O.
289,027. Rotary Engine. Charles C. Garcelon and William A. Woods, Santa Cruz, Cal.
280,069. Amalgamator. Edward W. Nelson, Chicago, Ill., and Eugene H. Cowles, Cleveland, O.
280,093. Guide for Rolling-Mills. Alvan A. Simonds, Dayton, O.
280,102. Ore-Roasting Furnace. Thomas Walker and John F. Carter, Philadelphia, Pa., Assignors to said Walker.
280,133. Coal-Chute. Henry Claussen and Theodor Staeber, Ellinwood, Kan.
280,139. Tubing, Packing, and Operating Oil-Wells. Thomas L. Crowley, Rew, Pa.
280,158. Miner's Fuse. William Eltringham, Minersville, Pa.
280,248. Rolling-Mill. Thomas Shaffer, Phœnixville, Pa., Assignor to the Phœnix Iron Company, same place.
280,271. Brick-Drying Apparatus. Nathaniel S. Willet, Newark, N. J., Assignor to Minetta P. Cooper, same place.
280,284. Apparatus for Unloading Coal from Vessels. Walter S. Bogle, Chicago, Ill., Assignor of one half to Wendell R. King, same place.
280,310. Art of Manufacturing Iron and Steel. James Henderson, New York City, Assignor of one half to Charles G. Francklyn, same place.
280,316. Brick-Machine. Lewis B. Kennedy, Keokuk, Iowa.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, July 6.

The lack of interest attaching to the doings at the Mining Exchange has been aggravated this week by the absence of many who aid in framing the course of events there, and an unusually dull week has been added to the number of quiet ones which preceded it. The total number of mining shares sold at the Exchanges aggregates 69,815 shares, as against 138,740 shares last week.

There has been no news of any importance in regard to the Comstock mines, the prospecting-work at one or two particular points, from which so much is anticipated, not having as yet developed any thing, so far as the public is taken into confidence. California has dropped off further still, there having been sales as low as 10c. per share, while Consolidated Virginia has fluctuated between 35 and 45c. Sierra Nevada temporarily recovered to $4.15, but fell off again to $3.75, while Union sold at $4.75. Sutro Tunnel fairly held its own.

The Leadville stocks did not attract any special share of attention. It is stated, although we have been unable to confirm the report, that the Evening Star and Morning Star companies have again resumed dividends or propose to do so at an early date; $25,000 for each of them is the figure given. After eight months of suspension, this news will be received with interest, especially as it is understood to be the result of working a part of the large reserves of low-grade ore. Among the stocks dealt at the Exchange, Iron Silver holds its strong position at $2.90@$3, due to the confidence in the mine and its good business management. Amie and Chrysolite were quiet at their recent range, while there was little interest in Dunkin, Hibernia, Leadville, Little Chief, or Little Pittsburg. Climax has continued to gather strength, being carried up as high as 20c. on the 2d.

The Bodie stocks have been neglected almost completely.

Among the Tuscarora stocks, Navajo has again fallen back to $2.50, while all the rest have failed, in most instances, to record even a single sale.

In the miscellaneous list, Alice stands without a transaction. The mine is a steady producer, and should soon have wiped out its debt and have paid for improvements. Horn-Silver has fallen back a little, selling at $7. The outlook in the lead market, which, of course, largely affects the prosperity of this mine, is not considered good, and it is generally believed that a considerable stock of the metal is carried in Chicago. Green Mountain has been fairly active and steady. As yet, no decisive reports as to the developments in the tunnel have come to hand, though the time can not be far off when it must reach the Blake chute upon the continuance of which in depth the future of the mine chiefly depends. Robinson Consolidated has declined still further. Ontario has now safely passed through the spring deluge, and will soon obtain relief for its pumps by the completion of the tunnel. During the recent struggle with the water, the stock of ore at the mill was nearly exhausted. Sierra Grande has declined still further. Philadelphia is filled with sensational reports concerning the approaching exhaustion of this mine. The managers have made a very favorable contract with the Pueblo Smelting-Works for the working of the tailings, which were notoriously rich.

The daily newspapers are treated with protests from indignant stockholders of the Alta-Montana, and the errors of past managers are freely heaped upon the shoulders of the present officials. Professor Blake is understood to have made a somewhat rosy report on the mine. The trouble does not lie with the latter, but with the incapacity of those who put up the present plant, which can not handle the low-grade and refractory though cheaply mined ores. Nothing can save the company but a thorough remodeling of the metallurgical plant by one who understands his business. This will take considerable money.

Parnell seems to be going through the usual process of newly listed mines of being subjected to attacks.

DIVIDENDS.

The Evening Star Mining Company, of Colorado, has declared a dividend (No. 54) of $25,000 (as stated by Leadville papers).

The Morning Star Mining Company, of Colorado, has declared a dividend (No. 17) of twenty-five cents per share (as stated by Leadville papers).

The Rye Placer Mining Company, of Oregon, has declared a dividend of five per cent, payable July 16th.

The South Fork Gravel Mining Company, of California, has declared its first dividend.

The Standard Consolidated Mining Company, of California, has declared a dividend (No. 56) of twenty-five cents per share, payable July 12th.

PIPE LINE CERTIFICATES.

The activity which characterized the business at the petroleum exchanges at the close of last week, gave way to holiday dullness during the past few days of the present week, the market, however, showing more activity after the national holiday. Prices declined pretty uniformly and in the aggregate considerably. The monthly report, which is due on the tenth, is looked forward to with considerable interest.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
June	30....	$1.18¼	$1.18¼	$1.16¼	$1.16¼	2,944,000
July	2....	1.16¼	1.16¾	1.15	1.15⅛	1,758,000
	3....	1.14⅝	1.15	1.14⅛	1.14⅝	1,546,000
	5....	1.14⅛	1.14¼	1.11⅞	1.12¾	4,812,000
	6....	1.13⅞	1.13⅞	1.11	1.12¼	1,504,000
Total sales.....						12,564,000

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SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. June 29.	June 30.	July 2.	July 3.	July 4.	July 5.
Albion	....	....	....	....	....	....
Alpha	1¼	....	....	....	....	....
Alta	.45	.40	....	....	....	.45
Bechtel	....	....	....	....	....	....
Belcher	1⅛	1⅛	....	....	....	....
Belle Isle	.50	.50	....	....	....	.45
Best & Belcher	4⅛	4⅛	....	....	....	4⅜
Bodie	.85	.80	....	....	....	.85
Bullion	....	....	....	....	....	....
California	....	.15	....	....	....	.15
Chollar	3¼	3⅜	....	....	....	3½
Con. Virginia	.45	.45	....	....	....	.45
Crown Point	1¼	....	....	....	....	1⅜
Elko Cons	.25	.30	....	....	....	....
Eureka Cons	4⅛	5	....	....	....	5¼
Exchequer	.25	.20	....	....	....	.20
Gould & Curry	2⅛	2⅛	....	....	....	2⅛
Grand Prize	.10	.10	....	....	....	.05
Hale & Norcross	6	7	....	....	....	6⅛
Independence	.70	....	....	....	....	....
Martin White	5	....	....	....	....	....
Mexican	2⅞	3	....	....	....	3
Mono	....	....	....	....	....	....
Mount Diablo	....	....	....	....	....	....
Navajo	3⅛	2⅞	....	....	....	2⅛
Northern Belle	6¾	6¾	....	....	....	6⅝
North Belle Isle	....	....	....	....	....	.20
Ophir	2⅝	2⅛	....	....	....	2¾
Overman	....	....	....	....	....	....
Potosi	1⅜	1⅛	....	....	....	1⅜
Savage	2	2⅛	....	....	....	2
Scorpion	....	....	....	....	....	....
Sierra Nevada	3⅝	3¾	....	....	....	3¾
Silver King	10	10	....	....	....	10
Tip-Top	....	....	....	....	....	.45
Union Cons	....	....	....	....	....	4¾
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3⅝	3⅞	....	....	....	3⅞

BULLION MARKET.

NEW YORK, Friday Evening, July 6.

The market is a little better than it was at the date of our previous posting; but it is, nevertheless, without any indications of value as to its early future.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
June 30	50 7-16	110¼	July 4	50½	Holiday.
July 2	50 7-16	110⅝	5	50½	110½
3	50 7-16	110⅝	6	50½	110½

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended July 6th, as compiled from various sources, amounted to $158,000, as against $138,500 reported for the previous week. The receipts from January 1st, 1883, to date are $5,988,213.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended June 30th	$215,178
Corresponding week last year	1,647,797
Since January 1st, 1883	6,620,882
Corresponding period last year	35,941,234

Imports.

Week ended June 30th	$48,492
Corresponding week last year	31,847
Since January 1st, 1883	6,940,957
Corresponding period last year	1,947,253

Foreign Bank Statements.—The governors of the Bank of England made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £172,000 bullion; but the proportion of its reserve to its liabilities was reduced from 41 5-16 to 35 3-16 per cent, against 35 per cent at the same date last year. July 5th, the bank gained £36,000 bullion on balance. The weekly statement of the Bank of France shows losses of 3,250,000 francs gold and 5,000,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of May.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	77,991	$398,410
*Alta-Montana, G. L. S.	"	....	§10,625
*Belmont	"	....	17,775
Bodie, G. S.	Cal	9,248	100,590
Bodie Tunnel, G.	"	6,128	51,447
*Bonanza King, G.	"	....	199,077
*Boston & Montana, G.	Mont	....	72,318
*Central Arizona, S.	Ariz	....	35,845
*Christy, S.	Utah	25,082	117,736
*Chrysolite, S. L.	Colo	§45,413	192,971
Cons. Bobtail	Colo	....	18,723
*Contention, S.	Ariz	92,820	475,824
Crescent, G.	Cal	....	13,000
*Custer, G. S.	Idaho	....	43,572
*Deadwood-Terra, G.	Dak	....	120,231
*Derbec Blue Gravel, G. S.	Cal	12,885	44,729
Evening Star, S. L.	Colo	....	47,061
*Father de Smet, G.	Dak	25,120	153,105
*Frisco M. and S. Co., G. S. L.	Utah	....	§77,084
Gunnell, S.	Colo	13,772	58,828
*Head Center Cons.	Ariz	1,207	8,109
*Head Center and Tranquillity	Ariz	24,115	42,601
*Hecla Cons., G. S.	Mont	58,938	293,922
*Homestake, G.	Dak	....	330,060
*Hope, S.	Mont	21,389	41,963
Horn-Silver, S. L.	Utah	228,000	1,283,000
Idaho, G.	Cal	....	88,642
*Independence, G. S.	Nev	6,048	32,991
Iron Silver, S, L.	Colo	127,109	503,831
*Kentuck, G. S.	Nev	2,156	10,393
*Lexington, S.	Mont	109,629	530,833
*Little Pittsburg, S. L.	Colo	....	22,873
*Marguerite, G.	Cal	....	33,200
*Martin White, G. S.	Nev	....	136,317
Morning Star, S. D.	Colo	....	84,428
*Moulton, G. S.	Mont	....	123,288
Mount Diablo	Nev	52,233	127,311
*Navajo, G. S.	"	62,336	343,962
*North Belle Isle	"	45,510	1,953
Northern Belle, S.	"	....	388,525
*Ontario, S. L.	Utah	....	807,695
*Oxford, G.	N. S.	6,855	28,179
*Phœnix, G.	S. C.	....	†3,666
*Pinal Cons., S. L.	Ariz	25,540	163,400
*Satemo, G.	N. S.	....	2,500
*Silver Bow, G. S.	Mont	....	101,241
Standard, G.	Cal	71,313	442,796
Star, S.	Nev	....	27,095
*Stormont, S.	Utah	21,377	95,658
Syndicate, G.	Cal	5,987	20,073
Tintic M. and M. Co.	Utah	....	7,632
*Tip Top, S.	Ariz	....	‡22,983
*Tombstone, G. S.	"	76,600	‡322,830
Wyoming Cons	Cal	....	31,541
Yellow Jacket, S.	Nev	30,191	183,064
Total amount of shipments to date			$9,027,815

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, July 6.

Copper.—As usual, after sales of large blocks to consumers, Lake copper has fallen into a state of quietude. Nobody wants to buy and there is very little offering, while the speculative interest has long since let the metal alone. We hear of only jobbing sales of Lake with 15½c. bid and 15¼c. held. In other brands, the market is quiet at the range of about 14@14½c., according to brand. There is again some inquiry from Europe, Baltimore being asked for this time. Abroad, the markets are fairly well maintained, a very encouraging feature for this metal. To-day's cables are £63 10s. for Chili Bars and £69@£69 10s. for Best Selected.

Tin.—The market is quiet and steady, the jobbing demand being good for the season. In a large way, we hear only of a sale of 100 tons at private terms. Quotations here are 21⅛@21⅜c. for spot Straits, Malacca, and Australian. England cables to-day to the Exchange, £93 5s.

Lead.—Though there has been some talk of a large transaction, the report is discredited, and no sales of any size are reported in any reliable quarter. The future of the market is looked forward to with some apprehension. Stocks here and in the West are undoubtedly accumulating, and the current demand is certainly not larger here than it was a year ago, while the output is still going on at a round rate. We quote nominally 4·40c. for Common and 4·42½@4·45c. for Refined.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is firm Sales for the week sum up over 550 tons of Refined at 4·13c., and 190 tons of Common at 4·12½c.

Messrs. Everett & Post, of Chicago, telegraph:

The market remains the same, if any thing a shade weaker. Sales were 210 tons of Common at 4·15c., and 110 tons of Refined, a special brand, at 4·20c.

Spelter.—The market is extremely dull, in spite of the fact that among all metals this ore is apparently most favorably situated. Good ordinary domestic brands are freely offered here at 4·50c. England cables £15.

Antimony.—Nothing has been done. We quote Cookson's nominally 10⅝@10⅝c., and Hallett's 9⅝@9⅝c. for large lines.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, July 6.

American Pig.—The celebration of the national holiday has broken up the week and has restricted business to a small limit, though the interest has grown considerably. The diversion of business from a larger to a smaller number of furnaces is beginning to tell on the tonnage of those who have been able to meet present prices, which are, however, still so low that there is very little profit in the business. The feeling is decidedly better, and is now, too, beginning to affect No. 2 Foundry and Gray Forge. Other than standard brands of course are still selling at less than current quotations, but a greater desire is manifested to purchase, and it now looks as though bottom prices had been passed. Sales during the week have been small, and it will probably be some time before consumers come forward to anticipate fall demands. We quote No. 1, $21@$23.50 for good to choice grades, at tidewater; No. 2, $19@$20.50; and Gray Forge, $18@$19.50. Bessemer pig is dull, American being $20 at furnace, and Foreign $21 at tide, nominally. England cables 50s.@50s. 10d. Spiegeleisen is quiet at $31.50@$32 for 20 per cent, and $25.50@$26 for 10 to 12 per cent. The Passaic Zinc Company is building a furnace to make spiegel from zinc ore residue.

Scotch Pig.—As yet, the expectations of a growing business in Scotch Pig have not been realized. The arrivals this week were small. Freights are quoted 6s. per cable from Glasgow.

At the Exchange, the following cable quotations were received: Coltness, 60s.; Langloan, 59s. 6d.; Summerlee, 57s. 6d.; Gartsherrie, 57s.; Glengarnock, at Ardrossan, 54s. 6d.; and Eglinton, at Ardrossan, 48s. 6d. Warrants to-day were 46s. 11d. We quote here, all ex ship, Coltness, $23.50@$24; Langloan, $23.50; Summerlee, $23; Gartsherrie, $23@$23.50; Glengarnock, $22; and Eglinton, $20.50@$21.

Rails.—For summer and winter delivery, the majority of the mills can take no orders, except for small lots, and some of them are booked for the whole of the year. Nominal quotations are $38 at mill, but for winter and spring delivery, the mills accept $37 for round orders. England cables £4 15s.@£5.

Old Rails.—There are no features to note, the market being dull and lifeless at $21@$21.50 for Ts.

Scrap.—There are slight indications of an improvement. We quote $22@$22.50 ex ship.

Philadelphia. July 6.

The iron transactions of the past week have necessarily been restricted to very narrow limits. A review of the past month shows a slight improvement in foundry irons, and a good many inquiries for refined iron: but it remains to be seen whether this indication will be followed up by a more active demand. The general conditions surrounding the iron trade are unchanged, and there is but little inducement for buyers to depart from their accustomed policy. The great fact that stands before buyers is, that nothing but an extraordinary demand for iron can improve prices. Production is beyond requirements, and the only deduction from this is, that prices will be lower. On the other side, producers say that, while this logic is faultless, there is no room for a decline, either in crude or finished iron. Ever since the opening of the year, a conservative policy has been followed, buyers purchasing only for their most pressing wants and with very few exceptions, that policy has been strictly followed. Producers have taken fright, and restricted the output of crude iron. The result in the past few days is what sellers regard as an encouraging upward tendency in foundry irons. Very little will come of it during the summer. Intercourse with large consumers, both of

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	June 30.		July 2.		July 3.		July 4.		July 5.		July 6.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.			.17	.16									5,800
Amie Con., Co.													
Argenta, Ne.													
Bar. & Walker, Ut.									10.12	9.00	10.25		2,200
Bassick, Co.	.51								.56		.55	.47	1,100
Belle Isle, Ne.													
Bodie Cons., Ca.													
Breece, Co.	.75		.12	.10									100
Bulwer, Ca.													130
California, Ne.													
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.			1.15										300
Chrysolite, Co.	.16	.12	.20	.16					.17		.17	.16	5,800
Climax, Co.	.45		.40		.35				.45	.43	.44	.40	4,500
Cons. Va., Ne.													
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.													
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.	2.70												100
Grand Prize, Ne.													
Great Eastern, Dk.													
Green Mountain, Ca.	.73	.72	.70		.71						.70		2,000
Hale & Norcross, Ne.													
Hall-Anderson, N. S													
Hibernia, Co.													
Homestake, Dk.			16.00	15.50					15.50				245
Horn-Silver, Ut.			7.50	7.00							7.00		750
Hukill, Co.													
Independence, Ne.													
Iron Silver, Co.			2.95	2.90	2.95				3.00	2.95	2.95		1,000
La Plata, Co.													
Leadville C., Co.	.52				.50								225
Little Chief, Co.													
Little Pittsburg, Co.													
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	3.10	3.00	2.85								2.50		600
Northern Belle, Ne.													
North Belle Isle, Ne.													
Ontario, Ut.													
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.					38.12								500
" Com., Ca.			9.00										100
Rising Sun, Ca.													
Robinson Cons., Co.	.56	.55	.55	.54	.54	.53			.53	.52	.55	.53	5,100
Savage, Ne.									2.10				100
Sierra Grande, N. M.	1.25		1.25	1.20	1.20				1.15		1.20	1.10	1,800
Sierra Nevada, Ne.	3.60				3.60				4.15	3.75	3.75		850
Silver King, Ar.					10.00				10.00		10.25		250
Spring Valley, Ca.			.60										65
Standard, Ca.													
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	June 30.		July 2.		July 3.		July 4.		July 5.		July 6.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.													
Albion.													
Alta.													
Alta-Montana, G.											.02		2,000
Am. Flag, S.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'lcher, G. S.													
Big Pittsburg, S. L.													
Bondholder													
Bradshaw, S.													
Buckeye													
" pref.													
Bull-Domingo, S.L.			.06	.05									1,300
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., B. H., G.													
Central Ariz'na, S.			.35										200
Cherokee, G.													
Climax, Co.													
Cons. Imp'ri'l, G.S.													
Crowell, G.													
Dahlonega, G.			.02										1,000
Decatur							.04						500
Dunderberg													
Durango, G.							.05	.04			.05		5,100
Eastern Oregon	.60	.57	.61				.64	.58			.63		9,400
Elko Cons.	.25	.23	.25	.24	.24							.65 .63	3,300
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.													
Hortense, S.							.10						40
Imperial.											.08		100
Lacrosse, G.			.10										100
Lucerne.													
Mariposa Pref., G.													
" Com., G													
Mexican, G. S.													
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S L.													
Ophir'l & Miller, S.	.15		.15										500
Parnell	.40						.45	.41			.40	.38	4,000
Quartz Creek													
Rappahannock, G.			.08				.07						1,000
Red Elephant, S.	.07												2,100
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.			.10								19	.18 .18	2,800
South Bodie, G.													
South Bulwer, G.													
South Bute													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.			.03										500
Sutro Tunnel	.21	.20			.21						.21		1,800
Taylor-Plumas													
Union Cons., G. S.											4.75		10

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 33,615. Non-dividend shares sold, 38,230.

forge and foundry irons, shows conclusively that an active demand will not be developed until September.

No. 1 Foundry is called firm at $21@$22. Standard and special brands have been bought pretty freely, but at lower prices than those quoted. Very little is selling at these figures, though efforts are made to create the impression that they are firm, and even like to advance.

During this month, the mills will be closed down for from two to three weeks, and those not well supplied with orders will remain out longer. Hence, forge iron will be dull, and as stocks are large, it is correct to infer that prices will remain weak, though some special brands are quoted with more firmness than for several weeks past.

Bessemer iron is nominally $21.50. Scotch iron continues dull and week. Some holders are endeavoring to unload stocks by concessions of 50 cents.

Merchant Iron.—Local trade is inactive, and card rates are 2·80c.; selling prices, 2·25@2·15c.; country mills, 2·10c. Common iron, 1·75@2c. Leading firms report stocks of iron light in consumers' hands, and therefore predict an improvement during August.

All kinds of construction iron have been selling pretty freely for a month or six weeks past, and leading manufacturers are satisfied with the prospects for the fall. An improvement is probable this month, as a good deal of business is generally held over from June, especially when prices are stiff as they have been.

Plate and Tank Iron.—The situation in plate could be much better; but notwithstanding low prices, a very large amount of business has been done in the aggregate. Capacity has been pretty well engaged all spring and summer. The chief cause of complaint is low prices. A few inquiries for large lots are on the market, and if buyers' terms are accepted, orders will be placed next week. There is nothing discouraging in the trade except low prices. Consumptive inquiries have been and are large, and will probably remain so, as bottom prices have been reached.

Sheet-Iron.—Mills are entering the second half of the year with well-filled order-books, and prices are firm at card rates for small lots as usual. Large consumers who look ahead for fall requirements in June and August will be favored.

Steel Rails.—Makers report the condition of trade to be satisfactory; though profits for the past six months have not come up to the returns of former seasons, owing to the low prices. Rates are $38. Light sections are $40.

Old Rails.—Offers for shipment are made at $22, with no takers. Yards are well filled with scrap, but little is moving.

Pittsburg. July 5.

Notwithstanding some very attractive concessions made by outside makers, consumers are purchasing only for immediate requirements, and are looking for a further weakness. Several mills have closed down for repairs. There will be a longer suspension for that purpose this year than is usual. Orders are scarce, and but little activity can be reported. Quotations for Foundry are $19@$21; Mill Irons, $17@$18. Concessions of 50 cents to $1 per ton have been made.

During the past six months, facilities for making iron have been considerably increased in and about this city. A large amount of plate iron could be sold, but the offers are below cost of making.

The output of pig-iron is fully up to all requirements, but stocks are light at Alleghany County furnaces. The present week is a dull one. Very little new business is under consideration, as manufacturers and buyers prefer to let the summer dullness pass away before entering into new or large contracts.

Less Muck Bar is offered, and quotations are $84. Merchant Bar is sold as low as 1·80@1·90c.

A few small transactions have taken place in wrought-iron pipes at 70 and 10 off. Sheet-iron continues in active demand for building purposes, and prices are as low as at any time for a year. A good many specifications are expected during July and August for construction iron for Western Pennsylvania delivery, but orders will not be placed except at exceedingly low prices. The Bessemer mills are working to full capacity. Offers have been received here at $37.50, fall delivery, but no sales have yet been made at that price. Old Rails are quoted at $23 for American.

The merchant steel trade is dull. Bessemer and open-hearth grades are cut. Crop-Ends are quoted at $25. Spikes, 2·60c. Selected Wrought Scrap, $24; No. 2, $23. Wrought Turnings, $16.

The Amalgamated Association holds its annual celebration in Philadelphia, August 7th.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, July 6.

Anthracite.

The influences which seem to be at work in attempting to shape the course of the coal trade are certainly not those of legitimate supply and demand. So far as the latter is concerned, even the most violent bull of coal stocks in Wall Street will not have the audacity to maintain that it is equal to that of last year. Our manufacturing industries in the New England States, always heavy consumers of anthracite coal, are not doing nearly as much work, our factories in such large cities as New York and Philadelphia are running on half time or less, the falling off in the production of iron is affecting the consumption of anthracite in the Schuylkill and Lehigh valleys; and yet, in spite of all this, the companies want to make themselves and the public believe that the market will warrant an advance in the price of coal, in spite of an increase in the production.

Middlemen have taken considerable coal at June prices, and there are indications even that they have ordered more than they will be able to handle.

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The month will probably be consumed in attempts to market this coal among the few who may be made to believe in a prospective August advance, or who may be in urgent need of coal.

From Philadelphia come reports that are significant, and confirm the opinion expressed by us some time since. Mr. Gowen, of the Philadelphia & Reading Coal and Iron Company, it is said, has been distributing copies of an agreement for signature among the individual operators in the Shamokin District to sell the coal mined for Western shipment to him, instead of consigning it themselves. The details of this scheme have not as yet been divulged; but it is obvious that it will have its advantages for the individual shippers, and will contribute to that most important end, the cheapening of the cost of the coal in Western cities, by reducing the general expenses. It can not be expected, of course, that the individual operators should enter into such an arrangement without some hesitation; but it is believed that ultimately the majority of them will accept it.

Bituminous.

Except frequent reports of forced sales of coal at low prices, there are no features to note. Business is extremely dull. We quote Clearfield $3.75@$4, while Cumberland is entirely nominal at $4.10@$4.35.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended June 30th and year from January 1st:

TONS OF 2240 LBS.	1883.		1882.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co..	65,874	1,768,555	84,172	1,539,120
D. L. & W. RR. Co.	79,527	2,219,023	107,431	2,014,921
Penna. Coal Co.....	23,184	623,921	38,378	581,205
L. V. RR. Co.....	15,126	520,655	19,290	512,000
P. & N. Y. RR. Co..	3,587	97,392	4,189	95,184
C. RR. of N. J.....	30,317	1,178,102	59,396	1,093,045
Penna. Canal Co....	9,585	160,652	15,392	173,287
North & West Br. RR.....	.....	216,355	.....	.....
	227,200	6,784,635	328,248	6,008,762
Lehigh Region.				
L. V. RR. Co.....	66,466	2,283,504	117,131	2,171,322
C. RR. of N. J.....	46,381	1,105,683	55,340	996,574
S. H. & W. B. RR..	.....	23,680	.....	20,000
	112,847	3,412,867	172,471	3,187,896
Schuylkill Region.				
P. & R. RR. Co.....	95,371	3,234,452	175,939	2,922,568
Shamokin & Lykens Val.....	34,555	659,093	29,252	546,017
	129,926	3,893,550	205,191	3,468,585
Sullivan Region.				
St Line&Sul.RR.Co.	810	29,927	1,627	27,070
Total	470,783	14,120,079	707,537	12,692,313
Increase.....	.....	1,428,666	.....	.....
Decrease.....	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878..... 7,058,738 tons.
" " " " 1879..... 11,514,593 "
" " " " 1880..... 9,914,544 "
" " " " 1881..... 11,921,724 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 355,174 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended June 30th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	3,072	45,933	32,575
Coal for shipment at South Amboy.....	10,137	400,979	396,701
Coal for distribution.....	11,320	385,734	349,111
Coal for company's use	2,592	72,992	63,792
Total	27,121	905,638	842,179
Increase.....	.....	63,459	.....
Decrease.....	.....	.....	.....

The Transportation of Coke over the Pennsylvania Railroad for the week ended June 23d and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region).....	526	49,426
West Penn. RR	2,003	51,413
Southwest Penn. RR	42,742	968,194
Penn. & Westmoreland Region, Pa. RR	4,066	110,196
Pittsburg, Penn. RR.....	31	454
Snow Shoe (Clearfield Region).....	489	9,971
Total	49,857	1,189,654

The Production of Bituminous Coal for the week ended June 23d was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.....	52,233	1,047,807
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	5,401	154,138
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.....	2,758	95,071
East Broad Top.....	555	22,255
Clearfield Region, Pa.		
Snow Shoe.....	3,690	117,258
Tyrone and Clearfield.....	58,531	1,323,046
Alleghany Region, Pa.		
Pennsylvania RR..	5,049	218,479
Pittsburg Region, Pa.		
West Penn RR.....	4,886	218,788
Southwest Penn. RR.....	1,249	53,328
Penn & Westmoreland gas-coal, Pa. RR	19,152	662,414
Pennsylvania RR	14,276	238,558
Total.....	167,778	4,151,142

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to July 2d.

PORTS.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria.....	.75	.....	.....
Annapolis.....	.....	.....	.....
Albany.....	.....	.....	.....
Baltimore	.50§	.....	.....
Bangor.....	1.50	.....	.....
Bath, Me.....	1.40@1.45	1.55	.....
Beverly.....	1.40@1.45	.....	.....
Boston, Mass.....	1.40@1.50	1.60	1.20@1.25
Bristol.....	1.25	.....	.....
Bridgeport, Conn.	.....	1.40	.55
Brooklyn	.85§	1.35	.....
Cambridge, Mass.	1.50@1.60‡	1.70	1.20@1.25
Cambridgeport..	1.50@1.55‡	1.70	.....
Charleston, S. C..	.75	.75	.....
Charlestown.....	1.45	1.60	1.20@1.25
Chelsea.....	1.45	1.60	1.20@1.25
City Point.....	.....	.....	.....
Com. Pt., Mass..	1.50@1.55	1.70	.....
E. Boston.....	1.40@1.50	1.60	1.20@1.25
East Cambridge.	1.50@1.55	1.70	1.20@1.25
E. Gr'nwich, R. I.	1.25	1.45	.80@.85
Fall River.....	1.20@1.25	1.45	.80
Galveston.....	.....	3.00	.....
Gardiner, Me	.....	.....	.....
Georgetown, D.C.	.75	.....	.....
Gloucester.....	1.50@1.55	.....	.....
Hartford.....	.....	.....	.....
Hackensack.....	.....	.....	.....
Hudson.....	1.00§	.....	.....
Lynn.....	1.60@1.65	1.85	.....
Marblehead.....	.....	1.85	.....
Medford.....	.....	.....	.....
Millville, N. J....	.....	.....	.....
Milton.....	.....	.....	.....
Newark, N. J.....	.....	1.40	.....
New Bedford	1.20@1.25	1.45	.90
Newburyport	.....	1.80	1.35
New Haven.....	.....	1.40	.55
New London.....	.....	1.40	.70
New-Berne.....	.....	1.25	.....
Newport.....	1.25	1.45@1.50	.80
New York.....	.85§	1.25	.....
Norfolk, Va	.65	.....	.....
Norwich.....	.....	1.60	.75
Norwalk, Conn ..	.....	1.55	.55@.60
Pawtucket.....	.....	1.55	.....
Philadelphia.....	.....	.....	.....
Portland.....	1.40@1.45	1.60	1.20
Portsmouth, Va..	.60@.65	.70	.....
Portsmouth, N.H.	1.60@1.65	1.70	1.30
Providence.....	1.20@1.25	1.45	.80
Quincy Point.....	1.55@1.60	1.70	.....
Richmond, Va...	.80@.85	.....	.....
Rockland, Me.....	.....	1.65	.....
Rockport	1.65@1.70	1.65	.....
Roxbury, Mass...	1.40@1.45	1.65	.....
Saco.....	.....	1.80	1.10†
Sag Harbor.....	.....	.....	.....
Salem, Mass.....	1.65@1.70	1.70	1.25
Saugus	1.60	.....	.....
Savannah.....	.....	1.00	.....
Somerset.....	1.20@1.25	1.50	.....
Staten Island....	.....	.....	.....
Trenton.....	.....	.....	.....
Troy.....	1.00§	.....	.....
Wareham.....	.....	1.70	.....
Washington.....	.75	.....	.....
Weymouth.....	.....	1.80	.....
Williamsbg, N.Y.	.....	1.35	.....
Wilmington, Del.	.....	.....	.....
Wilmington, N.C.	.80	1.00	.....
St. Thomas, W. I.	.....	.....	.....

* And discharging. † And discharging and towing. ‡ 3c. per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. ** Below bridge. †† Towing and pilotage, $75. H Hoboken.

Rates firm. Tonnage in demand.

BALTIMORE, July 2, 1883. GEORGE W. JONES & Co.

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports, per ton of 2240 lbs.

	Lump.		Steamer.		Grate.		Egg.		Stove.		Chestnut.	
WYOMING COAL.	$		$		$		$		$		$	
Pittston at Newburg.....	3	95	3	95	3	90	4	00	4	20	4	25
Scranton at Hoboken....	3	90	3	90	3	90	4	15	4	45	4	55
Lackawanna at Weehawk'n	3	90	3	90	3	90	4	15	4	45	4	60
Wilkes-Barre at P. Johnston	3	90	3	90	3	90	4	15	4	45	4	45
Plymouth R. A. at P. John.	.....		4	25	....		4	45	4	90	4	50
LEHIGH COAL.												
Honey Brook at Port John.	5	00	4	25	....		4	40	4	45	4	45
Fulton at South Amboy....	5	25	4	40	.....		4	40	4	30	4	40
U.L. & Coun. Ri'ge at Eliz'pt	.....		.....		.....		.....		.....		.....	
SCHUYLKILL COAL. *At Elizabethport.*												
Hard White Ash.....	4	85	4	85	....		4	25	4	60	4	35
Free-Burning White Ash...	.....		3	90	.....		4	15	4	60	4	35
Schuylkill Red Ash.....	.....		.....		.....		4	25	4	80	4	35
Shamokin.....	.....		.....		.....		4	40	4	80	4	45
Lorberry.....	.....		.....		.....		4	55	5	00	4	45
Lykens Valley (Brookside).	.....		.....		4	85	5	15	5	50	5	15
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.												
Hard White Ash.....	4	50	4	50	3	75	3	90	4	25	4	00
Free-Burning White Ash...	.....		3	55	3	55	3	80	4	25	4	00
Schuylkill Red Ash	.....		.....		.....		3	90	4	45	4	00
Shamokin.....	.....		.....		.....		4	05	4	45	4	10
Lorberry.....	.....		.....		.....		4	05	4	55	4	10
Lykens Valley (Brookside).	.....		.....		4	35	4	65	5	00	4	65

Jermyn coal, at Hoboken, is quoted per ton of 2240 lbs.: Lump, $3.90; Steamer, $3.90; Broken (grate), $3.90; Egg, $4.15; Stove, $4.45; Chestnut, $4.45; Chestnut, No. $23.

Wholesale Prices of Bituminous Coal.

Clearfield, at Philadelphia.....	$3.10@$3.25
" " South Amboy.....	3.80@ 3.90
" " New York, alongside.....	4.10@ 4.25
Cumberland, at Baltimore.....	3.15@ 3.25
" " Georgetown...	2.90@ 3.10
" " South Amboy.....	4.00@ 4.20
" " New York, alongside...	4 20@ 4.40

Horsford's Acid Phosphate

Makes a Cooling Drink.

Into half a tumbler of ice water put a tea-spoonful of Acid Phosphate; add sugar to the taste.

WANTED.—A COPY OF TREATISE ON Ore-Deposits, by Bernard von Cotta, translated by Frederick Prime, Jr., new or second-hand. Address, giving price, E. W. F., P.O. Box 1833, New York.

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IN an inaugural address delivered at the opening of the Rose Polytechnic Institute of Terre Haute, Ind., in March last, President CHARLES O. THOMPSON, formerly of the Worcester Free Institute, outlined the scope and defined the aims of the school to the development of which he is now lending his best efforts. We notice, as a commendable and significant departure from the usual course in civil engineering, that the young men who propose to be civil engineers will spend a part of their time in the machine-shop, that practice time to be concentrated in the first of the four years' course. Mr. THOMPSON'S address will be read with much interest by all those who follow developments in the great and promising field of technical education.

MR. JOHN R. MCCUNE, the umpire chosen by the Railroad Coal Trade Tribunal, has decided the question pending between the railroad coal operators and their men, whether 3 or 3½ cents were to be paid per bushel of 76 pounds for mining for all coal running over a one and a half inch screen. He has fixed the price at 3½ cents, thus offering a fair compromise, which probably would not have been reached except after a protracted struggle. His reasons are certainly convincing. While acknowledging that there is little profit in mining in the present overcrowded state notably of the lake markets, he urges that some saving might be made by operators in the expenditures for dead-work, royalty, and car service, thus enabling them to meet the men half-way. The latter, on the other hand, are told that they are mistaken when they assert that the cost of living now is as great as when the price of mining was four cents. Mr. MCCUNE'S statement is forcible; it is that of a clear-headed, impartial business man, who has looked the issue squarely in the face, and advises both parties, for their common good, to yield to the hard logic of facts. It is a question which Pittsburg operators will not unnaturally ask themselves, whether they must not be content to give up a large share of the lake trade for good, unless they can establish by undeniable evidence, not alone that their coal is better than that of their younger rivals, but place it before their customers in dollars and cents.

FROM England comes news that ought to be gratifying to those of our Western copper producers who sell argentiferous copper ores and mattes in the English market. We understand that recent contracts made there show better prices, equivalent to about 13 cents for the copper in the ore or matte. This, we understand, is due to the fact that a little "ring," as we should call it in this country, among the three smelting-works which controlled the working of this class of material, is threatened with competition. A firm near Liverpool has recently commenced working, and it is stated that the building of another large works is contemplated.

As for those producers who ship ordinary refined copper or black copper, the course of the London market during the past six months has been fairly encouraging. It is generally understood in England that one firm has been persistently bulling the market, and from a statistical point of view the market is in a fair condition. Messrs. JAMES & SHAKSPEARE, of London, furnish the following figures for the first six months of the year :

		January 1 to June 30. 1883.	1882.	1881.
Imports	Chili	20,583	20,388	17,337
	Other foreign	21,381	16,580	18,250
Tons		41,963*	36,968	35,587
Deliveries	Chili	19,799	21,606	21,323
	Other foreign	21,138	16,779	14,868
Tons		40,937	38,385	36,191

According to the same authority, the visible supply on the 30th of June was 48,197 tons at the close of last month, against 46,587 tons on the 31st of December, 1882, and 47,401 tons on the 30th of June, 1882. The Board of Trade returns are not yet at hand to show how the arrivals were distributed. So far, there are no features in the situation in London or here to warrant any uneasiness, while a revival of business activity may easily be attended by a higher range of values on both sides of the Atlantic.

"WHAT IS A KNOWN LODE?"

Section 2333 of the U. S. Revised Statutes provides that

"Where a vein or lode, such as is described in section 2320 (that is, a vein or lode of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits), is known to exist within the boundaries of a placer-claim, an application for a patent for such placer-claim which does not include an application for the vein or lode-claim shall be construed as a conclusive declaration that the claimant of the placer-claim has no right of possession of the vein or lode-claim ; but where the existence of a vein or lode in a placer-claim is not known, a patent for the placer-claim shall convey all valuable mineral and other deposits within the boundaries thereof."

Under this provision, the Iron Silver Mining Company at Leadville, Colo., brought suit against certain parties working lode-claims upon the (patented) Wells & Moyer placer-claim belonging to that company. A clause in the placer patent excepts from the grant thereof all lodes known to exist within the claim at the date of the application. It seems to have been admitted that no lode had in fact been *located* prior to that date ; but the defendants contended that it was generally known that a lode or vein of rock in place existed within the placer-claim before the application for a patent ; that shafts and other developments before made in lode-claims adjoining the placer established the fact that a vein or lode extended underneath the placer-claim. From this, they argued that it was a "known lode' within section 2333, was excepted from the grant in the patent, and they had the legal right to go upon the surface of the placer, after patented, and sink shafts and locate and hold portions of this vein.

In the United States Court at Denver, Judge MCCRARY held, upon these pleadings (in the case of the Iron Silver Mining Company *vs.* Sullivan *et al.*), that the term "known lode or vein" within section 2333, which was reserved out of the placer patent grant, meant a known lode or vein mining claim, which had been duly located or recorded and owned by some third party before the application was made for the placer patent ; and as it appeared by the defendants' answers that they did not locate or discover their lode-claims till after the placer patent was applied for or had issued, their rights were not reserved or excepted in the placer patent, and they were trespassers on the patented ground of the plaintiff company.

This decision applies to several cases. It is reported that one of them,

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as a test case, will be carried up to the Supreme Court. The above statement of the point involved is taken from an intelligent and apparently accurate summary in a Denver journal. Assuming it to be correct, we do not see how the Supreme Court can refuse to confirm this decision. There may be circumstances that would justify the conclusion that a lode is known to exist before it has been duly located. We can imagine, for instance, that an explorer might find and fully expose a lode, and that, by a sharp race or a clever trick, some one might cover it on the record-book with a placer-claim, just before he got it recorded. But no such circumstances exist in this case. The "lode" here is the "contact" or ore-bearing zone of Leadville; and it was simply inferred or presumed, not known, to exist under the placer-claim. As a matter of fact, in numerous instances, placers do cover the outcrops of the lodes that formed them. "Deposits of *débris* in place" is the name given to such placers, and a striking example is furnished by the great gold mine known as El Callao, in Venezuela, of which a brief account, from an excellent authority, is given in another part of this issue of the JOURNAL. But something more than this possibility or even probability should be required to constitute a "known lode."

The case above mentioned is important and noteworthy in several particulars. It is one of the few victories won by the Iron Silver Mining Company out of much litigation. The lode-locations, made with much patient care and at great expense, by Mr. WILLIAM A. STEVENS, and afterward acquired by this company, have been repeatedly curtailed of the privileges which the law was intended to confer, by the hostile verdicts of Colorado juries, who seemed determined that, law or no law, there should be no "going beyond side-lines," if they could prevent it. Now the placer-claims came into court, and in this case with better luck. This decision gives to the company an area of 160 acres in California Gulch and on Printer Boy and Iron hills, under a large part of which the "carbonate contact" is supposed to extend. Within this area, no lode-claims are recognized, if not "known" before the application for the placer patent. A large number of later lode-locations are thus ruled out. Among them are said (we do not know with what accuracy) to be the Brooklyn, Eighty-One, Sligo, General Sherman, Rebel, Minnie, Minnehaha, Gray Eagle, Gardiner, Goodell, and Arctic.

This decision, if sustained, opens a curious suggestion to miners. Since the law does not require that placer-claims shall contain placers, but declares that they may include "all forms of deposit excepting veins of quartz or other rock in place;" and since it provides that a placer-claim not containing "known" lodes shall cover "all valuable mineral and other deposits within the boundaries thereof," it is only necessary for a miner who has discovered "float" in a new locality to avoid looking for any lode, and to locate a placer-claim and make application for patent at once, in order to obtain 160 acres of complete and indefeasible mining rights. The cost per acre will be but $2.50, against $5 for a lode-claim; and the limitation of the side-lines may well be submitted to, in view of the large area. It appears, therefore, that for any one who likes that sort of title, the "square location" is already given by law, even on quartz-claims, and in dimensions exceeding all that has been heretofore proposed. We shall not be surprised to see shrewd operators taking advantage of this fact; and the result will be a good deal of fighting. *

THE TRANSMISSION OF POWER BY ELECTRICITY IN MINES.

The exigencies of special circumstances in the use of power in mines are often so peculiar that necessity forces engineers to adopt methods which above ground might be considered unwise. Work in inaccessible localities, danger of fire, inefficiency of ventilation, often make the carriage of steam through long lines of pipe practically impossible, and therefore hydraulic power, and more frequently still, compressed air, have found more frequent applications than above ground. A valuable addition to the number of methods of transmitting power over long distances has, of course, been hailed by mining engineers with much satisfaction, and they were among the first to turn transmission by electricity to account. Some time since, we submitted data gathered by work in a number of French mines, and through the publication of results by B. R. FÖRSTER, manager of the Royal Saxon collieries, we are in a position to add some details as to the experience gathered there.

Herr FÖRSTER has applied the electric transmission of power to two widely different cases. In the one, it was necessary to secure ventilation for the headings in a colliery at Zankeroda. The plant consists of a Dolguruki rotary engine, running at a speed of 800 revolutions, directly coupled to a Siemens & Halske dynamo machine placed at a distance of 367·5 feet from the shaft. The conductor, a copper rod 0·275 inch in diameter, is carried down the shaft to a depth of 856·3 feet, and from there to the fan, 1335·4 feet, a total distance of 2559·2 feet. The second machine, of the same type, mounted in the mine, is connected with the fan by belting, the fan being of the well-known Schiele type, with a 3·2-foot wheel, capable, according to the statements of the builders, of furnishing, at a speed of 500 revolutions, 6363 cubic feet of air at a pressure of 0·79 inch, and at an expenditure of power of 1⅞ horse-power. A series of tests were conducted above ground, with the whole plant complete, but with a length of conductor of only 160 feet. It was found that the engine delivered to the dynamo-electric machine producing the current 2·56 horse-power, of which 1·4 horse-power was converted into work in the receiving dynamo-electric machine, thus showing an efficiency, with a circuit of 160 feet, of 54·3 per cent. The dynamo was then running at a speed of 481 revolutions, which was reduced to 448 revolutions when the plant was in full operation, so that the efficiency of the transmission was reduced by 3·9 per cent in addition, thus carrying it down to very nearly 50 per cent. The fan, when the driving dynamo was running at 800 revolutions, was making 361 revolutions per minute, delivering 7000 cubic feet into the air. The cost of the entire plant was low, and it is reported to have worked efficiently for many months since its construction.

The second case of a successful application of the transmission of power by electricity is quoted by Herr FÖRSTER, who arranged the electric railroad in one of the main cross-cuts of the Oppel colliery at Zankeroda. The cross-cut is 2362 feet long, and is the outlet for the coal mined in the vein, the quantity delivered to it being 600 mine cars per day of 16 hours, each car containing 1047 pounds of coal, and weighing loaded 1594 pounds. We can not enter into details of the construction of the plant. It resembles in many points the design generally adopted by SIEMENS. In practice, a train of fifteen cars is moved at a speed of from 7·4 to 9·8 feet a second, the steam-engine at the mouth of the shaft making from 225 to 250 revolutions during the run, lasting from 3½ to 4½ minutes, through the 2034 feet of cross-cut. When the steam-engine was doing this amount of work, it delivered, according to brake trials made, 11·2 horse-power. The locomotive was at the same time developing 4·18 horse-power, or, assuming the friction of the gearing of the locomotive to have occasioned a loss of 25 per cent, the power actually transmitted by the electric current to the locomotive was 5·22 horse-power, or 46·6 per cent. The consumption of steam, with a pressure of 65 pounds, is estimated at 45·6 cubic feet per round trip of 15 cars. Herr FÖRSTER gives a statement of cost in which he shows that, making an allowance of 15 per cent of the cost of plant annually for wear and tear and sinking fund, it costs per car of coal hauled 3·01 pfennige with the electric road, 3·71 pfennige with horses, and 6·2 with men, when hauling 660 cars per day. When the capacity is increased to 800 cars per day, the cost for the electric road is reduced to 2·70 pfennige, while the others are not sensibly affected.

These two examples, we believe, furnish ample proof of the fact that there are probably many cases in which the transmission of power by electricity would pay well, notwithstanding the fact that the loss may be roughly placed at 50 per cent for moderate distances. This is particularly so where fuel is cheap, or where high heads of water are available, as in many of our mining districts, so that turbines running at a high speed can be used to drive the dynamo machines. There is only one point in connection with the electric railroad which needs attention. It seems difficult and dangerous to stop the trains suddenly, so that the engineer has not that absolute control over the locomotive which is desirable, even in underground roads.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Working Gold Ores in Georgia.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: For one and a half years, I have been experimenting with the "Dr. Charles process" for working sulphuret ores in these mines, with the results given below. Although the mine shows a great abundance of $10 ore, it is of so refractory a character that, for the last twenty-five years, all attempts to work it have resulted in failures.

The Charles process, as originally planned by him, included heavy and costly machinery, requiring great power to drive it. The result was all that the inventor promised, and of course entirely satisfactory; but the means of reaching it were entirely too slow and quite unsatisfactory. By carefully watching the process from beginning to end, and throwing out first one and then another part of the heavy machinery, I found it all to be useless, and worse than useless, except the concentrator.

The secret was all in his method of preparing the mercury. To make sure of this, other prepared mercury was tried, then chemically pure mercury, and the greatest care taken to get the most favorable flow of water over the plates, and the best adjustment of them. Our stamps are 750 pounds each, and I find by careful experiment that a 7-inch drop, 50 drops per minute, gives the best result. Our ore is much harder than the Lumpkin County ores, requiring heavier stamps. The exact amount of ore run through ten stamps in twenty-four hours I can not tell; but the amount of gold made will average fourteen dollars to the stamp every twenty-four hours. Every thing taken from the mine is run through the mill and counted as ore. The tests were in three runs of ninety-six hours each; the ore taken equally, as nearly as possible, from the different parts of the mine; and the three runs averaged, each in the clean-up, 14,000 grains gold 965 fine. The runs with chemically pure mercury and that prepared in the ordinary way, from exactly the same ore, gave less than one third.

The process is not patented, and the extra cost of using it is about five

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cents per ton. The total cost of milling and separating our ore is about fifty cents per ton, or about double what it costs in Lumpkin County.

There are very extensive mining properties in this vicinity, developed and undeveloped, that will pay from $3.50 to $10 per ton in the mill worked by this process, some of them showing immense amounts of low-grade ($3.50) ore above water-level, with water-power to run 300 heavy stamps. Such a mill would earn about $30,000 a month, and cost about $150,000 to build, with all modern improvements.

A start has been made to build a 160-stamp mill on one of these mines, to run by water-power. A wire-rope tramway will carry the ore from the main working-shaft to the mill, a distance of 1200 feet, with a fall of 12 degrees. A drain and cross-cut tunnel, about 1500 feet in length, cuts one vein 15 feet thick, two 8 feet thick each, and some smaller ones, 150 feet below the surface. The values of these ores are not given from assays, but from actual working in our common stamp-mills, in 100-ton lots, and will be repeated to satisfy any responsible parties who may wish to make such a test of Georgia ores. To such parties, this company's mines and mills are at any and all times open for inspection. No charge will be made for working 100 or more tons of ore from any of the mines, and the very closest scrutiny is invited. This company has no interest in other mines in the South, and no property for sale; but does this to satisfy those people who are afraid of mining property here, and yet are desirous of investing money in this line. A. H. MOORE.

OPHIR, CHEROKEE CO., GA., May 24.

A Reply to Mr. Arents.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In answer to the reply of Mr. Arents, in your issue of July 7th, I wish to say only a few words in regard to the experiment at the Northern Belle mill. It is hardly possible to make a reliable test by roasting one ton of the ore in a Stetefeldt furnace of large capacity. Mr. Belding does not state how he obtained "loss in roasting, 5 per cent of weight and 9 per cent of value." Nor is it entirely clear to me what he means. In fact, to determine a loss of silver in roasting by the ordinary method is impossible in this case. The roasted ore is spread over such a large area that it is not practicable to collect it all. And if this were done, the product would not represent the original ore. Large quantities of roasted ore cling to the walls of the furnace and dust-chamber, and drop down constantly. Besides this, I wish to say that Mount Cory ore, resembling in its mineralogical character very much the Ontario ore, needs a different treatment from Northern Belle ore, to obtain high chlorinations. The Northern Belle ore is not "banked up," but cooled shortly after discharging. If a larger quantity of Mount Cory ore, say 10 tons, as Mr. Arents himself suggested, had been put through the furnace, and kept on the cooling-floor for twelve hours, as is done at the Ontario mill, the chlorination of the silver would have increased materially, and the loss in tailings would have been, most likely, 5 or 6 per cent, in place of 14 per cent. Mr. Belding himself is fully aware of this in stating that more experience in treating this ore would improve results materially.

NEW YORK, July 10. C. A. STETEFELDT.

Mechanical Roasting-Furnaces.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of June 30th, I notice a long communication from Mr. C. A. Stetefeldt, criticising the remarks on "Mechanical Roasting-Furnaces," which appeared in the paper I read before the Institute of Mining Engineers at the Roanoke Meeting. In his anxiety to make known the special merits of the Stetefeldt furnace, he has rather unfairly quoted sentences from my paper, which, standing alone, without the sentences which follow them, give an entirely different meaning to that which is really expressed. The quotation he bases his remarks on is the following: "Like all mechanical roasters, however, this furnace can not be relied on for perfectly uniform results; and until this and other mechanical difficulties have been obviated, I have fallen back on the old-fashioned but always reliable Fortschaufelungs furnace." Here he stops his quotations, evidently because the following sentences, explaining the reasons for the adoption at this particular mine of the reverberatory furnace, are plainly set forth, and would appear, I believe, rational to most mining engineers. This sentence which he omits is: "Here, in the South, where labor is obtainable at 90 cents per day, where wood costs us less than $1 per cord, delivered at the furnace, the advantages to be gained by automatic rabbling, in whatever way obtained, are so slight that they are much more than counterbalanced by the perfect control one has all the time over the charge roasted in the reverberatory furnace. The advantages of the latter in the matter of first cost are, of course, undeniable." As this latter sentence shows, I am by no means advocating a general abandonment of the mechanical roasters for reverberatories, but merely point out the fact that there are still places where the latter can be economically and advantageously adopted. I fully agree with Mr. Stetefeldt in his remarks, that "of all engineers, the members of the American Institute should be progressive and well informed;" but my idea of a progressive and well-informed engineer is one who, by reason of his experience and observation, is able to obtain the best average results with the most economical outlay of capital. It does not follow that, because under certain circumstances one metallurgical appliance proves better than another, it would also prove so under diametrically opposite conditions. Mr. Stetefeldt, in warning all engineers from following such an example as mine, seems to assume that reverberatory furnaces, because they have proved themselves successful for one hundred years, should now, under all circumstances, be abandoned for other furnaces, whether the conditions which called forth the invention of the mechanical furnaces prevail or not. As a fact, Mr. Stetefeldt is probably aware that to-day, except where labor and fuel are exceptionally high, the reverberatory furnace, for roasting ores, is the one most generally in use; and that it has attained the venerable age of over one hundred years, is certain proof of its adaptability to the uses it is put to. Farther on, Mr. Stetefeldt, as a proof of the non-reliability of results from this class of furnace, quotes the fact that, in zinc-blende roasting, "the roasters are fined if they leave too much sulphur in the charge." He forgets to add, though, that as a general rule, these men work by the ton, and naturally endeavor to push the yield of the furnace beyond its natural capacity. In fact, this is one of the advantages of this class of furnace that, while practically giving a continuous process, each individual charge is under the perfect control of the operator. The example quoted by Mr. Stetefeldt of the operations at the Manhattan mill scarcely bears on the subject, as the conditions there are totally different from what they are down South. In regard to the "Brückner" furnace mentioned, Mr. Stetefeldt, as well as every other engineer who has had experience with it, will agree that it does splendid work when in the hands of thoroughly experienced men; but no one, I fancy, would assert that the results are generally better than those obtained in a well-managed reverberatory, and certainly the first cost is very much higher.

Now, in regard to the Stetefeldt furnace itself, probably few engineers besides Mr. Stetefeldt have greater belief in its many advantages, especially for chloridizing roasts, than myself. Its excessive cost, however, very naturally prevents its general adoption except by very wealthy companies. Further, I do not think that so far it has been introduced for roasting sulphides of iron sufficiently to prove all of Mr. Stetefeldt's claims for it. We all know that the combustion of sulphur is a very slow process. It requires not only the presence of a very large surplus of oxygen, but also requires considerable *time*, and as the amount of sulphur in each charge is liable to vary very materially, it stands to reason that the best furnace (all other considerations being equal) is the one where the ore can be subjected at will to a longer or shorter exposure to the oxidizing medium, as may be necessary. In this respect, the rotary furnaces would seem to have considerable advantage over the shaft furnaces. Now, one word more in regard to the relative cost of the two furnaces, on which Mr. Stetefeldt lays so much stress, and it will be apparent that circumstances may occur where, if a mining engineer has any regard to the pockets of his stockholders, it is better for him to adopt, provisionally at least, appliances a hundred years old rather than newer inventions of a more expensive type. The actual cost of one forty-foot reverberatory furnace was, according to the company's books, $760. This was exclusive of the chimney, which was already built some time ago. The cost of roasting, quoted at $1.10, fully includes all incidental expenses and allowances for wear and tear, the actual cost of roasting being 86½ cents per ton. Now, Mr. Stetefeldt, basing his figures on 24 tons per day, puts the cost of roasting at 59½ cents per ton, or, in round figures, one half our present cost, and from this deduces that an annual saving would be effected of $3636 by the use of his furnace. He further admits that these figures, under a less production, would be materially changed Now, as a fact, our present production of concentrates is under ten tons per day, so that, taking him at his own figures, if I had put up one of his furnaces, the cost of roasting would not have differed much from our present cost, and our stockholders would have been out of pocket to the tune of $9740, for no apparently corresponding benefit, except to the Stetefeldt Furnace Company. I can assure Mr. Stetefeldt that the whole matter was very carefully considered before such a retrogressive step in engineering practice was taken, as he calls it, by the erection of an appliance having one hundred years' record of good results.

As soon as Mr. Stetefeldt can get some more progressive engineers having the same conditions applying as with us to put up one of his $10,500 furnaces, and prove to us by a six months' run the claims now set forth by him, I can assure him I shall not prove too old-fogyish to consign our present furnace to an honorable oblivion, and at once erect one of his stately structures in its stead. E. GYBBON SPILSBURY.

NEW YORK, July 11.

EL CALLAO MINE OF VENEZUELA.

Special Correspondence of the Engineering and Mining Journal.

This mine is situated in Venezuelan Guayana, on the drainage of the Essequibo River, about 130 miles from the Orinoco River, and 250 miles from the Atlantic Ocean.

The lode is of sugary white quartz, about 5½ feet in thickness, with a pay-chute of ore from 600 to 700 feet in width; the lode has an average dip of 42 degrees; the greatest depth attained is 490 feet.

The mine is situate in a low valley, and the vein was discovered by placer workings from the surface down some 60 or 80 feet in depth, to a point where the vein became solid. No record was kept of the placer gold thus obtained; probably fully $2,500,000 were taken out from 1856 to 1870, when the lode proper was reached. From 1871 to May 15th, 1883, 144,265 tons of ore have been mined and milled, yielding 533,860 ounces of gold, 916⅔ fine, or an average of 3·7 ounces per ton.

The ore is crushed by American stamps; the gold is saved by amalgamation in the batteries and on short copper plates. The sulphurets, amounting to from one half to one per cent and of high value, have practically never been utilized. With proper concentration-works, the ore would probably have shown a gross yield of fully 4½ standard ounces per ton.

For the first six months of 1883, about 12,000 tons of quartz have been crushed, yielding nearly 61,000 standard ounces of gold, or over 5 ounces per ton.

El Callao is by far the richest free gold quartz mine the writer has ever seen, and is probably unexampled in the history of gold mining.

S.

WASHING GOLD IN PERU.—A correspondent sends *Iron* the following account, describing how the Peruvians did, and perhaps do, successfully operate: "The whole of the Chucamba (Peru), for a number of leagues above and below the Temple of the Sun, is auriferous, and the inhabitants of the province of Huamelies, through which it passes, obtain, by washing the sand and by means of sheepskins, $200,000 or $300,000 worth of gold annually. The wool on the skin is cut out until it is about half an inch in length. The skins are then anchored down, with the wool side up, by means of loose stones placed on them, in and below the various rapids, in which position they are suffered to remain from six to twenty-four hours. They are then carefully raised out of the water, turned wool side downward into a batea (tub) of water, and thoroughly washed; the gold falling from the wool of the skin is finally collected from the bottom of the batea. Sheep were unknown to the Incas, and as they had obtained an immense amount of gold from this Pactolean stream, it is presumed that they used the skins of the llama and those of the vicuña.

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OFFICIAL STATEMENTS AND REPORTS.

THE CERALVO MINING AND BENEFICIATING SYNDICATE, CERALVO, MEXICO.

Mr. Richard E. Chism, a mining engineer who is known to have had experience in Mexico, has recently reported on the mines belonging to Mr. F. P. Thompson, of Monterey, in the Ceralvo District, Nuevo Leon, Mexico. Mr. Chism describes the main geological feature of the district as massive limestone, in which most of the ore-deposits outcrop. Mr. Chism notes in detail the developments, the character of the veins, and the extent of the reserves in the Guadalupe, Mina del Agua, Refugio, Colorado, and Valenciana mines. The ores are calcareous and ferruginous mixtures of galena and blende, with considerable quantities of copper in some instances, and varying amounts of silver. Mr. Chism estimates that the Guadalupe has $62,000 profit in sight, the Mina del Agua $51,000, the Refugio $27,000, the Colorado $256,000, and the Valenciana $30,000. We are not in a position to critically examine these figures, which Mr. Chism seems to have compiled with an evident desire to be on the safe side, so far as a calculation of the quantities of ore available is concerned. He has, however, decidedly over-estimated its money value, so far as the lead is concerned, and we believe that he is not under any circumstances justified in looking to the utilization of his zinc-blende with a profit. It is simply preposterous to expect to work zinc-blende in an out-of-the-way place in Mexico for three cents a pound. We would advise those who own the mines to deposit their blende on the dump for the present, and consider its presence in the ore rather as a very serious drawback than as a possible source of revenue.

STEEL versus IRON FOR MACHINERY PURPOSES.

In the course of a discussion before the German Society of Engineers at Aix-la-Chapelle, Herr André gave the following instances of the failure of steel to take the place of iron, notably for heavy machinery:

Two years ago, we replaced the iron shaft of a high-speed steam-engine by a Bessemer steel one, manufactured at works which for such articles stand almost, if not quite, equal to Krupp and Bochum. After two years' work, the shaft broke suddenly when moving very slowly, and without any load attached (the train of rolls was not coupled). We were about to replace it with another Bessemer shaft of mild steel, when the manager of the steel-works himself advised us to return to the old material if there was any risk of the shaft becoming occasionally heated while working; for, he said, strong cooling appliances were then brought at once to bear on the shaft, which produced microscopic cracks on the surface, and these, in a short time, might produce an unexpected breakage. In order to confirm this, he (the speaker) telegraphed to ten wire-works where similar engines were in use, and found that the majority employed and preferred iron. It appears, therefore, that iron shafts are again replacing the steel ones which had superseded them for quick and heavy work, where there is any risk of heating. This was further confirmed by the foreman of engine-works on the Rhine, who stated that in two years they had had five breakages of heavy steel shafts, and had in each case replaced them with iron. In one of these steel shafts, of 15·75 inches diameter, a hole as large as the fist was found, and in it were two small steel balls, which had ground themselves quite round and smooth in the two years. As mild steel is even more inclined to form bubbles than hard, it seems to be, at present, even less adapted for heavy shafts and pieces.

It appeared to be as little adapted for steam-boilers. The same engineer, for example, had informed him that a boiler he had constructed cracked right across the bottom when removed from the workshop to the survey-yard, although great care had been taken in riveting and drilling the holes.

The constructor should remember also that "mild steel" is a very vague term; and it is necessary to ascertain where and by what process it is made. Nothing can be determined by the amount of carbon it contains; for, although one can estimate approximately, according to the carbon contained, the materials produced by a certain process at certain works, it is impossible to compare the productions of different works, especially where different processes are adopted. For example, Thomas steel, containing from 1 to 1·5 of carbon, may be exceedingly soft, while Bessemer steel, containing the same amount, may be so hard that a knob occurring on a thin wire rod can hardly be rolled away.

The differences in Thomas steel itself are very great, and although Mr. André could speak very favorably of it from personal experience, there were many complaints of inequalities. If an engineer, therefore, resolves to have no mild steel, but only ingot iron, he will find the border line between the two so confused that the following definition may be looked upon as a necessary expedient, "No material capable of considerable hardening shall be called iron," and, if narrowly examined, it will be seen that a great deal of the ingot iron specified as "incapable of considerable hardening," is, nevertheless, capable of very considerable hardening under certain circumstances, such as a sudden cooling of a heated shaft. This "inconsiderable hardening" is just sufficient to shrink the surface, produce tension, small cracks, and finally breakages.

Herr Petersen supplemented the remarks of the preceding speaker, stating that it is well known that various difficulties occur in casting thick steel ingots, and it is even more frequent to have a porous casting in mild than in hard steel. If steel ingots have incomplete, hollow, or porous spots, these do not become welded together by further heating and working, but, after being rolled thin, they retain their porosity, as unwelded spots are retained in wrought-iron. As these porous places are generally in the center of the ingot, the round bars, piston-rods, and axles made of it have also usually an internal weakness, which it is difficult to set right in the working, and which may cause breakages in the future. Thus the plunger-rod of a subterranean pumping-engine, on being tested with water up to 20 atmospheres, was shown to be hollow in its whole length, and water burst out of the cleft at the end of the rod. The following accident with the piston-rod of a pumping-engine occurred at a Westphalian coal-pit. The piston-rod in question belonged to a single-acting Cornish beam engine, with a cylinder diameter of 6·56 feet, and a stroke of 13·12 feet. The effective steam pressure was 4·5 atmospheres, the vacuum about 23·6 inches, so that the net effective pressure on the piston was 5·3 atmospheres, amounting altogether to 160 tons. The diameter of the piston-rod was 9·84 inches. The break occurred at the beginning of the descent, so that 11·5 feet of the stroke had yet to be accomplished. Falling from this hight, the piston struck the bottom of the cylinder and smashed with it the valve-boxes and all the principal parts of the engine. The breaking strain of the piston amounted in the full transverse section only to about 2·2 tons per square inch, and in the hollow place to about 9·8 tons per square inch. A lead casting the size of the fist was taken out of this hole. These examples are not meant to detract from the valuable qualities of cast steel, but merely to point out those weaknesses in it which must be guarded against in practice.

ECONOMY BY SUBDIVISION IN INSTALLATION AND OPERATION OF POWER AND MACHINERY UNDER VARYING DEMANDS.

By Julius L. Hornig, Jersey City, N. J.

The question of economy in the construction of steam-engines or motors has been discussed with great ability and science, so that the importance of the subject is generally appreciated and a selection is made from the most approved constructions. The economy by suitable adaptation and installation is a question which requires the same attention.

This article is intended to treat, in general, of the propriety of subdivision in installation where varying service is required. Such cases arise in central stations for supply of power, water, light, etc., or in manufactories, where a number of tools or machines are consuming power at varying demand. The object of the writer is to lead to further discussion and elaboration.

The generators of steam, for power under varying demand, will show higher economy by suitable subdivision. The fact that the highest economy in steam generation takes place when the most perfect combustion takes place, indicates that the temperature of the fire should be kept nearest to this point. Therefore, a variation in the quantity of steam required demands that a variation in grate surface should take place, or, in other words, that more or fewer boilers should be operated accordingly.

The question of combination of smaller and larger boilers is worthy of investigation; and, also, the subject of loss of heat from boilers while the fire is banked, in comparison with the loss of heat from boilers at low temperature of fuel and losses consequent to that.

Steam-engines, built for certain maximum capacity, will naturally show at full service the highest economy. Their loss by friction, inclusive of connections or transmissions to do work at a fixed speed, will be found essentially the same from minimum of work to their full capacity.

When work varies much, as, for instance, in the supply of light, this investigation proves important.

The attached economy-curves are worked out approximately from several systems of indicator-cards, and furnish the following:

COMPARISON TABLE OF USEFUL PERCENTAGE UP TO FULL CAPACITY.

WORK-DIVISIONS.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Per cent for large machine.....	35	55	66	75	80	86	92	95	98	100
Per cent for small machine.....	55	75	86	95	100					
Per cent difference.....	20	20	20	20	20					

The small machine, which has only half the capacity of the large one, doing the same work as the large machine, shows a gain of 20 per cent, if used instead of the large machine when the latter is worked only to half of its capacity.

To consider the loss, a few comparisons only may serve here. In assuming a number of the same class and size of machines installed, and referring to the curve of large machine, the percentage of loss will be found

Working 2 machines, $\frac{1}{2}$ capacity, in place of 1, full = 20
" 3 " $\frac{2}{3}$ " " 2 " = 10
" 4 " $\frac{3}{4}$ " " 3 " = 7
" 5 " $\frac{4}{5}$ " " 4 " = 5

The curve shows a loss of

20 per cent for using a machine only $\frac{1}{2}$ capacity.
34 " " " " " $\frac{3}{10}$ "
54 " " " " " $\frac{3}{20}$ "

The combination of working machines of different capacity must be, evidently, advantageous when using the smaller only for work up to its full capacity, then to change the work on to the larger up to its full capacity, laying the smaller up during the intermediate higher range and adding its service only at demand of rate above capacity of larger machine.

This combining of machines to keep their service nearest to their full capacity must secure the highest economy.

The rate of friction in steam-engine and transmission in other installations will not vary much from electric light machinery taken here as sample, and therefore a similar importance must exist.

This question of economy will apply to the installation of a number of pumps driven by a number of engines where the service varies at times. Also to a series of tools or machines operated under varying demand at factories.

The Holly Water-Works Company carries out a combination of several steam-engines operating one main shaft, and makes steam connection to the cylinders so that some or all may be used for high pressure, or some as second expansion cylinders, as demand may require. This should meet the requirement of subdivision in installation for economical service very effectively.

In first installations, frequently the engines are adopted largely in excess of present service required, as a provision for future extensions, whereby losses are caused in the mean time by increased friction, by the necessity of carrying low steam pressure, and by irregularity in motion due to injudicious expansion.

In transportation service, the timely addition of the so-called hill-horse for vehicles and the pusher for railroad trains, at the steeper parts of

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the roads, is an established mode of working motors to nearest steady full capacity.

The auxiliary boilers and engines are found in large works for similar assistance.

From boiler tests on best constructed boilers, it is to be assumed that the highest economy is reached by consuming 9½ pounds of anthracite egg coal per hour per square foot of grate, producing 8½ horse-power. This would give the ratio for best subdivision of boilers to suit a subdivision of engines in installation.

THE COPPER PRODUCTION OF THE WORLD.

Messrs. Henry R. Merton & Co., of London, have compiled the following estimate of the production of copper in the world, the figures estimated being marked with an asterisk. The figures, so far as we have been able to check them, give evidence of having been carefully compiled. The difficulties in reaching close figures are very great, because furnace materials and ores are so extensively shipped from one country to the other.

COUNTRIES.	1879.	1880.	1881.	1882.
Argentine Republic	300*	300*	307	800
Australia	9,500	9,700	10,000	8,950
Austria	245	470	455	455*
Bolivia—				
Corocoro	2,000*	2,000*	2,655	3,259
Chili	49,318	42,916	37,989	42,909
Cape of Good Hope—				
Cape Copper Company	4,328	5,038	5,087	5,000
Canada	50*	50*	50	221
England	3,462	3,662	3,875	3,875*
Germany—				
Mansfeld	8,400	9,800	10,999	11,516
Other German	600*	1,000*	1,743	1,743*
Hungary	976	976	976	976*
Italy—				
Libiola	340	580	680	600*
Leghorn	800*	800*	800	800
Japan	1,900*	1,900*	1,900*	2,800*
Mexico	400*	400*	335	401
Newfoundland—				
Betts Cove	1,500*	1,500*	1,718	1,500
Norway—				
Vigsnaes	2,000	2,040	2,350	2,300
Other Norwegian	412	386	290	290*
Peru	600*	600*	615	440
Russia	3,081	3,081*	3,000*	2,000*
Sweden	800	1,074	995	900*
Spain and Portugal—				
Rio Tinto	12,751	14,559	15,693	15,893
Tharsis	11,324*	9,151*	10,203*	9,000*
Mason & Barry	4,692	6,603	8,170*	8,000*
Sevilla	1,360	1,705	1,340	1,885
Portugueza	770	1,000	1,410	1,700
Poderosa	800*	800*	800*	400*
United States	23,350	25,010	30,882	39,300
Venezuela—				
New Quebrada	1,597	1,800	2,823	3,700
Total	147,656	148,901	158,138	171,613

THE COMSTOCK LODE.

The San Francisco *Bulletin* gives the following interesting history of the rise and fall of the Comstock lode mining speculation, which will be found interesting:

The nominal money value of the Comstock lode has undergone many changes in the last twenty years. From 1861 and on for several years, the mines grew in public favor, and values rose rapidly, and with but few radical contractions. From 1868, prices began to fall off under loss of ore-deposits and a diminished bullion yield. This reduction followed the mines until about the close of 1870. At that time, the twenty-five or more leading mines on the lode were rated at a trifle over $4,000,000 in round numbers. Then came the Belcher and Crown Point bonanza, and values again expanded all along the line. This continued for a couple of years, with now and then an interruption. Before the waning influence of an exhausted ore-body in these two mines had come to be seriously felt, the edge of the bonanza in the Consolidated Virginia and California mines was uncovered. This was followed by an unparalleled inflation in values until 1875, when the properties that were thought to be dear five years previously at $4,000,000, were considered (by some at least) undervalued at $275,000,000.

That was the highest valuation ever put upon the Comstock lode. The same mines from that time forward began to decline in value, long before there was any sign of exhaustion of the ore-body that had led to the inflation. Of course, the level of values was much lower when this information got out. The passing of the first dividend by the Consolidated Virginia settled the business with some, and unloading was the order all along. A few held on, under the belief that it was only a dodge of the enemy. The factor of distrust kept the market from going to pieces for some time after the majority had given up all hope of a renewal of dividends. There is occasionally an old stockholder who still believes that both these mines could pay dividends now, if the leading owners would consent to uncover alleged reserves. The several assessments since levied have not changed the opinions of these persons. Their faith is certainly a pleasant diversion, if not too costly. From $4,000,000 to $275,000,000 was a big jump, and from $275,000,000 to about $3,000,000 was an equally big fall. But these are feats which have been accomplished by the Comstock lode inside of twelve years.

We do not remember the lowest valuation for the Comstock lode in the past three or four years. But the valuation of a year ago was quite small. According to a table compiled by us on July 1st, 1882, the twenty-nine leading mines on the Comstock were valued at $3,061,910. These mines are divided into 4,021,560 shares, so that they were selling a year ago for less than an average of 75 cents per share. The leading stock at that time was Union Consolidated, which was selling at $8.62½ per share. Sierra Nevada was then selling at $4.75, Mexican at $4.50, Best & Belcher at $3.25, and Ophir at $2.15. Thus these five mines were selling for a nominal value of $2,336,420, or 76 per cent of the total for the whole twenty-nine. The only two mines selling at $1 per share were the Gould & Curry at $1.25, and the Utah at $1.05. There were eight mines in the list whose stock was rated at only 5 cents per share, and the rating would likely have been still lower but for the indisposition of the Stock Board to split a five-cent piece. There was a great change in these values last month, prices of some of which culminated about the 1st of June. At that time, Hale & Norcross was the leading stock, selling at $8.50, against $8.62½ for Union Consolidated a year ago. Following is a statement of the valuations of twenty-nine Comstock mines on the 1st of June in 1882 and 1883, with the assessments delinquent between the two dates:

	June 1, 1882.	Year's assessments.	June 1, 1883.
Utah	$21,000	$110,000	$61,000
Sierra Nevada	475,000	400,000	675,000
Union Consolidated	862,500	200,000	775,000
Mexican	453,600	352,800	564,000
Ophir	216,720	201,600	389,060
California	54,000	378,000	216,000
Consolidated Virginia	162,000	162,000	432,000
Best & Belcher	327,600	100,800	529,400
Gould & Curry	135,000	162,000	421,200
Savage	33,600	252,000	341,600
Hale & Norcross	33,600	168,000	952,000
Challar	22,400	168,000	453,600
Potosi	44,800	84,000	201,600
Julia Consolidated	5,500	11,000	22,000
Bullion	5,000	100,000	125,000
Exchequer	10,000	.....	45,000
Alpha Consolidated	7,500	.....	75,000
Consolidated Imperial	25,000	25,000	25,000
Confidence	12,400	6,240	87,360
Yellow Jacket	65,000	.....	582,000
Kentuck	6,000	.....	75,000
Crown Point	20,000	.....	185,000
Belcher	26,000	52,000	161,200
Overman	5,760	28,800	69,120
Caledonia	5,000	.....	20,000
Silver Hill	5,400	5,400	10,800
Justice	5,250	52,500	31,500
Alta	10,800	108,000	75,600
Benton Consolidated	5,400	32,400	16,200
Totals	$3,061,910	$3,160,540	$7,587,260

As will be seen, the nominal value of these securities has more than doubled within the past twelve months. But much of this increased value is supposed to represent new money that has been put in during the interval in the form of assessments. The nominal value on the 1st of June, 1882, with the assessments delinquent during the year, compares as follows with the nominal value at the close of that year:

Value June 1st, 1883		$7,587,260
Value June 1st, 1882	$3,061,910	
Assessments delinquent	3,160,540	$6,222,450
Increase for the year		$1,364,810

THE BASIC PROCESS AT THE PEINE WORKS.

In November, 1882, the Peine Basic Steel-Works were started, and all difficulties met with in the beginning have now, it is said, been overcome. There are very large deposits of phosphoric ores near Peine, Germany, and the pig made from them has from the start been regarded as particularly adapted to the basic process. The dolomite found in the vicinity of Peine contains 1·35 per cent of silica, 0·26 per cent of protoxide of iron, 2·03 per cent of alumina, 30·12 per cent of lime, 19·21 per cent of magnesia, 0·3 per cent of sulphuric acid, and 44·97 per cent of carbonic acid. It is sharply calcined in a cupola, crushed, and mixed with heated tar, the material thus prepared being used to ram the converters, make brick, etc. The walls of the converters stand from 80 to 95 blows, and the bottoms between 16 and 24 blows. The Ilsede pig contains from a trace to 0·1 per cent of silicon, from 2·5 to 3 per cent of manganese from 2·5 to 3·1 per cent of phosphorus, from 2·7 to 3 per cent of carbon, and a maximum of 0·1 per cent of sulphur; and after melting in a cupola, has the following composition: From 0·7 to 1·2 per cent of manganese, from 2·6 to 3·2 per cent of phosphorus, from 2 to 2·5 per cent of carbon, and a maximum of 0·1 per cent of silicon and 0·1 per cent of sulphur. The pig is decarburized in from 8 to 9 minutes, and the after-blow lasts four minutes, the final addition being 12 per cent of pre-heated ferro-manganese carrying from 54 to 60 per cent of manganese. The composition of the steel varies according to whether it is to be used for wire, structural work, etc., as follows:

	1.	2.	3.	4.
Silicon	0·42	0·47	0·60	0·30
Manganese	0·04	0·06	0·05	0·02
Phosphorus	0·03	0·06	0·04	0·03
Sulphur	0·10	0·14	0·30	0·09
Carbon				

An analysis of the cinder made yielded the following:

	Per cent.
Silica	2·45
Peroxide of iron	5·74
Protoxide of iron	15·10
Protoxide of manganese	2·75
Alumina	2·85
Lime	46·82
Magnesia	1·14
Phosphoric acid	22 23
Sulphuric acid	0·38
Sulphur	0·54

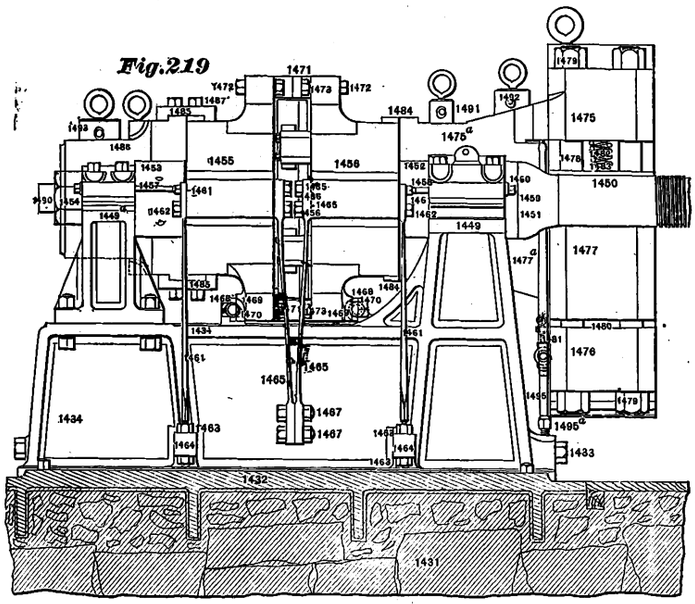
THE WATER-EJECTOR IN MINING.—In the Bleiberg District, Austria, a very interesting application of the ejector has been made in mining, a description of which is given in detail by Herr Ed. Makuc in the *Oesterreichische Zeitschrift*. A Korting ejector has been driven there by hydraulic power, to raise the water from a winze. It now lifts 366 gallons a second from a depth of 92 feet, and uses 435 gallons of power water with a head of 617 feet, thus showing an efficiency of 12 per cent. It is expected, however, that this power will suffice to carry the winze down to 200 feet, so that the efficiency then would be fully 20 per cent. The hydraulic ejector is now working only six hours a day, doing the work of 16 men at hand pumps in twenty-four hours. This system is therefore well worthy of the attention of all those who must sink at isolated points below a tunnel level in which a head of water is available. It would probably prove very useful on the Comstock lode.

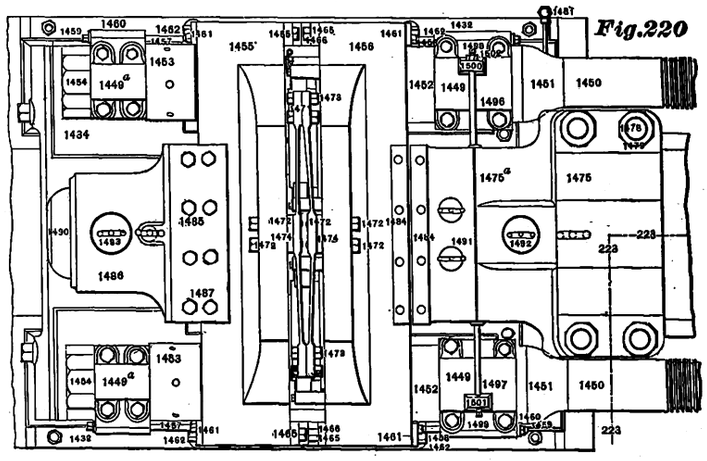
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THE EMERY TESTING-MACHINE AT WATERTOWN.

Until quite recently, special circumstances have made it impossible to give more than a general description of the great Emery testing-machine at Watertown Arsenal, Mass. The machine, illustrations of which we give this week, was built for the United States Board to Test Iron and Steel by Mr. Albert H. Emery, and before it was accepted by the Board, the following tests were made: A link of hard wrought-iron 5 inches in diameter between the eyes, was slowly strained in tension and broke at





722,800 pounds, and next a horsehair seven one-thousandths of an inch was tested and was found to break at one pound after stretching 30 per cent. These tests may serve to give an idea of the power and the delicacy of the machine, which has no rival the world over.

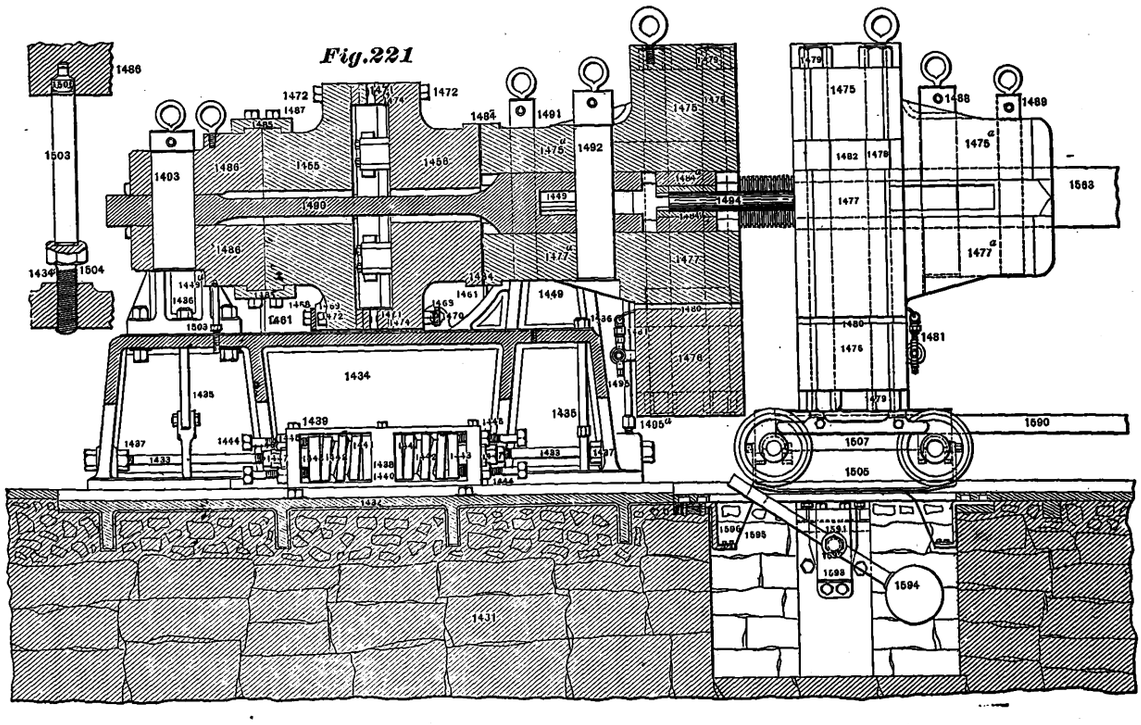
Before proceeding to a detailed description of the machine, a general outline of its construction will be useful. It consists of a hydraulic press, which is adjustable within a certain range as to distance, from the weighing apparatus fixed at one end of the machine, the two being connected by a pair of screws eight inches in diameter and forty-eight feet long, and so arranged that specimens from one inch to thirty feet in length and up to thirty inches in width can be tested. Our general view of the machine gives a good idea of its proportions and arrangement.

Figures 219, 220, and 221, reproduced from the plates attached to the patent, for which we are indebted to the kindness of the editors of the *American Machinist*, give the construction of the most important parts in detail. Fig. 219 shows a side elevation of the scale and of the machine, and Fig. 220 a plan of it.

Fig. 221 shows a longitudinal section of this end of the machine, with the scale-holder, that is, the holder which seizes the specimen and secures it to the scale, and shows in elevation the straining holder, that is, the holder which seizes the specimen and which is drawn backward or pushed forward by the straining press.

From a description prepared by Mr. Emery for the *American Machinist*, and from the patent specification, we take the following points relating to the construction:

1431, Fig. 221, represents a foundation of any suitable construction. To the bed-plate 1432 is secured a movable bed 1434, by means of bolts 1435, secured permanently to the bed or foundation, and provided with the clamp-nuts 1436, by which the bed 1434 is forced to its bed-plate with any necessary friction. The holding-bolts 1435 extend down through clearance-openings in the masonry or concrete bed, and are anchored to metal plates at bottom. The clearance-openings allow free recoil to the beds without bending the



holding-bolts. 1433 represents horizontal stay-rods, which may or may not be connected at their center, and are fixed at their ends by clamp-nuts 1437 to the movable bed 1434. These rods pass longitudinally through a case or bearing 1438, which is permanently attached to the bed-plate 1432 by screw-bolts 1439, and is constructed with a central abutment 1440, for the followers 1441, which receive pressure from the ends of springs 1442. The other ends of these springs bear against followers 1443, which are formed with stems, passing through the ends of the case 1438, and are adjustable therein by means of set-screws 1444, threaded in the ends of the case 1438, and locked in any position to which they may be set by jam-nuts 1445. The rods 1433 pass freely through the followers 1443 and 1441, and are coupled at their

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inner ends within the center of the case 1438 by a nut 1446, which is adapted to slide within the abutment 1440, and bears against the followers 1441 on either side. The rods 1433 bear on the extremities of the necks of the collars 1443 by nuts 1447, locked by jam-nuts 1448. It will now appear that any movement of the bed 1434, acting through the clamp-nuts 1437, rods 1433, and followers 1441 1443, will compress both of the springs 1442, so that the resilience of both will be exerted to restore the bed to its central or normal position. To the bed 1434 are fixed standards 1449 1449a, constituting pillar-blocks for the straining-screws 1450, which are secured to the pillar-blocks by collars 1451 1452 and nuts 1453 1454.

1455 1456 are a pair of coupled beams constituting alternately and interchangeably the bed and platform of the scale, hydraulic supports being interposed between the beams to receive and transmit the load. These beams are adjustable longitudinally on the straining-screws 1450, so that either which is to constitute the bed of the scale for the time being may be brought firmly home against the nuts 1453 or collars 1452, as the case may be, while the other beam is left free to serve as the platform of the scale. This adjustment of the beams is effected by setting-rods 1457 1458, secured separately to the respective beams 1455 1456, and adjustable in the pillar-blocks 1449a 1449 by nuts 1459, between which nuts and the respective pillar-blocks are interposed metallic washers, and beneath these gum-elastic washers 1460, for the purpose of allowing a slight resilience, to prevent the snapping of the said rods by the concussion incident to the breaking of a specimen. The setting-rods require to have clearance in the pillar-blocks. When one pair is to be tightened to bring the beam to which it is attached against its bearings on the straining-screws, the other pair of setting-rods are first relaxed to free the beam to which they are attached. The weight of the beams is sustained by flexible rods 1461, secured by bolts 1462 to the rear faces of the respective beams, and fixed below by nuts 1463, in lugs 1464, on the movable bed 1434.

1465, Fig. 219, represents spring-plates, which are bolted and secured by the nuts 1466 to the inner faces of the beams, and are strained together at their lower ends and connected by bolts and nuts 1467, so as to exert a strong pressure in forcing the beams together and keeping them firmly on the interposed bearings or pressure-supports of the scale. The plates at the same time serve to hold the faces of the beams parallel by preventing their tipping on the struts 1461, and they serve the further purpose of securing the beams against relative vertical motion. To stay the beams against horizontal motion transversely to the machine, they are held by flexible fixing-plates 1468, Figs. 219, 220, 221, secured at 1469 to the respective beams, and to the pillar-blocks or bed by nuts 1470, by which the beams are adjusted transversely to the machine as required. To firmly secure the beams against relative horizontal motion laterally to the machine, fixing plates or springs 1471, Figs. 220, 221, are employed, fixed at their centers to the respective beams by bolts and nuts 1472, and bolted together at their extremities, as shown at 1473. These springs serve, in conjunction with the springs 1465, to press the beams together on the interposed pressure-supports. The degree of pressure of the springs 1471 is regulated by the interposition of washers 1474, of any thickness required, between the springs and beams, the effect of said washers being to reduce the amount of deflection which is applied to the springs in bringing their extremities together. Similar washers are applied between the springs 1465 and the faces of the beams when required.

The pillar-blocks 1449 1449a may be made separately from the bed and attached thereto, or they may be constructed permanently with the bed. In practice, it is preferred to construct one pair 1449, as permanent parts of the bed, and for convenience of erection and adjustment to construct the other pair 1449a separately and bolt them to the bed, as shown. The coupled beams and the specimen-holder at the scale end of the machine may, either or all, be supported from the movable bed, as shown in the present illustration, or upon masonry or other permanent foundation as preferred. The specimen-holders consist each of three beams 1475 1476 1477. The outer beams 1475 and 1476 are secured together by bolts and nuts 1478 1479. The interposed beam 1477 is movable on the connecting-bolts 1478, constituting one jaw of a clamp, of which the beam 1475 constitutes the other jaw. The movable jaw 1477 is forced up to grip the specimen by the action of one or more hydraulic presses, 1480, Fig. 221, suitable dies 1484a, being interposed between the beams or jaws 1477 1475, with faces formed to suit the specimen to be tested.

1481 represents the pressure-pipe for operating the hydraulic presses 1480. The closing of the jaws 1477 1475 is limited by boxes containing springs by which the jaws are forced apart when released by the hydraulic presses. The two beams 1475 and 1477 of the specimen-holder are formed with projecting cheek-pieces 1475a 1477a, for the attachment of the specimen-holder to the load-beam of the scale or to the straining-bar, as the case may be. For the application of strains of compression (for which purpose the beam 1456 constitutes the load-platform, the load-beam specimen-holder is attached to the beam by bolting to flanges 1434, formed on the specimen-holder and beam, clamps 1485, such as are shown in Figs. 219, 220, and 221, fastened to similar flanges on the beam 1455 and the beam-block 1486 by bolts 1487. In the illustration given, the parts are shown in position for the application of a strain of tension. For this purpose, the cheek-pieces 1475a 1477a of the load-beam specimen-holder are connected to a beam-link 1490 by pins 1491 1492. The link 1490 extends through central apertures, as shown in the coupled beams 1456 1455, and is connected by a pin 1493 with the beam-block 1486, which latter is fixed to the load-beam 1455 by the clamps 1485 and bolts 1487.

1494 represents a specimen undergoing a strain of tension. In this illustration, the beam 1456 constitutes the bed of the scale, being drawn firmly against the bearing-collars 1452, by the setting-rods 1458, while the setting-rods 1457 are released from strain by backing their nuts 1459, so as to leave the beam 1455 free. Clearance is accordingly seen between the beam 1455 and the bearing-nuts 1453, and also between the specimen-holder and the fixed beam 1456. When a strain of compression is to be applied, the relations are reversed, the specimen-holder being in that case released from the beam 1455, and fixed to the beam 1456 by the clamps 1485 and bolts 1487, the said beam 1456 being released from the bearings 1452, so as to serve as the load-platform, and the beam 1455 being drawn firmly against the bearings 1453 by the action of the setting-rods 1457, so as to serve as the bed of the scale. When strains of compression are to be applied to columns or other specimens without the use of the holders, the beam-block 1486 is reversed in position, being clamped to beam 1456 by plates 1486 and bolts 1487, a suitable platform to receive the thrust of the specimen being attached to said beam-block by pin 1493.

The load-beam specimen-holder is supported on rods 1495, Figs. 219, 221, erected on the movable bed 1434, or on the stationary bed or foundation. The lower ends of these rods are screw-threaded, as shown in Figs. 219 and 221, and they are formed with angular collars 1495a, for the reception of a wrench for screwing the rods up or down for the vertical adjustment of the holders. By reason of their length, the rods possess sufficient flexibility to permit the slight movement which the specimen-holder receives in transmitting to the load-beam the strain to be weighed. The load-beam specimen-holder 1475, Fig, 220, is stayed against lateral motion by struts 1496 1497 bearing against the cheek-pieces of the said specimen-holder, and fixed by set-screws 1498 1499, screwed into lugs 1500 1501 on pillar-blocks 1449. The set-screws 1498 1499 are formed with conical or convex ends fitting corresponding cavities in the ends of the struts 1496 1497. The set-screw 1498 is first screwed in, to set the specimen-holder in proper position laterally, and is then locked by a nut 1502. The other set-screw 1499 is then screwed in against the end of the strut 1497, to fix the specimen-holder. The beam-block 1486 is supported on a rod 1503, Fig. 221.

The specimen-holder of the straining mechanism is constructed in similar manner to that already described, and is connected to the straining power by its cheek-pieces 1475a 1477a and pins 1488 1489. This specimen-holder is preferably mounted on a truck 1507, running on the rails or ways 1505. To determine the pressure given to the specimen by the hydraulic holders, so that the amount of pressure known to be necessary to fix and hold the specimen may be applied without injury thereto, the liquid-pressure pipes connected with the accumulator and employed to operate the holder-pressure are connected with pressure-gauges. The load, after being transmitted through the supports to the beam 1456, is carried directly against the projections on the screws 1450, so that the load which is put upon the screws by the straining press at one end of the specimen is exactly balanced by the load put upon the screws by the scale at the other end, this load being transmitted through the specimen, no part of the strain being carried through the foundations. If now the specimen breaks, the screws being under a load of compression, immediately free themselves of this load, putting the entire scale end of the machine in motion longitudinally in one direction and the press end in the opposite direction, these parts moving from each other until the screws are free from their load of compression, when the inertia of these parts under motion will continue their movement until the screws have received a load of tension nearly equal to the load of compression which was upon them, the difference of loading being that due to the loss of friction by sliding the scale end of the machine on its ways and moving the press on its track. The extension of the screws will now cause the ends of the machine to move together until the screws are free from tension, when inertia of the moving parts will expend itself in compressing the screws and in overcoming the friction mentioned. In order that movable bed 1434 may always come to rest in its proper position, buffer springs 1442, contained in boxes 1438 secured to fixed bed, are provided. See Fig. 221. These motions of extension and compression continue until the work of recoil is used up in the friction of moving the ends as mentioned. These vibrations are so rapid that, when the machine was originally tested in breaking a bar of wrought-iron of 20 inches section, they could be neither seen nor felt, but set gauges applied at each end showed the amount of these movements. They are not only unseen and unfelt, but they are also unheard, the noise of the breaking specimen completely hiding any little noise the machine may make, no jar or rattling whatever being detected in any part of the machine.

The pressure is transmitted through the medium of a number of liquid-pressure reducers. The base or receiving-head of the reducer contains small removable pressure-receivers—one for each of the pressure-pipes coming from the load-beam supports. The small pressure-receivers are each constructed with a stem for the reception of the liquid-pressure pipe, and with a small pressure-column attached to the head of the stem through the medium of a pressure-diaphragm and a lining-plate permanently connected at their edges, clamped to the reducer-base by a sealing-ring, and containing the liquid-pressure chamber between them. The delivering-head of the reducer is removable, being connected by the pressure-diaphragm with a separable head forming part of the pressure-column. The main part of this column is stayed at top by a fixing-plate separate from the pressure-diaphragm. Heavy strains are applied by a double-acting hydraulic press with piston-rods extending in both directions—one for applying strains of tension and compression, and also for transverse strains by the use of other accessory appliances, the other for torsional strains, which are applied through the medium of a chain-frame, double chain, and saddle arranged to impart forcible rotation in either direction to a torsion arm or wheel, which is also formed with a worm for applying lighter strains by means of screw-gearing.

THE DOETSCH COPPER EXTRACTION PROCESS.—So little is known in regard to the technical details of the Doetsch process, which the Rio Tinto has been testing on a large scale for years, that the following points in regard to it may be of interest. The raw ore, broken to a uniform size of about 0·4 inch, is piled up in heaps from 10 to 13 feet high, channels being left along the bottom, and vertical draught-holes being provided for. Then about two per cent of salt is scattered over the top of the pile, which is about 45 feet wide. A basin, 30 feet square, is then formed on the top of the pile, and the solution obtained after precipitation of the copper, subsequently saturated with chlorine, is allowed to flow into it. Trickling through this ore, this solution acts upon the copper. It is gathered in gutters, conducted to tanks, and made to flow through long sluices, where the copper is precipitated with metallic iron, the quantity of the latter being less than usual (from 110 to 120 parts per 100 parts of precipitate). The precipitate, which runs from 80 to 85 per cent of copper, is dried on hot iron plates. The solution, after precipitation, is dropped through a coke tower, in which it is met by an ascending current of a mixture of chlorine and hydrochloric acid.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Relocation.—Secretary H. M. Teller has rendered the following decision in a letter addressed to the Commissioner of the General Land-Office: I have considered the appeal of Mary G. Peck *et al.*, from your decisions of December 19th, 1882, and February 7th, 1883, holding for cancellation mineral entry No. 1882 upon Gold Dirt lode, Central City, Colorado. The original location was made and recorded in 1864, since which time there appear to have been numerous transfers of the property; and it is alleged by applicants that the possessory title by virtue of said location is in them.

The abstract of title in the case fails to verify this allegation. Applicants, however, made a relocation, dated December 22d, 1880, covering the same ground, and using the same name under which the mine was originally located.

Their certificate of relocation sets forth, among other things, that it is make without waiver of any previous rights, and to secure all abandoned, interfering, or overlapping claims.

They, by their counsel, now admit their probable inability to supply all the links necessary to show by abstract that they have title under the original location, and hence they claim under the relocation of December 22d, 1880.

Your decision holds that a relocator must show a complete and unbroken claim of title from the original locator, ending in himself, or prove abandonment of the property by the original locator or his grantee; also, that relocation, using the same name under which the original location was made, coupled with the attempt to furnish abstract of title from the original locator and grantees, shows that applicants claim as purchasers for valuable consideration, and therefore that the relocation confers no new title upon them.

I am unable to concur in these conclusions.

Generally, I see no reason why a locator should be called upon to furnish any facts or data relative to a previous location upon the same ground, or why an inquiry should be instituted relative to antecedent matters, except upon showing of irregularity and of injury to material interests. The law applicable to adverse claims provides how and when such showing may be made in case any rights are liable to be infringed.

In this case, applicants, by their admission of inability to furnish complete abstract of title under the original location, as required by your office, virtually waive all claim based upon said location, and rely solely upon their relocation.

The proceedings pursuant to the relocation appear to have been regular. None of the apparently adverse interests appearing in the abstract of title was asserted pending publication under said relocation, nor has it been since, and no adverse claim can now be filed because of the limitation of law. Sec. 2325 of the Revised Statutes provides that, "If no adverse claim shall have been filed with the register and the receiver of the proper land-office, at the expiration of the sixty days of publication, it shall be assumed that the applicant is entitled to a patent, upon the payment to the proper officer of five dollars per acre, and that no adverse claim exists."

You state that the right of the claimants, asserted by the relocation, has never, to the knowledge of your office, been questioned. All antecedent claims may, therefore, be regarded as having been abandoned, and all rights which may previously have existed as waived. . . . .

Publication is notice to the world of intention, and a challenge to any and all adverse claimants to come forward and assert their rights.

No adverse claim having been filed in this case, all antecedent claims may, as already stated, be regarded as having been abandoned, and the question therefore becomes one solely between the United States and the applicants. . . . . I see no reason why patent should not be granted as applied for under the relocation of December 22d, 1880. If applicants based their title solely on their rights as purchasers, the regulation of your office, to which you refer, might call for consideration; but I find no rule or regulation, and no law, which, on the facts as they appear, would operate to prevent the issuance of patent on the location made by the parties themselves.

Your decision is accordingly reversed. . . . .

Very respectfully, H. M. TELLER, Secretary.

THE PRODUCTION AND UTILIZATION OF GASEOUS FUEL IN THE IRON MANUFACTURE.*

By W. S. Sutherland.

While fitting on a feed-valve to a locomotive, about 1866, it struck me that, if the seams of boilers could be welded instead of riveted, there would be an advantage gained in strength and economy which was worth the working out; and, though still very far from seeing this generally done, yet we have now, through this idea, made some thousands of tons of welded flues, tubes, and parts of boilers by the process which I thought out, and which certainly greatly increases the strength of the joints, and makes the soundness of the welding an absolute certainty. It would be out of place to describe the process referred to further than is necessary to the development of this paper; and therefore I only add that the first question that arose was, how to obtain the requisite heat and apply it economically, and of uniform quality and concentration, upon the parts to be welded. A little consideration pointed out some disadvantages in the smith's hearth, which naturally first occurred to me—namely, that it is practically impossible to insure perfect uniformity of heat by it; that hence welding can only be done by a very skillful smith; that dirt and scoria are liable to get into the welds from the fuel; and that an access of air may get to the metal and burn it, thus destroying the whole of the work. Gas then seemed the legitimate fuel to use; but the gas must not be too expensive, and, to insure uniformity of action, should be supplied with the requisite oxygen or air in proper and definite proportion. But to obtain cheap and suitable gas was not easy, and the only gases that appeared available were coal-gas and Siemens gas. With coal-gas, we were successful, and we welded also with Siemens gas; but experience showed that we wanted a good cheap gas having some special qualities, the first of which was high heating power per unit of volume. I have been unable so far to arrive properly at any other solution of this difficulty than the use of gas made by the action of superheated steam upon carbon, and I found, on arriving at this point, that a method of making such gas had been brought out in America by Mr. Strong. I opened up negotiations with the proprietors of Strong's system, and these resulted in the erection at Birmingham of the first water-gas producer in England, which, so far as I know, works under the method described in the following paragraph: "Part of the fuel is burnt as completely as possible to carbonic acid and water; but the resulting heat is stored up partly in the remainder of the fuel and partly in regenerators, that in the regenerators being made to heat up to a sufficiently high degree a quantity of steam. This superheated steam is passed through the hot fuel, and forms with it carbonic oxide and hydrogen, which go away to be stored up and used." The producer we erected worked well, but it needed a good deal of repair. I was, however, enabled to procure the erection of a second one at Essen, in Germany (now set to work), which does not contain the faults found in the former one, and which, therefore, bids fair so far to answer our expectations. With this producer, we have made per ton of Staffordshire coal 55,000 cubic feet of gas, or about 25 cubic feet per pound of carbon, averaging by volumes approximately—

57	parts	H and hydrocarbon.
35	"	CO.
8	"	Co_2 and N.
100	"	

I have found that, to work well with water-gas (so far as treating iron is concerned), it is necessary to get up to a very high degree (not less than 1200 degrees C., I should say), which, however, can be done without injury to the apparatus if the parts exposed to it be protected by exterior cooling. The quantity of gas above given represents only about from 55 to 60 per cent of the available heat in the fuel; but I believe that by improvements, which may be very simply made, this percentage may be very largely increased, although, since there is a double operation and combustion in making the gas, the loss of heat must evidently be greater than in making producer gas. But this loss is, except when regenerators are used, largely counterbalanced by the higher temperature which can, owing to the absence of nitrogen in the gas, be obtained by its simple combustion, and by its greater heating power per unit of bulk, which enables much smaller mains to be used to convey it, and by the fact that much smaller furnaces may in many cases be employed. A great objection has been made to the poisonous quality of this gas; but I believe that it is no more poisonous than coal-gas, and, from my own experience with producer gas, coal-gas, and water-gas, I am convinced that the hydrocarbons and tarry matters do far more hurt than the carbonic oxide. In fact, it seems to me that the poisonous effects of carbon gases and vapors are somehow proportional to the weight of carbon in the injurious compound; and in that case, the hydrocarbons in coal-gas are quite as deadly, if not more so, as is well shown by the number of accidents that have happened with coal-gas. Compared practically with coal-gas, the heating power of water-gas seems one half; but experience has shown that it may be produced at a cost not exceeding threepence per 1000 feet, after paying for coal, labor, and plant, and that the first cost of plant is not very great; while for simplicity in using it when made, it is far superior to producer gas, and more easily managed.

It will, perhaps, be called to mind by many that numerous attempts have been made to manufacture water-gas in retorts; but an examination and comparison of these proposals with the methods above described show that the intrinsic difference between them lies in the facility which this method allows of raising the steam and fuel to a temperature which would rapidly destroy the retorts, but which is necessary for the attainment of good working results. While working with Siemens gas in 1871 and 1872, I had much trouble with the tar and water which came over with the gas and stopped up the tuyeres, and which it was therefore necessary to condense and separate. Now, it will be evident from what has gone before that, in making Siemens gas, the higher the temperature at the bottom of the producer, the better the gas made, and the less carbonic acid there will be in it. Many people are in the habit of saying that, if coal be made into this gas, there is a loss of sensible heat amounting to about 30 per cent; and they give as a reason the fact that carbon burnt to carbonic oxide really does generate about that quantity of its available heat, which, if the gases be cooled down, would be certainly lost. But they forget the coal-tar and water, which must be distilled off from the fuel, and to do which requires at least 10 per cent of this heat, leaving only 20 per cent to account for. Now, this 20 per cent is very difficult to utilize, and the only satisfactory way that can be practically carried out is to take the heat down to the bottom of the producer again, and make it superheat steam, so as to form some water-gas. This I did at that time by cooling down the hot gas by the air going to the producer, so that at the same time the tar and water were condensed.

But there is a simpler way of doing it. It is well known that increasing the draught of a fire increases its temperature. Then if the draught in the producer be increased, while increasing the heat at the bottom we shall diminish the carbonic acid in the gas, and at the same time enable more steam to be passed into the producer without increasing the carbonic acid. Now, it must be evident that, by the law of conservation of energy, if this heat at the lower p art be ncreased through the quickened draught, it must be at the expense of the heat in the outgoing gas, or else we should have a means of increasing the quantity of heat produced by merely putting a fan on. Therefore, by this simple means alone, the heat of the outgoing gas may be utilized; and practically we find that, while the carbonic acid may be kept down to from 0·2 to 2·5 per cent, the temperature of the outgoing gas often does not reach 300 degrees C., which represents a loss of only about 7·5 per cent of the total available heat of the fuel. There are two ways of accounting for this result. In the first place, it was pointed out by Mr. Lowthian Bell that the descending column of fuel carried down with it about 5 per cent of the heat produced; and, in the second place, the hotter the fuel, the more the air going to supply combustion will be heated by conduction from the glow

* A paper read before the British Iron and Steel Institute.

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ing fuel just before coming into actual contact with it. Thus the reactions go on and heat accumulates, but always at the expense of the upper portion of the fuel and of the outgoing gases. But to work at this higher speed, the producer must be perfectly accessible, so that it may be easily cleaned; there must be as little tendency to scaffold as possible; and, above all, it should not be greater in size than would allow of a man easily breaking up the fuel in it if it caked over or broke through; or, if it be large, mechanical stirring should be resorted to. The problem is to keep the fuel like a sponge, but without large holes and cavities. With the temperature thus kept down, and the loss by cooling made a minimum, little water is needed to bring it down to the requisite point for condensing effectively the tar and water. And as the higher the velocity or draught, the less is the plant required to treat any given weight of coal, so the outlay per ton of fuel gasified and purified is reduced.

I knew that tar and ammonia-water were worth something, but it was not until some years after these experiments that I got the opportunity of carrying out practically their utilization. In 1878, a plant was erected at the Shropshire Iron Company's works near Wellington, which, so far as taking the tar and water out of the gas is concerned, worked very well, and I am glad to say it is now about to be remodeled and extended. This plant was followed by another at the gold and silver rolling-works of Mr. Kemp, of Birmingham, who required very pure fuel for his purpose, and who told me that a drop of tar occasionally getting on to the material would be fatal. However, this has been working well and constantly for over two years, and I believe that no organized system of extracting residuals from fuel, except in the making of light gas, has ever been carried out successfully before. Other plants on this system are now erecting, and more still are about to be constructed in different places. One has recently been set to work in the alkali-works of Messrs. William Hunt & Sons, at Wednesbury, who have so far expressed their satisfaction with it. The working is made as simple as possible. The gas taken away from the producer has its pitch first thrown down to prevent the passages choking up, and is then passed through a condenser, which, while cooling the gas effectively, can increase the temperature of the water for cooling so as to adapt it to steam-raising. It is then scrubbed, to extract the ammonia and cyanides, etc., and, if drawn from the producer, passes through an exhauster. At the high speed kept up, much of the tar is carried on in waves along the interior surfaces of the mains, and if this were stopped in the ordinary way, the fuel absorbed in horse-power would be enormous; but, observing these waves, I thought that if the surfaces of part of the mains were developed and made porous, and contained in an outer chamber, in which a lower pressure could be kept up than that in the mains, these waves would ooze through the porous surface, and get out of the way of the current, while the difference of pressure would prevent them getting in the way again. Experience has proved this idea to be correct. We make these surfaces of wire gauze tubes, up through which the gas passes, a sufficient number being purposely set up in an outer chamber, from which some of the gas is passed by to the other side of the blower. This apparatus is of course on the pressure side. The dried and cleaned gas then proceeds to do its work. We find no difficulty in getting 1¼ cwt. of good tar per ton of Staffordshire coal, and the ammonia-water we have got up to 4 degrees Tweddel; but in the new plants the scrubber is better arranged, so that we may reasonably expect more and stronger liquor.

(TO BE CONTINUED.)

FURNACE, MILL, AND FACTORY.

Messrs. Johnson & Wilson, No. 91 Liberty street, this city, have, as agents for Saylor's American Portland Cement, issued a catalogue which contains considerable matter of interest to cement users generally, without special reference to the Saylor cement. Messrs. Johnson & Wilson, we may note, are also the agents of the Iron, Steel, and Mining Society of the Austrian Alps, a federation of a number of Alpine works that make among other specialties high-grade tool steel.

W. Hasenzahl, Cincinnati, has lately shipped one of his diamond drills, with complete outfit for prospecting, to Montana. A letter received from the president of the Quincy Coal Company states that the company has been using a drill bought from Mr. Hasenzahl a few months since, and is perfectly satisfied with the machine and its work.

At Kankakee, Ill., a barb-wire manufacturing company has been organized which proposes to manufacture the wire without a license.

Rifenburg & Co. have made a proposition to the people of San Diego, Cal., to begin, on certain conditions, the erection of buildings suited for iron and steel-works. Ground has been selected between San Diego and National City. About one hundred men will be employed, it is stated.

The Boston *Commercial Bulletin* says: "The Edwards Manufacturing Company, at Augusta, Me., has decided to close up all work of improvement on the company property at once, and also abandon the project of a new factory. The reason assigned is, that the valuation placed upon the property by the assessors is excessive, imposing a burden which similar property in the State does not bear, and placing the Edwards Company at a disadvantage in a close and depressed market for cotton goods.

The business of the Jarvis Furnace Company and the New England agencies of the Korting Injector, Armington & Sims Company, engines, Sheffield grate-bars, and Schutte & Goehring's jet instruments will in the future be conducted by a stock company organized under the State laws of Massachusetts, with a capital of $100,000. This company will do business under the name and style of the Jarvis Engineering Company. It will not only take charge of the old agencies, but will do a general engineering and contracting business in putting in steam plants for all kinds of manufacturing purposes. K. M. Jarvis is president; A. F. Upton, treasurer and general manager.

At the late National Exhibition of Railroad Appliances, Messrs. Shields & Brown, Nos. 78 and 80 Lake street, Chicago, made a very handsome display of steam pipe and boiler coverings, which attracted much attention. They also covered over a thousand feet of pipe in the Exhibition building, thus illustrating the merit and value of their coverings to all interested visitors. This enterprising firm was awarded by the Exhibition the silver medal which was offered for the best boiler and pipe covering. There were five other exhibitors present in the same line. Among their patrons are the Pullman Palace Car Company, the Chicago, Burlington & Quincy Railroad, the Edison Electric Light Company, and many others.

The Merrimack Manufacturing Company, of Lowell, Mass., has recently put in a five-inch Curtis pressure regulator for its steam-pump, which throws a ten-inch stream and supplies fresh water to a battery of boilers of 7500 horse-power.

The Ontario Rolling-Mill Company, Hamilton, is making large quantities of angle fish-plates for the Grand Trunk, Canadian Pacific, and Canada Southern railroads.

The new McKenney Tubular Rail Company, of Chicago, will locate its works at La Grange, Mo.

The Duncansville rolling-mill, near Hollidaysburg, Pa., which suspended work for repairs, is now running on full-time.

The rolling-mill of McKee, Anderson & Co., at Beaver Falls, Pa., has shut down for a month.

Five more blast-furnaces are to be added to the five already in operation in and around Birmingham, Alabama. It is now proposed to open several new coal-beds and build new furnaces as soon as the railroads furnish the transportation facilities.

The main shop of the Cleveland City Forge and Iron Company is 80 feet wide by 800 feet long, and has 15 hammers made by the Cuyahoga Steam Furnace Company. Ten of the hammers have a single furnace and cylinder boiler, and five of them have double furnaces and flue boilers. The works can make shafts up to 40 tons in weight, all finished and ready to go into the boat. The axle works have a capacity of 500 axles per day. The coupling-pin plant consists of five machines and five furnaces, with an annual capacity of 10,500 tons. For making links, the works have eight hammers and ten furnaces and six machines and six furnaces, and can make 12,000 tons of links per annum. The machine-shop is stocking up with a large amount of heavy tools: A 60-foot lathe, swinging 60 inches, made in Scotland, and weighing 56 gross tons; a 30-inch stroke slotter, weighing 32 tons, made in Philadelphia; a boring-mill, swinging 16 feet 1½ inches between housings, made at Hamilton, O., and weighing upward of 40 net tons; and a planing-machine, which planes 6½ feet square and 25 feet, with bed 40 feet long and a table traverse of 52 feet, made in Philadelphia, and weighing 36 tons.

The Otis Steel-Works, at Cleveland, have the tracks of the Lake Shore & Michigan Southern Railroad passing on the north, and those of the Cleveland & Pittsburg on the south side. The works have an open-hearth plant, consisting of two seven-ton and four fifteen-ton furnaces, the former having an average capacity, nearly, of 100 tons, and the latter of 200 tons each per week of eleven turns. The maximum has been 125 and 270 gross tons respectively. Pig and scrap or pig and wrought-iron are the raw materials used, no preheating being done. Bottom casting is exclusively practiced at the works, the arrangement being a modification of that originally introduced in Bessemer practice. The product is ingots for variety of purposes, and direct castings, principally heavy work, such as rolls. The plant, if pushed to its utmost capacity, is believed to be able to make forty thousand tons per annum. The most interesting feature of the plant is the Wellman plate-mill, trains of the same design being at work or building at Schoenberger & Co.'s, Pittsburg, the Spang Iron and Steel Company, Pittsburg, and the Springfield Iron Company, Springfield, Ill. The mill is driven by a Porter-Allen high-speed engine, having a cylinder 40 inches in diameter, with 48-inch stroke, and running at a speed of 100 revolutions, with a steam pressure of 80 pounds. The ingots are reheated in three furnaces. The train is three-high, the upper and lower rolls being driven, while the middle roll is an idler. The upper roll is raised and lowered by counterweighted levers. The length of the rolls is 112 inches, the diameter of the upper and lower rolls being 31 inches, while that of the middle roll is 20 inches. They run at a speed of 67 revolutions per minute, and roll down ingots to the well-known Otis plate in one heat. The mill has besides one three-high sheet train driven off the end of the blooming train, and a merchant mill driven by a horizontal engine with 28-inch cylinder and 48-inch stroke. The axle forge contains four Cuyahoga hammers. A recent addition to the works has been a mechanical puddler driven by a two-cylinder horizontal engine.

The Cleveland Rolling-Mill Company recently turned out 100,280 pounds of No. 5 steel wire in one shift, J. P. Edwards having charge of the rolls.

The St. Louis Ore and Steel Company is introducing the Gustin patent hot-bed and straightening apparatus in its rail-mill. This improvement is expected to increase the product 25 per cent, and will save considerable labor.

A well sinking for natural gas by the Central Glass-Works Company, of Wheeling, at a depth of 840 feet, after piercing a thick vein of sand-rock, struck a strong flow of gas. It was conducted from the mouth of the well in pipes and lighted, making a blaze thirty feet high. The gas will be used for fuel in the glass-house. This is the fourth well which has been successfully drilled through to a gas-vein.

Joseph Corns, after a prosperous three years as lessee of the Massillon Rolling-Mill has concluded arrangements by which he and his son became owners of the mill, under the firm name of Corns & Son. It is the intention to enlarge the works considerably, increasing also the working force, which now consists of 150 men. The mill has been running uninterruptedly during all the recent period of depression and uncertainty in the iron trade.

The converting department of the Cambria Iron Company's steel plant is connecting with furnaces Nos. 5 and 6 by means of two railroad tracks, which, when completed, will be used for conveying molten metal directly from the furnace to the converters.

William Todd & Co., founders and machinists, Youngstown, O., have just cast for the Delaware iron mine, in Michigan, three drums, which are 14 feet in diameter and 7½ feet high, and are each cast in one piece, but so arranged that they will easily split in three pieces, for convenience in shipping. Each drum weighs twelve tons, and will hold a cable nearly a mile long. These are undoubtedly the largest drums ever cast in Ohio.

H. K. Porter & Co. have under way at their light locomotive-works a locomotive for pushing rail blooms at the Scranton Steel-Works. It weighs but about three tons, and is only two-foot gauge. The cylinders are five inches diameter and 10 inches stroke. There is no cab, as it will run inside of the steel mill.

The Springfield Iron Company, of Springfield, Ill., expects to have its new steel boiler-plate train running at an early date. It will roll plates up to nine feet wide.

Messrs. Howard & Morse, of this city, have issued a catalogue descriptive of the Blackman power ventilator, an exhaust-wheel which has been coming into favor rapidly for a variety of purposes, prominent among which are the ventilation of dwellings, hospitals, theaters, vessels, mines, the exhausting of steam, moisture, dust, noxious gases, etc.

Among the recent contracts secured by the Porter Iron Roofing Company, Cincinnati, Ohio, are the following: Iron roofing and siding to cover all the buildings of the Western Nail Company, Belleville, Ill. Iron roofing and siding for the Isabella Furnace, Barneston, Pa. This was made of galvanized iron, the best and most expensive. Galvanized iron, No. 20 gauge, for the County Buildings at Winnemucca, Nevada. Iron roofing and siding for oil-works at Newport, Arkansas. Roofing and siding for Chicago Tire and Spring-Works, Chicago, Ill. Iron roofing for large mill at Socorro, New Mexico. Iron roofing for the match-works at Brownsville, Me. Iron roofing for large smelting-works at Tombstone, Arizona.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents will be promulgated by the General Land-Office the present week as of date July 1st:

CALIFORNIA.

MARYSVILLE DISTRICT.

Abbott Quicksilver Mining Company, Abbott quicksilver mine.

COLORADO.

CENTRAL CITY DISTRICT.

Paul Lindstrom, placer. Edgar Freeman, Rising Sun lode. Joshua S. Reynolds, Specie Payment lode. John G. Roberts, Camel lode. Charles M. Hill *et al.*,

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Buena Vista lode and mill-site. Charles F. Wells, Arabian lode. Charles W. Pollard, Olympic and Titan lodes. Thomas McCallister, IXL lode. Samuel Heilner, Great Sphinx and Cleopatra lodes. Mary G. Arnett, I. O. U. lode. Park Disbrow, Etta Disbrow lode. Cornelia C. Munson *et al.*, Badger lode. Jabez Rippin, Lucas lode. Nels Johns, Enterprise lode. Michael Kelly, Big Spring lode. H. J. Robbins *et al.*, Old Timer lode.

DEL NORTE DISTRICT.

Alexander H. B. Harenc, Radcliff lode.

LAKE CITY DISTRICT.

W. Weston *et al.*, Iron Clad lode. Herman Beckarts *et al.*, San Juan lode.

LEADVILLE DISTRICT.

Scott Hayes, Wisconsin lode. John W. Reed *et al.*, Lillie lode. W. S Ward, Bismarck lode. J. O. Hallmark *et al.*, Bonanza King lode. John McGranahan *et al.*, City of Durham and Little Rose lodes. Charles O. Edman *et al.*, Mobile lode. Theodore A. Fellows *et al.*, Old King Cole lode. W. J. Wilson *et al.*, Carleton lode. Charles J. Moore *et al.*, F. C. Garbutt lode. New York & Colorado Mining Syndicate and Company, Patch lode. Mathias Stauffacher *et al.*, Little Annie lode. James Camoran *et al.*, Camoran lode. J. C. Taylor *et al.*, G G lode. James C. Spenas, Yale lode. Chippewa Consolidated Mining Company, Comstock lode.

PUEBLO DISTRICT.

Christian Wahl *et al.*, Dakota Maid and Boss lodes. C. L. Wall *et al.*, Queen of the Valley lode. Lumber City & Silver Cliff Mining Company, Copper King lode. Richard Irwin *et al.*, Cymbeline lode. Valley City Mining Company, California lode.

NEVADA.

CARSON CITY DISTRICT.

Ferdinand S. Van Zandt, Brooklyn, Cooper, and Galatia lodes. Manuel San Pedro *et al.*, San Francisco lode.

EUREKA DISTRICT.

C. L. Bray *et al.*, Kemp & Keene Consolidated lode.

NEW MEXICO.

Benjamin F. Gumm *et al.*, Miguel Otero lode.

MONTANA.

HELENA DISTRICT.

Joseph Rosenthal *et al.*, Mapleton lode. Michael C. Cotter *et al.*, Empire lode and mill-site. John J. McRae *et al.*, Glengarry lode.

UTAH.

SALT LAKE CITY DISTRICT.

Benjamin Bachman *et al.*, Governor lode. Thomas J. Gibbons *et al.*, Benton lode. M. J. Snedaker *et al.*, Allegan lode. Lars S. Anderson, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

TOMBSTONE MILL AND MINING COMPANY.—The following dispatch, just received, shows the June output from the mill and furnace to be $91,400 gross. The fourth level of the West Side is opening in a good body of high-grade ore. The new strike in the Tough Nut has increased in size and value at a depth of seventy feet. The local papers say that the company is now purchasing all the smelting ores it can get, and is paying the highest market price for them.

GRAHAM COUNTY.

GLORIETTA.—This company owns seven claims located about a mile and a half southwest of the Detroit Company's mines. It has already spent $2500 in development-work. Work has been resumed on the Micawber. A shaft 100 feet in depth has been sunk on this claim, and two levels started, one at 50 feet, which is in 25 feet; and another at 75 feet, which is in 15 feet. The company proposes to run the latter level 50 feet further, through the deposit of iron, and then to sink another shaft.

PIMA COUNTY.

The Caledonia copper group, twenty miles south of Picacho station, on the Southern Pacific Railroad, has been sold to J. D. Power. The ore gives an average of 26¼ per cent copper.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The average assay value of the pulp is $36.42 per ton; that of the tailings, $5.90 per ton. There were 209 car-loads of ore hoisted from the mine, 145 car-loads of which were from the 740 to 770 foot levels.

STANDARD CONSOLIDATED.—There were extracted and shipped to the mills 1461 tons of ore during the past week.

SYNDICATE.—The mill is running on ore from the mine.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—At the mine, all work except pumping is suspended.

GOLD STRIPE.—The mill has been started up, but will be kept running day shift only for some time. Some prospecting is kept up, and upon the result of this, future operations will depend.

GREEN MOUNTAIN.—No new developments yet to report in the big tunnel. The drift goes ahead rapidly and steadily. The ledge does not yet prospect enough to warrant milling any of the ore. In the mean time, ore enough is taken from the upper tunnels to keep both mills fully supplied.

COLORADO.

BOULDER COUNTY.

KEYSTONE.—The mine is now worked after many years of idleness. A portion is worked on a lease.

MOUNTAIN LION.—This mine has been recently purchased by Eastern capitalists, who purpose to develop it extensively. A forty-stamp mill is to be erected shortly.

SENATOR HILL.—The mine has been making regular shipments for some time. The developments consist of three shafts, all of which are in pay. The property is worked on contract.

CHAFFEE COUNTY.

The following statement shows the large amount of development-work done in the various properties in Monarch District:

	Feet.		Feet.
Black Tiger, tunnel	420	Buck's, tunnel	400
Black Tiger, shaft	75	Middle Fork, tunnel	290
Monarch, shaft and drift	837	Mount Ætna, tunnel	400
Eclipse, tunnel	620	Greeley, tunnel	1210
Eclipse, shaft	130	Columbus, tunnel and drifts	3000
Silent Friend, tunnel	117	Tabor, tunnel	650
Crœsus, tunnel	200	Beta, tunnel	612
Gene Moore, tunnel	300	Beta, shaft	140
Lost Wonder, tunnel	369	Zephyr, shaft and drift	642
Lexington, tunnel	195	Buda, shaft and drift	400
Michigan & Big Chief, tunnel	140	Denver, tunnel	889
Continental Divide, tunnel	452	Kangaroo, tunnel	1500

The grading of the railroad from Maysville to Garfield and Chaffee is nearly completed and ready for ties. A force of from 200 to 300 men is kept constantly at work, and it is expected that the cars will be running by August 15th, when the output of the Monarch District will be greatly increased.

CLEAR CREEK.

Following is a statement of ore-shipments from Georgetown and vicinity during the month of June:

Shipped from	Tons.	Value in dollars
Boston & Colorado Works	415	$52,700
Silver Plume Sampling-Works	202	20,200
Miners' Smelting Company	150	16,000
Mendota Lode	82½	6,485
G. W. Hall & Co	40	8,000
A. P. Stevens (estimated)	150	30,000
Total	1,039½	$133,385

BRITISH QUEEN.—The tunnel which has been started at the base of the mountains is now in 125 feet, and will intersect the old Baker mine at a distance of twenty-five feet more. Contracts will then be made to run it 200 feet farther. The Baker mine has over one mile of levels, shafts, and winzes, that produced large sums of money ten or twelve years ago and have been mostly abandoned since. The company has commenced, within the last year, to clean out these old openings, with very satisfactory results.

GOLDEN LEAF.—The mill for the reduction of the quartz taken out of this lode, on Soda Creek, will be in running order shortly. The shaft on the lode is about 90 feet deep, and the character of the free-milling ore is still unchanged. A new adit has been started on the vein close to the mill, which shows stamp-dirt three feet wide. When the mill is in running condition, it is the intention to treat custom ore for all those developing mines in close proximity to the above property, and for no others.

NEW YORK & COLORADO.—A contract has been made with Messrs. Fraser & Chalmers, of Chicago, for the erection of a fifty-ton stamp-mill.

REPUBLICAN MOUNTAIN.—This company, an English incorporation, has been steadily driving its Everett tunnel ahead, on Republican Mountain. It is in from 700 to 800 feet, having already cut the Morning Star lode, being within 100 feet of the Edward Everett, and having at least three patented lodes to cut within the next 400 feet, all belonging to this company. On the Morning Star, a drift has been run some 100 feet westerly of the tunnel, and a shaft raised to surface. The tunnel cuts it at a depth of 250 feet. The ore milled runs from 300 to 500 ounces silver. As soon as all the company lodes in the line of the tunnel have been cut, systematic development of each of them is proposed. Among other properties included within the company's patented properties are the Alhambra, Ogden, and Parr claims, with several hundred feet of shafts and other developments.

SNOWDRIFT.—Major Fulton has received a favorable five years' lease and bond on this mine, and will work it hereafter on his own account.

DOLORES COUNTY.

RICO REDUCTION COMPANY.—The works which were recently started, says a dispatch from Rico, prove a perfect success with the local ores. These works have been enlarged and improved since last year.

GILPIN COUNTY.

KING.—The main shaft has now attained a depth of 315 feet. The ore assays 1½ ounces of gold, 18 ounces silver, and 54 per cent lead per ton. Sinking will be resumed as soon as a contract for 100 feet can be let.

RARA AVIS.—Work has been stopped at the Whitney mine, owing to defective hoisting machinery. It is rumored that the company will remove the engine and boilers from the mill building to the mine. There is a sufficient capacity to hoist from a depth of 1000 feet.

VALLEY VIEW MINING AND MILLING COMPANY.—The annual meeting was held in Central City recently. On the return of the President, work will be resumed upon the property, the larger portion of which has been developed.

GRAND COUNTY.

READY CASH.—A strike of some importance has been made in this mine. A fine streak of mineral of a high grade, varying in thickness from fourteen to eighteen inches, was encountered in the cross-cut tunnel driven to tap the Ready Cash. The tunnel is in over 200 feet.

LAKE COUNTY.

The Leadville *Herald* gives the following statement of the bullion production for the quarter ended June 30th. The Royal Gorge is estimated:

SOURCE.	Tons of lead.	Ounces of silver.	Ounces of gold.	Value.
Arkansas Valley (bullion)	2,051¾	357,786	877	$595,757.60
Arkansas Valley (ore)	1,953½	196,348	..	391,779.80
La Plata Smelter	1,772	331,315	840	540,726.50
Cummings & Finn	1,937	335,316	195	536,077.60
Harrison Works	1,572½	119,208	1,036	293,328.80
American Smelter	1,500	135,000	1,582	315,140 00
Elgin Smelter	96	11,402	118½	23,551.20
Eddy, James & Co (ore)	6,996	831,865	.....	1,544,692.66
Royal Gorge, Canon City (ore)	400	35,455	.. ..	75,000.00
Leadville G. & S. Mill	.....	55,768	.....	61,344.80
Shields Mill	.....	7,471	12½	8,250.00
Tabor Mill	.....	20,296	16	22,645.60
Miscellaneous	.. ...	2,000	200	6,520.75
Total second quarter	18,278¾	2,429,120	4,877	$4,414,815.31
Total first quarter	.....	.....	.....	3,662,662.00
Total for six months of 1883	.....	.....	.....	$8,077,477.31

In the above calculations, lead is figured at $90 per ton; silver, at $1.10 per ounce; and gold, at $20 per ounce.

The *Herald* reports the ore output of the mines situated on the different hills at Leadville for the month of June as follows:

	Tons.		Tons.
Carbonate Hill	5,701	Printer Boy Hill	1,030
Yankee Hill	1,376	Fryer Hill	4,604
Breeze Hill	1,243	Little Ella Hill	1,340
Iron Hill	17,402	Sugar Loaf Mountain	310
Rock Hill	1,851		
Total			34,857

CATALPA.—The mine produced, during the month of June, 945 tons of ore. The output is the result mainly of tribute-workers. Exploration-work carried on in the eastern portion of the property has not met with the success anticipated. The rises made from the incline driven eastward from the bottom of the upper shaft have reached the limestone and porphyry contact. At the points where the contact was cut by the rises, it was found destitute of contact matter and ore, the two formations making a close contact. The next movement will be the exploration of the northeast corner of the Catalpa claim, near the line of the Evening Star mine. Negotiations are in progress with the Colorado Iron and Steel-Works. If that company will pay four dollars a ton for the iron ore of the Catalpa, the manager will contract to supply the company with from fifty to one hundred tons of ore per day. The ore contains from fifty to sixty per cent of metallic iron, a small quantity of manganese, and only a trace of silica. Assays show the ore to have a value of from two to seven dollars in silver to the ton,

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which is not enough to make it profitable ore to mine and reduce for the silver it contains.

CHRYSOLITE.—The company has begun the shipment of iron ore to Billings's smelter in Utah. The iron is to be used as a flux in lead smelting, and trial lots only have been sent so far.

HENRIETT.—At present, the mine shows greatly increased resources, and a very large production of ore may be looked for in the future.

SUMMIT COUNTY.

ROBINSON.—It is stated that the directors have acceded to the request of Mr. Greer for a modification of his lease, and that a new lease was signed on the 28th ult., which alters the royalty payable by Mr. Greer in several important respects, relieves the lessee from the duty of erecting concentration-works at the mine, and divests the lease of some of its most objectionable features. It now remains to be seen how it will work in practice. Mr. Greer returned on the 4th. The shipments vary from four to five cars a day, and the grade remains the same. In June, the total shipments were 87 cars, as against 92 in each of the two previous months, the falling off being due to the temporary stoppage of work, due to the water.

DAKOTA.

Much work will be done this summer in the tin mines recently discovered in the Harney range.

ALTA-LODI.—A complete reorganization of this company has been made, and work will be resumed upon the mines some time in August.

CALEDONIA.—The superintendent reports, June 24th: Ore produced, 1050 tons. The pump is in place in the winze, and a good incline track is down. Will start drifts to-morrow. The mill is running to its full capacity.

FATHER DE SMET.—The superintendent's report, for week ended June 30th, shows: Ore extracted from first, second, and third levels, 2750 tons. Ore milled, 2700 tons. Golden Gate north header in 158 feet: tramway level rise up 80 feet.

GARFIELD.—This company has a force of men employed upon the Charter Oak and other mines on Silver Creek.

STAND-BY.—Under the arrangement made between the company and the Boston capitalists, the latter will construct railroads to other mines in the vicinity, and keep the mill running to its full capacity. This contract is to hold good at least two years. Other mining property, water-rights, etc., in the immediate vicinity will probably be purchased by the company, and it is stated that negotiations for several transfers are already opened. Work will shortly be commenced on the Stand-by property, with the intention of thoroughly testing its value, and a large quantity of ore will be milled during the present year.

GEORGIA.

CONSOLIDATED GOLD MINING COMPANY OF GEORGIA.—The treasurer's report, presented at the third annual meeting, shows receipts and disbursements as follows:

RECEIPTS.

Proceeds of bullion, Ivey mine	$38,289.64
Proceeds of bullion, Bast mine	22,482.11
Dividends on 13,130 shares treasury stock	5,877.20
Proceeds sale treasury stock to pay for right of way for new ditch	1,000.00
Balance on hand June 1st, 1882	199.38
	$67,848.33

DISBURSEMENTS.

Expenses at Ivey mine	$10,022.24
" " Bast mine	9,932.87
Construction account of Ivey mine, including right of way for new ditch	1,775.97
Office expenses	1,847.69
Dividends	44,000.00
Balance on hand June 1st, 1883	267.56
	$67,848.33

The superintendent states that, during the year, seventeen miles of canal to convey the waters of Cane Creek to the Ivey mine have been built, with sufficient reservoirs for the storage of water. This is an exceedingly valuable work, as it gives a supply of water for hydraulic work, and also furnishes power for running the mill. The new sixty-stamp mill has been completed, and the work done at the Bast and Ivey mines has been going on steadily with favorable results.

MAINE.

Reports are, that the Blue Hill mining camp is a busy place at present. The Douglass, Stewart, and Blue Hill mines are actively at work, and, collectively, employing a large force of men. The Douglass is steadily producing and shipping refined copper, and good progress is made in the construction of the calcining-furnace.

EDGECOMB.—This mica mine is vigorously developed. It is situated in the town of Edgecomb, about three miles from Wiscasset. The product of this mine is said to be equal to the best North Carolina mica. In mass it is wine-colored, but, when split, is white. There seems to be an inexhaustible supply; and the deeper the shafts are sunk, the better the quality.

MICHIGAN.

The production of the mines named is given for the month of June as follows:

	Tons.
Calumet & Hecla	1754
Quincy	275
Franklin	177
Atlantic	159
Allouez	112
Pewabic	68
Peninsula	58
Wolverine	46

CHAMPION IRON COMPANY.—A portion of the company's lands, located in the vicinity of Michigamme, has been leased to parties who will explore it for gold, the latter being said to exist in quantity sufficient to warrant a thorough search.

ETNA.—The company has paid the stipulated bonus of $10,000 for the privilege of mining ore at a royalty of 75 cents per ton.

ILLINOIS.—Work will be resumed in the near future, probably under an arrangement with one of the most prominent companies operating on the range.

MCCOMBER.—Operations have been resumed.

MONTANA.

JEFFERSON COUNTY.

GREGORY CONSOLIDATED.—The extraction of ore at the present time is confined principally to the third and fourth levels. The daily output is about 35 tons, which will be largely increased on the completion of a projected concentrator that will have a daily capacity of 100 tons. The smelting capacity of the company will be amply sufficient to treat the product of both the old and the new concentrator on the completion of the latter. In the mean time, it is the intention of the company to take all necessary measures for the energetic and deep development of the mine. A new hoist with a capacity to sink 1000 feet has been already ordered, and will be started into operation as soon as possible. The facilities of the company for the easy and comparatively inexpensive reduction of Gregory ore are exceptionally good. Wood and water are in abundance, with nearness of plenty of fluxing ores and the certainty of early opportunities for cheap railroad transportation.

SILVER BOW COUNTY.

ALICE.—The mines of this company are looking well. The ore-house is full, and the eighty-stamp mill is running regularly.

BELL.—Drifting has been commenced from the old workings in the 240, to connect with the new shaft at the 270. The 400-foot station is nearly completed, when a north drift will be started from that level, to tap the vein underneath the old workings, to which an uprise will be run. The smelter is making a successful run. The concentrator is repairing, and will be started up on ore from the low-grade dump.

MOULTON.—Reports show the usual amount of development-work. The ore uncovered is of a good grade. A streak in the ledge about twelve inches wide assays as high as 400 ounces. The mil is running steadily.

NEVADA.

GEDDES & BERTRAND.—The mill is running regularly, reducing about 60 tons of ore that goes from $24 to $29 per ton. The cost of treating is said to be $8 for mining and $6 for milling.

GRAND PRIZE.—The Grand Prize-Argenta hoisting-works at Tuscarora were burned to the ground June 30th. The loss by the fire is $30,000, the outlay necessary to replace the building and machinery. There was only $10,000 insurance.

NEW HAMPSHIRE.

MASCOT.—Another rich strike of ore is reported on this property at Gorham. The vein in the tunnel at the base of the mountain, which has shown well hitherto, has been steadily improving in appearance as work progressed, and among the many streaks of galena with which the vein-matter is interspersed is one more than four inches in width. The mine is showing most encouraging prospects. The work of development is carried steadily forward, and meanwhile, preparations for the erection of the concentration-works are progressing favorably.

NEW MEXICO.

According to the Albuquerque *Journal*, the injunction obtained lately by Brunswick & La Rue against H. B. Ferguson, who represents the interests of the Jack Winters heirs in the North Homestake mine at White Oaks, has been dissolved by Judge Bristol, after a full hearing.

Work has been commenced on the large smelter of Mr. Billings, at Socorro. It is going to be at present a two-stack of 100 tons capacity daily. It has machinery capable of running 400 tons by supplying the additional furnaces. There are about sixty men at work now, and it will be completed by August 15th, for treatment of the Kelly ore. The railroad track is partly completed to the smelter, and cars will be run to it very shortly.

OHIO.

The vein of mica in Jackson township is still undeveloped, the parties discovering having thus far failed to secure a lease of it. They claim to know exactly where it is, but decline to give any information either to the owner of the farm or to any one else before securing the lease.

UTAH.

The Salt Lake *Tribune* gives the following statement of bullion receipts in that city for the first half of 1883. The ore receipts have been excluded, because the ore reduced in the furnaces there appears for its full value in the bullion shipments of the smelters. The table, however, by no means includes all the bullion production of Utah. The Mingo smelter makes no daily or weekly reports, and its work is not included. Other smelters, also, are not reported. None of Silver Reef except the Stormont is given. The immense ore-shipments of the Crescent, going for the most part directly to their destination outside the territory, are also not reported. It is estimated that, if all were included, the bullion product for the half-year would amount to four millions and a half. January, $473,025.83; February, $577,041.24; March, $664,571.66; April, $563,341.77; May, $506,565.10; June, $453,480.20. Total, $3,238,025.80.

The Copper Belt mill, at Marysvale, has been consolidated with the Pluto mine, for the purpose of working its ores, and the mill is to be put in operation as soon as possible. Messers. Holderman and Nicholson have gone there for the purpose of pushing work on the mill, and they hope soon to be producing metal. This consolidation extends only to the mill and mine, and not to the Pluto Mining Company.

SILVER REEF.

Wells, Fargo & Co.'s shipments of silver from Silver Reef, for the month of June, amounted to $36,924.14.

VERMONT.

VERMONT COPPER MINING COMPANY.—The New York *Tribune* states that the probable result of the recent strike and riot at Vershire will be that the company will fall into the hands of a receiver. The actual condition of the affairs of the company and the prospects of the mine are briefly stated as follows: There is a bonded indebtedness of half a million dollars, with interest past due. The floating indebtedness is nearly $200,000. The corporation which owned the mine for many years previous to a year or two ago was known as the Vermont Copper Mining Company, Smith Ely, President. The miners, up to within a few months, worked at contract prices, and, after the decline in copper, the output of ore was done at a loss. The company became involved in financial difficulties and litigation last year. The Vermont Copper Company was formed to succeed the old corporation, with E. Ely Goddard, President. F. M. F. Cazin was manager under the company, and the firm of Goddard & Cazin run the corporation store. It is claimed that Cazin expended a large sum of money in worthless improvements, a crushing-mill being built at an expense of $30,000, which has not been used. At last, the property was deeded back to the Vermont Copper Mining Company. Bonds were issued and the creditors of the company were paid largely in these securities. Meanwhile Goddard sued Cazin for libel. The firm of Goddard & Cazin dissolved partnership. Cazin was arrested. Application is made by Cazin for the appointment of a receiver of the property. Attachments have been laid on the property, including one in the name of the Eagle National Bank of Boston for $20,000. One week ago, the men refused to go to work. The president of the company, Smith Ely, declined to pay the miners their just dues. He also refused to put any more money into the business.

VIRGINIA.

VIRGINIA STATE MINING COMPANY.—An excellent quality of roofing slate is quarried from the company's 4040 acres tract at Snowdon, near Rope Ferry station of the Richmond & Alleghany Railroad, Amherst County, twenty-four miles west of Lynchburg, where it has a bed of slate three miles long and three quarters of a mile wide. These slates are on the eastern slope of the Blue Ridge, and very convenient to the railroad.

WYOMING.

The copper mines at Hartville are producing a large amount of copper. The smelter is running continually, the mines are developing, and there is already more ore on the dumps than the smelter can treat for some time to come. The mines are producing largely, and, taking into consideration the fact that they were discovered only three years ago, the outlook is very favorable.

The last find reported near Cheyenne promises to be of great value. An Iowa company has been at work for several weeks on a quartzite ledge, near Buford station, on the Union Pacific Railroad, and at the bottom of the new shaft has struck native copper scattered in fine grains and leaves, all through the vein. The ledge is over 120 feet across, and cuts the formation at nearly a right angle.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, July 13.

Our mining market has shown a slight increase in activity compared with the small dealings of the past weeks. The sales, which were pretty uniformly distributed—more so than usual, in fact—aggregated 224,910 shares, against 138,740 last week.

From the Comstock there has been no news, authentic or otherwise, to affect values, which have on the whole, however, exhibited a little more strength. California has reacted slightly, sales ranging between 11@15c., while Consolidated Virginia has fallen off from 45c. in the beginning of the week, to 40c. at the close. Sierra Nevada fluctuated between $3.40@$4.50, closing at $4.35, while Union advanced from $4.75@$5.50, and closed to-day at $5.25. Sutro Tunnel held its own.

The Leadville stocks exhibited signs of weakness, Iron Silver quietly holding at $2.95@$3.10, the latter being higher than usual. We refer editorially to the successful issue of some of the litigations in which this mine is involved. Amie, Little Pittsburg, and Climax have been weak, while Chrysolite, under active trading, advanced to $1.30, but declined later on, closing at $1.20. There was little interest in the other Leadville stocks.

Bodie stocks have excited no more interest than usual. Standard has held its own. Bulwer reached $1 on Saturday, but records no sales since then.

Among the Tuscarora stocks, Navajo has again rallied, advancing from $2.25@$3, closing at the latter figure. The rest have been quiet.

In the miscellaneous list, we note particularly, as the first transaction for a long period, the sale of 1000 shares of St. Joseph Lead at $7. Alta-Montana has reached bed-rock at 1c. per share. The mine was sold under foreclosure proceedings this week for $719,000. The bulk of the indebtedness of the company is to local bankers. Eureka has dropped off under light sales to $4.50. Aside from the poor outlook for the mine, the future of lead is not promising. Horn-Silver, after advancing to $7.75, declined and closed at $7. Northern Belle has been a little more active than usual, and has held its own. Silver King has dropped off to $9. Sonora has been the most active stock on the list, recording over 100,000 shares, advancing from 18 to 40c., but closing at 25c.

At a recent meeting of the Henriett Mining Company in London, organized to work the Henriett mine of Leadville, it appears that the English engineer, Mr. Henty, who reported on the mine, very much overestimated the reserves. Mr. Moffatt, the vender, has signified his willingness to pay 20s. each for all shares offered previous to the 27th of July, the shareholders retaining the two dividends of 2 per cent each which they had received.

Another Leadville mine has been launched on the London market. This time it is the Silver Cord, with a capital of £100,000 in £1 shares, £10,000 cash being asked.

The stock operations of the palmy days of mining speculations have left behind them a fruitful crop of litigation, among which we may note the suits of Sylvester H. Langdon, a stockholder of the Mack Morris Mining Company, against Clinton B. Fisk, José F. Navarro, A. V. Stout, and others; and of E. Nutt against the trustees of the Nueve Minas de Santa Maria, one of the Roberts schemes. Mr. Nutt alleges that the mining land owned by the company, in the State of Sonora, Mexico, was purchased for $17,000 from its original owner, and that the purchaser for this sum then sold it to the company for all but seven of the 100,000 shares into which its capital stock of $25,000,000 is divided. He charges that the property was certainly not worth more than $500,000, and that the purchase of it by the company for stock representing a par value of $24,999,825 was a fraud, particularly in view of the fact that most of the shares were given by the seller of the land back to the trustees of the company or their nominees, and by them put on the market for their own benefit as full-paid stock. He purchased 300 of the shares at $2 each, and he now seeks to compel the trustees to account to the company, for the benefit of himself and other stockholders, for the $24,000,000 of stock which he alleges they have fraudulently obtained and disposed of to their own advantage.

MEETINGS.

Dunderberg Mining Company, Nos. 90 and 92 Broadway, Room 37, New York City. The adjourned meeting of the stockholders for the election of trustees, and such other business as may be presented, will be held August 1st, at three o'clock P.M.

DIVIDENDS.

The Castle Creek Mining Company, of Idaho, has declared its regular monthly dividend (No. 14) of three per cent, payable July 16th.

The Copper Queen Mining Company, of Arizona, has declared a quarterly dividend of $125,000, payable on July 16th, 1883. Transfer-books close July 13th, and reopen July 17th.

The Mount Pleasant Mining Company, of California, has declared a dividend (No. 2) of fifteen cents per share, payable at the office of Messrs. Laidlaw & Co., No. 14 Wall street, New York City, July 16th.

The Homestake Mining Company, of Dakota, has declared its usual monthly dividend of $50,000, payable on the 25th inst., at the office of Messrs. Lounsbery & Haggin, No. 15 Broad street, New York City.

The Quincy Mining Company, of Michigan, has declared a dividend (No. 30) of $3.50 per share, payable August 15th, to stockholders of record July 24th.

PIPE LINE CERTIFICATES.

The week has been one of considerable activity and of considerable excitement, the market giving way. The official figures of the United Pipe Lines (in barrels) for three months are as follows:

U. P. L.	April, 1883.	May, 1883.	June, 1883.
Net stocks	33,123,726	33,366,470	33,656,342
Certificates issued	25,39[illegible],241	27,084,933	28,591,101
Credit balances	7,730,485	6,281,537	5,065,241
Receipts	1,856,793	1,895,283	1,842,012
Deliveries	1,584,047	1,637,203	1,536,751
Excess receipts	272,746	258,080	305,261

A comparison of the June report with that of a year ago is given below in barrels:

U. P. L.	June, 1882.	June, 1883.	Changes.
Net stocks	26,966,476	33,656,342	Inc. 6,689,866
Certificates issued.	21,282,496	28,591,101	Inc. 7,308,605
Credit balances	5,683,980	5,065,241	Dec. 618,739
Receipts	2,419,935	1,842,012	Dec. 577,923
Deliveries	1,796,712	1,536,751	Dec. 259,961
Excess receipts	623,223	305,261	Der. 317,962

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
July	7	$1.14⅝	$1.14⅞	$1.13½	$1.14⅝	1,975,000
	9	1.14⅝	1.14⅞	1.13¼	1.14⅛	2,080,000
	10	1.14⅛	1.14½	1.12½	1.12½	2,011,000
	11	1.12⅝	1.12⅝	1.11⅜	1.11⅞	2,112,000
	12	1.10¼	1.12½	1.09⅝	1.11¼	3,978,000
	13	1.09⅛	1.09⅝	1.06⅝	1.08⅛	5,044,000
Total sales						17,200,000

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. July 6.	July 7.	July 9.	July 10.	July 11.	July 12.
Albion	.....	.....	2	2	2	2
Alpha	.....	1¾	.....	.....	.....	.....
Alta	.50	.75	.80	.90	1	1
Argenta	.....	.....	.10	.....	.05	.05
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	1¼	1¼	1¼	.....	1¼	1¼
Belle Isle	.40	.....	.....	.45	.45	.....
Best & Belcher	4¼	4¼	4⅛	4¼	4⅜	4¼
Bodie	.80	.75	.60	.65	.70	.75
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	1⅛	.....	.....	.....	.....	.....
California	.10	.10	.05	.10	.15	.15
Challar	3⅜	3½	3⅛	3⅜	3⅛	3½
Con. Virginia	.50	.45	.45	.45	.45	.40
Crown Point	1¼	.....	1½	1⅜	1⅜	1⅜
Elko Cons	.....	.....	.....	.....	.....	.....
Eureka Cons	5¾	.....	6	5	4¾	4½
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	2⅜	2½	2½	2½	2½	2½
Grand Prize	.05	.05	.05	.....	.02	.05
Hale & Norcross	5⅞	5⅞	6⅛	5⅝	5⅞	6
Independence	.70	.....	.....	.....	.60	.55
Martin White	5	5	5	.....	.....	.....
Mexican	3	3	3⅛	3	3	3
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	.....	5½	5½	4¾	4½	5
Navajo	2⅝	2⅝	2⅞	3⅛	3	3⅛
Northern Belle	7⅛	.....	.....	6½	7	6⅞
North Belle Isle	.20	.....	.....	.....	.....	.....
Ophir	2¼	2½	2⅝	2½	2½	2½
Overman	.....	.....	.....	.....	.....	.....
Potosi	1⅝	1½	1½	1½	1½	1½
Savage	2	2	2	2	2	2
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nevada	3⅜	4⅛	4¼	4	4⅛	4¼
Silver King	10	9¾	.....	.....	.....	.....
Tip-Top	.....	.....	.....	.....	.....	.....
Union Cons	4⅝	5	5⅛	4⅞	5⅛	5⅛
Utah	.....	.....	2¾	2¾	2¾	2⅞
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	3¾	3¾	4⅛	4	4	4

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, July 12.

There has been a little more animation in the market for copper stocks this week, and prices show considerable firmness, especially for the two leading mines. Ingot copper is steady at 15¼ cents, and as the production for June of the companies above alluded to shows quite an increase over the same time last year, it is fair to suppose that, even at the present price of ingot, the mines will continue to be remunerative to the stockholders, which fact tends to bring buyers into the market for all the stock offered. Calumet & Hecla advanced from $242@$243, with sales of less than 50 shares all told for the week. The usual quarterly dividend of $5 per share has been declared, payable August 15th, to holders of stock July 14th. Quincy advanced from $49@$51½, with more than usual changing hands. The announcement of a dividend of $3½ per share had rather a depressing effect on the stock to-day, and it was freely offered at $50 regular to $49, seller 60. It was generally expected that the dividend would not be less than $5, the same as last year. Franklin sold at $10, the same as last week. Osceola declined from $20@$19½. Atlantic sold at $11. Huron, at $1⅝@$1½; and a small lot of Allouez at $1¾.

In silver stocks, at the old Board, there has been absolutely nothing doing. Sales of Bonanza at $2¼ @$2⅜, Sullivan at $1¼, and a small lot of Silver Islet at $4, tell the whole story. At the Mining Exchange, there has been more activity; but the trading has been confined to a few specialties, and prices do not show large fluctuations. Bowman continues to be the leading stock, with sales of about 17,000 shares at 27@33c. Massachusetts & New Mexico was rather dull in the early dealings at about 7@8c., but was more active to-day, with sales at 9c. The bonds are quoted at 16@18 per cent. Empire, rather quiet, but firm at 20@25c.

At the afternoon Boards, Huron sold at $1½. Sullivan declined to $1. San Pedro sold at 35c. Bowman, 20@28c. Massachusetts & New Mexico, at 9c. Catalpa, dull, 53c. bid, 56c. asked. Quincy, 49@ 50c. Silver Islet, $4 bid.

BULLION MARKET.

NEW YORK, Friday Evening, July 13.

The firmness noted in our previous postings was only temporary, in consequence of weaker Eastern exchanges, and, with lower sterling exchange here, our figures are reduced as per accompanying table. The market is weak and likely to go somewhat lower.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
July 7	50½	110½	July 11	50 7-16	110¼
9	50½	110½	12	50 7-16	110¼
10	50½	110½	13	50 7-16	110¼

United States Assay-Office at New York.—Statement of business for the month ended June 30th, 1883:

Deposits of gold:		
Foreign coin	$181,000	
Foreign bullion	38,000	
United States bullion	444,000	
United States bullion (re-deposits)	114,000	
Jewelers' bars	73,000	
Refined gold	105,000	$955,000
Deposits of silver:		
Jewelers' bars	14,900	
Foreign coin	12,000	
Foreign bullion	15,500	
United States bullion (contained in gold)	5,700	
United States bullion (re-deposits)	1,850	
Bullion, Arizona	900	
Colorado	26,000	
Lake Superior	500	
Montana	65,500	
New Mexico	17,500	
Oregon	100	
Utah	02,600	
Refined silver	71,800	294,000
Total deposits		$1,249,000
Gold bars stamped	$1,331,332	
Silver "	377,117	1,708,450

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended July 13th, as compiled from various sources, amounted to $176,000, as against $158,000 reported for the previous week. The receipts from January 1st, 1883, to date are $6,164,213.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended July 7th	$170,584
Corresponding week last year	216,100
Since January 1st, 1883	6,791,466
Corresponding period last year	36,157,334

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Imports.

Week ended July 7th	$36,865
Corresponding week last year	58,127
Since January 1st, 1883	6,976,822
Corresponding period last year	2,005,380

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank lost £19,500 bullion; but the proportion of its reserve to its liabilities was raised from 35 3-16 to 42 5-16 per cent, against 39⅛ per cent at the same date last year. The bank, July 12th, gained £16,000 bullion on balance. The weekly statement of the Bank of France shows losses of 7,825,000 francs gold and 6,900,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of June.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$398,410
*Alta-Montana, G. L. S.	"		§10,625
*Belmont	"		17,775
Bodie, G. S.	Cal		100,590
Bodie Tunnel, G.	"		51,447
*Bonanza King, G.	"	67,573	334,223
*Boston & Montana, G.	Mont.		72,318
*Central Arizona, S.	Ariz.		35,845
*Christy,	Utah.		117,736
*Chrysolite, S. L.	Colo.	§43,545	246,516
Cons. Bobtail	Colo.		18,723
*Contention, S.	Ariz.		475,824
Crescent, G.	Cal		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		172,277
*Derbec Blue Gravel, G. S.	Cal		44,729
Evening Star, S. L.	Colo		47,061
*Father de Smet, G.	Dak.		153,105
*Frisco M. and S Co., G. S. L.	Utah		§77 084
Gunnell, S	Colo.		58,828
*Head Center Cons.	Ariz.		8,109
*Head Center and Tranquillity	Ariz.		42,601
*Hecla Cons., G. S.	Mont.		293,922
*Homestake, G.	Dak.		419,148
*Hope, S.	Mont.		41,963
Horn-Silver, S. L.	Utah		1,283,000
Idaho, G.	Cal		88,642
*Independence, G. S.	Nev.		32,991
Iron Silver, S. L.	Colo.		503,831
*Jocalitita, S.	Mex.		‡228,022
*Kentuck, G. S.	Nev		10,393
*Lexington, S.	Mont.	107,655	638,488
*Little Pittsburg, S. L.	Colo.	7,451	35,645
*Marguerite, G.	Cal		33,200
*Martin White, G. S.	Nev.		136,317
Morning Star, S. D.	Colo.		84,428
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev		127,311
*Navajo, G. S.	"		343,962
*North Belle Isle	"		1,953
Northern Belle, S.	"		388,525
*Ontario, S. L.	Utah	87,652	1,038,687
*Oxford, G.	N. S.	7,076	35,255
*Phœnix, G.	S. C.		†3,666
*Pinal Cons., S. L.	Ariz.		163,400
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		101,241
Standard, G.	Cal		442,796
Star, S.	Nev.		27,095
*Stormont, S.	Utah.		95,658
Syndicate, G.	Cal.		20,073
Tintic M. and M. Co.	Utah.		7,632
*Tip Top, S.	Ariz.		‡22,983
*Tombstone, G. S.		91,400	414,230
Wyoming Cons	Cal		31,541
Yellow Jacket, S.	Nev.		183,061
Total amount of shipments to date			$10,025,557

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, July 13.

Official returns place the German exports and imports of metals as follows, the metric ton being the unit:

	Imports.	Exports.
Sheet-lead	46	1,076
Pig-lead	1,972	41,916
Litharge	2,184	2,393
Rolled copper	159	1,409
Ingot copper	10,579	6,097
Copper wire	71	588
Brass	436	1,265
Nickel	173	55
Quicksilver	396	6
Pyrites	108,709	27,517
Sheet-zinc	148	14,270
Spelter	4,395	56,478
Zinc ores	24,567	8,846
Tin	5,636	667

Copper.—This metal is beginning to show elements of greater strength. The export engagements have been heavy, and we note that both Baltimore and Anchor brands are quoted in London, although the figures are still considerably below Best Selected, with which they rank in quality.

The latest reports from Arizona are by no means encouraging to the producers there. In the Globe District, only one company is running, and in Clifton the Scotch company seems to have got pretty deep into the mire, through the incapacity of the managers, who do not appear to be able to smelt the siliceous ores of the Metcalf group without the ferruginous ores of the Longfellow, from which they have been cut off by the cave in that mine. The Arizona product will, therefore, not be as heavy as has been anticipated, while the only metal that now reaches our market from Butte is that from the Parrott, the product of the other smelters being shipped abroad.

We note this week sales, at private terms, for home consumption, of between 700,000 and 800,000 pounds of Baltimore copper, and of about 200,000 pounds of Lake ingot and wire bars for export at 15½c. England cables Chili Bars to-day at £63 15s.@£64, showing firmness there.

Tin.—The market has been quiet. At the Exchange, there have been sales during the week of 250 tons, the latest to-day being 25 tons spot at 21c. We quote for jobbing lots, spot cash, 21¼@21⅝c. for Straits, 21¾c. for Lamb & Flag, 21½c. for Australian, and 22c. for Banca. London cables to-day, £92 10s.@£92 15s.

Lead.—Our market has been very dull, with only a few small sales, not aggregating more than 200 tons of Common at 4⅜c., and 4·35c., and it does not appear to be salable at the latter figure now.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market has declined slowly since our last report; there are more sellers than buyers, and hence prices are weak. Ordinary Missouri has been sold here to Eastern consumers at 4·10c., sales being 130 and 170 tons of Refined at 4·10½c.

Messrs. Everett & Post send us the following dispatch:

The market is very flat and weak, and buyers are holding off, taking only for immediate requirements, as they expect a decline. Offerings, however, are very light, especially of Refined. We note sales of 300 tons of Common at 4·15c., and 200 tons of Refined at the same figure.

Spelter.—The market is extremely dull, in spite of the fact that among all metals this ore is apparently most favorably situated. Good ordinary domestic brands are freely offered here at 4·50c. England cables £15@£15 2s. 6d.

Antimony.—Nothing has been done. We quote Cookson's nominally 10⅝@10⅝c., and Hallett's 9⅝@9⅝c. for large lines.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, July 13.

The total stock in bond at the ports of New York, Philadelphia, Boston, Baltimore, and New Orleans are, according to the same authority:

	Jan. 1. Tons.	June 1. Tons.	July 3. Tons.
Pig-iron	6,330	7,635	4,242
Spiegel iron	4,131	2,609	1,396
Old rails	5,504	2,665	2,711
Scrap iron	1,384	3,023	4,008
Scrap steel	456	306	560
New iron rails	6,642	4,119	255
New steel rails	4,816	4,587	.....
Grand total	29,263	24,944	13,172
Decrease during June, 1883			11,772

Official returns place the exports and imports of iron and steel of Germany as follows for the year 1882, the unit being the metric ton:

	Imports.	Exports.
Iron ore	785,359	1,621,182
Merchant iron	15,785	144,407
Wire	3,496	227,415
Pig-iron	283,009	186,938
Scrap	8,048	59,548
Plate and sheet	3,157	44,204

The following figures, showing the imports of iron and steel and the stock in bond at New York, have been compiled by Mr. Edward J. Shriver, Secretary of the New York Metal Exchange:

ARTICLES.	IMPORTS. May.	June.
	Tons.	Tons.
Pig-iron	10,707	12,206
Iron ore	2,157	1,509
Spiegel iron	3,981	5,704
Old rails	179	178
Scrap iron	1,308	1,839
Scrap steel	4,176	7,981
Steel blooms	209	372
New steel rails	10,928	3,572
New iron rails	.....	.....
Steel wire rods	9,952	13,963
Iron wire rods	393	600
Swedish iron	1,262	2,098
Iron bdls. and bars	78	100
Iron beams	236	401
Hoop-iron	115	2
Sheet-iron	279	453
Russia sheet-iron	.....	.....
Steel bdls., bars, etc	678	476
Steel tires and forgings	298	312
Iron tubes	.....	.....

ARTICLES.	STOCK IN BOND. Jan. 1.	June 1.	July 3.
	Tons.	Tons.	Tons
Pig-iron	2,822	4,033	2,767
Iron ore	.....	.....	.....
Spiegel iron	2,705	1,699	538
Old rails	4,552	1,792	1,778
Scrap iron	694	2,487	2,849
Scrap steel	456	306	306
Steel blooms	.....	.....	.....
New steel rails	2,603	2,802	.....
New iron rails	5,638	3,020	.....
Steel wire rods	5,253	6,953	1,786
Iron wire rods	707	1,386	1,414
Swedish iron	1,566	1,626	1,627
Iron bdls. and bars	.....	.....	.....
Iron beams	.....	.....	.....
Hoop iron	.....	.....	.....
Sheet-iron	85	101	101
	Lbs.	Lbs.	Lbs.
Russia sheet-iron	1,090,880	848,890	814,890
Steel bdls., bars, etc	.....	.....	.....
Steel tires and forgings	.....	.....	.....
Iron tubes	.....	.....	.....

American Pig.—The feeling continues to improve, although furnace agents do not report any heavy sales, and we are able to note this week that the improvement has spread from No. 1 to No. 2, which is now also attracting more attention. At the Metal Exchange, the following transactions have been reported: Monday, 200 tons No. 1, September, at $22.75; Tuesday, 400 tons No. 1, September, at $22.75, and 200 tons, October, at $22⅞; Thursday, 500 tons No. 1, September, $22⅞, and 100 tons No. 1, October, $23; and to-day, 100 tons No. 1, November, $22⅞. We quote for spot, according to brand, $21.50@$23 for No. 1 Foundry, $19@$20 for No. 2, and for Gray Forge, $18.50@$20. Bessemer pig is quiet and unchanged, buyers' and sellers' views lying apart. England cables 50s.@51s. 3d. f. o. b. Spiegel is dull, with 20 per cent quoted at $31. There is little demand.

Scotch Pig.—The market is feeling the impetus of better figures for American Pig, a firmer market in Glasgow, and higher freights, which are cabled 7s. 6d. Sales during the week aggregate from 800 to 1000 tons in lots at the following quotations ex ship: Coltness, $23.75@$24; Langloan, $23.75@$24; Summerlee, $23@$23.50; Dalmellington, $21.25@$21.50; and Eglinton, $21@$21.50.

At the Exchange, the following cable quotations were received: Coltness, 59s. 3d.; Langloan, 60s.; Summerlee, 57s.; Gartsherrie, 57s. 9d.; Glengarnock, at Ardrossan, 54s. 6d.; and Eglinton, at Ardrossan, 48s. 6d. Warrants to-day were 47s.

Rails.—There is very little doing, although the inquiry for small parcels for early delivery is fair, $38@$39 at mill being quoted. There have been transactions for winter delivery, bids not being higher than $36.50, which the mills decline to accept.

Old Rails.—Trade continues very dull, with but few transactions to base quotations upon. We quote Ts $21@$22. We quote a sale of 600 tons of cropends at the Exchange for July delivery at $25 delivered.

Scrap.—There is very little business to report, quotations remaining nominally $21.50@$22.50 ex ship for No. 1.

Philadelphia. July 12.

The past five days have developed very little of special interest, outside of crude iron. The trade is in an attitude of expectation on both sides. Neither manufacturers nor consumers are willing to make a

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	July 7. H.	July 7. L.	July 9. H.	July 9. L.	July 10. H.	July 10. L.	July 11. H.	July 11. L.	July 12. H.	July 12. L.	July 13. H.	July 13. L.	SALES.
Alice, Mon.													
Anie Con., Co.	.16		.17	.16	.15		.15	.14	.14		.15	.14	10,400
Argenta, Ne.	.15												200
Bar. & Walker, Ut.													
Bassick, Co.			10.38				10.25		10.25				325
Belle Isle, Ne.	.47		.43								.46	.45	700
Bodie Cons., Ca.	.9				.75				.75				220
Breece, Co.													
Bulwer, Ca.	1.00	.90											645
California, Ne.	.15	.12			.13	.11	.13		.15		.12		5,430
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.	.13						.14	.13	.13				1,700
Chrysolite, Co.	1.25	1.20	1.25		1.30	1.25	1.25		1.15		1.20		4,700
Climax, Co.	.17	.15	.16	.09	.14	.10	.12	.10	.13				11,400
Cons. Va., Ne.	.45				.47		.43				.45	.40	4,100
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.	6.50		5.38		6.10	5.83	4.50						600
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.			2.35		3.70								200
Grand Prize, Ne.			.09								.35	.10	2,200
Great Eastern, Dk.													
Green Mountain, Ca.	.71												700
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.											.69		100
Homestake, Dk.			16.00										50
Horn-Silver, Ut.	7.50	7.00	7.50	7.00	7.75		7.25	7.00	7.37		7.00		1,455
Hukill, Co.													
Independence, Ne.													
Iron Silver, Co.					3.10	2.95			3.00	2.95	3.00		1,520
La Plata, Co.													
Leadville C., Co.	.55										.54		400
Little Chief, Co.			.55	.53	.54								2,000
Little Pittsburg, Co.			80								.70	.66	400
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.			2.25		2.90	2.55	3.00		2.90	2.80	3.00	2.95	3,900
Northern Belle, Ne.	6.87		7.00		6.75	6.50	6.65	7.00	6.63				1,210
North Belle Isle, Ne.													
Ontario, Ut.													
Opuir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.55		.56	.54	.70		.58		.60	.54	.59		2,550
Saint Joseph's Lead.									7.00				1,000
Savage, Ne.													
Sierra Grande, N. M.			1.25	1.10			1.20	1.15					1,900
Sierra Nevada, Ne.	3.40				4.50		4.10				4.35		675
Silver King, Ar.	10.12	10.00					9.00						450
Spring Valley, Ca.													
Standard, Ca.	7.25				7.50	7.12	6.87		7.25				550
Stormont, Ut.	.48								.48	.46	.48	.47	4,000
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	July 7. H	July 7. L	July 9. H	July 9. L	July 10. H.	July 10. L.	July 11. H.	July 11. L.	July 12. H.	July 12. L.	July 13. H.	July 13. L.	SALES.
Advance.													
Albion	.50												1,100
Alta													
Alta-montana, G.					.02		.12	.01	.02				3,100
Am. Flag, s.													
Barcelona, G.													
Bear Creek													
Belvidere													
Best & Belcher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.	.28												1,000
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G													
Clav'r's W. & M. Co.													
Cal., B. H., G.					1.00				1.00				400
Central Ariz'na, S.							.80				.80		400
Cherokee, G.			.03										1,000
Climax, Co.													
Cons. Imp'ri'l, G.S.													
Crowell, G.													
Dahlonega, G.													
Decatur											.04	.03	1,800
Dunderberg													
Durango, G.							.05						500
Eastern Oregon	.65		.67	.65	.70	.68	.71	.70	.72	.70	.72		12,600
Elko Cons.			.26	.23	.25	.23	.23				.19		2,100
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.													
Hortense, S.													
Imperial	.04												200
Lacrosse, G.			.10				.10	.09					700
Lucerne													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.													
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S.L.													
Ori'nt'l & Miller, S.			.13										700
Parnell			.44	.43					.42				1,900
Quartz Creek													
Rappahannock, G.	.08												1,500
Red Elephant, S.					.07						.06		3,100
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.21	.18	.38	.20	.40	.32	.31	.24	.25	.21	.26	.22	100 800
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.											.03		300
Sutro Tunnel	.22	.20	.21		.22	.21	.21	.20	.21		.21		12,100
Taylor Plumas													
Union Cons., G. S.	4.75				5.25		5.00		5.50		5.25		970

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 67,710. Non-dividend shares sold, 156,300.

BOSTON MINING STOCKS.

	July 6. H.	July 6. L.	July 7. H	July 7. L.	July 9. H.	July 9. L.	July 10. H.	July 10. L.	July 11. H.	July 11. L.	July 12.* H.	July 12.* L.	Sales.
Allouez													
Amie													
Atlantic													
Astec													
Bodie Con.													
Bonanza D.			2.25				2.37½		2.25				500
Bowman Sil	.31	.27	.33	.28	.31	.30	.30	.29	.33	.28			16,800
Bruns. Ant.													
Bulwer					.65								100
California													
Cal. & Hec.	.242		.242		.242								10
Catalpa	.55				.55								200
Central Ariz													
Climax													
Co. Virginia	.45				.45								400
Copper F'ls													
Copperop													
Crescent									.22½				200
"Cusi"					1.62½								100
Decatur													
Deer Isle													
Denver City													
Douglas			1.00		1.00								200
Duncan													
Dunkin													
Empire			.25		.26		.26		.25				1,500
Eureka Con.									6.00				50
Franklin	10.00						10.00						95
Hancock G.													
Harshaw	.50								.50				325
Huron	1.63				1.63								400
Independ'ce													
Indian Q'n.													
Mammoth													
Mass. & N.M.	.09	.08					.09	.08	.09	.08			20,000
Milton													
Napa													
National													
North. Belle													
Ontario													
Osceola	20.00	19.50	19.50						19.50				25
Penn-Breck.													
Pewabic													
Pine Tree													
Plymouth													
Quincy			50.50	50 00	51.50	50.00							256
Ridge													
Robinson							.55						1 0
San Pedro													
S'ra Nevada	4.00												100
S'ra Grande													
Silver Islet	4.00												2
Silver King					10.25								50
Simpson Gd.													
So. Pacific													
Standard									7.50				20
Sullivan	1.25				1.18¾		1.25	1.12½	1.06¾				700
Sutro Tun.	.21				.21				.21				900
Sycamore	.50												200
Twin Lead.	.13	.12	.15	.12	.15	.14	.15		.15	.14			15,780
Vizina													

PHILADELPHIA MINING STOCKS.

	July 6. H.	July 6. L.	July 7. H.	July 7. L.	July 9. H.	July 9. L.	July 10. H.	July 10. L.	July 11. H.	July 11. L.	July 12 H.	July 12 L.	Sales.
Amer. Cons.													
Argent	.23	.22	.23	.21	.23	.21	.22	.19	.22	.18	.20	.19	27,600
Arizona So.													
Battle Mt.					.04	.03							2,000
Buena													
California													
Calista													
Chrysolite													
Cincinnati			.11				.11	.10	.11				9,800
Comprom'e.	.20						.22	.19			.19	.16	4,900
Contention													
Con. Virg.													
Dauntless													
Del Monte											.03		1,000
Denver City	.18	.16	.16							.17			2,900
Eureka													
Girard	.06	.05	.05		.06	.05							3,400
Governor													
Grand Uni'n	.18				.18	.17	.18		.19	.18	.19	.18	9,500
Green Mt.													
Gunnison	.45	.42½	.42½	.45	.40								4,200
Homestake													
Horn Silver													
Iowa Gulch	.22	.11	.12	.10	.11	.10	.11	.10	.10	.07	.08	.07	10 0200
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud										.15			1,500
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan	.04									.04			2,000
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina	.15		.16		.16		.16						2,700
Penn-Breck.	.10		.11	.10	.10	.09	.10	.08			.10		18,100
Permanent.	.02				.02								9,000
Pizarro													
Pizarro Ex.			.01										8,000
Potosi													
Rara Avis			.27½	.25		.30							700
Rara Avis E.	.09		.9		.9		.09		.13		.09		8,000
Record													
Rico Plon'r.													
Sierra Apac.							.25		.25				1,700
Sierra Be. la.	.57½	.55			.60	.57½	.60	.57½					13,900
Sierra G'nde	1.20	1.07½	1.22½	1.12½	1.15	1.12½	1.17¼	1.10	1.17¼	1.05	1.22½	1.15	21,300
Sierra Nev.													
Silver Cord			1.60				1.60				1.62½		2,700
Silver King													
Silv'r Plume	.02		.02				.02		.01				51,300
Sonora Con.													
Standard													
Sultana	.04		.04				.04						5,000
Sutro Tun'l.													
Tombstone			1.00				1.00				1.00		2,100
Victor			.02		.02		.02				.02		25,000
Yale Mt.													

*Reports for July 12th were not received.

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move while they regard the market as liable to sudden change. Pig-iron is unexpectedly strong, especially in the higher grades. Offers were made to-day for some of the special brands at $23.50, and they can not be had. Regular buyers are favored, and hence outsiders find stocks sold ahead, frequently at 50 cents less than market rates. Standard makes run from $22@$23, and in some cases future delivery can not be had, even at these figures.

Outside of half a dozen brands, there is no difficulty in buying iron at reasonable rates. Nothing in good No. 1 has been heard of under $22. More or less No. 2 is offered and sold as No. 1, owing to the scarcity. No. 2 ranges from $20@$22, and some little is selling at the latter quotations, though well-known makes are going at $20, and sales have been heard of at $19.50.

Gray Forge iron continues dull. Some inquiry has been developed, but transactions are of rare occurrence. Quotations range from $17@$19. A few transactions of a few hundred tons each were close in the neighborhood of $18 at furnace. Some makes are held firmly at $18.50, and the very best makes are sold up. Some inquiry is coming for Bessemer pig, but buyers will not purchase, except at figures which makers can not accept.

In Muck Bars, an improving feeling has shown itself for the best makes, and sales are known of at $35. A few hundred tons of Charcoal Blooms sold at $60@$61, while poorer makes sold as low as $56.

Anthracite are $47@$49, and Scrap Blooms, $44.

Merchant Iron.—The closing down of a good many mills and the uncertainty as to how long they may be out has given the retail trade in Merchant Bar a little more firmness and activity. Brokers are receiving orders at 2·20c., and stores are doing business at 2·25c., and in some cases at 2·30c. in small lots. Buyers are not making any particular move as yet, knowing that the output will prevent any upward tendency and that Western iron can be relied upon in any event. Several inquiries are in hand, but buyers are not ready to close. They are feeling around with a view to future purchases.

There is less activity in nails, and selling prices are unchanged. The action of the Western nail men will help this market. Car-load lots are sold at $3, and there is very little disposition to cut prices. Stocks are not large enough to create very active competition.

Structural Shapes.—Within a day or two, some inquiries have come to hand for structural iron, which manufacturers expect to have orders for in a week or ten days. Quotations are 2·40c. for Angles, 3·20c. for Tees, and 3·50c. for Beams and Channels. It is said that some large contracts will be given out during this and next month for bridge work.

Plate and Tank Iron.—The low prices in plate iron have brought out a good many orders within a few days, and five or six of the larger mills here are now crowded. Negotiations which had been pending for a long time were suddenly closed. Very few mills are short of orders, and at present figures there will be no difficulty in keeping busy.

Sheet-Iron.—More business was received this week at 4@4½c. Galvanized is specially active. A large amount of building will be begun immediately, as is indicated by the number of permits taken out for work to be finished before winter.

Wrought Pipes and Tubes.—Steam Pipes can be bought at 72½ off list, and Tubes at 60 per cent off. Low prices have brought out buyers, and the week's business has been large.

Steel Rails.—Most of the business transacted this week in Steel Rails was in small lots at $39@$40.

Old Material.—Old material is without any activity whatever, and rails are nominally $21.50 for Tees.

Scrap.—Yard-men have managed to dispose of a few hundred tons of Cast No. 2 and No. 1 at prices ranging from $17@$24.

Pittsburg. July 11.

No improvement has been developed during the past ten days. Pig-iron has gone so low that furnacemen are not desirous of taking large contracts at present figures, as cost is barely obtained. Stocks are accumulating in the Mahoning and Shenango valleys. Supplies at Wheeling are large, and, in Alleghany County, stocks of iron are accumulating in consequence of the shutting-down of mills for repairs. Buyers are without stocks, and will not anticipate requirements until after the resumption, which will take place about August 1st.

The demand for unfinished iron is dull, and prices range from 1·80@2c. A few mills in this district are still running. The demand for nails has temporarily fallen off, and prices are $2.90.

The action of the nail manufacturers was a foregone conclusion, and will lead to an improvement in prices for the fall trade.

A good inquiry has developed for sheet-iron and wrought-iron pipe.

Building activity will absorb the bulk of the production of the mills furnishing construction iron.

Steel rails are quoted at $38@$40, and small orders are placed at the latter figure.

Old rails are quoted at $22.50, and negotiations will be closed for summer shipments abroad at that figure.

Spikes are 2·60c. Crop-ends, $25. No. 1 Scrap, $24.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, July 13.

Anthracite.

Current business is quiet, middlemen being fully occupied in placing the coal taken by them, while buyers are as a rule content to await developments. The local retail trade has not as yet shown any disposition to take more than is necessary to meet the small current demand. The opinion seems to prevail that a very quiet month will follow the June maneuver, though it is likely that it will prove of considerable interest in other ways. Full-time work is to begin next week, and the leading companies will strain every nerve to put a heavy quantity of coal Westward. How soon friction will be developed by the efforts of the new-comers, remains to be seen. A few specks are making their appearance on the horizon even now. So long as peace reigns in the West, our markets will to some extent be benefited, as the pressure to sell will be less. Should the struggle there, which is looked upon by many to be inevitable, cease to be local and begin in general, then there may be some irregularities here.

From Philadelphia come reports of scarcity, which, however, are not likely to be more than temporary.

The report circulated in the anthracite region that the Philadelphia & Reading Coal and Iron Company will work the mines of the Lehigh & Wilkes-Barre, as early as August 1st, is not confirmed here. That this will be done in the near future is beyond doubt, but it is not believed that the matter will be consummated before the first of September.

Advices from the East are not rose-colored, and the general business situation has not as yet shown any signs of improvement, which, however, is not looked forward to until the close of the month or the middle of August.

Bituminous.

The only transaction of interest worthy of being recorded this week is the sale of 10,000 tons of Cumberland coal to the Fitchburg Railroad at $2.85 at Georgetown, which would be equivalent to about $4.35 delivered in Boston. Business is quiet and dull, with a slight undercurrent of strength. Consumers recognize that prices for bituminous coal are very low. There are many evidences that, for steam-making purposes, bituminous coal on the seaboard is gaining ground considerably. We quote Clearfield coal $3.75@$4.10, and Cumberland $4.10@$4.40, according to quality. Freights are declining, a fact which is favorable to all the shippers who have heavy contract engagements, but is not of any great influence upon current business.

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended July 7th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	717	46,650	34,254
Coal for shipment at South Amboy	4,451	405,430	410,056
Coal for distribution	8,173	393,908	360,499
Coal for company's use	1,501	74,494	65,566
Total	14,842	920,482	871,375
Increase		49,107	
Decrease			

Comparative statement of the production of anthracite coal for the week ended July 7th, and year from January 1st:

Tons of 2240 lbs.	1883. Week.	1883. Year.	1882. Week.	1882. Year
Wyoming Region.				
D. & H. Canal Co.	21,800	1,790,355	63,132	1,602,252
D. L. & W. RR. Co.	45,228	2,264,252	79,323	2,094,244
Penna. Coal Co.	13,771	637,692	31,887	613,092
L. V. RR. Co.	5,310	525,965	16,198	528,198
P. & N. Y. RR. Co.	2,626	100,018	3,540	98,730
C. RR. of N. J.	23,976	1,202,078	31,461	1,124,506
Penna. Canal Co.	5,105	165,737	10,471	163,758
North & West Br. RR.	8,350	230,254		
	126,166	6,916,351	236,018	6,244,780
Lehigh Region.				
L. V. RR. Co.	49,540	2,333,044	76,853	2,248,175
C. RR. of N. J.	21,206	1,126,889	43,234	1,039,799
S. H. & W. B. RR.	1,674	27,095		20,000
	72,420	3,487,028	120,087	3,307,974
Schuylkill Region.				
P. & R. RR. Co.	58,710	3,282,164	114,989	3,037,557
Shamokin & Lykens Val.	15,881	674,979	19,628	565,645
	74,591	3,967,143	134,617	3,603,202
Sullivan Region.				
St Line&Sul.RR.Co.	1,173	31,100	712	27,782
Total	274,350	14,401,622	491,434	13,183,738
Increase		1,217,884		
Decrease	217,084			

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878 ..... 7,510,905 tons.
" " " " 1879 ..... 12,562,206 "
" " " " 1880 ..... 12,932,194 "
" " " " 1881 ..... 12,932,194 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 339,027 tons, as compared with the corresponding period in 1882.

The Transportation of Coke over the Pennsylvania Railroad for the week ended July 7th, and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	450	50,353
West Penn. RR	1,525	54,608
Southwest Penn. RR	34,026	1,045,820
Penn. & Westmoreland Region, Pa. RR	3,001	117,196
Pittsburg, Penn. RR	15	469
Snow Shoe (Clearfield Region)	396	10,758
Total	39,413	1,279,204

Horsford's Acid Phosphate
In Seasickness.

S. S PARKER, Wellington, O., says: "While crossing Lake Erie, I gave it to some passengers who were seasick, and it gave immediate relief."

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The Farwell Con. Mining Co.,

Situated in Independence Gulch, Pitkin County, Colorado, consisting of

Extensive Gold Mines, developed,

Large tract of

Placer Claims, undeveloped,
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DIVIDENDS.

OFFICE OF QUINCY MINING COMPANY.

NEW YORK, July 11, 1883.

DIVIDEND NO. 30.

THREE DOLLARS AND FIFTY CENTS ($3.50) per share will be payable August 15th next, to holders of record 24th inst. Massachusetts holders will be paid at the office of Mr. N. H. Daniels, 2 Change Avenue, Boston. By order of WILLIAM ROGERS TODD, Treasurer.

OFFICE OF THE HOMESTAKE MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, July 13, 1883.

DIVIDEND NO. 59.

The regular monthly dividend of FORTY CENTS per share has been declared for June, payable at the office of the Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad street, on the 25th inst.

Transfer-books close on the 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

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NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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THE Second Annual National Mining and Industrial Exhibition was opened at Denver, on the 17th, with much festivity.

THOMAS COUCH, of Salt Lake, Utah, one of our most experienced and reliable mine foremen, is at present at Butte City, Montana, where he may be addressed for a short time. He offers his services either to examine or to manage mines.

OUR correspondent, "Specular," who closely follows developments in the great Lake Superior District, this week discusses the present condition and the prospects of the ore mines. He states the condition of that great industry frankly, as he finds it; but he does not by any means give encouragement to those furnace-men who believe that all they need to do is to wait in order to obtain their supplies of raw material at their own figures. On the whole, his view is not as gloomy as that of Mr. JAMES M. SWANK, who, in a letter to the *Bulletin*, dated July 6th, says: "From the best information that we could obtain, we came to the deliberate conclusion that this year's production of iron ore in the Lake Superior region will not materially exceed one half of the production of last year: it will certainly not reach two million tons."

THE "boom" for which the members of the Metal Exchange have gradually been getting into shape has come, and pig-iron and tin have been chosen as the favorites. With a plethoric treasury, $65,000 being in bank, and a large number of members who have had ample experience in bulling and bearing cotton, petroleum, grain, and stocks, a lively time may be looked forward to for a while. The Metal Exchange is established on a firm basis, and is bound to become an important element in the trade. It is useless to discuss whether it is a desirable factor or not. Its existence can not be argued away or its members be frowned down. In the metals, it has a field of considerable promise, so far as concerns the magnitude of the business which may come to it. Tin has been the foot-ball of speculators on both sides of the Atlantic for years, and has naturally promptly assumed a prominent *rôle* at the Exchange. Lead has almost annually felt the results of speculative dealings, and spelter has been repeatedly touched in the same way. Years ago, copper was quite a favorite metal with outsiders; but the unwavering policy of the Calumet & Hecla Company, backed by its great power, so thoroughly discouraged the speculative element that for a long period it has been entirely absent. The recent great increase in the product, distributed among a number of producers, would appear to create opportunities, and it does not seem impossible that in the future we may witness speculative manipulation simultaneously on both sides of the Atlantic.

Pig-iron and old material have seen periods of wild speculation by outsiders in this country. We need only point to the boom period, when, notoriously, merchants and capitalists of all classes "plunged" deeply; but we question whether any thing approaching in magnitude the Scotch warrant market can ever be built up in this city. In other branches of the iron trade, there is little room for speculative maneuvers. Such is briefly the field, so far as we can survey it, of those who have begun to deal in futures in the Metal Exchange. That the introduction of this means of creating business is capable of doing some good, and a good deal of harm, those in the trade will be ready to admit. There is a powerful opposition to it; but those who dread its influence will not be wise if they sit quietly by. It will undoubtedly divert some business from other cities to New York, and from other channels; but we question whether in times of ordinary activity the general public will do much toward its support.

THE INDIAN GOLD MINING INDUSTRY.*

During the past few years, Americans have been so busy here in endeavoring to save from the general wreck the more meritorious mining ventures floated during the period of speculative excitement that they have had little time or disposition to watch the course of events abroad. There was little that was consoling in the fact that, while they were struggling in the trough of the seas, enthusiastic British investors were giddily riding on the foaming crest of a huge wave. The history of the Indian gold mining excitement, which Mr. D. E. W. LEIGHTON has written in a clear, critical manner, furnishes a striking illustration of the dangers into which mining is carried. It is instructive because it is, we believe, the first instance in which the distribution of the funds invested by the public is made known. The Indian gold mines have been an extreme case, and have been paralleled in this country only in a few instances; but the manner in which they were floated in the English market is, unfortunately, only too often repeated. Mr. LEIGHTON distributes the blame for the swindles perpetrated and the errors committed pretty uniformly, and does not spare the dear investing public, for which so many display tender sympathy and echo unbounded indignation after it has awakened to its folly, while few are willing to assume the thankless task of warning and advice.

The first one of the mines of the Wynaad and Kolar districts was put on the London market in December, 1879, and in rapid succession others followed until within nineteen months forty-one companies had been formed, of which thirty-three, having a nominal capital of twenty millions of dollars, proceeded to allotment. The interest in this class of ventures made it possible to carry values near par, and in many cases far above it, until in July, 1881, after a month of the wildest boom, the bubble burst. Out of the thirty-three companies, fifteen have until now passed through the hands of the liquidator, the majority of them probably never having done a stroke of mining work. Nearly all of the rest of them may be supposed to have been actually formed with the object of extracting gold from the ores supposed to exist in the Wynaad and Kolar districts. These eighteen companies, according to Mr. LEIGHTON, have a combined capital of £2,682,500, of which £306,000 is still left unspent in the treasuries of the companies; £1,546,500 may be set down as the amount of money paid for the properties, and £130,000 as the capital uncalled for, or calls not paid in, leaving as the money actually spent £700,000. Of this sum, it is estimated, not less than £194,000 was expended for law charges, directors' fees, agencies, and traveling, thus leaving only £506,000 as the amount actually laid out in plant and development-work, the former calling for £338,000 and the latter for £168,000. The vendors and promoters of the Indian gold mines got £1,195,000 in cash and £1,297,000 in shares, a part of which, we presume, they realized on. These are hand-

* THE INDIAN GOLD MINING INDUSTRY, ITS PRESENT CONDITION AND ITS FUTURE PROSPECTS. By D. E. W. LEIGHTON. Madras: Higginbotham & Co. 1883. 8vo, 70 pages; with Appendix, xxii pages.

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some figures for mere prospects and exhausted coffee estates; but they would be comparatively insignificant, if, in the wide territory covered, there were proved really gold deposits of magnitude and permanence. Unfortunately, the millions spent thus far in machinery and development have not even given assurance on that point. Up to the close of 1882, there have been crushed 3901 tons of quartz yielding 536 ounces of gold. Mr. LEIGHTON urges, and no one acquainted with mining operations will deny the force of his argument, that it is impossible to bring an industry such as the extraction and treatment of gold ores to full working order within as brief a period as the impatience of directors and stockholders generally expects, especially when the mines are located in an inaccessible region, like the Wynaad, which is 30 or 40 miles from the coast, with an ascent of 3000 feet. BROUGH SMYTH, who first drew attention to and fully described the district, undoubtedly underrated these difficulties. But making full allowance for this fact, it must be humiliating to those engaged in the district to confess that after two years' work they know little or nothing more of the deposits than when they began. Mr. LEIGHTON does not acknowledge this in so many words, but it may clearly be read between the lines. He deplores that so much money, comparatively, was expended for machinery, while so little was done in the mines, and winds up his review with the statement that "it may be said with some confidence that the time is now near at hand, when, in the Wynaad, at any rate, the existence or non-existence of gold in paying quantity will be an established fact." We sincerely hope that the next monsoon will furnish the proof, and that then Indian mining companies will take the sound advice which Mr. LEIGHTON offers. The money wasted will then at least have been spent to some purpose, in acquiring, though at a fearful price, experience.

DAVID DUNCAN.

In the death of Mr. DUNCAN the coal trade has lost one of its most distinctive representatives, one who spent his entire life in the business, having been an active participant in the wonderful development of the industry from its small beginnings to the colossal proportions of to-day. He bore a varied, an extensive, and an honorable part in all its different relations.

Mr. DUNCAN was born in Scotland in 1813, and while yet an infant his father emigrated to this country, and as early as 1820 was engaged in the coal business in Philadelphia, where the deceased found his first employment as a boy in his father's yard. At the age of twenty, he went to Schuylkill County, and was identified with MILNES & HAYWOOD throughout their entire mining career. Subsequently, he went to Philadelphia, and took charge of the Port Richmond shipping-docks, whence he returned to Schuylkill County as weigh-master for the old Schuylkill Canal Company at Mount Carbon. He then engaged in mining operations, whose vicissitudes finally landed him in New York, where he remained in the wholesale coal trade up to the time of his death. Known and respected by all, Mr. DUNCAN filled a conspicuous place among his contemporaries. Without having had the advantages of an academic course, he accumulated a large and varied fund of information. In business, he was conservative and methodical, being governed by the strictest commercial rules, but above all by a strong and unswerving sense of honor. In manner, he was singularly unobtrusive, genial, and kindly; but in argument or maintaining what he thought the right, he was bold and tenacious. His domestic life was a poem. Surrounded by a large and loving family, he sought no diversion outside the sacred circle upon which his whole affection was concentrated, and which he saw bloom into the third generation before he passed away. A man of broad and liberal interpretations, he was of deep religious convictions, and the sweet serenity with which he faced the fell destroyer beautifully illustrated the symmetry of his life.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Zinc-Blende and Galena in Pyrites Deposits.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My attention has been called to a communication written by H. J. Davis, of Charlemont, in your issue of May 19th, 1883, in which he assumes that Mr. Whitmore is in error in making the statement "that on top of pyrites deposits are usually found zinc-blende and galena." I have had the management of the Cotopaxi and Saltiel groups of mines at Cotopaxi, Fremont County, Colorado, since early in 1879, and have found that the large vein of cupriferous pyrites ore running through both properties is covered by a strong vein or seam of zinc-blende, followed on its hanging-wall by a large vein of pyroxene rock bearing galena. The ores are contained in fissures, almost vertical, and have a granite country-rock. In other localities of Colorado, I have noticed the same accompaniments to the deposits of chalco-pyrites. Yours truly,

NEW YORK, July 16. E. H. SALTIEL.

THE OUTLOOK FOR THE LAKE SUPERIOR IRON MINES.

Special Correspondence of the Engineering and Mining Journal.

The iron ore miners of the peninsula have at last awakened to the poignant reflection that, if they wish to send their products to market at all this season, they must begin to make hay while the sun shines. Up to the glorious Fourth, the shipments for 1883 exhibited a falling off of 440,000 tons from the corresponding time of last year, when the total consignments of Marquette and Menominee ores had reached a long mark over a million tons. Of course, it is understood by all that the adequate cause of this falling-off was not any deficit in actual and possible supplies of material, but the cadaverous condition of the market. Producers have listened attentively for invitations to send down their ores ever since the new year opened its eyes; but what little they have heard, with a few trifling exceptions, has been little else than the merest badgering. The highest grades of Bessemer have gone begging. Only yesterday, your correspondent had word from one of the largest rail plants in the West, that no ores need apply in that market. No sales have been made to speak of, outside of concerns which have found it very convenient to offer their wares for what they would bring. It was asserted, early in the season, that the Republic had sold; but the author of the story was color-blind as regards the truth, and that, too, for a purpose. Rumors have often been afloat of large sales, the last being the report that the Cleveland has contracted for the delivery of 90,000 tons, and the Republic for 75,000; but such rumors, as a rule, are simply chewed air. Generally speaking, the mines are as saleless as in January or February, and the hope that is said to spring eternal in the human breast is now turning into the gall of bitterness.

In the mean time, the mines have accepted the grim logic of events by restricting output and curtailing every possible expense. The Republic has lately excused 375 men, and is now working only one shift. The Lake Superior has discharged no less a number, and is doing practically no stoping at all. The Champion has discharged 250 men, and, with the exception of the Barnum, the other mines of the Marquette District, as well as those of the Menominee, have followed a very strong suit. The Champion, I am credibly told, is working but four machines in its whole property. The Milwaukee, of the Negaunee hematites, has closed down rather than pay royalty, and the greater part of the mines are carrying few if any stopes. Some, of course, have not abandoned stoping; but as a rule, these are concerns which must either pump hard or drown altogether. These do not cut any marked figure in our peninsular totals. Several extraneous enterprises, such as the railroad to Copperdom, and the short one from Copperdom to Lac la Belle (the locomotive for which, a heavy Baldwin, passed up last week), have swallowed up considerable of the floating labor; but multitudes of miners, true to their traditions, have drifted into other and distant parts.

Nevertheless, ore has constantly been dropping down to lower ports, despite the stagnant market. It was natural that the Republic should employ its fleet of barges and schooners in transporting its ore. Other mines have had to ship enough to fill their contracts with vessel-owners; and very lately, there seems to be a general suspicion lest a big fish or two should swallow the whole market by being on hand in Cleveland in time of need, and quite a number, therefore, have begun shipping in dead earnest, though the raw material is as yet unsold. This in part accounts for the activity that has been developed in the past two weeks. And yet there is no reason to think that prices for ore will be slaughtered, even though they are deposited in the enemy's country. There will doubtless be sharp competition, and the companies are willing to part with their products at a reasonable margin, the Goliath of Gath having freely offered its specular for $6.50 which sold for $9 last year; but the companies have altogether too stiff a spinal column and too heavy an exchequer for the furnaces to imagine for a moment that they will give their ores away. It is quite probable that a few thousand tons may be sold by shaky companies for what the iron-mongers have a caprice to pay; but this disturbing factor will be transient and of little consequence. The profits of the past will prevent any general collapse approximating to a panic. No one apprehends a collapse here, and those who are best informed are most buoyant. Perhaps a few quotations of ruling prices per ton for ores would be interesting:

Quality ore.	1883.	1882.
No. 1 Bessemer, specular and magnetic.. .	$7.00@$8.00	$9.00@$10.00
No. 1 Non-Bessemer, specular.	5.50@ 6.50	8.00@ 9.00
Bessemer hematites.....	4 75@ 5.25	7.25@ 8 00
Non-Bessemer hematites	4.25@ 5.00	6.00@ 6.50
Menominee ores.....	5.50@ 6.75	7.00@ 8.50

It is quite probable that these figures include the limits of all important sales, if, indeed, any sales thus far can be said to be important, though the lower range of figures is the one for the most part contracted on.

The surface reason why so much unsold ore is now going below is competition between the mines, as already outlined. But there is another reason for sending these large blocks of ore down, which is far deeper. It is: If our peninsula people would retain their lion's share of furnace traffic, they must have their ores within easy reach of the furnace district; and the shipping season is fast wearing away. As it is, the lake mines have always held a strong grip on the steel and iron producers. Of course, it is silly to think that Lake Superior pig will be easily supplanted, or that the furnace-men, remembering past figures which they paid for Republic, for example, will retaliate as soon as any possible opportunity offers itself by letting us up here severely alone. But it remains true that Lake Superior iron men can not afford to be too unconcerned and indifferent, as they would certainly be if they were to hold their immense blocks of ore in their distant stock-piles, because buyers had not been forthcoming in the early months of the year. To keep the ore at home would be to turn the market over in the fall, winter, and spring to the lean producers of Pennsylvania, New Jersey, Vermont, and the South, to say nothing of the West and the new Northwest. And our people might possibly find out that this was a dangerous experiment.

What ought to be done, first of all, is to compute what share our lake properties have in the annual output of our American mines; and after that, ascertain what are the probable limits of demand until another season, and then, by inference, how much ore can be safely sent down this summer from our northern mines. Concerning each of these, it is

only possible to speak with approximate correctness, since many of the data are, for reasons, sequestered. If we follow the advice of Captain Cuttle, however, and "make note of" what significant facts are at hand, we can get bearings sufficiently accurate to outline plans and predict results.

For the past few years, only enough ore has been in furnace-yards during the winter to carry the furnaces over until the opening of navigation, and has been, for this reason, a more or less constant quantity. The product of ore for any year, therefore, may be approximately reckoned by computing the ore requirements of the pig and blooms made in that year, and subtracting therefrom the tons of ore which were supplied by importation. The amount of pig cast in American furnaces during 1881 was 4,641,564 net tons of 2000 pounds. The amount of blooms made directly from ore were insignificant, probably not exceeding 50,000 net tons. Taking into account the lean ores of Eastern and other districts, it is safe to say that the ore required would not fall short of 7,000,000 tons. The importation of ore for 1881 equaled something over 850,000 tons, leaving 6,150,000 tons as the aggregate requisition made upon American mines. To supply this demand, our peninsular mines sent down a round 2,320,000 tons, or a trifle over one third of the whole amount. There are no definite data by which to outline the amounts supplied by other sources, although Mr. Swank gives a few statistics as follows: New Jersey, 737,000 tons; Champlain District, 637,000 tons; Lebanon District, 250,000 tons. During the year 1882, our domestic furnaces turned out 5,178,000 tons of pig and perhaps 50,000 tons of blooms from ore. This could not have been done on less than 8,100,000 tons of ore. Of this amount, some 590,000 tons came from foreigners, leaving 7,500,000 tons to be blasted from domestic mines. To supply this increase, our lake people again came to the front with 2,950,000 tons, or, as in 1881, a trifle over one third of the aggregate domestic supply. Mr. Swank's figures exhibit a like increase in the districts above named, New Jersey furnishing 900,000 tons; Champlain, 675,000; and Lebanon, 400,000.

It is evident, from these figures, that the lion's share of furnace trade has been held by Lake Superior companies. It is evident, moreover, that any encroachment on this lion's share will be firmly held, if it be at all possible, by those who make the encroachment, since the developing of properties, construction of plants, shipping facilities, and the like will give these persons a grip on the market which will be shaken off with supreme difficulty. A period of indifference on the part of lake iron men will place them in the predicament now rattled around in by lake copper men, who, oblivious of the ambitious aspirations of Arizona and Montana miners of black copper ore, held on their course until the Western striplings at last threaten them with ruin. This may be, probably is, a little rhetorical; but yet it contains food for solid reflection. There was no other course for the Michigan mines to pursue than to send down at least enough ore to maintain their hold and influence upon the iron-mongers of the country. A process of restriction, as has already, and in former letters, been set forth, is going on at the mines; but it would be most subversive of self-interest to hold all unsold ore at home, lest, while we are waiting, another's shears clip off the golden fleece. The mine-owners of South Wales, Lancashire, and Cumberland can do what we can not do, since the furnaces which melt their ores are under their very noses, and their mines are never, like ours, locked out of the market by a long and expensive winter. They must not be our examples. We must be a law unto ourselves.

SPECULAR.

A VISIT TO LEADVILLE.

Special Correspondence of the Engineering and Mining Journal.

To the lover of grand and majestic scenery, a journey from Denver to Leadville, via the Denver & Rio Grande Railroad, is a treat not soon to be forgotten. Nothing could be grander than the Grand Cañon of the Arkansas, and no visitor from the East should miss seeing it.

Arriving at Leadville, all was hurry and bustle, and trade was very brisk, as the mines were all making their monthly payment of wages. Harrison avenue is filled every day with busy people, hurrying to and fro; while in the evening, the foot-walks are almost impassable from the crowd of toilers, whose day's work is over and who are out seeking amusement and social intercourse with friends.

Leadville and its surroundings have been so often described that it must be pretty well known now; nevertheless, for the sake of those who may not know, or who may have forgotten, I may say that it lies on a gently sloping plateau, between two gulches, at the foot of the mountains bounding the eastern side of the Arkansas Valley, and about five hundred feet above the river-bed. Around it, to the north, east and south, and within a radius of about five miles, lie the mines which are the chief source of its wealth. To the northeast, about one mile away, is Fryer Hill, containing the celebrated Robert E. Lee mine, the Matchless, Chrysolite, Little Pittsburg, Amie, Little Chief, and several others. Eastward, on the suburbs of the city, is Carbonate Hill, with the Morning and Evening Star mines, the Catalpa, Henriett, Agassiz lease, Gonabrod, Leadville Consolidated, and others upon it. Behind it lies the most celebrated part of the camp at present, namely, Iron Mountain, possessing in its depths the Silver Cord, Iron Silver and leases, A. Y., Iron Hill Consolidated, and other mines, having an output equal to half the total output of the camp. Southeast, and farther away, lie the mines on Printer Boy Hill, famous for the rich ores obtained in the Nellie S. mine; and in the same direction, Breece Hill, Rock Hill, Little Ella Hill, Yankee Hill, and Sugar Loaf Mountain. Southward lies the once rich California Gulch, with its gold diggings, famous in the days of the Pike's Peak rush. Now it is chiefly celebrated as the location of several large smelters, among which are the Harrison Reduction-Works and the La Plata, American, and Arkansas Valley smelters. Such is a sketch of the camp in the immediate neighborhood of the city. I shall now deal with its mines and works more in detail, so as to give a fair conception of its present state.

To begin with Fryer Hill, we find that, although one of its richest mines—the Robert E. Lee—is almost laid off, pending its sale to an English company, its output for the month of June has reached 4604 tons of ore. Among its mines, the Little Pittsburg and the Chrysolite have the largest output, reaching about 900 tons apiece for the month. The Matchless, Little Chief, and Climax Contract put out from 480 to 500 tons. The Robert E. Lee just puts out enough to pay expenses pending the sale. I heard that the Matchless was likely to be bought by the English company which is about to purchase the Robert E. Lee; at least, it has that offer of it. This mine is putting out about 75 tons of ore per day just now, which I was told averaged about 80 ounces of silver to the ton. The owners of the Little Chief, after several offers from parties desirous of leasing their old dumps, decided to make what they could themselves out of them; and to this end have erected four sets of jigs (six to the set) on Big Evans Gulch, which runs just north of Leadville. There they haul all the sand and finer portions of the waste, and concentrate it, sorting out the large by hand at the dumps. It takes about fourteen tons of dump-stuff to yield one ton of salable ore, which will run from 30 to 50 ounces of silver to the ton, although the pieces of galena of which it chiefly consists, by themselves, would run as high as 300 ounces of silver per ton. This leaves a profit to the company of about 25 per cent. In this mine, they have lately run a drift northward on the east line, and have found some small streaks of very rich ore in putting up a sixty-foot rise.

I may remark here, that one of the greatest developments in this camp has, of late, been that of leasing on the part of owners to outsiders. Sometimes, it is a part or the whole of a mine, and sometimes a dump-heap. The above mine, for instance, was offered 10 per cent royalty on its dumps for what it left after washing and sorting. The foreman remarked to me, as he carefully sorted over a handful of waste, that he did not intend to bid against them. The Ætna mine is now leased to no less than four different parties. The owners in this way share the spoils without running any risk.

On Carbonate Hill, the output is somewhat greater, aggregating 5701 tons for June. The Catalpa and the Evening Star both show an output of over 1000 tons, the Morning Star coming near them with 918 tons. The Henriett, Agassiz lease, and Gonabrod yield from 500 to 625 tons. The manager told me that the Henriett mine's present rate of output was from 1000 to 1200 tons per month. The manager of the Leadville Consolidated Mining Company received me very courteously, and informed that the mine was one of the first paying mines discovered. It now holds several contiguous claims. The output is steady at from 300 to 400 tons per month, consisting, like most mines around here, of hard and sand carbonates, which run from 25 to 30 ounces of silver per ton.

I hear that the Clontarf and Brookland mines are soon to be formed into and worked under one company.

Iron Hill, as before mentioned, has the largest output, yielding 17,402 tons, while the total output for the whole camp for June reaches 34,857 tons. The largest producing single mine is the Silver Cord, where I was most courteously received by the manager, Mr. T. S. Wood, who at once proposed that I should go down the mine and see for myself. So, having donned some mining toggery, I descended, and, in charge of the foreman, was shown a part of the mine where they were busiest. No. 3 station contains one of the most magnificent breasts of solid hard carbonate I ever saw. At present, it stands 25 feet by 20 feet of solid ore. In places, it has reached a depth of 60 feet. Here and there, the sparkle of large lumps of rich galena could be seen. Altogether, it was a splendid sight, even for one who was not a shareholder. It was impossible, in the time at my disposal, to visit the other parts of the mine, which runs on an incline 800 feet deep into the hill. I was told that they had struck it quite as rich in other parts. The output runs between 3500 and 4000 tons per month, and the ore contains gold as well as silver, and a considerable quantity of lead. The Iron Silver, with its leases, which has already attracted the attention of the JOURNAL, shows the splendid result of 9700 tons output for June. In this case, to the good fortune of the shareholders and praise of the management, the original mine has had joined to it several other very wealthy contiguous mines. The A. Y. is producing about 50 tons per day, and has now got the new No. 3 shaft down to the mineral; but it is to be put down deeper yet. The Iron Hill Consolidated has an output for June of about 1200 tons, and is doing well. Other mines on this hill are also producing well.

On Breece Hill, the output was about 1250 tons last month, being pretty equally divided among the four principal mines, Breece Iron being at the head with 450 tons, the other three running from 200 to 260 tons.

On Yankee Hill, which has an output for June of 1376 tons, the Robert Emmet yields 1100 tons.

Rock Hill, with the La Plata group as its chief attraction, yields about 1850 tons; the La Plata giving about 1100 tons to this heap. Printer Boy Hill, famous for the Nellie S. mine, which some consider the richest mine in camp, shows an output of 1030 tons, of which the Nellie S. yields 750 tons. It was reported, some time ago, that ore very rich in gold had been struck in this mine; but competent authorities informed me that it was probably only a small quantity, especially as it is common on that hill to find these small pockets of gold ore.

Little Ella Hill yields about 1350 tons to the general quota, most of it coming from the Little Ellen and Opulent mines, which produced respectively 810 and 520 tons of ore last month. The Little Ellen Company is putting in a 110 horse-power hoisting-engine, and will soon have quite a large plant there. Sugar Loaf Mountain adds the insignificant amount of 310 tons from five mines in June, and winds up the list.

In looking at the ore output, one is much struck by its fairly even distribution among the leading mines; for, except in one or two instances, the report shows a wide and comparatively even quantitative output. I venture to think that this is as it ought to be if the camp is to maintain its present prosperity.

Leadville has six large smelters, besides stamp-mills and ore sampling-works. I visited nearly all, and was courteously received by the managers or superintendents. Most of them have from 5000 to 10,000 tons of ore on hand. The Harrison Reduction-Works, which were burned down in May, started two furnaces one month afterward, and are in full blast with all four furnaces now, which speaks well for the energy of the managing officials. Their stoppage largely accounts for the slight disappointment felt in the returns for the last quarter, and for which, considering this, there is really no cause. They run through from 160 to 200 tons per day. The La Plata Works, which have just passed into the hands of an English company, are not contemplating any changes at present, and are working along as usual, running off from 150 to 175 tons per day from their five furnaces. The American Works are putting through about 200 tons per day. The Arkansas Valley Works have lately been undergoing a thorough overhauling; but despite the great and

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beneficial changes inaugurated during the last three months. have only been obliged to stop twice. for three hours each time. They have put in a new 150 horse-power engine. to take the place of the two smaller ones used until now. It is about the largest in the camp, and will run every thing except the pumps and electric light. Four new boilers have taken the place of the old ones. The new arrangement is very ingenious, and reflects much credit on the management; for of all tests, that is hardest which demands the economical adaptation of new machinery and plans to old works. One furnace is blown out at present for repairs; but when all are going, the works can run through from 200 to 250 tons of ore per day, which is about the largest quantity worked per day in the camp. The Cummings & Finn and Elgin smelters are on the same principle, and are running up to their full capacity just now.

The Leadville Gold and Silver Milling Company is running a large quantity of ore through per day, and shows a good output in silver bars, which are reported 969 fine. The Tabor mill was burned down on May 26th, and is consequently out of the running just now. Up to that date, it had done well. These amalgamators can treat economically a very low-grade ore, lower even than the smelters; but it must not contain lead, whereas, for the smelters, the more lead there is, the better they like it.

In conversation with the manager of four or five mines around here, I learned that it was his opinion that the camp's prospects were excellent for at least the next four years; which, as he said, was as far ahead as any wise man would care to prognosticate. He thought that the bullion output would be greater than ever this year, despite the combined disadvantages of the burning of two works, and the flooding of the mines to such a late period, owing to the quantity of snow which fell this spring, coupled with the late season.

The official statement shows that already the output has reached a total of $8,077,477 for the past half-year, with a total of $4,414,815 for the last quarter. From now until January is by far the best season for output at the camp.

With regard to the surrounding districts, the leading developments are in the Red Cliff, on the Eagle River. and the Robinson district. Both have given promise of a prosperous future. St. Elmo reports big strikes.

Leadville itself is not so prosperous as it was two years ago. In walking about the place, one observes a good many houses to rent or to sell, though chiefly in the back streets. Persons owning property here informed me that they could not obtain what it originally cost them, though these may be isolated cases. As to its prospects, it is difficult to come to any conclusion. Unless fissure-veins can be found in the igneous rocks underneath the stratified rocks, in some of which the ore is at present found, the days of Leadville's present prosperity as a camp are surely numbered. But, on the other hand, there is no saying what effect it may have on the city, if it becomes, as seems very likely, a commercial center for a number of more or less prosperous camps around. These are already rapidly forming, and, it would seem, must naturally depend upon Leadville to a large extent, not only to receive and treat their ores, but as a place from which to draw the necessaries of life. In this way, the future of Leadville may be placed on a much firmer foundation than it has at present. The question must finally drop into the hands of the railroad companies, and it may then furnish a curious example of their power to make or ruin a locality. Anyhow, Leadville's history is already made; for it falls to the lot of few places to record such an enormous output of wealth as $74,000,000 (the output to date) in so short a time. A. C.

LEADVILLE, July 12.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

DECISIONS, RULINGS, ETC.

Loss of Original Papers.—Where there is no adverse claim or protest to a mining application, and the original papers have been lost, the General Land-Office requires no republication of notice of application; but satisfactory evidence of the original publication is necessary, also as to the posting of notice, and that the same remained posted during publication notice.

Suits by Adverse Claimants.—An adverse claimant against an application for patent on a mining claim is required by law to commence a suit. The fact that a suit is pending between the same parties, wherein the adverse claimant is the defendant, does not waive the obligation. (Secretary's decision.)

Relinquishment of Surface Ground.—There is no provision in the mining laws whereby surface ground not in conflict with another claim can be relinquished, and at the same time all the rights pertaining to said surface ground which have been relinquished can be retained by the applicant. Therefore, the relinquishment of surface ground not in conflict with other claims can not be allowed, unless all the rights connected with the lode, and which are covered by said surface ground, are also relinquished. It will be necessary, therefore, for an applicant wishing to retain all the rights acquired by location to make application for all the surface ground not covered by prior locators. If only a small portion is desired, then it will be necessary to be restricted to the right to follow the lode between vertical planes drawn downward through the end-lines of claim. In this case, but not in the other, a new survey will be required. The above decision originated in the following state of facts: A mining company originally stated its claim so as to show on the surface a parallelogram fifteen hundred feet in length by one hundred and fifty feet in width, and at the same time claimed only a portion of the surface ground included within the extreme boundaries of the location. Said portion was divided into three parts: three hundred feet at easterly end, one hundred feet in width; three hundred and fifty feet at westerly end, one hundred and fifty feet in width; and a piece at discovery-shaft twenty-five feet square. The application referred to above was for surface ground twenty feet square at the discovery-shaft. and which it will be perceived is only a very small portion of the surface ground to which the applicants are entitled by location.

Discovery-Shaft in Cross-Lode.—The owner of a lode claim can not sink a discovery-shaft within the space of intersection of a cross-lode claim previously discovered and located.

Coal Land Fees.—The question was asked, Will the government charge a claimant twenty dollars per acre for coal land when the same was situated more than fifteen miles from any completed railroad at the time claimant commenced opening and improving the mine, and at date he filed declaratory statement therefor, but within fifteen miles of which a railroad was completed before said claimant made application to purchase the land covered by said declaratory filing? The Commissioner of the General Land-Office holds that, in the absence of express statutory provision authorizing a disposal of coal lands at a lower price, the language of the coal law requires that if, at the date of "application to the register" to enter coal land, the same shall be within fifteen miles of any completed railroad, payment must be made therefor at not less than twenty dollars per acre, even if a coal mine had been opened and improvements commenced thereon, or declaratory statement filed therefor, prior to the completion of a railroad within fifteen miles of the land.

Forfeiture of Co-Owner's Interest.—Section 2325 of the Revised Statutes prescribes that notice shall be given only "at the expiration of the year" in which the expenditures are made; that forfeiture accrues only upon failure to "contribute a due proportion of the expenditures by each person interested" within ninety days after service of personal notice in writing or within ninety days after the expiration of the period of publication. Will it prevent a forfeiture of "a co-owner's interest if he performs his portion of the expenditures after the necessary expenditures have been made by his co-claimant"? The above is the substance of several queries, propounded by a party in interest, to the Commissioner of the General Land-Office. He replies that, after publication of notice, the delinquent is bound to "contribute" his proper proportion, that is, to reimburse his co-claimants. But if a part of the co-owners have made all the required expenditures before the expiration of the period within which the law requires that they shall be made, the question whether the other claimants may make additional expenditures upon the claim equivalent to their proper proportion, instead of reimbursing their co-claimants, is a matter in which the commissioner is in doubt, and prefers to express no opinion upon the subject except in the event of a case of the kind coming before him, when he may be assisted by argument or guided by precedents established by the courts.

Claims upon Reservations.—Title can not legally be initiated to public lands reserved by the government from sale or other disposition, nor to lands erroneously excluded from a reservation by mistake of a surveyor. Location of claims upon reserved lands being void *ab initio*, the Commissioner of the General Land-Office has no authority to recognize locations made prior to the opening of such reserved lands to exploration and entry, as entitling locators to the preference right of purchase after the restrictions have been removed. Contests arising out of the circumstances indicated, between parties claiming by adverse locations, must be adjudicated by the courts. In the above case, mining claims were surveyed in a reservation through an error of the surveyor.

THE PRODUCTION OF QUICKSILVER IN CALIFORNIA.

Mr. J. B. Randol, of the New Almaden mines, has kindly favored us with the following interesting table:

PRODUCTION OF QUICKSILVER IN CALIFORNIA FOR TWELVE MONTHS ENDED JUNE 30TH, 1883

MONTHS.	Napa.	Great Western.	Sulphur Bank.	Redington.	Great Eastern.	New Idria.	Various.	Total (flasks).	New Almaden.	Grand total (flasks).
1882.										
July	380	410	579	195	111	169	15	1,859	2,522	4,381
August	582	490	418	184	388	130	61	2,253	2,432	4,685
September	641	513	430	225	348	129	157	2,443	2,766	5,209
October	580	516	370	251	229	266	73	2,285	2,844	5,129
November	718	200	28	96	306	156	136	1,892	2,619	4,511
December	865	339	300	311	221	126	94	2,254	2,379	4,633
1883.										
January	590	390	280	367	262	112	84	2,085	2,497	4,582
February	295	364	310	181	156	133	11	1,450	2,150	3,600
March	485	305	335	202	162	142	14	1,647	2,230	3,877
April	530	294	310	243	142	76	3	1,598	1,756	3,354
May	325	293	350	135	164	144	13	1,424	2,344	3,768
June	360	400	91	165	184	137	10	1,347	2,214	3,561
Totals	6,351	4,514	4,053	2,555	2,673	1,720	671	22,537	28,753	51,290

A NEW SMOKE-CONSUMING DEVICE.—The Illinois Central Railroad Company is endeavoring to secure a smoke-consumer attachment to its locomotives that will enable it to comply with the Chicago ordinance. For two or three weeks, the engine Robert L. Walker was running on the company's tracks along the lake front at Chicago. It was built at the Taunton (Mass.) Locomotive-Works, and has cylinders seventeen inches in diameter and of twenty-four inches stroke. It contains a smokeless furnace, invented by Mr. Robert L. Walker, of Boston, for whom the engine was built, and who brought it to Chicago in order to demonstrate to railroad men and others interested that he can effectually do away with the smoke and spark nuisance. A vertical water-table divides the fire-box or furnace into two compartments, one of which is charged with fresh coal, while the other contains freely burning coal. The compartment containing the fresh coal is closed at the top by a damper which confines the gases and is regulated by the fireman in the engine-cab. The smoke and gases arising from the fresh coal as it becomes heated, pass through a small opening over the water-tables and above the fire into the next compartment, where they are entirely consumed. The operation is then reversed by the other compartment of the fire-box being charged with fresh coal, in consequence of which the smoke and gases pass into the compartment opposite, where the fire has reached a high temperature. Any sparks escaping through the flue in front of the engine are arrested by an extended fire-box, also in front of the engine. There is in the fire-box a fire-brick arch, which becomes highly heated, and preserves a uniform temperature in the furnace and assists in consuming the gases from the fresh coal. A recent practical test in pulling heavily laden trains showed that neither smoke nor sparks were emitted from the smoke-stack.

THE MINING REGION AROUND PRESCOTT, ARIZONA.*

By John F. Blandy, Prescott, Arizona.

WITH SUPPLEMENT.

With the Report of Mining Statistics for the year 1872 there was published a geological map of the United States and Territories. This is, I believe, the only map which represents the geology of Arizona, and is, as far as my observations go, correct. It is, however, on so small a scale as to be of little practical value to the miner. I know of no other maps, even of localities, of this territory. The topographical maps are also on so small a scale as not even to serve as guides from place to place; the largest, that of Eckhoff and Ricker, being only 30 by 30 inches to represent a territory of 135,000 square miles. For these reasons, it is exceedingly difficult to describe the various mining centers in an intelligent manner, and equally so to examine such a hilly country as it is intended to describe in this paper.

When I first came into this territory, I soon realized the troubles I had to encounter in trying to form an opinion, or even to get the needed information on the geological contour. I have, therefore, labored as best I could to get a topographical diagram of the section of country represented by the map which accompanies this paper.†

The lines run by the Land Department up the valleys of the Aqua Frio, and those west of the Hassayampa, and connected east and west to the north of Prescott, enable me to correctly inclose the space covered by the Bradshaw and Sierra Prieta mountain groups; but the territory covered by these mountains, and the most difficult part, I have had to fill up as best I could. I have met with such success as to meet the approbation of those most familiar with the country, and, with the map in hand, any one would be able to cross it in any direction. As there has not been a single line of survey made across it, this has been no small undertaking, and I have had to depend upon sights from prominent points with the pocket-compass, or, in the absence of that, to make observations, with watch in hand, and guess as nearly as possible the meridian direction. But one main wagon-road passes through the district, that from Prescott to the Peck mine.

Having constructed a map with approximate correctness, it remains to mark in the general geology; but it is still difficult to draw accurately the distinct lines of junction between the formations. To do this requires an amount of muscular exertion that no one can understand unless he has tried it in such a hill-country—a region of gulches and steep, rocky hillsides, most of it covered with a growth of tangled thorny bushes, or prickly, poisonous cactus plants.

I have, therefore, only marked the general run of the rocks, without attempting the line of the boundaries of any. It is only meant as a skeleton upon which others may assist in filling in the detail as they may be able. It is the detailed geology of a region which is of the most assistance to the miner, and it can not be too minute. I am not aware that any geological map has been issued of any locality of Arizona.

I shall refer only to that part of the map which shows the country between the Peck mine and the town of Prescott. The Peck mine is situated in a primary slate formation, the north boundary of which is at Bear Run. This sweeps around in a northerly direction, crossing Turkey Creek and the mouth of Wolf Creek, the head of Cedar Creek, and after crossing the Big Bug Creek to the north of the station, passes northward by the Silver Belt mine, and is lost to view under the Aqua Frio flats and Lonesome Valley, or what is marked on the government maps as the Prescott Plains.

To the north of this formation, we have a porphyritic-granite ridge, passing from the Tuscumbia mine through to Trinity, crossing Turkey Creek at the mouth of Pine Creek, thence over the high divide between Pine and Wolf creeks. This does not show itself at Big Bug Creek, unless the small field of granite near Boggs be a continuation of the same. Next north of this granite ridge, we have a syenitic gneiss, covering the country up to the foot of Mount Union, with the exception of a narrow belt of hornblende slate, which crosses Turkey Creek at the Masterson mill. This brings us to the great granite center of Mount Union. From its sides start out the various streams of Main and East Hassayampa, Turkey, Big Bug, and Lynx creeks. Mount Union is said to be the highest peak, with the exception of San Francisco Mountain, in Yavapai County, which would make it about 10,000 feet above tide. It, with two neighboring peaks, the one to the north, the other to the south, appears more like a north and south ridge of granite, and throws out a finger forming the dividing ridge between the Big Bug and Lynx creeks, reaching nearly to the Silver Belt mine, where it abuts against the high-tilted slates of the first-mentioned formation. Another finger is thrown out to the southwestward, forming the divide between the East Hassayampa and Turkey Creek, the highest point of which lies between the Bodie and Bully Bueno mines. At the point where the Peck road crosses this divide, at the lowest point, it is hidden by a thin covering of the syenitic gneiss. Between Big Bug Creek and the head of Wolf Creek, lies a high plateau called the Mesa. This is a sheet of "malpais," or lava, from fifty to one hundred feet or more in thickness, which rests upon the vertical strata of the syenitic gneiss. The valley of Lynx Creek is occupied by a more or less stratified granitic rock, which extends southward across the head of Hassayampa, and beyond the Senator mine. This is separated from the large field of granite which surrounds Prescott by the ridge of hornblende schists which crosses the Hassayampa at the bridge, and forms a divide between it and Lynx Creek, and in which heads the North Wolf, Groom, and Granite creeks, the highest point of which is Spruce Mountain.

The Prescott granite, extending northward to the great mass of Granite Mountain, here and there incloses patches of hornblende slates, and syenitic gneiss, and is intersected by trap dikes and protrusions of columnar basalt. Of the latter, two fine examples are to be seen near the town—Thumb Butte, and a hill near the mouth of Banning Creek. To the north of Prescott, on the east side of Granite Creek, may be seen the syenitic gneiss which underlies the county eastward to lower Lynx Creek. We now have a general outline of the geology of the space lying between the Peck mine and Prescott. I have seen too little of that lying to the westward, or of that lying to the east of the Aqua Frio, to refer to it at present. It only remains to make some reference to the veins occurring in the various formations.

The large majority of these, whether in the stratified rocks or in the granite, have a northward and southward trend, varying, say, from N. 20 degrees E., and S. 20 degrees W. to N. 20 degrees W., and S. 20 degrees E. The exceptions do not vary greatly from this, although I have noticed a few that have a nearly east and west course. Among the stratified rocks, a large number are what might be called "*layer*" veins; that is, they strike and dip with the formation, and are limited in length, seldom extending for more than three or four mining claims. In many instances, I have supposed these to be formed by the warping of the strata, causing openings to be made between the strata. This is particularly the case where the white quartz ledges occur, as in the belt in which are the Bully Bueno, Yaho, and the gold ledges on Pine Creek.

The veins in the slate formation of the Peck District occur in or in contact with heavy quartz strata, locally called quartz dikes, and carry silver in form of chlorides, sulphides, and in galena. In some of the veins, large amounts of carbonate of iron occur. The quartz dikes are the conspicuous feature of the district, standing like high walls, sometimes as much as fifty feet above the slates. The finest examples of these walls can be seen near the mouth of Wolf Creek, where they occur not more than six feet thick at the base, and stand at least fifty feet high, terminating in pinnacles—a fair representation also of the dip of the strata.

The veins in the granite ridge next north seem to occur in groups, as in Tuscumbia, Trinity, and on the east slope of the Wolf Creek ridge. In these, the ores are also silver-bearing, in form of chlorides with lead, brittle silver ores, and in galena and blende. The principal vein-matter is quartz and barytes.

In the syenitic gneiss region, the veins are all silver-bearing with the exception of the belt referred to above, which passes through from the Bully Bueno mine across Pine and Wolf creeks, which are gold-bearing quartz veins. Between this belt and the granite on the south, the ores are much the same in nature as those of the granite, with the exception that there is but little antimony in combination. The vein-stones are the same. To the north of the gold belt, up to the foot of the Mount Union granite, the amount of galena in the vein increases in quantity as you go northward, until finally argentiferous galena with much pyrites is almost the only ore. The barytes also become less and less, and quartz increases in quantity. In this section, I have found the only lime spar, in form of nail-head, that I have seen in this region. This occurs in the Goodwin vein.

The veins in the Mount Union granite are all gold-bearing, many of them also carrying silver in combination with galena, and large amounts of pyrites. The gold in the croppings of the veins and to a limited depth, is free, but below altogether in the pyrites. Some veins are found containing large amounts of carbonates of lead which yield well in silver. The decomposition of these veins and of those in Lynx Creek Valley is the source which has supplied the gold to the placers in all the streams heading in this mountain, more particularly to the Hassayampa and Lynx creeks. In some of the veins of this formation, is to be found much blende of a very dark character.

The veins of the Lynx Creek Valley are, as a rule, the largest of the region, varying in width from two to twenty or thirty feet. They carry gold and silver in varying quantities. Sometimes, pockets are met with yielding at the rate of several hundred dollars per ton in gold. The occurrence of silver is much more uniform. Most of these veins have been prospected largely in the cropping and the ore worked in arrastras. This has been, however, to a limited depth, I believe never over thirty feet, and most of them much less, as the baser ores occur, and the miners have had no means of treating them.

Below the decomposed croppings, the ores are the basest of the region, being a mixture, in every conceivable variation, of sulphurets of iron, zinc, antimony, lead, and copper. Of course, all are not equally contaminated, as in some pyrites form the mass of the ore; in others, but little copper is to be seen. As a rule, it may be said that the ores will average some sixty dollars per ton in the precious metals. This district is generally regarded as the gold section of the region. The prevailing vein-stone is quartz and decomposed wall-rock. The only rare minerals I have heard of as recurring in these veins are molybdates and phosphates of lead in the Accidental mine, but I have seen none.

The veins of the hornblende schist range are gold and silver-bearing apparently in about equal quantities. The silver occurs as chloride, and also in galena, many very rich and large specimens of the former (horn-silver) having been found. In some of the veins, very rich streaks of gold have been encountered by the prospectors. Much of the vein material is of a talcose slaty nature near the walls, and the ore-streak is largely made up in many of the veins of a very flinty yellowish-brown massive quartz; this is particularly the case where galena occurs in the vein. But few veins, and hardly any of note, have been opened in the Prescott granite. On the southern edge of it, along the Hassayampa, some strong veins of gold-bearing pyrites have been opened; a strong galena vein, with a small amount of pyrites and a large vein of copper pyrites, have been developed to some extent.

To this meager description of the region I might add that a band of porphyritic slate extends on the east side of the Aqua Frio from the Homestake mine at the western foot of the Black Hills southward to Copper Mountain. Whether this formation lies next east to the slates of the Peck District or not, I can not tell, not having closely examined it. So far as examined, these porphyritic slates show veins of copper ore of high grade, containing silver in greater or less quantities from $7 to $85 per ton.

On the map, I have marked approximately the sections covered with timber. This consists of pine, oak, and juniper.

The streams called creeks, for want of a better name, might more properly be called *sluice-ways* to carry off the heavy falls of water in the rainy season. There is, however, a small amount of running water in all of them for most of the year, particularly in the winter and spring, caused by the melting of the snows.

As I have said, this is but a meager description of the geology of a large and important mineral district; but I have meant it only as a

* A paper read before the American Institute of Mining Engineers.

† The engraved map accompanying this paper is one half the scale of the original map.—ED.

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beginning by furnishing an outline of the district and giving an opportunity for others to assist in building upon the foundation which is thus begun.

It will be understood that the mineral district extends much beyond that part which I have attempted to describe. It reaches southeastward to the Tip Top mine region, the copper deposits of Castle Creek, the Tiger District, and southwestward to the Vulture mine, near Wickenburg, and the gold mine of Antelope Peak; westward, to include the copper mines in Copper Basin; and on the east, it covers the copper and silver mines of the Black Hills and Ash Creek, and the gold region of Cherry Creek near the Verde. To these may be added the gold mines and placers of the Black Cañon and Squaw Creek.

This region possesses as fine a climate as can be found in the United States, fine open weather in winter, with but few storms, and those of snow. The nights, from November to April, are cold, although the days may be clear and balmy. In summer, although the thermometer may register from 105 degrees to 110 degrees in the shade, the atmosphere is by no means as oppressive as in the Atlantic States at from 85 degrees to 90 degrees. There are very few days in the year when it is too disagreeable to work in the open air. Many severe things have been said of "dry Arizona;" but it has never been called the "land of beautiful and glorious sunshine," to which it is entitled.

ON THE OCCURRENCE OF GOLD IN WILLIAMSON COUNTY, TEXAS.*

By Prof. Charles A. Schaeffer, Cornell University, Ithaca, New York.

In the early part of last year, I received a small amount of powdered mineral from Williamson County, Texas, to be examined for silver. The specimen proved to be limestone, slightly colored by hydrated oxide of iron, and assayed, per ton, $2521 in gold and $5 in silver. Supposing, of course, that this was a case of "salt," I applied for more of the material, stipulating that it be sent in lumps, and received several pieces, averaging from three to four cubic inches, which assayed $46.50 in gold. A third lot, about one peck in amount, consisting entirely of good-sized lumps, assayed $160.19. Frequently-repeated examinations of the lumps from the second and third lots convinced me finally that, in those cases, at least, the material had *not* been tampered with, and that the gold had been deposited there by natural agencies.

In the month of April, I visited the point from which the specimens were said to have been taken, about twenty miles north of Georgetown, and from an old shaft, about 15 feet deep, took a number of samples. At the very top of the shaft, there is a hard cap-rock, four feet thick, and below, extending through a thickness of about 2½ feet, is a bed of very porous rock, highly colored at many points with hydrated oxide of iron. Below this is a layer of very finely granular limestone, of a faint pinkish color, about six feet thick, and, still lower, another bed of porous rock from two to three feet thick. The samples previously sent me corresponded exactly in appearance with the rock in the two porous beds. Subsequent examination of fourteen samples taken by myself gave the following results: Three contained no gold, four showed a trace, and seven contained amounts varying from $2 to $20.67 per ton, the average of the fourteen being $5.46. These results, though low, nevertheless showed the existence of some gold, and it was therefore deemed advisable to investigate the subject more thoroughly. In the month of June, I revisited the place, and spent several weeks in prospecting the neighborhood.

Extending through Williamson County from north to south, covering a breadth of from four to nine miles, are a number of long, low hills, generally from fifty to a hundred feet above the surrounding prairies. Near the top of one of these ridges, was the shaft previously referred to. The rock was all horizontally stratified, and there was no evidence or probability of any vein. If gold was present in paying quantities, it would undoubtedly be found in the beds of porous rock. To test the permanency of the existence of gold, seven shafts were sunk at various points around the original shaft, and at distances varying from one hundred to three hundred feet. In all of these, the porous strata were encountered, and, so far as the external appearance of the rock was concerned, it was found to be precisely the same as in the first shaft, although the thickness of the beds varied somewhat at different points. Fifty-two specimens taken from the various points where the porous strata had been exposed, and from the outcroppings of the same, gave the following results: Twenty contained no gold, and thirty-two contained amounts varying from $1 up to $231.50, the whole fifty-two averaging $15.20.

Further investigation convinced me that, although these results were apparently highly favorable, nevertheless the average of the whole rock is far below the figures indicated. Selecting from all the points worked thirty-two lots, they were all carefully sampled and the samples assayed. Of these samples, thirty-one contained no gold, and one contained $1 per ton. The examination of the dirt taken from the dry beds of the ravines, below the level of the two beds in question, showed sometimes one or two very minute colors, but more generally nothing at all. While, therefore, not desiring to call attention to this locality as a possible source of supply of gold, I nevertheless wish to record the fact that gold does occur at the point in question in moderate amounts.

The most remarkable feature of the occurrence is the fact that the limestone is undoubtedly Cretaceous. It is generally stated that gold may occur in rocks of all ages, and Professor Kerr, in a recent paper read before the Institute,† concludes with these words: "From the facts here given, it would seem that gold is so widely diffused that we may expect to find it in any kind of rock." Nevertheless, I believe the occurrence of gold in Cretaceous limestone has not as yet been reported in the United States.

As regards the mode of deposition, it is very evident that it got into the rock in the condition of auriferous iron pyrites. The calcium sulphate, resulting from the decomposition of the pyrites and the limestone, has all been washed out, occasioning the porous character of the rock, and the greater part of the brown oxide of iron and the insoluble gold remain entangled in the pores and crevices. At some points, the gold has been concentrated by the action of water, while in others it is entirely absent. Unfortunately, there is no way to distinguish between the auriferous material and that which is entirely barren, since the amount of the oxide of iron seems to bear no relation to that of the gold present.

There is a tradition, very commonly believed in the neighborhood, that, two or three hundred years ago, the Mexicans obtained silver there, and, in proof of this, attention is called to a large number of irregular trenches to be found at many points on the hills. These trenches have, with the lapse of time, become partially filled, but in all cases they are easily identified by the large blocks of the hard cap-rock which are strewn around on both sides and in the trench itself. So far as silver is concerned, the popular idea is clearly a mistaken one; but it would seem not improbable that, in the days of cheap peon labor, this district may have been worked for the small amount of gold to be found.

* A paper read at the Boston Meeting of the American Institute of Mining Engineers.
† Transactions, Vol. X., p. 476.

AMERICAN MINES IN THE ENGLISH MARKET.

Mr. William Weston has written one of his vigorous letters to the London *Mining Journal*, which so forcibly deals with questions frequently discussed in this country that we make room for the following abstracts from it:

For those who wish to buy developed mines which are now actually paying, there are plenty of them in San Juan. I have often heard it said in London, "If the Americans have any good mines, they keep them; but if they have any worthless ones, they come over here to unload." That they "keep them" is not true, as no man will sell quicker at a fair price than an American. There are thousands of good mines and prospects in Colorado for sale, and an Englishman's money is just as good to the owners as that of their own countrymen, so the first part of the wise saw is bosh. That a great many worthless American mines have been brought to London I admit; but if they found purchasers there, who have the buyers to blame but themselves? No man is so generally skeptical of every thing American as the astute Britisher; and no man, when he does buy any thing American, does so with such utter folly, as a rule, as that same gentleman. He exercises far less care than he would if buying a horse, and in most cases buys it through the medium of three or four different lots of middle-men, and naturally pays four times as much as if he bought it from the owner, as those modest and obliging mediums generally expect to realize out of the transaction quite as much as the owner receives for his property. Then, when the buyer finds he has been sold, he declines to admit his own folly, and raises a hue and cry against Americans and their mines in general. Just about as mean and cowardly as the man who goes into a gambling-den with the intention of winning the gambler's money; but when, instead, the gambler wins his, he calls on the police to help him get it back again.

Now, I will explain why it is that so few really rich American mines find their way into the English market, and I can best do this by telling how some of the best dividend-paying mines have been placed on the American market. I will mention names of neither men nor mines, to avoid the suspicion of surreptitious "puffing." There is in America a firm of two gentlemen, said to be worth fifty millions of dollars, which they have made legitimately in their business, which is what I call being "jobbers in mines." They have a staff of trusted experts; and when they hear of an exceptionally rich mine or prospect, they send one of these men to examine, with power to write a check for it on the spot if necessary.

Having bought it, they then proceed to develop it thoroughly, by creating large reserves of ores, erecting pumping, hoisting, and reducing machinery, thus bringing the mine into a permanently paying condition. Then, and not till then, do they organize a company, and offer the shares to the public, and the public takes the mine readily, paying this firm, of course, a very handsome profit, which, as they have had all the risk, they are thoroughly entitled to. As long as the public gets good value for its money, and a mine that pays good dividends, they neither ask nor care how much profit the vendors make out of it. And it must be remembered that this firm, although they rarely do make a mistake, are not infallible; sometimes a mine turns out badly, and then, as they do not offer it to the public, they lose all they have paid for it, or put into development.

On the other hand, how do the English get hold of American mining properties? Chiefly from the hands of middle-men, who are generally penniless adventurers, who get hold of a bond or option on some mine for such length of time as will enable them to get up a company, advertise the shares, and so get the money to pay for the property and their own commission; the bringing of the mine into a paying condition being quite an after-consideration, and one which these gentlemen care nothing about. And I assert, as a positive fact, that the owners of really good mines in Colorado will not tie their property up or have it hawked about London by adventurers. I do not mean to say that all properties that come to the public through middle-men are worthless by any means, as some of them are very good, and as the purchasers are put into communication with the owners and the property reported on by reliable English engineers, every thing is square and above-board. To show why some rich mines never find their way to London, I will cite a case in point. I know a mining property in the San Juan region, near Ouray; fair claims on the same vein all in pay, the ore yielding from 50 ounces to 500 ounces of silver and 10 ounces of gold per ton of 2000 pounds; price, £150,000 cash, with fully that amount of ore (gross) in sight; title perfect; true fissure-veins; and total length of claims along the course of the vein 6000 feet. The owners of this group are the original discoverers, and will not tie their property up to any one for six months, in order to give them a chance to sell it. Why should they? The dead-work alone has more than paid all expenses; and if they want some money, they can take it out of their mine. There is the property for sale at a price, and the owners are content to bide their time, knowing that, sooner or later, a buyer will come along and pay them cash for it. Therefore, they have no inclination to tie it up for six months, in order to let some middle-man or promoter of companies take it to England and try to sell it. And as no middle-man will take the trouble to try and sell it in England without a firm option, the property does not find its way there. On the other hand, owners of worthless properties

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which they can not sell themselves will readily give an adventurer a bond or option on the property, and take the chances of his being able to sell it.

Owners of rich properties like the one I have named will give a bond or firm option if they are paid for—that is, if a certain sum be paid down, that sum to be applied on the purchase money if the sale is consummated, or forfeited if it is not; but those as a rule who play the role of middlemen have no money to pay for any thing.

From the foregoing, it will perhaps be understood why so many poor properties go to England. To reiterate. No owner of a really rich paying property or promising prospect in Colorado will tie his mine up to a party of middle-men for six months, in order to give them the chance of getting the money to pay for it, unless he gets a sum paid down as forfeit-money, or unless he happens to be very well off, and have a great deal of mining property to dispose of, and I know of such exceptions now offered in London, and very good properties they are. If a few wealthy Englishmen would do as the firm of American jobbers before mentioned—come to San Juan and see the mines themselves, or send their engineer to examine, with power to write a check if the property proves as represented, they would get some of the richest gold and silver mines in the world, and at reasonable figures. It will be asked, perhaps, "If these men own such good gold mines, why do they wish to sell them?" But no miner or man who knows any thing about mines will ask such a question. Most of our richest mines and prospects in San Juan are still held by the original discoverers—poor men. Every miner knows that it takes large expenditures of capital to put a silver or gold mine into permanent pay. By this I mean creating reserves of ore at least two years ahead, erecting pumping and hoisting machinery and reduction-works to treat the ore. If they take ore out of their mine without doing this, I call it "picking the eyes out" of their mine, and no good miner will do it. In San Juan, we have a number of phenomenally rich silver mines, which have paid from the grass-roots; but because they will do this, it is no reason why they should have their eyes picked out; on the contrary, they are the very ones that deserve the greatest care and the most systematic development.

In one claim of the group of four already cited, there is ore in sight to the value of half a million dollars—ore actually blocked out, and I have heard it said: "Instead of selling their mine for £60,000, why do not the owners go to work and take it out of the mine?" Simply because they are not fools. The ore already blocked out is above water-line, and this taken out, they would have to erect pumping and hoisting machinery to go deeper. More than this, as they have no capital to erect reduction-works, they would have to sell the ore to local buyers at a large sacrifice of profit; then, again, it would take some years to mine it without any capital. So, as the owners have other mining property to develop, and as the country is rich and new, and plenty more mines to be found, they prefer to stick to their legitimate business of prospectors—that is, finding and selling mines. They prefer, in fact, rather to take a reasonable sum, cash down, for their mine, and sell to men who can afford to develop it into permanent pay, than to "pick its eyes out," wait two or three years for their money, and then, perhaps, have a white elephant on their hands in the shape of a rich mine, without the capital to enable them to get the ore out any deeper.

THE PRODUCTION AND UTILIZATION OF GASEOUS FUEL IN THE IRON MANUFACTURE.*

By W. S. Sutherland.

(*Concluded from page 22.*)

In the first part of my paper, it is pointed out that, to insure sound welding, the gas should be supplied with the requisite air in constant and definite proportions. To secure this, it has been found necessary to mix the gas and air thoroughly together before combustion, care being taken to prevent explosions, and dissipate them if they should happen. A very powerful and concentrated flame is thus secured, which, when it contains an excess of gas, has no tendency to oxidize the iron, and gives a very soft, mellow heat. I do not believe that mixed gas and air have ever been worked in this way before—at any rate, not on the large scale that we work on—and, as must generally be the case in new combinations or methods, the study of its action must be instructive. Explosions of the mixed gas and air are prevented by very simple means, and the method has now been at work for some ten years without accident. I should like, in this connection, to mention that, when an explosion occurs in any ordinary working mixture, it does not instantaneously travel along the mains, but is carried forward in the form of a wave or disk of flame, traveling with a certain velocity. This disk seems to have some dynamic properties which liken it to a solid mass in motion. Thus, it will not turn a corner readily unless obliged to do so, and strikes any thing it comes against with great force. If, then, at a convenient corner of the mains, an outlet be provided in the direction of the delivering main, and a light cover of India rubber be fastened on, the disk of fire will cut it out or break it, just as a blow would do, and no further damage is done. Indeed, I have often watched this disk of fire moving backward and forward in a passage, and obeying the hand that was closing and opening the gas and air-valve. The ordinary Bunsen burner, in which the gas and air mix as they come together for combustion, is always supposed to produce a higher temperature; and since by the above system a far more perfect mixture and diffusion can be obtained, it naturally occurred to me that this offered an easy solution of the problem of obtaining high temperatures. And so it does, but coupled, I must confess, with some drawbacks. I have spent much time and trouble over it, and argued in this way: If it be possible to keep down the carbonic acid in producer gas, while at the same time storing up in it nearly the whole of the thirty per cent of heat before mentioned, and if by mixing the gas with the proper amount of air before burning a rapid combustion be effected, why could not this simple means be employed to burn fuel generally? And if it be true that mixing the gas and air raises the temperature, this increase could only be at the expense of the outgoing gases; therefore a kind of regenerative action should be set up that would cause an accumulation of heat at the root of the flame, and which would extend itself as the action went on.

Now, I must say, and can show in practice, that all this is true; but so far, its application seems to be limited to special uses, of which steam-raising is one of the chief. Consider that by this means the full effect of the fuel can be produced directly it enters the boiler, so that complete combustion is secured at once, and the gases have only to give up their heat in passing along the boiler; that the highest temperature is produced at the very first; and that there is therefore a greater fall and consequent better duty, and you will then say that there is reason in what I say. But in these general uses where Dr. Siemens has introduced his magnificent system of regenerators, experience has so far shown that his system is better, and for the following reasons: Suppose a stream of mixed gas and air to enter a furnace. There is no trouble about diffusion, since the gas and air are already thoroughly mixed, and therefore they ought at once to burn and give out their highest temperature; and since the rate at which the gases will conduct depends upon the temperature of the heating body (the initial heat of the gases being supposed constant), and as well upon the thickness of the stream of gas, it follows that if this higher temperature be produced quickly, and the stream of gas be kept thin as it enters the furnace, more heat should flow back into the hinder layers of the gas while those in front burn, and that thus the reaction would tend to accumulate heat at the root of the flame in precisely the same way as in a coal fire, so that the faster the gases are driven into the furnace the greater the temperature would become. Now, all this really happens; but in a coal fire the fuel is traveling back, carrying heat with it, which is not the case in the gas fire, and this has to be allowed for. Besides this, the rule of conduction in the gases must be within certain limits of proportion to the speed with which the frame travels back, so that to get the highest temperatures with good producer gas, the flame must be made to envelop to some extent the stream of incoming gases, in order to make it as hot as possible all around, and this stream must also be made very thin. All this is exceedingly difficult to manage. Sometimes all goes well, a great wave of heat can be seen accumulated round the tuyere, and the furnace is hot directly; but the next minute, without any change in the quality of the gas mixture, the wave of heat is blown away from the tuyere, and in a moment or two the furnace goes down. Still, this system can be used in many ways where regeneration is not applicable, as in steam-raising and in chemical works, and wherever a very high temperature is not desirable, although, for economical reasons, it is better in most cases to get the highest temperature attainable. It is not easy to understand how the rise of temperature tends to extend over the remoter parts of the furnace; but heat always tends to flow from the hotter to the colder parts, as is well known, and the heat in a furnace may be compared to a mound or wave of water on a stream driven over an eminence which remains stationary while the water goes on. The higher temperature gradually spreads more or less in the furnace, without at all breaking the law of conservation of energy, the increase of heat being always obtained at the cost of the waste gases.

Ten years' experience with thoroughly mixed gases has tended to confirm the timid views advanced some years ago. These observations refer to the action of the different gases and mixtures of gases and air upon iron and steel in welding and heating, and in puddling iron as well, in which direction some experience has been gained with them.

In a paper read before the Royal Society, Professor Graham showed that iron at an elevated temperature is permeable by both hydrogen and carbonic oxide, and especially so by the latter gas, and he added that in the process of manufacture soft iron absorbed or occluded within it a considerable volume of carbonic oxide, "which it carried about ever after." Now, in treating iron or steel, the only general fuels we have are carbon and hydrogen and compounds of them, which are all burnt with oxygen. The iron is practically always oxidized when in the ore; but after treatment in the blast-furnace, it contains more or less carbon; and leaving out silicon, sulphur, phosphorus, and other impurities, the metal varies almost indefinitely between pig-iron and ore, becoming white iron, cinder iron, cast-iron, steel, soft steel, wrought-iron, pure iron, and burnt iron containing oxygen. Therefore, if there be no impurities in the iron beyond hydrogen, oxygen, and carbon, all these different qualities would be owing to some difference in the relative quantities of these substances in the iron, to the manner in which they are combined or mixed, and to the different states in which they and the iron may be. In treating iron for welding by the aid of mixed gases and air, it is found that the first essential is, that there be an excess of gas in the mixture. The slightest excess of air, of fully combined carbonic acid, or steam infallibly burns the iron, makes it rotten and the weld becomes a bad one. If pure hydrogen in excess be used, it is difficult to weld with it. A higher temperature is required, the iron appears to remain hard up to the melting-point, holes are easily eaten into it, and when broken the iron will be found to have a fine white crystalline fracture. The weld is strong, but very short, as in steel. If carbon be the fuel used, the weld varies from a coarse, steely fracture, to a ductile one, and sometimes a rotten one, according as the carbon or air is in excess. If carbonic oxide in excess be used, the iron begins to soften at a lower temperature, becomes pasty, and seems to effervesce; when welded, it is very tough, and breaks with a tough, dark, silky fracture characteristic of wrought-iron. If soft steel be welded, it will not bear the same degree of heat that wrought-iron will, but tends to fall to pieces on the hearth; when welded with a good carbonic oxide flame, however, it works very well, and stands a good elongation before breaking.

From observation of these facts, I always endeavor to get as much carbonic oxide as possible in my gas, and as little hydrogen and oxygen as I can, consistently with obtaining the requisite temperature. Pure iron can only be regarded as a chemical curiosity, which may for a moment be produced in practice, but which passes at once to wrought-iron or oxidized iron. Now, in making steel in the Bessemer converter, the metal is heated with air until all the carbon is blown out; and if the process could be stopped at exactly the right place just when the carbon had all become carbonic oxide and remained in the metal, undoubtedly a soft, ductile metal just like wrought-iron might be produced without having to add any spiegel. But so long as any unoxidized carbon remains in the iron, I say from experience it would work "raw," as the welder says, when welded, and would be crystalline; and if iron oxide remained

* A paper read before the British Iron and Steel Institute.

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in it, it would be rotten. Now, why should we not recognize Professor Graham's definition, and say that while steel is iron containing unoxidized carbon, wrought-iron is iron in which carbonic oxide is occluded, taking the intermediate place between carbon in steel and oxygen in burnt iron? Carbon and carbonic oxide are both soluble in iron, while carbonic acid and oxygen are both practically insoluble, but a low oxide of iron is again soluble. It seems reasonable to imagine that carbonic oxide, which must be fluid in the metal, acts the part of a solvent in allowing a proper coming together of the particles, while carbonic acid and oxygen tend to keep them apart, and iron oxide, while somewhat soluble, acts the part of carbon in pig-iron in an exaggerated degree, in that it causes the metal to become softer, and even rotten, when cold. A curve might be drawn showing the transition from one state to another, in which the admission of carbonic oxide would lengthen out the point representing pure iron. Now, the conclusion I wish to draw from all this—if you decide that it is just—is an important one.

To produce a good, true wrought-iron which will weld well, and in all particulars take the place of the best puddled iron, use the Bessemer converter or an equivalent vessel, and instead of blowing raw air into it, blow Siemens gas (which contains an excess of carbonic oxide) along with the air, in varying proportions, until at the finish a proper excess of gas is present. To keep the metal fluid with this proper excess, let gas or air, or both, be heated to a sufficiently high temperature before going in, and pass them, in thin streams side by side, under the surface of the metal—that is, through the bottom, sides, or wherever they can be got to go—so that when they come in contact with the metal the mixture may be perfect, and good wrought-iron will be produced. Now, it may be objected that the present action in the converter produces carbonic oxide. True, and I believe that, if it were possible to blow out all the carbon and stop just at the right moment, wrought-iron would be produced; but in reality, the metal would be overblown at one part, while another would contain some carbon, a third carbonic oxide, and so on. If, however, carbonic oxide in excess were blown in with the air, the sum of the actions would, as it were, steady the process all through, and lengthen out the carbonic oxide or wrought-iron period, so that the whole could be brought to the proper quality without fear of being overblown. Again, it may be said that analysis shows that carbonic oxide does exist in overblown Bessemer steel, but always with nitrogen, hydrogen, and oxide of iron, because Mr. Lowthian Bell and Dr. Aldin Wright have shown that carbonic oxide will not take out the last portion of oxygen from the iron oxide (produced by the over-blow), which thus keeps the metal rotten; and besides, the carbonic oxide is not sufficient to do what is expected from it. It is always not any one action which takes place, but the sum or resultant of a great many; and to get the carbonic oxide to do its work properly, it must as much as possible be in excess. The object of this process would be simply to produce wrought-iron, with all its good qualities increased; and although I perhaps ought not to say so here, certain dynamic considerations make it probable that this process would greatly facilitate the elimination of sulphur and phosphorus, while it is but reasonable to expect that its introduction would cheapen wrought-iron as well as improve its quality.

NOTE RELATING TO "WATER-HAMMER" IN STEAM-PIPES.*

By Robert H. Thurston, Stevens Institute, Hoboken, N. J.

The writer has been called upon during the past winter, in the course of his professional work, to examine into the systems of steam heating in use on so large a scale in New York City and elsewhere, and to report upon the condition and capabilities of one of those "plants" which have been put in operation. In the course of this investigation, he was compelled to examine into the peculiar methods of injury to which long lines of steam-pipe thus used are exposed.

The action familiarly known as "water-hammer" had been long known to him, as to every engineer who has had much to do with steam-power, and its singular effects had been often observed and commented upon by him, as by others; but in this case, these effects were developed on so large a scale, and were so serious oftentimes in their consequences, as to impress upon him the desirability of examining into the matter more carefully than had yet been done. He has not been able to make a systematic and thorough investigation such as he would have liked to make; but he has been able to collect some facts, a few of which will be here presented, that may at least have the effect of calling the attention of engineers more generally to this matter, and may lead to further study of the subject.

When a pipe is filled with steam, and then has introduced into it a quantity of cold water, or when a pipe, itself cold, and containing cold water, even in very small quantity, and without pressure, has steam turned into it, the first contact of the two fluids is accompanied by a sudden condensation which causes a sharp blow to be struck, usually at the point of entrance; and sometimes a succession of such blows occurs, which are the heavier as the pipe is larger, and which may be startling, and even very dangerous.

It is not known, so far as the writer is aware, precisely how this action takes place in all cases, or what conditions are most favorable to the development of the tremendous pressures which are often produced. Perhaps the action is as follows:

The steam, at entrance, passes over or comes in contact with the surface of the cold water standing in the pipe. Condensation occurs, at first very slowly, but presently more quickly, and then so rapidly that the surface of contact between the two fluids is broken, and condensation is completed with a suddenness that produces a vacuum. The water surrounding this vacuum is next projected violently from all sides into this vacuous space, and, crossing it, strikes upon the surface surrounding it. As water is nearly incompressible, the blow thus struck is like that of a solid body, and the intensity of the resulting pressure is the greater as the distance through which the portion of surface attacked can yield is less. In this manner, enormous pressures are sometimes produced.

In some cases, it seems certain that such pressures may be caused at points in the pipe far from either end and from the point of entrance of the steam. For example, a pipe may lie in a nearly or quite horizontal line, and, if not fully drained, may contain a considerable quantity of water lying in the lower portion, while the steam may flow in above it. The passage of this steam along the surface of the water may cause some disturbance of the surface of the liquid, and this disturbance being gradually increased as the flow of steam becomes more rapid, may finally cause a break in the surface of the water, which disturbance may produce more rapid condensation and still further agitate the mass, until condensation occurs with such rapidity that a vacuum is formed at the point of greatest action. The next result is the rushing of steam from both directions toward this point, carrying with it, as it goes, masses of water which, coming from opposite directions with enormous velocity, meet at the intermediate spot at which the condensation has been most rapid, and being stopped by instant collision, produce a pressure which may only have as its limit the strength of the pipe.

Where the pipes are not burst by this action, it is common to see them sprung and twisted out of line, torn from their connections, and, when a succession of shocks occurs, as is often the case, the whole line writhes and jumps lengthwise to an extent that is sufficiently serious to cause well-grounded alarm.

The writer had an opportunity, in the course of his work on the case above alluded to, to obtain some probably approximate measures of the intensity of this action in long and heavy lines of pipe. Four lengths of eight-inch pipe had been split by this action, and the writer desired to ascertain whether they remained, in their injured condition, strong enough to bear the ordinary steam pressure of the line from which they were taken. This never rose above fifty or sixty pounds per square inch. They were therefore subjected, in a proving-machine, to gradually increased pressure until the already fractured parts were still further injured, the repairs, or rather, the patching, having been carefully done in such a way that they were not strengthened by it. This was done by putting on soft patches along the line of the split and securing them by bolts which were set in the line of the split. The patches thus served as simple stop-valves, preventing the exit of the water through the break.

The following are the results of the tests:

Pipe No. 1.—This pipe was split, near one end, for a distance of fifteen inches, along the line of the weld. When placed in the proving-machine, it bore the applied pressure until it attained an intensity of 400 pounds per square inch, when the split suddenly extended about ten inches; the pressure could no longer be kept up, and the test terminated.

The pipe was then taken to a pipe-cutting machine and the injured part cut off. It was then again subjected to pressure. It bore a pressure of 1100 pounds per square inch—the highest that it was convenient or customary to apply to that size—and was taken out sound.

Pipe No. 2.—This length was cracked for a distance of fifteen inches along the line of weld, not far from the middle of its length. The crack had opened a little and the pipe was slightly bulged. This piece bore 800 pounds, and then gave way, the fracture extending just enough to let off the pressure.

At the opposite end of the pipe, was another split, eight inches in length. The part just fractured was cut off, and the remaining portion was again subjected to the water-pressure. This time, it bore 1050 pounds per square inch when the crack was started, and ran about fifteen inches. It began leaking, and showed plainly the effect of the pressure at about 800 pounds.

This was an unusually interesting specimen, as the pipe had been bulged considerably by the water-hammer along the line of the eight-inch crack. The pressure afterward borne, therefore, seemed to the writer to be likely to be a fair measure of that product originally by the water-hammer. Such bulging as was here seen never occurs at usual pressures. The new break did not follow the weld, but ran irregularly, and apparently indifferently, through weld or solid iron.

Pipe No. 3.—This length was split for a distance of 22 inches, the end of the break being about three feet from the end of the pipe. It sustained a pressure of 250 pounds. The sound part of the pipe was then tested up to 1050 pounds without injury.

Pipe No. 4.—This piece was split, like the last, and to just about the same extent, was tested similarly, and gave way at 300 pounds per square inch.

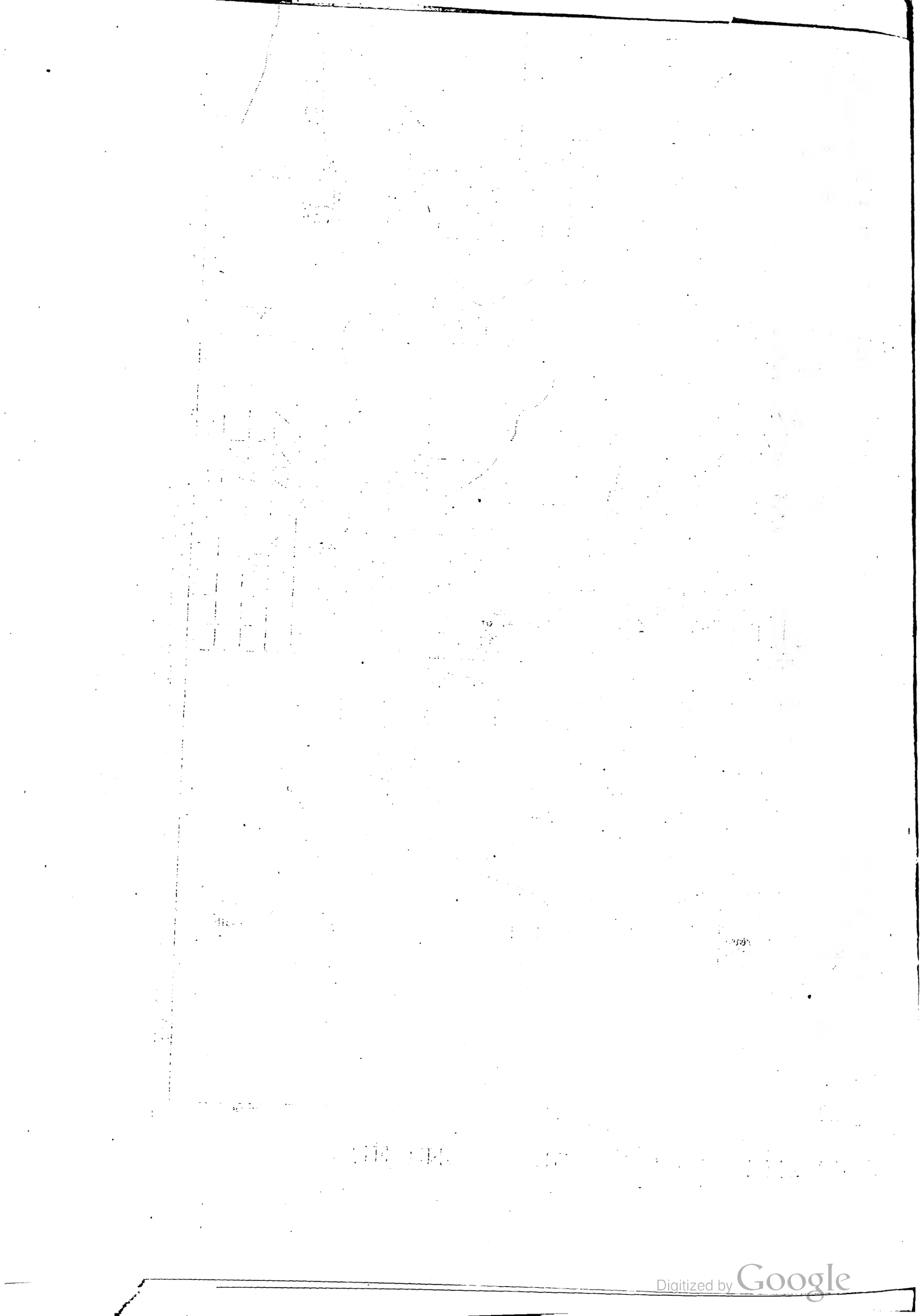
All of this pipe was eight-inch pipe, three eighths of an inch thick, and made with the usual form of lap-welded joint. The welds were not always perfect, as is probably the fact with all such pipe; but this pipe, butt-welded, would have borne very much higher pressures than those to which it was subjected, in ordinary work, by the steam carried on the line. It can not be asserted that these lengths of pipe did not split under pressures less than those to which they were afterward subjected by the writer, as it is very possible that the first blow may have found a weak part of the pipe, and the split may, in some cases, have extended to stronger portions. Nevertheless, the writer is inclined to believe that this was not the case in all instances, and is convinced that, in one case at least—that of the eight-inch crack which was accompanied by a decided bulge in the pipe—the water pressures, at the test, were at least approximately equal to, and are very likely to have exceeded, those obtained at the later test. It seems to him very certain that we may consider it as proved that the pressures produced by "water-hammer" are often enormously in excess of those familiar to us in the use of steam, and that they have, in many cases, exceeded 1000 pounds per square inch. It is, then, evident that it is not often safe to calculate upon meeting these tremendous stresses by weight and thickness of metal, but that the engineer must rely principally, if not solely, upon complete and certain drainage of the pipe at all times as the only means of safely handling steam in long pipes, such, especially, as are now coming into use in the heating of cities by steam led through the streets in underground mains.

The facts here presented have been, to the writer, something of a revelation, and have seemed to him to possess unusual interest and importance to the engineer using steam under such conditions as are here referred to. It is a fact which has long been well known, that these suddenly produced pressures are often very great. The writer has occasionally, for many years, known of serious and sometimes fatal accidents due

* A paper read at the Cleveland Meeting of the American Society of Mechanical Engineers.

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to this cause; but that these stresses are often as great as is here indicated, has probably been as little realized by engineers generally as by himself.

DISCUSSION.

CHARLES E. EMERY: The paper of Professor Thurston is valuable, but, I am sorry to say, incomplete. In the first place, the wording of the introduction is unwittingly well calculated to perpetuate a fraud. Last fall, the New York papers were filled with accounts of explosions of steam-pipes, and, in spite of all protests, refused, except in their advertising columns, to call attention to the fact that there were two steam companies, and that the difficulties were on the lines of but one of them. Few read the advertisements, and the press outside of New York copied only the news items, so to this day there is a general impression all over the country that steam enterprise in New York has been a failure. While, ordinarily, engineering facts are valuable, without reference to time, place, or persons, the above statement, with some explanations further on, show the necessity in this case of stating at the outset that the New York Steam Company, of which a gentleman from your beautiful city of Cleveland is president, has not required the services of Professor Thurston, and has been supplying steam continuously since April of last year; while another company, namely, the American Heating and Power Company, the plant of which Professor Thurston reported upon, and ambiguously describes as "one of those plants which have been put in operation," actually ceased operations early last winter, after a few months' abortive trial, and is now in the hands of a receiver, who is endeavoring to sell the property in the interest of the bondholders. The phenomenon of the "water-hammer" is familiar to most steam engineers, particularly those who have had to do with the large pipes used on ocean steamers. The writer, from his connection with the New York Steam Company, had full opportunity to watch the operations of the American Company, and is surprised to find in the paper of Professor Thurston no reference to one of the chief causes of danger in operating the pipes of that company.

Warring nations and political parties have each a war-cry, and an opposition stock company has to have a "tin image on wheels," or a something that can be talked up as being better than the regular thing. Water-gas made a good opposition to coal-gas, and even now is useful in helping the petroleum combinations to work off their naphtha. The people who built the new road through Cleveland, parallel to the Lake Shore, talked "Nickel-Plate"—that is, they did the work well and succeeded in selling out at a profit, as was intended. The American Heating and Power Company did not do this way. They engaged General Newton, who knew how to spend government money, and therefore ought to know about steam, which other people study for a lifetime, and induced him to trail his uniform in the dust of trade. He was their "tin image on wheels," and he invented their war-cry, namely, "superheated steam" (his patent being among the company's effects), and this cry raised the money among brokers, merchants, and clerks who thought they understood all about steam—"superheated steam," at least. The engineer, Mr. R. H. Buel, has done some engineering work of a literary character that is a credit to himself and the country, and should have known better than to attempt to carry superheated steam in underground pipes. One of the consulting engineers, a very able man, should also have known better. Professor Thurston should have known better when he was called in; but the attempt was actually made. The regular superheaters were never used; but a series of pipes in the boiler setting answered the purpose to a limited degree, superheating the steam, it was said, some 60 or 70 degrees, probably more at times, as the demand for steam varied; for who could regulate such an apparatus, or, in fact, any apparatus for such a purpose? The results are evident. Of course, the branches of the line where little or no steam was used soon cooled down, so as to contain only saturated steam, and at times all the branches were in this condition. Upon opening a valve anywhere, however, a circulation would be established, which in due time, but not at once, would bring the superheated steam into that line, and all the conditions of an explosion be present as soon as the steam reached any collection of water, it being evident that water, which is harmless in the presence of saturated steam of the same temperature, would act as an efficient condenser of steam at a higher temperature, though of the same pressure as that due to the temperature of the water. The reduction of volume thus caused would not be as great, of course, as if steam were forced in contact with cold water, but entirely sufficient to cause a flow of steam from both directions, bringing with it more water to reduce the volume of more steam, thereby causing collision; with a necessarily great increase of local pressure, straining the pipes, causing the joints to leak at all sorts of odd places where there were apparently no reasons for the difficulties. The more violent explosions were undoubtedly due to a combination of the straining effects due to the reduction of volume of superheated steam, with the more potent one of direct contact of steam with water cooled below the temperature, due to the pressure during times of inaction, the forces being brought into action more strongly when the steam was conducted through one pipe to heat an adjoining one. The conditions which brought about the bursting of the pipes undoubtedly varied with the circumstances of each particular case and with the peculiarities of each location. As the advance-sheets of Professor Thurston's paper only reached the writer when already busily engaged, a day ahead of the time when this must be sent on to be read in connection therewith, it is not possible at this time to fully discuss the subject, and its consideration in a more serious vein must be left for a proposed paper on the general subject of "District Steam Systems," which it is expected will be prepared when all the problems necessary to a complete mechanical and financial success shall have been analyzed and the necessary apparatus put in practical operation.

PROFESSOR TROWBRIDGE: I am amazed that Professor Thurston should give this paper the distinctive character of personal and individual research on his part. As a matter of fact, the investigations to which he alludes were conducted by a commission, not by himself personally or individually. The American Heating and Power Company of New York requested General Newton and myself to investigate the causes of the bursting of so many of their pipes and the breaking of so many valves in their plant, and I was asked individually to recommend a third member of the commission. I recommended Professor Thurston, and he was appointed. The commission entered upon a long examination, which involved the inspection of the plant, the testing of the pipes which had been burst or split, and the examination of witnesses who were supposed to be expert in steam-fitting. More than two weeks were consumed in these investigations, the results mentioned in Professor Thurston's paper being included in the final report of the commission. That final report was drawn up by myself and, with minor changes, was signed by General Newton, as chairman, Professor Thurston, and myself. The whole subject of water-hammer was discussed for days, and Mr. Frederick Tudor, of New York, at my suggestion, came before the commission, and showed by a simple experiment the effect of condensation to which Professor Thurston refers in his paper. The pipe tests were made by Morris, Tasker & Co. for the commission, and the whole commission was to have been present at the test; but unexpected circumstances prevented General Newton and myself from attending. The results were, however, furnished as a part of the investigation carried out by the commission. In regard to the *theory* given by Professor Thurston of the cause of "water-hammer," whether it be correct or not, it is simply a repetition of suggestions made during those investigations. Mr. Osborne, of St. Paul, and Mr. Frederick Tudor, had each in his extensive practice experienced in a variety of ways the ill-effects of water-hammer, and both confirmed the conclusions to which the commission in its discussions had already arrived. I can not, therefore, let this paper of Professor Thurston's pass without correcting the impressions conveyed by the writer that the results and the report referred to were his own individual productions. Where a commission of experts investigates a subject and makes an official report, as in this instance, it seems to me remarkable that one of the members should allude to its joint investigations and report as his own, without reference in any manner to his associates.

THE TELEPHONE IN A COLLIERY.

A Bell telephone has been fitted up in the Marie pit of the Cockerill Company's colliery at Seraing, Belgium, and has worked without a hitch since the second of April last; so satisfied, indeed, is the company with the experiment, that it is about to put down a telephone in all its shafts. The apparatus on the surface is placed near the winding-shaft, at a point easily accessible to both the day and the night hands. The underground instrument is placed in the main rolley-way, and the wire is protected by gutta-percha, being attached to insulators about every fifty yards. This wire is kept as far as possible from that of the electric signal, so as to avoid any induced currents, which would give rise to difficulty, and even danger; for when the telephone was first put down in the Marie pit, and the call-bell of the telephone was rung, the electric signal was heard at the same time, which misled the banksman. The telephone is found to render great service in the colliery, the ease of communication saving a great deal of time. In the event of an accident to the ropes, the cages leaving the guides, the derangement of the cage signal (whether electric or otherwise), or a stoppage from any cause whatever, instantaneous communication may be made from the bottom to the surface, or *vice versa*.

THE LUMINOSITY OF HEATED GASES.—Dr. Werner Siemens has recently demonstrated, by means of his regenerative furnace, that highly heated gases do not emit light. The furnace employed was that of his brother, the glass manufacturer of Dresden, which gives a temperature of from 1500 degrees to 2000 degrees Centigrade. The interior of the furnace was watched through side-holes, and not the least light met the eye from the highly heated air of the furnace. It therefore appears that all light from heated gas must come, not from the gas, but some solid radiating impurity. Observations with a thermo-pile also seem to show that no heat either is radiated by pure gases at a high temperature.

RUSSIAN BASIC STEEL.—Mr. Sergius Kern, of St. Petersburg, writes as follows to the *Chemical News*: It was a very interesting object for the writer to test the qualities of the basic steel of Russian manufacture. Near St. Petersburg, the Alexandrovsky Steel-Works are commercially working the basic process in Siemens-Martin furnaces.

The plate steel welds quite like iron; in fact, the Nevsky Works, St. Petersburg, rolling the ingots, make, out of the remaining scrap, piles which, heated to a welding heat, are rolled into capital plates for different purposes. The following are the results of trials of the steel plates:

Unannealed Plate.

Thickness in inches.	Breaking weight. Tons per square inch.	Elongation in 8 inches. Per cent.
½	26	29

Annealed Plate.

½	22	36·25

The chemical composition of the steel runs as follows:

	Per cent.		Per cent.
Carbon	0·10	Sulphur	0·02
Manganese	0·43	Silicon	traces
Phosphorus	0·02	Copper	none

I am informed that the raw materials charged into the furnace contain, on the average, 0·75 per cent of phosphorus. I am very happy to state that the great invention of Messrs. Thomas and Gilchrist is worked in Russia in such a satisfactory way.

MESSRS. CRADDOCK & Co., of Wakefield, are now manufacturing a special rope in which the wires and strands are both twisted in the same direction, thus giving a much longer surface of the wire exposed to friction, which lessens, if not entirely removes, the cause of wires breaking on the crown of the strands; and as the working of the rope around drums and pulleys bends the wires in an oblique direction, the greatest amount of wear possible from the wires is secured, as they will not break until too much reduced, and become therefore too weak for their work. The wires in the strands on this principle have a longer bearing one against another than in the ordinary system, and

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prevent much injury which results from the wires in each adjoining strand cutting into one another. There are claimed for this rope greater durability and immunity from wires breaking when but slightly worn, which has caused many ropes to be put aside as useless. One of this make, 4½ inches circumference, and 350 yards long, was used at Blackwell, from July 31st, 1880, to September 23d, 1882. When taken off, there were only six or eight broken wires in the entire length; but as the wear on each outside wire was so nearly the same, thus making possible the collapse of a good number at once, it was thought advisable to put on a new one.

FURNACE, MILL, AND FACTORY.

The fillers at A. M. Byers & Co.'s Girard furnace have struck against a reduction of fifteen cents a day.

A test was made recently, in Philadelphia, of a cold-packed pipe-joint, as operated by the Consolidated Pipe-Joint Company; and though a pressure of 240 pounds to the square inch was applied to the pipes, not a drop of water escaped from the joint. The test was made at the machine-shop of John Baizley & Son, No. 513 Penn street, in the presence of a number of visitors. Among those present were Gas Trustees Smith, Kelly, Gill, and Rittenhouse; President Smith, of Select Council; Superintendent de Kinder, of the Water Department; and ex-Governor Hoyt. The packing is of lead, which is cast in a belt about the pipe close to the joint, and too large to fit the opening which it is intended to calk. After the lead is cooled, hydraulic pressure is applied to the belt, and it is forced into the pipe-socket, making a perfectly tight joint. By the present method, molten lead is run into the joint. On cooling, the lead shrinks, and it is necessary to use oakum calking to make the joints tight. The economy claimed for the new method is, that it saves 60 per cent in lead, makes a joint that will not leak, saves time in operating, and can be used in a smaller trench than is required for the present system of calking.

The Northwestern Steel Wheel Company has recently been incorporated, and is at once to erect works at Chicago, Ill. Its purpose is to manufacture a newly patented steel wheel for agricultural machinery. Its works will consist of a machine shop and foundry.

The *Industrial World* says that the Fowler Rolling-Mill Company, Chicago, has recently doubled its capacity for the manufacture of the Fowler spike by the placing of an additional train of rolls, a 100 horse-power engine and boiler, and additional furnaces. By some improvements lately made by Mr. Fowler, he is enabled to carry an old rail from the furnace and convert it into finished spikes in fourteen seconds. By this process, the usual reheating of the iron is obviated. The company has just purchased the remainder of the block adjoining its works, which will give it the necessary enlargement of the plant.

The Fort Pitt Steam Boiler and Plate Iron-Works, of Pittsburg, Pa., formerly operated by D. W. C. Carroll & Co., are now wholly in the hands of Mr. D. W. C. Carroll, who was the senior member of the old company.

Park Brothers & Co., of the Black Diamond Steel-Works, Pittsburg, have closed a contract with John Roach & Sons to furnish a large amount of steel to be used in building the government vessels.

Greenwood rolling-mill, Tamaqua, Pa., which was closed some time ago by the failure of C. F. Shoener and the Greenwood Rolling-Mill Company, has been leased by Messrs. Daniel Snepp and H. A. Weldy, who will start the mill some time this month. They will engage principally in the manufacture of hoop and merchant iron.

The largest weekly production of iron made by a furnace in Sharpsville was that produced by Spearman No. 2 last week, the output being 728 tons, or 104 tons per day.

By act of legislature, the name of the Orford Nickel and Copper Company has been changed to the Orford Copper and Sulphur Company, proprietors of the Bergenport Copper-Works. This change has been made as indicating more clearly the business carried on by the company, it having discontinued the mining and smelting of nickel ores. The company purchases, and refines and sells on commission, copper ores, cements, mattes, and bullion. Mr. Robert M. Thompson, Nos. 37 and 39 Wall street, being general manager; W. E. C. Eustis, of Boston, president; and C. F. Atkinson, of 19 Exchange place, Boston, treasurer.

The Murphy Iron-Works, of Detroit, have just set up two of Murphy's smokeless furnaces for J. S. Kirk & Co., Chicago, and are now busily constructing six more, for which orders have been received.

The Chicago Gas Fuel and Light Company is laying three principal mains in Chicago and erecting its works preparatory to prosecuting its business with vigor. The works, covering an area of 265 by 374 feet, are located at the corner of Hanover and Butler streets. The company will use the Lowe water-gas process. It will start with a daily capacity of 3,000,000 feet, and possesses sufficient room to enable it to double that capacity, if required. The machinery is now getting into place, and the company will be ready for business November 1st. Four purifying-boxes, 25 by 30 feet, with 30-inch seals, and two holders with capacity of 1,250,000 feet, will be used. By November 1st, 100 miles of pipe will be laid, including a 24-inch main surrounding the south side of the city. In these preparations, 800 men are employed, and 900 consumers have contracted to take gas from the company.

The American Forsyth Powder Company, of California, has purchased five hundred acres of land near Shippenport, Morris County, N. J., for a consideration of about $11,000. The land is in one entire tract, unbroken by a county road. The works, when completed, will cost nearly $1,000,000. The property is the tract at Shippenport which was owned by the Dover Bank, but does not include the forge. The bargain for the property was consummated about two weeks ago, and the papers sent West for the signature of Mr. James B. Lewis, one of the officers of the late bank, who is now making a visit to Dakota.

Four hundred men are thrown out of work by a fire which destroyed the shops of the New Haven Rolling-Mill Company, on the 15th. The loss to the company in buildings and machinery is about $50,000. The fire broke out over the annealing-boxes. It could have easily been put out when discovered, but no water was to be obtained. The city water company had cut off the water supply to the mill, in order to make repairs to the mains.

A terrible boiler explosion occurred at the anthracite iron furnace of the Philadelphia & Reading Railroad, at Kutztown, on the morning of the 17th. At four o'clock, the inhabitants of the place were aroused from their slumbers by a rumbling sound like that of an earthquake. This was followed a second later by a shock that was strong enough to knock people from their feet. It was found that one of eight boilers walled in had exploded. The furnace is operated by Messrs. William M. Kaufman & Co., and the casting hour was half-past four A.M. Just before the final preparations were made, the men went outside to get some fresh air. Suddenly a terrible noise of escaping steam was heard, and the next instant the boilers were lifted with a crash and the furnace was a wreck. Large portions of the boilers were thrown long distances, and the air was filled with flying *débris*, among which were the mangled and lifeless remains of the workman. One large piece of boiler iron was sent flying through the air, and landed nearly a quarter of a mile from the boiler-house. The stock-house of the furnace, the boiler-house, and adjoining buildings were torn to splinters. Four men were fatally injured, and many others sustained serious injuries. The only man killed was Franklin Waltman, twenty-one years of age. He was fearfully lacerated, and his body, limbs and head were a charred mass. The damage to the property will amount to many thousands of dollars. The seven boilers that were thrown out of position by the explosion were badly damaged. The furnace will have to be entirely rebuilt.

The steel-mill and two of the furnaces of the Bethlehem Iron Company were put in operation on the 19th, and the force of men will be increased daily until the full number is at work. About 100 men have been sworn in to do special police duty and to protect the workmen should an attack be made upon them by the Union men.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

CONTENTION.—The work of enlarging the main shaft to admit pump-works is pushed vigorously. The uprise from the bottom of the shaft has reached a distance of 255 feet. From the surface, the compartment is down 30 feet. The pumps have arrived, and the work of building the stone foundation will be commenced in a few days. Prospect-work in the mine has been discontinued during the enlargement of the shaft. Enough ore is, however, daily extracted to keep the mill running.

GRAND CENTRAL.—No important developments are reported. Work is progressing as usual.

TOMBSTONE MILL AND MINING COMPANY.—A new concentrating mill is building at Charleston, with a capacity of 100 tons per day, to be used in concentrating tailings. Fifty tons per day are forwarded to mill and smelter, supplied mainly by West Side, although Tough Nut and Good Enough are yielding considerable amounts.

GILA COUNTY.

OLD DOMINION.—According to the Globe *Chronicle*, this company has bought all the property and plant of the Long Island Company, consisting of the Cuperite, Gray, Hoosier, and Nevada mines, and the thirty-ton smelter. It is probable that the furnace will be moved to the site occupied by the other Old Dominion furnaces, and that all four stacks will shortly be running steadily. It is stated that the company also proposes to smelt copper ores for mine-owners in the district, and that probably an additional furnace will be erected for that purpose.

YAVAPAI COUNTY.

RICH HILL GOLD MINING COMPANY.—The prospectus states that the property of the company consists of a gold-bearing ledge 1500 feet long by 600 feet wide, situate in Weaver Mining District, Yavapai County. The ledge or claim is named the Van Arman claim, and was located in 1882. Some work was done on the ledge—sufficient to demonstrate its richness. The ledge is seven feet wide, a true fissure-vein. Assays from croppings show all along the ledge that the quartz is rich in gold. The nature of the country is rough, although there is plenty of wood near the mine. Water is, however, scarce, and in milling will have to be carried one mile in pipes, unless a well is sunk or water is found in the mine.

CANADA.

PROVINCE OF ONTARIO.

ROBERTSVILLE.—The iron mine, on account of depression in the iron trade, has been obliged to close down. The Roberts Company mined about 100 tons per day and employed about twenty men, whose wages averaged $4000 per month. The Levant mine is still in active operation.

COLORADO.

ARAPAHOE COUNTY.

Smith, Hibbard & Co. are just completing a new crusher and smelter in Denver, which is expected to do work cheaper and better than any now in use. Though some parts of the machinery are still unfinished, enough has been completed to enable the management to run fifteen or sixteen tons of very refractory ore per day of twelve hours. Just at present, experiments are making with some heavy zinc ore with a view to save the zinc. Should these be successful, a new industry would at once be instituted in Colorado; for while there is an abundance of ore carrying 50 per cent of zinc, no process has heretofore been able to separate it. This ore is known as sulphate of zinc.

BOULDER COUNTY.

MATTIE.—This mine has been bought by the same company which purchased the Keystone some time ago. Machinery will be placed on the workings at once, the same now used on the Keystone. The latter property will be supplied with a new plant of machinery, which has been purchased and will arrive immediately. It is rumored that a smelter will be erected in connection with the concentrator.

CLEAR CREEK COUNTY.

HOOSAC.—At the Little Mattie mine, the property of this company, the shaft has attained a depth of 280 feet. The 150-foot level is in over 200 feet west of the shaft, and the lower or 250-foot level has been run 150 feet west. Three shifts are driving the latter ahead, on a good ore-streak, while for a year past stoping has been carried on in the upper level. The ore mills high in silver and gold, averaging about $200 per ton. The monthly shipments are from twenty to thirty tons. The new engine-room, shaft-house, and ore-house have just been finished. The new machinery, consisting of a thirty horse-power hoisting-engine, and two thirty horse-power boilers, is in place and works satisfactorily.

PERKINS TUNNEL LODE.—This mine, at which a recent rich gold strike was made, is rapidly developing. Several new shafts have been sunk in tracing the vein. Several tons of ore will be sent to the mill in a few days.

SUMMIT TUNNEL AND MINING COMPANY.—The tunnel has been driven steadily ahead into Belleview Mountain, until now they have reached a depth of tunnel near 600 feet. At the expiration of their present contract, steam-drills, air-compressors, and all the necessary machinery for driving the tunnel 3000 feet will be put in place. This company owns nine patented lodes in this mountain, all of which will be cut by its tunnel, which is driven 5½ by 7½ feet in size. Up to this time, nothing but solid granite has been met with. The company expects to strike its first lode at about 1000 feet, and will eventually reach the Specie Payment lode, which will be struck at great depth. The enormous outlay necessary for the completion of this tunnel, and before any returns for the capital invested, shows the confidence the incorporators have in this district, and their enterprise.

DOLORES COUNTY.

SOUTH PARK.—Since the change in the ownership of this mine, it has been worked steadily. The tunnel is in 300 feet from its mouth, and a cross-cut has been run 35 feet to the south, where the flat or blanket vein was struck. A rise has been made 15 feet high, and in ore all the way. A drift has been driven 40 feet farther south, in the vein. This drift is 4½ feet wide and 6½ feet high, all in ore. The ore of this mine is in black manganese, carrying sulphurets and large quantities of native silver. The ore mill-runs from 175 to 450 ounces of

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silver per ton, and from 10 to 15 per cent of lead. The mine is shipping from 10 to 12 tons per day.

GILPIN COUNTY.

It is stated that a party of capitalists will erect a stamp-mill in or near the mouth of Moon Gulch, which will be run on custom ore from several of the developed mines in Boulder District. There is plenty of wood and water near at hand. It is expected that the mill will be up and running in ninety days.

CALIFORNIA.—No work is done below the 1300-foot station in the main shaft, now 1450 feet deep. Since breaking the steel wire cable, sinking has ceased, the water now being nearly up to the 1400-foot station. A new cable is expected, when the water will be taken out and the sinking resumed.

HIDDEN TREASURE.—The main shaft has attained the depth of 1400 feet, making it the deepest mine in the State of Colorado. Present development-work is doing in the 1500-foot west level. The 1400 level, when driven to the California mine on the east, will strike that shaft at the depth of 1500 feet, there being a difference in the elevation of the ground of 100 feet.

GUNNISON COUNTY.

The Gunnison Iron and Steel-Works have, after a thorough examination of the properties on Gold Hill, purchased the claims known as the Deadlock, Bullion King, York, Sinbad, Michigan, and Iron Mountain. These claims all lie to the south of the wonderful Cumberland, whose production of iron is well known. The vein that crops boldly to the surface on the Cumberland is easily traced to the apex of Gold Hill, across the above-mentioned claims, which, only partially developed, show that the iron exists in large bodies. Work has already been commenced, and the force will be increased to 200 men very shortly.

HINSDALE COUNTY.

MASTODON.—The run of this ore at the Crookes concentrator has been a success. Out of the nine tons run through, there are three tons of concentrates, two and a half of which will give 70 per cent lead. The other half is second-grade, with more or less lead. The ore was not assorted, but taken from the width of the vein.

LAKE COUNTY.

Late Leadville exchanges contain the following: "It has long been realized," says the *Herald-Democrat*, "that the facilities for treating the ores produced in this district were entirely inadequate, and, as a result of this, a new smelter is about to be provided under a co-operative system. Several meetings have been held in reference to the scheme, and the conferences have been most satisfactory. At least one million dollars will back the enterprise, and it is expected that work will begin very shortly."

ADAMS.—This company has been organized to work the Brookland and Clontarf mines. The pumps at both shafts are running at full capacity, and the Clontarf shaft, already free from water, will begin taking out ore immediately. As soon as the transfer of the properties is completed, an effort will be made to connect the two shafts by a level, when the Brookland will be used principally for pumping, while the extraction of ore will be carried on through the Clontarf.

EVENING STAR.—The recent new strike shows a gray sand and hard gray lead carbonate, assaying respectively five ounces in silver and fifty-eight per cent in lead, and eleven ounces in silver and thirty-three per cent in lead. The new discovery is considered of importance, as up to the present time the mine has failed to disclose any ore in this portion of the claim, although several winzes were sunk to the ore-plane as the incline advanced.

GLASS-PENDERY.—The property has opened a large body of iron ore, through which are disseminated good-sized pockets of fine ore. Shipments of iron ore, running from six to eighteen ounces, are made regularly, while at short intervals lots of very fair ore are sent to the smelters. The mass of iron developed in the mine is very large, and being situated below the old working-levels in the mine, it was considered advisable to drive a drift to connect the ore-body with the Glass shaft. Only about twenty feet yet remain to be cut through, when the connection will be effected, and the ore can then be extracted at greatly reduced expense.

LITTLE PITTSBURG *vs.* LITTLE CHIEF.—Col. J. B. Bissell, referee in the case of the Little Pittsburg *vs.* the Little Chief Mining Company, July 13th, returned a verdict awarding the Little Pittsburg Consolidated Mining Company $19,400 and ten per cent interest per annum for nearly three years. The history of the case is about as follows: During October of 1880, while Mr. John T. Herrick was manager of the Little Chief mine, he learned of a fair streak of ore situated on the line of the Little Pittsburg claim, which his predecessor, Mr. George Daly, had left standing and lagged up. Mr. Herrick directed his foreman to take down the lagging and extract the ore. On these orders, the miners of the Little Chief entered the premises of the Pittsburg and began the extraction of ore, following the ore-body for about thirty feet. Hearing work in progress, the Little Pittsburg immediately drove a drift to intercept the trespassers, but failed to reach them until, it is alleged, about thirty thousand dollars' worth of ore was broken down and shipped by the Little Chief Company. Evidence for a suit for damages was immediately collected, and a suit instituted. Numerous delays followed, and finally Col. J. B. Bissell was appointed to receive testimony, and listen to the arguments of the attorneys. In justification of his act, the manager of the Little Chief alleged that, while connected with the Little Pittsburg mine, that company obtained twice as much ore from within the boundaries of the Little Chief claim, and now connecting with the Little Chief, and seeing an opportunity to equalize matters, he embraced it, and stoped the ore from the Little Pittsburg territory as alleged. The Little Chief filed a claim as an offset to that of the Little Pittsburg, and of nearly double the amount, and also attempted to show that the claim of the Little Pittsburg was excessive.

MATCHLESS.—A ten-ton lot of ore, averaging 375 ounces to the ton, was shipped recently. The northern workings of the mine now show about six feet of lead carbonate ore, the greatest quantity of this character ever disclosed in the Matchless. The southern portion of the claim is disclosing additional pockets of rich horn-silver.

NEW PITTSBURG.—Considerable work is in progress on the property of this company.

ROBERT E. LEE.—A great deal of exploration-work is doing at present.

ST. LOUIS.—This mine on Breece Hill, is making some very fair ore-shipments. The property embraces the principal portions of the former Colorado Prince and Miner Boy mines, together with the main shafts, tunnels, and buildings on these properties. During the past few weeks, the lessees have shipped about fifty tons of low-grade oxidized ore, the value of which has not yet been ascertained. The mine also produced, and in various small lots, some quite high-grade gold ore.

PARK COUNTY.

LONDON.—A special dispatch says that this company's stamp-mill has been demonstrated a success. The clean-up amounts to from 155 to 150 ounces of amalgam in twenty-four hours, worth from $800 to $1000. It is believed the mill will produce $1000 a day from London ores steadily and without increasing the capacity. Embrey concentrators are to be put in the mill to work over the concentrates.

PITKIN COUNTY.

ST. ELMO CONSOLIDATION.—The mines embraced in this property are located in Conundrum Gulch, a short distance from Aspen, and during the present season have been worked with considerable activity. A shaft seventy-five feet in depth has been sunk at the St. Elmo mine and has been drifted from in all directions. The shaft has penetrated a good body of quartz carrying silver glance, and assays have been had as high as five thousand ounces. In the development of the claim, about one hundred tons of ore have accumulated upon the dump, and it is the intention of the owners to begin the shipment of this matter to the Aspen smelter at once.

SUMMIT COUNTY.

CINCINNATI.—This mine has been leased. The lessee has done a considerable amount of development-work, cleaning out old tunnels and shafts. This property was once thought to be the most valuable in Summit County, but for several years has been suffered to lie idle. General Wilson, the lessee, has a contract to operate the mine for several months, and expects to ship three car-loads of galena per week.

KEYSTONE BULLION COMPANY.—The works are running to their full capacity and are concentrating nearly 100 tons daily, which will give about two car-loads of concentrates per day. The principal source of supply is from Mayo Gulch, the Washington group, the Penn-Breckenridge property, and the Union mine, also the IXL property at Swan.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended July 1st: Ore produced, 1050 tons. We have not started the drifts in the winze, but have begun stoping ore there. Every thing in and about the mine is running in good shape. July 8th, reports: Ore produced, 1025 tons. Shipped 59$\frac{5}{8}$ ounces gold, value $10,000. The ore on 400-foot level at bottom of winze is looking well as work advances. The mill is running to its full capacity.

FATHER DE SMET.—The superintendent's report for the week ended July 8th, shows ore extracted from first, second, and third levels, 1950 tons. Ore milled, 1950 tons. Golden Gate north header advanced 7 feet. Header in 165 feet.

IDAHO.

High water in Snake River has somewhat interfered with mining. The sluice-boxes have generally been temporarily removed, but are replaced as the water subsides. Two new companies are just beginning work. One company is making a ditch on the west side of the river. It is stated that the St. Paul Placer Mining Company is going to do work on a large scale.

PHILADELPHIA MINING AND SMELTING COMPANY.—Good progress is made at the company's works. The mines are opening up well, and showing large quantities of ore that can be extracted at slight cost as compared with most of the mines in this section. The two old smelting-furnaces of the company are doing good work and running right along, turning out from one and a half to two car-loads of base bullion per day. The two new furnaces just erected are ready to start. When the four furnaces get to work, they will reduce about 120 tons of ore, and yield from 40 to 50 tons of bullion per day. The works, started as an experiment, are now an assured success. They have, during the past two months, received ores from over fifty mines. The quantity of ore so far received exceeds 2500 tons, of which nearly a thousand tons remain in the bins at the works. This ore came from mines scattered all over the Wood River or smelting section, and averaged 55 per cent in lead and about 100 ounces in silver.

MEXICO.

A correspondent of the Mexican *Financier* writes about the mines at Tlalpajahua as follows: Tlalpajahua is in the northeast corner of the rich State of Michoacan, close to the boundary of the State of Mexico, and within about four miles of Mineral del Oro in the latter State. At Mineral del Oro, an American company is putting in a twelve-inch pipe pump, and fine hoisting machinery, and is building reduction-works. Not less than 3000 miners can be had here at 50 cents a day, and common peons at 31 cents. There is plenty of low-priced fuel; oak-wood at $4 a cord, and pine at $3. The streams here have plenty of water in the rainy season, and from February to June they become low; but at any time, there are not less than 100 miner's inches of water, and it would be very easy to use it as a motive power and for hydraulic purposes. What we greatly need here are reduction-works with two or three stamp-mills of from 50 to 100 tons capacity each. There are here fourteen quartz-veins varying from six inches to 15 feet in width, and there are over one million tons of rejected ores on the old dumps giving from $10 to $25 a ton. Our city is paved with quartz, and there is no doubt that some day some smart American company will undertake to mill all this quartz and to pave over the streets of Tlalpajahua with the regular country-rock. The arrastra men are hauling ore from the old Corona's and Borda's dumps as far as sixteen miles, working the ores on the ancient and primitive arrastra, saving some of the gold, the rest being lost, together with all the silver.

Tlalpajahua is about nine miles south of the Mexican National Railroad, and is convenient to two stations, El Oro and Tepetongo, to which we have very good wagon-roads. There are ten or fifteen mill-sites here, with more or less water-power. Some new locations have been made here lately, among them one by several employés of the Mexican National Railroad. They have almost one kilometer in length on the Temascales vein, one of the good veins of the camp. They are working steadily, and before long will cut the main vein. Not less than fifty smaller mines are idle for want of reduction-works, as all we have here now is a five-stamp mill, made by Fraser & Chalmers, of Chicago, which is worked by water-power with fine results. This mill is working the ore of the Concepcion group of mines, the owners of which are both Mexicans and Americans. They have ore as rich as $500 to the ton, but never less than $50. The ores of the different veins of the camp are almost all of the same kind—quartz with sulphurets and native silver; some chlorides may very rarely be seen, but all the ores have high grades of gold.

Several of the mines are capable of producing from fifty to several hundred tons of ore daily; among them may be counted the Coloradillas, Santa Rosa, Azteca, San Juan, Concepcion, Borda, La Nacional, Jesus María, and fifty more. Several other mines can produce very rich gold ore, and their output is from five to twenty-five tons each, daily. Among them are the Sirena, Comanja, El Muerto, La Trinidad, Santa Rita, La Casa, and many more smaller veins. In fact, what we need here is modern-process milling-works, capable of reducing from 50 to 100 tons a day; and before a year or two are passed, this camp can produce ten times that amount, as here are hundreds of mines now just on the surface with none of them more than two or three hundred feet deep, with the exception of the Borda, which is about 400 feet deep. These Borda mines produced over $35,000,000 just before the war of independence, but they are now full of water. The Borda group is owned by a Chicago company, which has been fixing the roads from the town to the mines, and extensive machinery is expected to be working there before long.

The mining interests at Zomelchuacan, Vera Cruz, continue to be most encouraging. A new gold mine has recently been denounced in the district.

Some very good lead mines have lately been opened near Jalacingo. The ore assays 70 per cent lead and eight ounces of silver to the ton of 2000 pounds.

CONSOLIDATED MINING COMPANY.—This company of Zomelchuacan has sent its first bar of gold to the mint. More will be sent as soon as it can get the new amalgamating pan which has been ordered. The company has been building quite extensively for the new smelter, which will probably be soon in operation

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There is a considerable quantity of lead carbonate ores on hand to start it up with.

MIQUITA.—A rich vein of ore carrying gold has been recently struck.

SAN JUAN DE DIOS.—This mine, situated in the Hermosillo District, Sonora, has been sold to an American company for $87,000.

MICHIGAN.

The Marquette *Mining Journal* gives the following table, which exhibits in gross tons the total lake shipments of iron ore from upper peninsula ports the present season, up to and including July 11th, together with the amount shipped from the same ports during the corresponding period of last year :

Name of port.	1882.	1883.
Escanaba	726,403	480,869
Marquette	406,980	183,821
L'Anse	17,338	18,377
St. Ignace	10,427	2,518
Total	1,161,148	685,585

Showing a decrease of 475,563 gross tons.

CHAPIN.—At the west end of the mine, the ore-body shows a width of from 100 to 130 feet of ore ; and as the Ludington has 103 feet of ore on the same vein at the most easterly point to which mining work has reached, it is quite apparent that the Chapin has a body of ore yet untouched within the limits described. An attempt to reach this ore by a shaft put down in the overlying quicksand has been made, but was not successful, and the management will adopt some other plan of attacking it.

FRANKLIN.—In the interest of economy, the management is preparing to use coal on the mine for steam purposes. A tramway from the lake front to connect with the foot of the incline is just completed, which will be used in transporting coal to the top of the hill with but one handling.

OSCEOLA.—Preparations are making to erect another head of Ball's stamps in the dressing-works.

ROPES GOLD MINE.—The boiler for this mine is now in place, and, as soon as the steam-pipes are in, the pumps will be started up and the shaft unwatered, when mining will begin in earnest. Sinking and drifting will be prosecuted, and the lode shown up as fully as can be. The mill is ready to begin stamping as soon as the power to drive it is in shape.

MISSOURI.

THE NEW ST. JOSEPH CONCENTRATING MILL.—The St. Louis *Republican* has a letter from a correspondent in which he gives the following details on the new St. Joseph concentrating mill, at Bonne Terre, built to replace the works destroyed by fire on February 25th :

The rebuilding of these works was begun on the ninth day of March last, and on the 25th of June instant, one of the largest and most complete mills in existence, occupying the sites where the old mill stood, and filled with improved machinery for dressing ores, was completed and set in operation.

The main building is 150 feet long by 122 feet wide. The engine and boiler-houses at the north end of the mill are respectively eighty feet long by thirty wide and ninety by forty. The boiler-house at the south end (partially completed) is sixty feet long by forty wide, and the machine-shop is fifty feet long by twenty-five wide. Except the lower story of the main building, all these structures are built entirely of iron on stone foundations. The lower story is built of oak timber, but covered with corrugated iron. It has three hundred and fourteen upright columns, sixteen inches square, which carry the crushers, rolls, screens, pipes, and pumps, all below the main floor, and support the long lines of shafting. There are in this mill six Blake crushers, seven pairs of Cornish rolls, sixteen double percussion-tables, thirty-six double horizontal jigs, thirty-six plunger jigs, two Wilbraham pumps, with a capacity of 3500 gallons per minute ; five Knowles pumps ; fifteen centrifugal pumps ; thirty-three mortised, beveled, and spur-gear wheels ; 120 pulleys, and over 3000 feet of belting. This machinery is operated by two Harris-Corliss condensing engines, having a combined capacity of 300 horse-power, built in Providence, R I. Five batteries of boilers supply the engines with steam. Three months and a half from the day on which the first stone was laid in the foundations of these buildings they were virtually finished, and the entire machinery, made in many different places throughout the country, was in place. The engines were started and tested on the first day of June, instant, and now hundreds of wheels are making their rapid revolutions and answering the purposes for which they were devised.

MONTANA.

GALLATIN COUNTY.

HENRY VILLARD HYDRAULIC GOLD MINING COMPANY.—A description of this company's property shows the following : The mines are situated in Emigrant Gulch, about twenty-five miles from Livingstone, on the road to the National Park. The company owns what is believed to be the old channel of the gulch. It has about 380 acres of ground. A small portion of this has been worked continuously for the past twenty years, and has yielded a large quantity of gold. One claim now worked by hand yields a net profit of $11 per day to each man. Since purchasing the ground, the company has sunk five prospect-shafts twenty-five feet deep, and they show good pay-dirt all the way down. This, however, does not take them down to bed-rock, there being from sixty to one hundred feet of gravel on the bed-rock as shown by the old workings. The company owns the Mill Creek water-right ; and for the purpose of more extensive operations than at present, it proposes to construct a ditch eight miles in length, to bring its waters to the mines. It will have a capacity of six thousand inches, which will be fully sufficient for all requirements. Thirty new claims adjoining this ground have been taken up recently, for the working of which water will be procured of the company.

MADISON COUNTY.

BELL.—This mine, situated in the vicinity of Virginia City, is developed by two tunnels, one of which is over 400 feet. The average width of the vein is 15 feet, and the rock assays 40 ounces of silver, with considerable gold.

PROSPECT.—This property has a shaft 35 feet deep, from the bottom of which is a level 220 feet, the ore along the ledge assaying 50 ounces in silver. Still below is a tunnel in 200 feet, the ore assaying about the same as in the upper level ; and still below this is another tunnel, in 400 feet, which assays 40 ounces. The width of the vein where it has been struck in all the tunnels and levels is from ten to twelve feet. One hundred and sixty feet from the mouth of the lower level, starts an incline, which is down 35 feet.

VIRGINIA CONCENTRATING COMPANY.—A concentrator of 130 tons capacity is building at Virginia City for the purpose of testing the ores in the immediate neighborhood. It it should prove a success, more extensive works will be built.

SILVER BOW COUNTY.

ALICE.—A three-foot ledge of 277-ounce ore has been uncovered on the west drift from the 200, which is undoubtedly the same vein which has been stripped on the 100-foot for a distance east and west of over 300 feet. Cross-cutting to intercept this body of ore will be commenced immediately from the 400-foot level.

BELL.—The concentrator has started up, and it is expected will work from 60 to 70 tons of ore from the low-grade dump per day.

NEVADA.

ALBION.—Since so many varying reports concerning this property have been published recently, the Eureka *Sentinel* has felt obliged to give the correct facts. They are stated as follows : At the time the last assessment was levied, Selby & Co., smelting and lead company, the principal creditors of the Albion Company, agreed to advance sufficient funds to pay off the miners and laborers, who held liens against the mine to the amount of $45,000, which they did advance in cash. They were also willing to postpone the payment of their own claim, amounting to $120,000, as well as that of Prescott, Scott & Co., foundrymen, amounting to $20,000 more, in order to give the mine a chance to work itself out of its financial embarrassment by allowing it to run and to be developed. It was then considered by the trustees of the Albion that, if an assessment of 50 cents per share, amounting to $75,000, could be collected, it would put the mine in such a financial condition as to relieve it of its pressing necessities, and enable it to carry on the work of development. It was with this view that the 50-cent assessment was levied. The stockholders, however, refused to pay the assessment, which brought into the treasury of the company 112,000 shares of the delinquent stock. But neither the trustees of the Albion nor the creditors are responsible for that. It is true that the mine has been advertised for sale for a claim of $1800 by a party holding an execution ; but this claim was settled on the 1st of July, and the execution withdrawn. There is no expectation here that the mine will be sold at all ; but we have it from the best authority that it will not only not be sold, but that it is the intention of the present management to push the development of the mine with the utmost vigor, and that it is not an exaggeration to assert that the Albion mine will probably be entirely out of debt within the course of the present year. It may be safely predicted also, that within a few months the condition of the mine itself will be better than ever before. A later report by the same paper states that 25 tons of ore were hauled from the Albion to the Eureka Consolidated furnaces, July 9th, the first shipment since the recent adjustment of affairs and the general transfer of accounts to Prentiss Selby.

EUREKA CONSOLIDATED.—An official letter shows that at the Locan shaft the main drift is running as rapidly as possible. One furnace is running and producing as usual. The following prospect-work has been done during the week : 3d level uprise on quartzite, 12 feet ; in all, 64 feet. Main drift, Locan shaft, driven this week 42 feet ; in all, 47 feet.

UTAH.—The following gentlemen were elected to serve for the ensuing year at the annual meeting : Charles H. Fish, President ; R. H. Follis, Vice-President ; G. C. Pratt, Secretary. The Board of Trustees is as follows : Charles H. Fish, Richard H. Follis, and D. B. Lyman. The superintendent's report shows that a great deal of repair work has been necessary to keep the openings in a safe condition. At the 1350 level, the south lateral drift has been cleaned out and retimbered 775 feet to the company's south line. At this point, the drift connects with an incline winze leading up to and connecting with the Sierra Nevada 1200-level drift, which runs in a southerly course to that company's shaft. Through these openings, we get natural ventilating air. The drifts also contain the pipes which convey the water from the mine to the Sutro Tunnel. At a point 315 feet north of the incline, No. 1 crosscut has been extended 87 feet ; total length, 207 feet. This drift has been advanced farther to the west than any other without finding the west wall. At the 2500 level, the east main drift has been extended 69 feet, the face of which is in very hard rock and free from water. No work has been done in the south lateral drift during the year. The flow of water remains unchanged. An unlooked for expense has been incurred in repairing drifts and water-pipes through which the water flows to Sutro Tunnel. Early in March last, the pipe burst at a point 1100 feet south of the Sierra Nevada shaft on the 1500 level. Owing to foul air and the caved condition of the drift, it was impossible to reach the break until ventilating-pipes had been put in, and the drift cleaned out and repaired for a distance of 600 feet. When the break had been reached and temporarily repaired, I deemed it an economical measure to abandon cleaning out and retimbering the remaining 800 feet of drift to the point where the pipe connects with the Union shaft drain-pipe. Instead I am now running a drift from the Union shaft drain tunnel, 1600 level, having first made an uprise of 25 feet. This drift is now extended from the top of the uprise 180 feet, leaving 60 feet to run to connect with 1500 level Sierra Nevada drift at the point where the pipe was repaired. This work will be completed and pipes laid through the new drift by the end of the present month. The machinery is all in good working order. The pumps are running successfully, and the water is down to the lowest point in sump.

UTAH.

FRISCO.—Large quantities of ore are produced daily. The company has 3000 feet of tunnels, shafts, and rises. The vein will average thirty inches all through the mine. The lower tunnel, to tap the vein at a depth of 200 feet deeper than the present vein workings, is in 240 feet, and according to the survey there are only thirty-six feet more to run to strike the vein.

SILVER MOUNTAIN.—The report presented at the annual meeting, held at Salt Lake City recently, shows that the tunnel has a total length of 386 feet. At this point, a fine body of carbonate and galena ore was encountered, varying in width from one to five feet. Assays made show 43 per cent lead and 82½ ounces of silver per ton. The composition of this ore is such as to render it an exceedingly fine ore for smelting. Extracting and shipping ore will begin as soon as the developments in the level run from the point where the strike was made are sufficiently advanced.

The purchase of the Dexter mining claim, adjoining the Silver Mountain, for $2000 in money and 500 shares of stock, is also reported. The width of the vein not being determined, and the ore-body being unexplored, I considered it of great importance to secure the adjoining ground before the extent of the strike becomes known, and therefore advised the purchase, which secures the company a large and very valuable tract of additional ground.

TINTIC DISTRICT.

The mining outlook in this district is good, with the exception of the Mammoth property, which is lying idle, not from any fault of the mine, but from bad management. The Eureka mine is turning out about thirty tons of ore per day, which is shipped to Colorado to be smelted. The Beck mine is working about twenty men, and the property is looking fair, and the output is regular. Messrs. Smith & Martin have taken charge of the Red Bird Consolidated at Eureka, and are putting in fine steam hoisting-works, among the best yet erected in the district. The Park property has a concentrator at work. The gangue or waste from this mine is very soft, and easily washes away, leaving the concentrates in the form of lead ore very rich in silver. The Old Chicago has a good strike on it, lately made in the well-defined ledge, which runs about 100 ounces in silver. The Northern Spy is supplying the Tintic mill with ore, and is doing a good business, and has a steady output.

VERMONT.

VERMONT COPPER MINING COMPANY.—The company has now paid one third of the amount due for laborers' wages for the months of May and June. The company as at present organized will not resume work, and the mines will probably be idle the rest of the year or longer.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, July 20.

The mining market has been very dull this week, and the transactions afford little or nothing of interest to note. Eastern Oregon and Sonora have been the most active stocks dealt in, while Horn-Silver has displayed the most strength. Below will be found a complete summary of the market. The total number of sales aggregates 115,559 shares, as against 224,910 last week.

The Comstock shares have been very quiet at weakening prices. Consolidated Virginia, with a fair business, was irregular, selling from 40 @32@35c.; Sierra Nevada sold at $3.90, with a small business. Union Consolidated has been quiet and weak, selling from $5.50@$4.75. Mexican sold at $2.85. Consolidated Imperial records small sales at 4c. Sutro Tunnel has been moderately dealt in at steady prices; it sold at 19@20c.

The Leadville stocks were but moderately dealt in, and were steady. Amie sold from 14@12c., under small transactions. Chrysolite was quiet and steady, selling from $1.15@$1.10. Dunkin sold at 20c. Iron Silver records a fair business at strong prices, selling from $2.95@$3.10@$3. Leadville sold at 50c. Little Chief, with a small business, was irregular, selling from 50 @51c. Little Pittsburg was quiet and a little weak, selling from 70@65c. Climax sold from 13@10c., with small transactions.

The Bodie stocks were very quiet and weak. Bodie Consolidated was weak, a sale of 100 shares being quoted at 69c. Standard had a small business at weak prices, selling from $7@$6.50@$6.63. North Standard sold to-day at 7@8c.

The Tuscarora stocks record small transactions at steady prices. Grand Prize sold at 31c., and Argenta at 35c. Belle Isle was moderately dealt in, and was weak, selling from 45@39c. Navajo records a small business at steady prices; it sold from $2.85@$3. Elko Consolidated was quiet and steady at 22@25c.

In the miscellaneous list, Alice has been quiet and weak at $2.70@$2.50. Caribou records a small business at steady prices, selling from 12@13c. Green Mountain was quiet and irregular, selling at 71@73@72c. Homestake shows some strength under small transactions; it sold from $16@$17. Horn-Silver has been fairly dealt in, and has been quite strong; it sold from $6.88@$8@$7.75. Northern Belle was quiet and steady at $6.25. Robinson Consolidated has been very quiet at steady prices, selling from 61@60c. Sierra Grande was moderately dealt in and was weak; it sold from $1.25@$1. Stormont sold from 48@37c., with a small business.

Alta-Montana was quiet at 2c. Bradshaw records a fair business at weakening prices; it sold from 28@25c. Caledonia was quiet and steady at $1.15. Decatur sold from 3@5@4c., with small transactions. Eastern Oregon was actively dealt in at strong prices; it sold from 72@76c. Oriental & Miller was quiet and steady at 14@13c. Sonora Consolidated was very active at irregular prices; it sold from 29@25c.

A suit has been brought to dissolve the American Mining Stock Exchange, and for the distribution of the insurance and gratuity fund to its members. The Exchange gave up its rooms at 63 Broadway last May, and since that time its members have disbanded and joined other exchanges. Action is now brought for the purpose of having a receiver appointed to take possession of the fund, which amounts to about $10,000.

The Governing Committee of the New York Mining Stock and National Petroleum Exchange has reduced the fee for transferring seats in the Exchange from $100 to $25.

DIVIDENDS.

The Father de Smet Consolidated Mining Company, of Dakota, has declared its twenty-eighth dividend of twenty cents per share, payable July 31st.

PIPE LINE CERTIFICATES.

As will be seen by our table below, this week has been a very active one in the oil market. A decline set in in the early part of the week, and was only checked to-day, when strong figures prevailed. There was no news of importance from the oil regions to affect the market.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
July 14.....	$1.08	$1.08¼	$1.03⅞	$1.04⅝	3,646,000
16.....	1.04¼	1.04¼	1.00⅝	1.02⅝	5,314,000
17.....	1.03⅛	1.04⅛	1.01⅛	1.01⅝	3,656,000
18.....	1.01⅛	1.01⅝	.97⅝	1.00⅛	4,645,000
19.....	1.01	1.02½	.99	1.01⅛	3,094,000
20.....	1.02	1.06½	1.01⅜	1.06⅛	3,319,000
Total sales.....					23,674,000

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. July 13.	July 14.	July 16.	July 17.	July 18.	July 19.
Albion	....	....	....	....	....	....
Alpha	2	2⅛	2⅛	2¼	2¼	....
Alta	.65	.70	.70	.70	75	.70
Argenta	.05	.05	.05	.05	05	.05
Bechtel	....	....	....	....	....	....
Belcher	1¼	....	....	1¼	1¼	....
Belle Isle	.35	....	....	.40	.40	.40
Best & Belcher	4¼	4⅜	4⅝	4½	4⅛	4¼
Bodie	.80	.75	.75	.60	....	.70
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.10	.15	.15	.10	.10	.10
Challar	3⅝	3¾	3¾	3¾	3⅝	3⅝
Con. Virginia	.40	.40	.40	.35	.40	.40
Crown Point	1⅜	1½	1½	1⅜	1¼	1¼
Elko Cons	....	25	25	25	....	25
Eureka Cons	5	4¾	4¾	4⅝	4½	4¾
Exchequer	....	....	....	....	....	....
Gould & Curry	2⅝	2½	2½	2⅝	3	3
Grand Prize	.05	.05	.05	....	.05	.05
Hale & Norcross	6¼	6⅝	6⅝	6½	6½	6⅝
Independence	....	....	....	50	....	.40
Martin White	....	....	....	....	....	....
Mexican	3	3	3	2¾	2¾	2¾
Mono	....	....	....	....	....	....
Mount Diablo	....	5	5	5⅛	....	....
Navajo	3	2⅞	2⅞	3⅛	3⅛	3
Northern Belle	....	....	....	....	....	....
North Belle Isle	....	....	....	....	....	....
Ophir	2½	2½	2½	3⅝	2⅝	2⅝
Overman	....	....	....	....	....	....
Potosi	1½	1⅝	1⅝	1½	1½	1½
Savage	2¼	2⅛	2⅛	2¼	2¼	2⅜
Scorpion	....	....	....	....	....	....
Sierra Nevada	4	4	4	3⅞	3¾	3⅝
Silver King	....	....	....	....	....	....
Tip-Top	....	....	....	....	....	....
Union Cons	5	5	5	4⅝	4½	4⅝
Utah	2¾	2¾	2¾	2⅝	2½	2½
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3⅞	4	4	3⅞	3¾	3¼

The following are the financial balances of the various mining companies on July 1st:

CASH ON HAND.

Alta	$12,131.81	Hale & Norcross	$870.43
Alpha Con	4,827.90	Jackson	2,591.38
Andes	937.15	Mono	3 319 35
Argenta	1,723.21	Mexican	7,632.39
*Belcher	26,724.26	Northern Belle	53,724.76
Best & Belcher	22,568.53	Ophir	19,684.22
Benton Con	10,056.68	Occidental	6,578.09
Bulwer	2.691 48	Silver Hill	2,562.34
Bodie Con	38,143.60	Sierra Nevada	36,045.60
Con. Imperial	7,602 83	Summit	1,372.19
Crown Point	23,229.58	Standard	116,03?.27
Challenge Con	5,117,73	Savage	12,234.33
Con. Virginia	20,824 34	Tioga Con	913 45
California	683.10	Utah	5,388.43
†Day	1,855.38	Union Con	22,173.42
Gould & Curry	134.92		

INDEBTEDNESS.

Grand Prize	$23,282.71	Martin White	$4,258.69
Lady Washingt'n	1,942.26		

Albion, exact amount not yet known; approximates $260,000.

* Belcher due Sutro Tunnel Company, $10,920.
† Bills payable, $91,151.81.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, July 19.

The market has lapsed into a state of extreme dullness again, the transactions being almost entirely confined to the stock of one mine on the list, namely, Quincy, which declined from $50@$48, with some pressure to sell the stock. Only one share of Calumet & Hecla changed hands, and that at $239, ex dividend $5, an advance of $1 over last sale. A small lot of Osceola sold at $21, and this comprises all the transactions in the copper-mining shares for the week. The brokers in these specialties certainly have reason to complain of the stupidity of the market, and are anxiously looking for a better time coming.

In silver stocks, with the exception of Silver Islet, there is not much change. The report from Silver Islet of a rich strike in the 1160 level has brought some buying orders, and the stock advanced from $4@$7½, with sales of about 600 shares. Sullivan declined from $1¼@75c., and at the Mining Board, sales were made at 62½c., seller 60 days. Catalpa and Cresent, both dull on the poor showing for June; the former declined from 57½@45c., the latter sold at 25c. Bonanza declined from $2¼@$2.

At the Boston Mining Exchange, there is less activity than last week, and prices are a shade lower. Bowman Silver declined from 27@21c., and Massachusetts & New Mexico got back to its old price again, 7c., sales. There was considerable doing in railroad stocks, Toledo, Cincinnati & St. Louis being most prominent, with sales of over 1000 shares at $3⅞@$2⅞, the latter figure being to-day's price.

3 P.M.—At the afternoon Boards, there was little doing. We note sales of Bonanza at $2. Quincy, at $48. Huron, at $1½. Silver Islet was offered at $7; no bid. Catalpa, 47½c. bid. San Pedro, 27½c. bid. $240 was bid for Calumet & Hecla. Franklin offered at $10. Pewabic, $3½ bid; and Atlantic, $11 bid.

BULLION MARKET.

NEW YORK, Friday Evening, July 20.

As foreshadowed in our postings of the 13th inst., our silver market has declined, and is weak at the figures of annexed table.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
July 14	50⅜	110⅛	July 18	50 5-16	110
16	50⅜	110⅛	19	50 5-16	110
17	50⅜	110⅛	20	50 5-16	110⅛

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of June.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	....	$398,410
*Alta-Montana, G. L. S.	"	....	$10.625
*Belmont	"	....	17,775
Bodie, G. S.	Cal	18,945	119,535
Bodie Tunnel, G.	"	3.185	54,642
*Bonanza King, G.	"	67,573	334,223
*Boston & Montana, G.	Mont	....	72,318
*Central Arizona, S.	Ariz	....	35,845
*Christy, S	Utah	....	117,736
*Chrysolite, S. L	Colo	$43,545	236,516
Cons. Bobtail	Colo	....	18,723
*Contention, S.	Ariz	81.594	557,428
Crescent, G.	Cal	....	13,000
*Custer, G. S.	Idaho	....	43,572
*Deadwood-Terra, G.	Dak	....	172,277
*Derbec Blue Gravel, G. S.	Cal	....	44,729
Evening Star, S. L	Colo	....	47,061
*Father de Smet, G.	Dak	25,058	178,163
*Frisco M. and S. Co., G. S. L.	Utah	....	$77 084
Gunnell, S	Colo	....	58,828
*Head Center Cons	Ariz	....	8,109
*Head Center and Tranquillity	Ariz	....	42.601
*Hecla Cons., G. S.	Mont	....	293,922
*Homestake, G.	Dak	....	419,148
*Hope, S	Mont	....	41,963
Horn-Silver, S. L.	Utah	264,000	1,547,000
Idaho, G.	Cal	....	88,642
*Independence, G. S.	Nev	....	32,991
Iron Silver, S. L.	Colo	....	503,831
*Jocui-tita, S.	Mex	....	‡228,022
*Kentuck, G. S.	Nev	....	10,393
*Lexington, S.	Mont	107,655	638,488
*Little Pittsburg, S. L.	Colo	7.451	35,645
*Marguerite, G.	Cal	6,998	45,745
*Martin White, G. S	Nev	....	136.317
Morning Star, S. D	Colo	....	84,428
*Moulton, G. S.	Mont	....	123,288
Mount Diablo	Nev	60,512	187,823
*Navajo, G. S.	"	....	343,962
*North Belle Isle	"	....	1,953
Northern Belle, S.	"	7,381	395,906
*Ontario, S. L.	Utah	87,652	1,038,687
*Oxford, G.	N. S.	7,076	35,255
*Phœnix, G	S. C	2,500	7,700
*Pinal Cons., S. L.	Ariz	23,218	186,618
*Satemo, G.	N. S.	....	2,500
*Silver Bow, G. S.	Mont	....	101,241
Standard, G.	Cal	133,026	575,822
Star, S.	Nev	....	27,095
*Stormont, S.	Utah	....	95,058
Syndicate, G.	Cal	9,043	29,116
Tintic M. and M. Co.	Utah	6,989	14,691
*Tip Top, S.	Ariz	....	‡22,983
*Tombstone, G. S.	"	91,400	414,230
Wyoming Cons	Cal	....	31.541
Yellow Jacket, S.	Nev	10,594	193.658
Total amount of shipments to date			$10,685,671

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

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Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended July 20th, as compiled from various sources, amounted to $131,262, as against $176,000 reported for the previous week. The receipts from January 1st, 1883, to date are $6,295,474.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended July 14th	$278,469
Corresponding week last year	225,000
Since January 1st, 1883	7,069,935
Corresponding period last year	36,372,334

Imports.

Week ended July 14th	$158,780
Corresponding week last year	16,609
Since January 1st, 1883	7,136,602
Corresponding period last year	2,021,989

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank lost £87,000 bullion, and the proportion of its reserve to its liabilities was reduced from 42 5-16 to 41 7-16 per cent, against 40 3-16 per cent at this date last year. June 19th, the bank gained £17,000 bullion on balance. The weekly statement of the Bank of France shows losses of 1,450,000 francs gold, and 2,275,000 francs silver.

METALS.

NEW YORK, Friday Evening, July 20.

Copper.—We confirm the favorable indications of last week, though it can not be said that as yet they have had any effect upon values. There is less pressure to sell than there has been for a long time, and inquiries for Lake from people who have not been supplied under the pool sales are getting more numerous. Odd lots are picked up for export at 15@15⅛c., which is the ruling quotation, while other brands are 14@14⅛c. The English market has retained its steadiness, although some of the merchants' circulars are bearish in tone, probably in opposition to the parties who are apparently getting ready for a squeeze, should business revive in the fall. London cables £63 10s. for Chili Bars.

To-day, the members of the Exchange took a turn at copper, and sales of 50,000 pounds of Lake at 15c. and 100,000 pounds at 15⅛c., and 150,000 pounds of Baltimore at 14⅛c. and 50,000 pounds at 14c. were recorded.

Tin.—Outside of the Exchange, where 350 tons of tin were sold, the business of the week has been quiet. The spot is concentrated in a few hands, and we quote spot Straits, round lots, 21¼@21⅜c. London cables £93.

Lead.—In the beginning of the week, 400 tons of Newark sold at 4·30c., and 400 tons of St. Joe lead at 4·32½c., and since then there have been small sales at 4·35c., for Common, which we quote. The large holders, among them the Richmond, hold firmly, and have not been sellers, and while there is no active demand, the offerings, too, are small. Refined may be nominally quoted 4·35@4·40c., nothing being done.

The telegraphers' strike has prevented the receipt of our usual dispatches from St. Louis and Chicago. England cables £12 10s. for Spanish.

Spelter.—This metal appears unable to rally, and we note sales at 4⅜c., a figure at which even some of our Eastern works must find it hard to compete, while Europe is out of the race entirely. England cables £15 5s. for Silesia.

Antimony.—There is nothing special to note. Quotations are 9¼@9⅝c. for Hallett's, and 10¼@10⅝c. for Cookson's, advices from England being lower.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, July 20.

Telegraphic dispatches are at hand, announcing the failure of the Manchester Iron and Steel Company, at Pittsburg.

American Pig.—The firmness which we have so frequently dwelt upon, so far as prime brands of No. 1 is concerned, continues, while No. 2 and Gray Forge are quiet and easy. Furnace agents report a fair business, the Thomas Iron Company alone having contracted for 3000 tons at full figures.

At the Metal Exchange the following sales have been reported during the week:

Monday, 100 tons No. 1, October delivery, at $22.50, and 200 tons at $22.37½. Tuesday, 500 tons at $22.25, 200 tons at $22.37½, 400 tons at $22.12½, and 1200 tons at $22, all October delivery, and 100 tons at $22, 200 tons at $21.87½, and 200 at $21.75, all September delivery. On Thursday, 200 tons October were sold at $22.12½, and to-day 300 tons, November delivery, from $22.50 down to $22.25. We quote at tide-water, spot, according to brand, $21.75@$23 for good to choice No. 1, $19@$20 for No. 2, and $18.50@$19.50 for Gray Forge. Nothing has been done in Bessemer pig. England cables 50@51s. Spiegeleisen is quiet, with 20 per cent quoted $30.50@$31.

Scotch Pig.—There has been an advance in freights, which are now quoted by cable 9@10s. from Glasgow to this city, which induces importers to assume a firmer attitude, though business is not large and arrivals continue light. We quote ex ship: Coltness, $23.75@$24; Langloan, $23.75@$24; Summerlee, $23@$23.50; Dalmellington, $21@$21.50; and Eglinton, $21.

At the Exchange, the following cable quotations were received: Coltness, 61s. 3d.; Langloan; 60s.; Summerlee, 57s. 6d.; Gartsherrie, 57s. 6d.; Glengarnock, at Ardrossan, 55s.; and Eglinton, at Ardrossan, 49s. 6d. Warrants to-day were 47s. 4d.

Rails.—We hear of sales aggregating 15,000 tons, partly for early delivery, at $38½ at mill. There is considerable inquiry for small lots for such delivery, which has reacted somewhat favorably upon sales for fall and early winter. England is unchanged.

Old Rails.—There are several good-sized lots in market without eliciting bids higher than $21@$22.

Scrap.—Old material of this description is dull and lifeless at $22@$22.50 ex ship.

Philadelphia. July 19.

Eastern Pennsylvania iron quotations stand as recorded last week, and transactions up to present writing, for this week, show firmness in all except inferior makes of crude iron. Consumers are ordering quite freely, for near-by use, but can not be induced to place orders for remote delivery, as they look for a further weakness before the opening of the regular fall trade. Several furnaces are preparing to go into blast, and, should there be any material increase in the output, the present upward tendency will be arrested and uncertainties and fluctuations gather around the trade. The present output is apparently sufficient to meet actual requirements, and firm prices can be held. Special No. 1 Foundry sold to-day at $23.50, and all furnaces are well sold up for the summer output. The standard brands are held with considerable firmness, although occasional transactions have leaked out at lower than quoted rates. Very little good No. 1 has been sold below $22, and some firms hold at $22@$22.50. No. 1 iron, no better than No. 2, is sold at $21.50. No. 2 averages $20. A number of transactions for ordinary makes were closed at $19.50. The mill-owners are preparing to resume, and some few orders for 500-ton lots have been placed at from $17.50@$18 at furnace; $17 iron is to be had, but there is less of it offering than two or three weeks ago.

There is some little inquiry for Scotch iron, but very little is doing. Bessemer iron is dull, and quoted nominally at $21.50, but large consumers will not pay that price. A good deal of ore is arriving.

Spiegeleisen is quoted, $31 for 20 per cent; with buyers waiting, at $30.

Sales of Muck Bars have taken place between $34 and $35, with a tendency toward the lower figure. Best Charcoal Blooms command $61, and small sales have been heard of from this down to $56, and from $47 to $50 for different makes of anthracite.

Merchant Bars are held at 2·20c., but the business done below this is increasing. In view of the increased output, buyers are more exacting, and it is harder to place orders at 2·20c. Small lots are 2·25c. Stores are doing a fair business. Country mills are selling their inferior makes all the way from 1·90@2·10c.

Nails.—Inquiries for nails begin to improve, and prices remain substantially as heretofore quoted, $3 to $3.15. The Western suspension will help demand here. Fall requirements will be heavy. Offers of less than $3 have not been accepted.

In structural iron, plate and tank, and all kinds of sheet-iron, a fair movement is reported, though very little has been done in the way of anticipating September requirements.

Steel rails are quoted $38@$39, and thus far it appears that makers have the advantage in negotiations. Offers of $36@$37 have terminated in orders at $37.50 and $38. Western mills are taking large orders at $39@$40. The demand for railroad material is satisfactory, and prices are strong.

Pittsburg. July 19.

The improvement in the iron market which was noted last week continues, with the result of drawing out a good deal of inquiry during the past few days, and a moderate number of orders for immediate delivery.

The fact is more clearly brought out that supplies in consumers' hands are lower than prudence permits, and some of the larger consumers have placed orders for two or three weeks' requirements, intending to await further developments. The holders of the Marshall iron have quieted the market by the assurance that they will not unload it in bulk, but will dispose of it in a manner that will not unduly influence the market.

The nail men have shut down for a month, in order to keep prices where they have been for ninety days. Stocks are low in first and second hands, and they will be able to maintain prices where they are by the present policy. Steel mills are partially idle for repairs. The supply of all kinds of steel is heavy, and prices weak. Inquiry for old rails is active and negotiations for large lots are pending. Bessemer iron is quoted at $21.50. No. 1 Foundry, $19@$21. Old Rails, $22.50. Red Short mill iron, $18.50. Warm-Blast Charcoal, $26. Cold-Blast, $28@$30. Muck Bars, $34.50. Demand light. Merchant Bar, 2c. in small lots and 1·90c. shaded in large lots. Nails, $2.90. Wrought Pipes, $70 and $80. Track supplies are in active demand and unchanged. Crop-Ends, $25. Scrap Iron is in fair demand at $22 for Common, and $23@$24 for Selected.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, July 20.

Anthracite.

As anticipated, the month continues to be a very dull one. There is considerable coal moving, to fill June orders, but new business is very small in volume and is generally made on the basis of June prices, lower figures being more frequent than higher ones, practically no coal selling at circular rates, except the best Lehigh coals.

News from the West, which is now the principal point of interest, is not particularly encouraging, though no signs of any sharp competition appear on the surface. The Executive Committee of the Western Association met last week at Buffalo, to straighten out some of the irregularities in that market.

President Roberts, of the Pennsylvania Railroad, called a conference at Philadelphia, on Friday last, of the Western shippers of anthracite coal over his road. The probable effect upon the Westward coal tonnage of the Pennsylvania Railroad of the completion of new connections of coal roads to the West was fully discussed, and it is stated that the railroad officials showed their determination not to permit any diversion of trade, but to do all in their power to keep it in its present channel.

It is not believed that the heavily increased tonnage can be placed on the Western markets without some struggle, and it is feared that, if prices should suffer too much there, while well maintained here, the diversion to the seaboard might demoralize the trade

John H. Jones, official accountant, has just published the following statement of the anthracite coal tonnage for June, 1883. The figures include the entire production of anthracite coal, excepting that

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. July 14. H.	July 14. L.	July 16. H.	July 16. L.	July 17. H.	July 17. L.	July 18. H.	July 18. L.	July 19. H.	July 19. L.	July 20. H.	July 20. L.	SALES.
Alice, Mon.					2.70	2.60							350
Amie Con., Co.			.13		.14	.12					.12		3,900
Argenta, Ne.					.35								500
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.	.4				45		.69		.39				1,200
Bodie Cons., Ca.													100
Breece, Co.													
Bulwer, Ca.													
California, Ne.													
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.	.13	.12			.13		.13		.13				3,000
Chrysolite, Co.	1.15		1.15	1.10	1.15						1.10		2,400
Climax, Co.													
Cons. Va., Ne.					.40	.37			.36	.35	.35	.32	4,600
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.					.20				.20		.20		1,800
Eureka Cons., Ne.													
Excelsior, Ca.													
Father de Smet, Dk.	4.00												100
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.													
Grand Prize, Ne.					.31								700
Great Eastern, Dk.											.01		500
Green Mountain, Ca.			.71		.78	.72							2,000
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.					16.00				17.00				600
Horn-Silver, Ut.	7.00				7.25	7.13			7.00	6.88	8.00	7.75	1,740
Hukill, Co.													
Independence, Ne.													
Iron Silver, Co.	3.00	2.95					3.00		3.00		3.10	3.00	3,830
La Plata, Co.													
Leadville C., Co.					.50								500
Little Chief, Co.	.50				.53	.51							1,700
Little Pittsburg, Co.	.70		.70	.65					.70	.65			900
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.					3.00	2.85					3.00	2.90	1,700
Northern Belle, Ne.					6.25		6.25						300
North Belle Isle, Ne.													
Ontario, Ut.													
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.							8.00	7.50					200
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.61				.61	.60			.60				6,600
Saint Joseph's Lead.													
Savage, Ne.	2.20												100
Sierra Grande, N. M.	1.25				1.15		1.15	1.10	1.05		1.05	1.00	3,700
Sierra Nevada, Ne.					3.90								150
Silver King, Ar.							5.50						100
Spring Valley, Ca.													
Standard, Ca.			6.75				6.50		7.00		6.63	5.50	599
Stormont, Ut.		.48			.37								1,700
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. July 14. H.	July 14. L.	July 16. H.	July 16. L.	July 17. H.	July 17. L.	July 18. H.	July 18. L.	July 19. H.	July 19. L.	July 20. H.	July 20. L.	SALES.
Advance.													
Albion													
Alta													
Alta-Montana, G.			.02		.02					.02			5,400
Am. Flag, s.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'icher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.					.29	.26	.26		.26	.25			3,000
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W.&M.Co.													
Cal., B. H., G.			1.15		1.15								300
Central Ariz'na, s.							.10						1,100
Cherokee, G.													
Climax, Co.	.13	.12	.11	.10			.10						1,700
Cons. Imp'ri'l, G.S.							.04						900
Crowell, G.													
Dahlonega, G.													
Decatur	.08						.08					.05	.04	5,200
Dunderberg													
Durango, G.													
Eastern Oregon	.73	.72	.73	.72	.73	.73	.73		.75		.76	.75	16,100
Elko Cons.	.22				.22		.25						600
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.													
Hortense, s.											.08		500
Imperial													
Lacrosse, G.					.11						.09		1,600
Lucerne													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.	2.85												50
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S.L.											.08	.07	600
Ori'nt'l & Miller, S.	.14	.13	.40		.14				.13		.13		3,400
Parnell													200
Quartz Creek													
Rappahannock, G.													
Red Elephant, S.													
Ruby, of Arizona													
Silver Cliff, S.									.15		.16		800
Sonora Con.	.27	.25	.29	.27	.27	.25	.26	.25	.26	.25	.27	.25	19 300
South Bodie, G.													
South Bulwer, G.													
South Hite											.08		100
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel	.20				.20		.20		.20		.20	.19	10,500
Taylor Plumas													
Union Cons., G. S.	5.50				5.00						4.75		550

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 45,659. Non-dividend shares sold, 69,000.

BOSTON MINING STOCKS.

	July 13. H.	July 13. L.	July 14. H	July 14. L.	July 16. H.	July 16. L.	July 17. H.	July 17. L.	July 18. H.	July 18. L.	July 19. H.	July 19. L.	Sales.
Allouez													
Amie													
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.	2.25				2.13		2.13	2.00			2.00		450
Bowman Sil	.28	.26	.26				.22	.21	.22	.21			12,600
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.					239						241		6
Catalpa			.58		.50		.50		.45				1,000
Central Ariz													
Climax													
Co. Virginia			.45										200
Copper F'lls													
Copperop.													
Crescent	.25												200
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas			.95										100
Duncan													
Dunkin													
Empire							.20		.26	.24			500
Eureka Con.													265
Franklin									10.00				25
Hancock G.													
Harshaw													
Huron											1.50		350
Independ'ce													
Indian Q'n.													
Mammoth													
Mass. & N.M.	.09		.08				.07		.07				14,250
Milton													
Napa													
National													
North Belle			6.75						6.88				35
Ontario													
Osceola							21.00	19.50					16
Penn-Breck.													
Pewabic													
Pine Tree													
Plymouth													
Quincy	49.00	48.00	49.00		48.63	48.25	48.25		48.13	48.00	48.00	47.50	217
Ridge													
Robinson									.62				100
San Pedro									.30				200
S'ra Nevada									4.00				50
S'ra Grande													
Silver Islet	5.50	5.00							7.50	7.00			615
Silver King													
Simpson Gd													
So. Pacific													
Standard													
Sullivan	1.00	87½	.75		.75		6.75		.75				20
Sutro Tun.	.21								.21				1,820
Sycamore													700
Twin Lead.	.15	.14	.15				.15	.14					8,700
Vizina													

PHILADELPHIA MINING STOCKS.

	July 13. H.	July 13. L.	July 14. H.	July 14. L.	July 16. H.	July 16. L.	July 17. H.	July 17. L.	July 18. H.	July 18. L.	July 19. H.	July 19. L.	Sales.
Amer. Cons.													
Argent.	.18		.19	.18			.19	.17	.17	.16			15,700
Arizona So.													
Battle Mt.			.03										3,000
Buena													
California													
Calista													
Chrysolite													
Cincinnati			.11	.10							.12	.11	44,400
Comprom'e.			.19				.17		.16		.19	.18	17,000
Contention													
Con. Virg.													
Dauntless													
Del Monte	.08	.02	.02				.02						5,700
Denver City													
Eureka													
Girard	.06	.04	.04								.03		4,700
Governor			.05						.05				1,500
Grand Uni'n	.18		.18						.18				7,500
Green Mt.													
Gunnison	.42½		.42½				.40		.40		.40		6,300
Homestake													
Horn Silver													
Iowa Gulch	.07	.06	.08				.08	.07	.08	.07	.07		33,500
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd			.06				.07						4,200
Little Maud							.04						1,000
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan	.04		.03										2,000
Navajo													
North'n B'l													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.	.10		.09				.10		.09		.10		14,900
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis	.30								.30				6,600
Rara Avis E.	.09	.08	.09				.09		.09		.09		17,300
Record													
Rico Pion'r.													
Sierra Apac.									.23	.20	.20		700
Sierra Bel'e.							.55		.55		.52½		1,800
Sierra G'nde	1.20	1.17½	1.15				1.25	1.12½	1.12½	1.07½	1.07½		23,500
Sierra Nev.													
Silver Cord.			1.70	1.67½									2,300
Silver King.													
Silv'r Plume	.01										.02		8,000
Sonora Con.													
Standard													
Sultana							.03		.04				3,600
Sutro Tun'l.													
Tombstone	1.00	97½					97½				1.00	97½	2,100
Victor							.02						3,500
Yale Mt.													

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consumed by employés, and for steam and heating purposes about the mines :

	June, 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	1,026,526	3,645,255	2,906,674	I. 738,581
Central RR. of N. J.	*	1,745,399	1,888,373	D. 142,974
Lehigh Valley RR.	†529,927	2,848,728	2,619,692	I. 229,036
Del., Lack. & W. RR.	415,031	2,217,068	2,019,258	I. 197,810
Del. & Hud. Canal Co.	‡287,347	1,531,161	1,365,371	I. 165,790
Penna. RR.	253,672	1,208,969	1,056,800	I. 152,169
Pa. Coal Co.	124,516	653,183	604,880	I. 48,304
N. Y., L. E. & W. RR	33,560	161,004	106,804	I. 54,200
Total	2,670,581	14,010,767	12,567,852	I. 1,442,916

* Included in tonnage of Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 5718 tons.

‡ In addition, there were 47,377 tons transported from mines by Delaware & Hudson Canal Company, during June, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, June 30th, 1883, was 592,309 tons ; on May 31st, 1883, 645,377 tons ; decrease, 53,068 tons.

Bituminous.

There is absolutely nothing to report in the bituminous market, which remains stagnant with low prices induced by the sharp competition among producers, the rivalry of the two leading regions, and the efforts of new classes of coal to gain a foothold in the market. Quotations remain nominally unchanged.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended July 14th, and year from January 1st :

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	51,063	1,841,418	81,938	1,684,190
D. L. & W. RR. Co.	69,472	2,333,724	105,079	2,200,224
Penna. Coal Co.	22,233	659,925	37,153	650,245
L. V. RR. Co.	*	525,965	41,546	569,744
P. & N. Y. RR. Co.	4,036	104,054	4,173	102,903
C. RR. of N. J.	*	1,202,078	56,152	1,180,658
Penna. Canal Co.	6,634	172,371	13,228	196,986
North & West Br. RR.	15,358	245,612	.....	.....
	168,796	7,085,147	340,169	6,584,959
Lehigh Region.				
L. V. RR. Co.	*	2,333,044	111.856	2,360,031
C. RR. of N. J.	*	1,126.889	56,669	1,082,886
S. H. & W. B. RR.	2,561	29,656	.....	20,000
	2,561	3,489,589	168,516	3,462,917
Schuylkill Region.				
P. & R. RR. Co.	109,141	3,401,305	161,071	3,232,487
Shamokin & Lykens Val.	29,236	704,215	10,581	585,209
	138,377	4,105,520	171,652	3,824,696
Sullivan Region.				
St Line & Sul. RR. Co.	896	31,996	1,296	29,071
Total	310,630	14,712,252	681,633	13,901,634
Increase	.....	810,618	.....	.....
Decrease	371,003	.....	.....	.....

* Reports for week ended July 14th have not been received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878..... 8,028,518 tons.
" " " " 1879.....13,120,529 "
" " " " 1880.....11,107.215 "
" " " " 1881.....13,663,325 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 424,253 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended July 14th :

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	2,300	48,950	38,547
Coal for shipment at South Amboy	9,733	415,168	431,252
Coal for distribution.	11,805	405,712	375,177
Coal for company's use	3,229	77,723	68,252
Total	27,072	947,553	923.228
Increase	.....	34,325	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended July 14th was as follows :

Tons of 2000 lbs., unless otherwise designated.	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	59,808	1,310,353
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	4,723	168,209
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,563	103,339
East Broad Top	688	23,811
Clearfield Region, Pa.		
Snow Shoe	4,025	128,010
Tyrone and Clearfield	62,709	1,477,264
Alleghany Region, Pa.		
Pennsylvania RR.	7,312	236,089
Pittsburg Region, Pa.		
West Penn RR.	8,150	234,972
Southwest Penn. RR.	1,688	57,822
Penn & Westmoreland gas-coal, Pa. RR	22,208	723,355
Pennsylvania RR	10,865	271,837
Total	185,739	4,635,061

The Transportation of Coke over the Pennsylvania Railroad for the week ended July 14th, and year from January 1st :

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	640	50,993
West Penn. RR	2,040	56,648
Southwest Penn. RR	42,569	1,088,389
Penn. & Westmoreland Region, Pa. RR	3,990	121,186
Pittsburg, Penn. RR.	32	501
Snow Shoe (Clearfield Region)	173	10,931
Total	49,444	1,328,648

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports, per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Newburg	3 95	3 95	3 90	4 00	4 20	4 25
Scranton at Hoboken	3 90	3 90	3 90	4 15	4 45	4 55
Lackawanna at Weehawk'n	3 90	3 90	3 90	4 15	4 45	4 60
Wilkes-Barre at P. Johnston	3 90	3 90	3 90	4 15	4 45	4 45
Plymouth R. A. at P. John.	.....	4 25	....	4 45	4 90	4 50
LEHIGH COAL.						
Honey Brook at Port John.	5 00	4 25	...	4 40	4 45	4 45
Fulton at South Amboy	5 25	4 40	.....	4 40	4 30	4 40
U.L. & Coun. Ri'ge at Eliz'pt	.....	.....	.....	.....	...	....
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash	4 85	4 85	...	4 25	4 60	4 35
Free-Burning White Ash	.....	3 90	.....	4 15	4 60	4 35
Schuylkill Red Ash	.....	.....	.....	4 25	4 80	4 35
Shamokin	.....	.....	.....	4 40	4 80	4 45
Lorberry	.....	.....	.....	4 55	5 00	4 45
Lykens Valley (Brookside)	.....	.....	4 85	5 15	5 50	5 15
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 50	4 50	3 75	3 90	4 25	4 00
Free-Burning White Ash	.....	3 55	3 55	3 80	4 25	4 00
Schuylkill Red Ash	.....	.....	.....	3 90	4 45	4 00
Shamokin	.....	.....	.....	4 05	4 45	4 10
Lorberry	.....	.....	.....	4 05	4 55	4 10
Lykens Valley (Brookside)	.....	.....	4 35	4 65	5 00	4 65

Jermyn coal, at Hoboken, is quoted per ton of 2240 lbs.: Lump, $3.90; Steamer, $3.90; Broken (grate), $3.90; Egg, $4.15; Stove, $4.45; Chestnut, $4.45; Chestnut, No. $23.

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For Women and Children.

Dr. Joseph Holt, of New Orleans, La., says : "I have frequently found it of excellent service in cases of debility, loss of appetite, and in convalescence from exhaustive illness, and particularly of service in treatment of women and children."

DIVIDENDS.

OFFICE OF QUINCY MINING COMPANY.

NEW YORK, July 11, 1883.

DIVIDEND NO. 30.

THREE DOLLARS AND FIFTY CENTS ($3.50) per share will be payable August 15th next, to holders of record 24th inst. Massachusetts holders will be paid at the office of Mr. N. H. Daniels, 2 Change Avenue, Boston. By order of WILLIAM ROGERS TODD, Treasurer.

SAN FRANCISCO, July 13, 1883.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared

DIVIDEND NO. 28,

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Transfer-books will close on the 23d inst.

H. DEAS, Secretary.

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THE UNITED PIPE LINES, OIL CITY, PA.

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38 Water Street, Room 1,
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TO AND FROM
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GOING NORTH.

STATIONS.	53 Phila. Express.	55 Saratoga Express.	Washing'n & Saratoga Limited.	59 Albany Express.
L've WASHINGTON, P. RR.	.....	8 00A.M.	9 30A.M.	.....
" BALTIMORE, P. RR.	.....	9 25	10 50	.....
" PHILADELPHIA, Broad St. Station.	3 20A.M	1 00P.M.	1 30P.M.	.....
" LONG BRANCH, P. RR.	9 20	.....	.....	.....
" BROOKLYN, foot Fulton st.	10 50	3 20P.M.	3 20P.M.	3 40P.M.
" NEW YORK, Desbrosses St.	11 10	3 50	3 50	4 10
" NEW YORK, Cortlandt St	11 10	3 50	3 50	4 10
L've Jersey City, P. RR. Station	11 22A.M.	4 02P.M.	4 02P.M.	4 34P.M.
Arr. Cranston's	1 08P.M.	f5 34	f5 34	6 07
" West Point	1 10	f5 36	f5 36	6 09
" Kingston (Catskill Mountains)	2 30	6 50	6 50	7 50
" Catskill	3 16	7 36	7 36	8 45
" Albany (Union Sta. D. & H. C. RR.)	4 30	8 50	8 50	10 10P.M.
" Saratoga	6 15	10 00P.M.	10 00P.M.	12 48A.M.
" Caldwell (Lake George)	8 00P.M.	.....	.....	.....

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STATIONS.	56 Albany Express.	58 Saratoga Express.	60 Phila. Express.	
L've CALDWELL (Lake George)	.....	6 25A.M.	11 10A.M.	.....
" D. & H. C. RR. SARATOGA, D. & H. C. RR.	7 00A.M	8 00	12 50P.M.	.....
" ALBANY	8 40	9 50	2 30	.....
Arr. Catskill (Catskill Mountains)	10 08	11 05	f3 43	.....
" Kingston (Catskill Mountains)	11 00	11 50	4 28	.....
" West Point	12 28P.M.	f1 14P.M.	f5 53	.....
" Cranston's	12 30	f1 15	f5 54	.....
" JERSEY CITY, Union Station	2 20	2 50	7 30	.....
" NEW YORK, Desbrosses St.	2 30	3 00	7 40	.....
" NEW YORK, Cortlandt St.	2 30	3 00	7 40	.....
" BROOKLYN, foot Fulton St.	2 40P.M.	3 10	7 50	.....
" LONG BRANCH, Penn. RR.	.....	4 47	9 55	.....
" PHILADELPHIA, Penn RR.	.....	5 30	10 46P.M.	.....
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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E., ROSSITER W. RAYMOND, Ph.D., CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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THE Moore method of blasting with lime cartridges has been tried in one of the collieries of Messrs. BERWIND, WHITE & Co., in the Clearfield region, without success, the coal, it is said, being too soft.

THE Charcoal Iron-Workers are going to invade Michigan, beginning on the 14th of August with a visit to Detroit, its copper-works, and the Eureka and Hamatramck iron-works. Reaching St. Ignace on the 16th, they propose to visit the Martel furnace, and, on their way to Marquette, the Vulcan furnace. Just how they are going to divide themselves up to see all that is to be seen in the Marquette iron region, is not yet decided ; but as the association has already acquired fame as being intensely eager for business, we have no doubt that it will accomplish a good deal in the brief time allotted to it.

To all those who have watched with interest the first experiment with the Wallace Arbitration Act in the Pittsburg rail coal trade, the tidings that have come from there will cause lively satisfaction. It will be remembered that some weeks ago, Mr. MCCUNE, the arbitrator, made an award, fixing the price for mining per bushel of coal at 3½ cents. Operators and miners in a large number of pits promptly acquiesced in this decision, and for a short time every thing looked bright. Unfortunately, there were a number of pits in which the miners had agreed to work for three cents irrespective of what the award might be, and their adherence to this agreement threatened to make the arbitrator's decision a dead letter. The curious spectacle was presented of the majority of operators and miners in the district earnestly co-operating to bring about one end, the cessation of work on a three-cent basis in the off pits. For more than a week, they labored in vain ; and the first attempt at settlement by arbitration threatened to be a failure, until, a few days ago, success crowned their efforts, and now almost every pit along the Pan-Handle road is working at the compromise rate. The temper shown by both parties is, to say the least, an encouraging sign for the future. The hardships of both men and operators are undoubtedly great. With nut coal selling on the wall at Pittsburg for 5¼@5¾ cents per bushel, little local demand for slack, and fierce competition in the lake trade, the profits of the shippers must be small indeed, if there is not in many instances a positive loss. The outcome of the Pittsburg experiment will give encouragement to the moderate element in other districts. Thus, we note with pleasure that the Iowa miners and operators, at a meeting at Des Moines on Wednesday, chose committees to arbitrate on the screen question, which has been a very troublesome factor for years.

THE PIG-IRON TRADE.

The American Iron and Steel Association has accomplished a feat of which the officers of that organization and the members of the iron trade may well be proud. The *Bulletin* this week contains full statistics of the production of pig-iron during the first six months of the year, and the stocks on hand and unsold. To gather such figures for an industry so widely scattered over so great a territory, and publish them complete three weeks after the close of the period for which they were collected, is a remarkable proof of excellence of organization and industry. It reflects great credit, too, upon the trade itself, showing how intelligently such work is appreciated.

An analysis of the figures, a summary of which we can only print, will, we believe, show in a general way that the pig-iron trade has reached a sound basis. The production of all kinds of pig-iron was as follows, for the first six months :

PRODUCTION OF ALL KINDS OF PIG-IRON.

STATES.	In blast Jan. 1st.	In blast June 1st.	FURNACES JULY 1ST. In.	Out.	Total.	TONS OF 2240 LBS. One half of 1882.	First six mos. 1883.
Maine	1	1	1	....	1	1,831	1,923
Vermont	....	....	....	1	1	540	.....
Massachusetts	2	2	2	3	5	4,614	3,722
Connecticut	7	3	5	4	9	10,867	11,961
New York	37	32	27	30	57	185,784	173,402
New Jersey	13	10	9	10	19	78,931	71,611
Pennsylvania	185	163	151	124	275	1,093,418	1,211,811
Maryland	11	10	11	12	23	24,341	18,537
Virginia	15	16	16	25	41	39,165	52,739
North Carolina	....	....	....	5	5	514	.....
Georgia	4	3	3	3	6	18,947	20,879
Alabama	12	13	14	4	18	50,341	60,250
Texas	1	1	1	....	1	589	2,000
West Virginia	5	3	3	8	11	32,688	36,213
Kentucky	9	6	6	12	18	29,697	25,569
Tennessee	14	11	8	11	19	61,429	64,872
Ohio	62	41	44	49	93	312,009	319,238
Indiana	2	1	....	3	3	4,464	4,850
Illinois	9	7	7	9	16	160,896	108,832
Michigan	14	11	12	17	29	93,837	72,518
Wisconsin	8	6	5	10	15	38,330	26,041
Missouri	3	6	5	12	17	50,734	41,200
Minnesota	1	1	....	1	1	3,028	3,035
Utah	....	....	....	1	1	26	.....
Colorado	1	1	1	....	1	10,588	11,325
Oregon	1	1	1	....	1	3,013	5,800
California	....	1	1	....	1	441	900
Washington Territory	....	1	1	....	1	.....	2,800
Total	417	351	334	354	688	2,311,062	2,352,019

Turning first to the figures for the production, it will be seen that the output has been heavier thus far than it was last year, when the total production marked the unprecedented total of 4,623,333 gross tons ; but this excess, 40,357 tons, is so light, and the number of furnaces blown out recently is so great, that the total for this year will beyond all doubt be below last year's figure. The falling off is heaviest in the West and less striking in New York and New Jersey, while Pennsylvania shows a heavy increase, half of which is due to Alleghany County. The Southern States show an increase of about 30,000 tons, an evidence of the recent activity in that section.

Grouped according to the fuel used, the figures stand as follows :

PRODUCTION ACCORDING TO FUEL USED.

KIND OF FUEL.	In blast January 1st.	In blast June 1st.	FURNACES JULY 1ST. In.	Out.	Total.	TONS OF 2240 LBS. One half of 1882.	First six mos. 1883
Anthracite	161	137	125	96	221	911,669	906,870
Charcoal	129	105	98	149	247	311,505	250,719
Bituminous	127	109	111	109	220	1,088,428	1,194,430
Total	417	351	334	354	688	2,311,062	2,352,019

This proves that as yet the blowing out of furnaces has not made a very

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strong impression upon the quantity of metal made. It is well known how difficult it is, from the nature and costliness of the operation, for a furnace-man to make up his mind to stop being a producer, and the pig-iron trade is therefore always the slowest to recover. That buyers need not fear an early scarcity of metal is clearly shown by the following statement of stocks:

STOCKS ACCORDING TO FUEL USED.

	On hand Dec. 31, '82.	On hand June 3, '83.
Bituminous	140,353	196,099
Anthracite	95,767	186,735
Charcoal	147,535	145,756
Total	383,655	528,590

The heaviest increase in pig, smelted with bituminous coal and with anthracite, is in Pennsylvania, while the exceptionally heavy stocks of charcoal pig are concentrated in the South, and particularly in the West and Northwest.

The data for the number of furnaces in blast are of interest so far as they go. They would, of course, be much more valuable if a reliable estimate of their capacity were added. The *Iron Age* attempts to gather such figures; but the large number of differences between their figures for the number of furnaces in blast and those of the *Bulletin*, so thoroughly discredits the tables of our contemporary that we dare not use its data, when it comes to the much more difficult task of estimating capacity.

On the whole, the statistics offered show that, while the pig-iron industry is tending toward a sounder basis, they do not give any encouragement whatever for the hope that a material advance in prices can be successfully maintained. Stocks are ample, in fact more so, in some instances, than the trade appeared generally to believe.

CORRESPONDENCE

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

"The Outlook for Lake Superior Iron Mines."

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: When a person seeks to teach the public through the medium of an influential trade paper, he should at least make a proper effort to obtain facts, rather than state with so much positiveness what he conceives to be facts. In his article, under the above caption, in your issue of July 21st, "Specular" says, "Generally speaking, the mines are as saleless as in January or February." Again, "It is quite probable that a few thousand tons may be sold by shaky companies for what the iron-mongers have a caprice to pay, but this disturbing factor will be transient and of little consequence." Again, "If indeed any sales thus far can be said to be important."

If "Specular" had seen fit to place himself in communication with any reputable commission house in Cleveland, he could have become acquainted with the fact that, on July 1st, at least 1,250,000 tons of ore had been placed. At this date, it is quite within the limits of safety to say that this has been increased to a million and a half of tons. To July 11th, 685,585 tons had been brought down, and at this rate by November 11th we shall have a movement of hard on to two million tons, larger than any year in the history of the trade, except 1881 and 1882. Some of the mines are entirely sold up, and are refusing orders. So far from the companies, as a rule, bringing down ore which is unsold, exactly the contrary is the case; nine tenths of the ore down is sold, and a large daily movement of ore from the dock to consumers is going on. P.

CLEVELAND, July 23.

The Luminosity of Heated Coal-Gases.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The luminosity of the gases derived from coal depends entirely on the carbon set free and kept incandescent *during* the process of combustion. Without this condition, they cease to be illuminants. This is the case, either when carbon is prevented from separating and becoming incandescent in the flame, or when it is separated from the gas before the latter is ignited. The illuminating part of gas consists of heavy hydrocarbons, especially ethylene, C_2H_4. This, under ordinary circumstances, burns, separating carbon, which, in a state of incandescence, furnishes the light. With a greater addition of air, this carbon is not allowed to separate as such and remain incandescent, but is all converted to carbonic acid. This is the case when illuminating-gas is burned through a Bunsen burner. The lighter hydro-carbons, CH_4, always burn, *without separating carbon*, to carbonic acid and water; therefore they give no light. When a gas is highly heated before ignition, the heavier hydrocarbons are destroyed, and converted, with separation of half of their carbon, into lighter hydrocarbons, which burn without giving light. This explains the result of the practical test by Dr. Siemens, referred to under this heading in the ENGINEERING AND MINING JOURNAL, Vol. XXXVI., No. 3, p. 37. This explains also how gases which burn with separation of incandescent carbon have a greater *radiant* heat than otherwise. The incandescent carbon is the source of the radiant heat. This may easily be tried with a Bunsen burner, which will give, with closed air-holes, more radiant heat than with open. In the latter case, the heat is all concentrated in the flame, no incandescent carbon being separated, but all burning to carbonic acid. ADOLF GLEIM.

426 WALNUT STREET, PHILADELPHIA, July 21.

NEW PUBLICATIONS.

A PRACTICAL TREATISE ON THE STRENGTH OF MATERIALS; *Including their Elasticity and Resistance to Impact.* By THOMAS BOX. London and New York: E. & F. N. Spon. 1883. Small octavo, 525 pages, with Index and numerous Plates.

As the writer of practical treatises on "Heat," "Hydraulics," "Mill-Gearing," etc., and as an eminent authority on the subject o this volume, Mr. Box is already widely known; and this volume, giving the latest and best empirical rules established by English practice, as well as the theoretical laws and formulas, where these have practical certainty and value, will be welcome to all engineers. A cursory examination of the book leads us to praise its arrangement and clearness of style. It is beautifully printed, and the plates, though small, are very good. We have detected no errors of the proof-reader; and the general appearance of careful editing makes us feel pretty sure that in this particular it is free from fault. In the case of a book consisting so largely of formulas and tables, defects of that kind are disastrous; and yet they are not always detected at first examination. Mr. Box dates his preface in March, 1883, and professes to have incorporated the latest researches and experiments. Yet we can find no trace in his book of the report of the United States Testing Board, the first volume of which has been several years, and the second a shorter period, before the public, in larger editions than such books usually enjoy. In the first volume, to say nothing of other important matter, Mr. Box might have found the splendidly thorough paper of Commander Beardslee's committee on chains and cables—a discussion which no writer on that subject can afford to ignore. But we point out this deficiency rather for the benefit of English than of American engineers. In this country, we have other means of getting the results of American practice and investigation, and do not need to go to English books for them. Hence the fact that Mr. Box's manual, like so many others from that side of the water, is filled almost exclusively with English data, rather enhances its value for us. It is not we, but our British brethren, who should demand of their technical authors a wider range and greater energy. *

LIFE OF SIR WILLIAM E. LOGAN, KT., LL.D., F.R.S., F.G.S., *First Director of the Geological Survey of Canada, chiefly compiled from his Letters, Journals, and Reports.* By BERNARD J. HARRINGTON, B.A., Ph.D., *Professor of Mining in M'Gill University; Late Chemist and Mineralogist to the Geological Survey of Canada. With Steel Portrait and Numerous Wood-Cuts.* New York: John Wiley & Sons. 1883. Octavo, 432 pages. (*Index.*)

Professor Harrington, in his modest preface to this volume, represents himself as a mere compiler, and says his aim has been, not "to write a eulogium or yet a lengthy criticism of Sir William, but rather to bring together such of his own words as will recall him to the minds and hearts of old friends, or enable those who were not privileged with his acquaintance to form for themselves an estimate of his character and work." This aim, it must be confessed, is, after all, that of every worthy biography. Whether it shall be attained by compilation or by a more formal portraiture, is a question of means simply. Professor Harrington has accomplished with judgment and taste the task he set before himself. The book contains an intelligent and interesting account of Sir William Logan's work, and also reveals the character of the man, more clearly and naturally, perhaps, than this could have been done by a deliberate critical analysis.

It is pleasant and instructive to note that Logan began his career as a mining engineer and metallurgist. To use his own words, "My whole connection with geology is of a practical character. I am by profession a miner and metallurgist, and for many years was one of the active managing partners in an establishment in Wales, where we annually smelted 60,000 tons of copper ore and excavated 60,000 tons of coal." Such a practical experience is an excellent introduction to certain branches of geological work. The reverse process is not so successful. Eminent geologists do not necessarily or easily become experts in mining or in economic geology. On the other hand, it is true that those men who begin with mining, and having acquired in the practice of this art a habit of keen observation, are liable to generalize too rashly and too widely from data which are local and subordinate, as compared with the more general facts of geological science. From this weakness, Logan was singularly free, no doubt because he was already prepared by education and habits of thought to study logically the phenomena he encountered. His paper on the Under-Clays of South Wales, read before the Geological Society of London in 1840, is an admirable specimen of clear and cogent reasoning. It carried conviction with it, and settled at once and for good a most important question connected with the formation of coal. That this mineral is of vegetable origin, was generally admitted; but whether the coal-beds have been formed like accumulations of drift-wood, or have grown in the manner of peat-bogs, *in situ*, was vigorously disputed. Logan, while engaged in coal mining, observed under eighty or more coal-seams, in the Welsh field, the invariable pressure of so-called under-clay, containing *stigmaria* in such conditions as to prove that the plant had grown there and had not been drifted there. The constancy of this phenomenon, once demonstrated, overthrew the drift theory. Logan's further conclusion, that "in the *stigmaria ficoides* we have the plant to which the earth is mainly indebted" for its stores of fossil fuel was correct in one sense, and curiously erroneous in another. Later discoveries showed this supposed species to be a root, and to support the trunks of *sigillariæ*, *lepidodendra*, etc. The leaves and upper branches of these trees have been abundantly found in the shale-roofs of coal-beds. These discoveries, complementing that of Logan, have fixed the general outlines of the theory of the growth of coal, although there are points which still challenge discussion. Professor Harrington sketches the question, cites a great part of Logan's paper, and refers the reader to the works of Principal Dawson (probably the highest authority on this subject), for further details.

Logan's scientific enthusiasm exhibited itself early, in his preparation, with great labor and at private expense, of a topographical and geological map of the coal district of Glamorganshire, Carmarthenshire, and Brecknockshire. This map was exhibited by him in 1837—he was then thirty-nine years old—at a meeting of the British Association. Delabeche, then Director of the Ordnance Geological Survey, said of it:

"The work on this district being of an order so greatly superior to that usual with geologists, and corresponding in the minuteness and accuracy of its deta

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with the maps and sections executed by the Ordnance Geological Survey, we felt desirous of availing ourselves of it, when Mr. Logan most handsomely placed it at our disposal. Having verified this work with great care, we find it so excellent that we shall adopt it for that part of the country to which it relates."

Such a compliment, from such a source, was equivalent to fame. The quotation is from a letter to the Colonial Office, urging the appointment of Logan to the Geological Survey of Canada. Murchison, Sedgwick, and Buckland heartily joined in this recommendation; and in 1842, the appointment was made, and Logan undertook his "herculean task," as Sedgwick had called it. This constituted the great work of his life. Of the manner in which he discharged it, we will not here speak at length. Professor Harrington's book gives an excellent summary of the progress of this great survey, not omitting to recognize with unstinted praise the labors of those who, like Murray and Hunt, so ably supported their energetic chief. Moreover, an appendix, from the skillful and graceful hand of Principal Dawson states with welcome clearness the disputed questions concerning the age and stratigraphical relations of the Quebec group, regarding some of which, as our readers are aware, Dr. Selwyn, the present director of the Canada Survey, has been led to reject the earlier views of Logan. Such a reversal by later and more extended research implies no discredit to the industry or acuteness of a pioneer. The work done by Logan for Canadian geology and for the development of Canadian industries will continue to be as well recognized and as highly esteemed as when in 1856 he was knighted by the Queen, and received from the Geological Society the more distinguished honor of the Wollaston medal.

Of all these matters, and of many others, such as the Lake Superior controversy, and the *Eozoön Canadense*, the reader will find the story well told in Professor Harrington's book, which is thus at once a charming biography, and a valuable record of scientific progress. *

THE BELT COPPER MINE.

Special Correspondence of the Engineering and Mining Journal.

The Belt Mines Company is a property owned and operated by English capital, and consists of the combined estates of the old Bohemian and Great Western companies, together with a sufficient territory some distance away (the Penn property) to make a round total of nearly 3500 acres. The mines are situated in the Greenland District of Ontonagon County, Michigan, which extends in an easterly and westerly direction from fourteen to twenty miles from the mouth of the Ontonagon River. They have been brought into the foreground lately by a series of representations in local and English papers, which, so far as they have any influence at all, can have no other effect than to mislead and discourage the investment of capital, and particularly foreign capital, in mining operations in this country, and therefore ought to receive a discussion which shall be fair to all parties and at the same time try and save our peninsula from the reproach of disreputable and illegitimate scheming. We can not afford to try the experiment of an Emma mine swindle on Lake Superior; for although the elastic consciences of a few well-remunerated individuals might not suffer very considerably from the tension, it would be certain to distort the reputation of our mineral fields, for many years characterized by strict integrity, into a synonym for deceit and fraud. Your correspondent does not wish to uncover any sores, or to engage in any sparring match with either friendly or unfriendly editors, when he undertakes to undeceive the foreign readers of the ENGINEERING AND MINING JOURNAL concerning the Belt mines, and he will therefore honestly endeavor to be so plain that the wayfaring man, though a foolish speculator, need not err therein. No one, unless he be willfully wrong-headed, shall misunderstand.

The Evergreen range mines were among the earliest worked on Lake Superior, some of the charters being contemporaneous with the Minnesota, the bonanza mine of twenty years ago. After several years' trial, however, these properties gradually suspended operations, from lack of cupriferous returns, and the merciless tributor was turned into them to make himself fat on whatever was left as spoils. It is about thirteen years since the Evergreen Bluff closed down, and about eleven since the National followed suit. Of late years, little or nothing has been doing in this western "Sleepy Hollow," and its very name has become the acknowledged synonym for stagnation. But during the past two or three years, there has been a resurrection from the dead of interest in this venerable county, in some purposes for legitimate development and in others for Israelitish speculation. We shall arrive at the status of the Belt mines by considering the motives behind the curtain for this revival.

It has been held that the mines of Ontonagon have not had a fair chance; that the methods of operating them were primitive and meager; that the system of labor was as ruinous as it was dishonest; and that the whole business was carried on for the interests of the laborers, and not, as nowadays, for the stockholders. And each of these charges can be successfully maintained. Certainly, the methods of breaking, hoisting, and treating rock were most primitive and meager. Operations were often confined to extracting in summer the hundred or two tons of mineral which had been discovered in the winter. The rock was treated by stamps and wash-houses of a style so primitive as to suggest a transition to the dark ages to one who visits the mills of Lake Linden and the Atlantic or even those of Copper Falls (modern), Allouez, or Portage Lake. Indeed, so much copper was lost by inadequate slime treatment that it has been thought profitable to purchase the sand-heaps of the older mines and send them through the scientific apparatus of our times. Secondly, the system of labor was essentially dishonest. No laborer had any moral compunctions that he ought to do a full day's work for a day's pay. Particularly was this true of contract miners. The hours of labor were generally eight, and even for this short shift it was seldom thought necessary to work with any thing like the regularity and pressure which characterize modern mining. It excited neither surprise nor comment if a party of miners lost the greater part of a shift, particularly if pay had been good, in order to take a turn at the town tavern. This was a fault of the times. It was equally true of the Keweenaw mines, where the contract miners by no means infrequently came up from underground, after the bosses had once "turned in," and went over to Eagle River or Eagle Harbor for a night's spree. Thirdly, the mines appear to have been operated at that epoch in the interest of the laborers and not of the stockholders. The shiftlessness of the contract work is proof positive of this, to say nothing of the silver which was appropriated by those in power, as well as stolen by wholesale by the operatives and sold to the disreputable dealers who used to put in at Copper Harbor, Eagle River, and Ontonagon. The unwritten history of these times shows a state of things which were in themselves dishonest, and not infrequently disreputable. Your correspondent does not wish to magnify this mole-hill, though it is a very formidable one, into a mountain, and therefore does not even insinuate that the system of pillage was universal, though the loose system of working was well-nigh so; for he well knows that superintendents of these properties, and particularly of the Evergreen range properties, were honest and intelligent, and would have done better if they could. The evils were an integral part of their times, and existed in the nature of things, in spite of the best intentions. But good intentions did not help the stockholders any, and the mines gradually succumbed to the incubus upon them. The introduction of labor-saving machinery, scientific treatment, high explosives, a different system of management, and a more rational spirit of enterprise has now cut off these abuses, and that forever. For the mines of Ontonagon to copy after those of Houghton in materials, methods, and vim, would be to give them what they have not as yet had, a fair chance to pile up fortunes for the holders of their certificates of stock. One Ontonagon mine, and that a neighbor of the Belt on the Evergreen range, has undertaken to solve the problem, and is the most successful mine of our day on the range. This is the argument of those who favor a revival of mining in the old properties of "higher point."

On the other hand, there were several circumstances which were favorable to a transient success. The price of copper was twice and sometimes three times as high as at present. If prices were now what they were in 1865, when the average was above thirty-six cents, the profits in copper mining would now contrast very favorably with those on iron mining during the years 1881 and 1882. Then, again, the mines were scalped, "scrammed" they call it in the iron country, the best leads being followed until they failed to pan out, when the property was summarily abandoned. Thus with the National and partially with the Evergreen Bluff. No such risks were ever taken as are now constantly taken in the Pewabic, the Allouez, or the Copper Falls; no such stretches of lean ground were attacked, and the Mars, which is the leader of the Ontonagon mines, even in this enlightened day, attempts nothing at all problematical—a thing which is not at all to its praise. Nothing problematical has yet been attempted—a very important fact—and, judged by modern standards, Ontonagon may even now be safely called a *terra incognita*. A candid discussion of this topic during the past few years, by the best copper miners in Lake Superior, has resulted in a disagreement of opinion, some holding that, with modern machinery, modern discipline, and modern vim, the best mines of Ontonagon could, if copper maintained a pretty good price, be made to pay a moderate rate of interest on the enormous outlay of capital which would be necessary from the first for conducting operations. Others, and they are legion, have not believed it would pay. And even the most sanguine have never betrayed any symptoms of enthusiasm—except, indeed, when they had a property to sell. So far your correspondent has spoken with candor, and, he trusts, with accuracy. His own modest opinion, taken for what little it is worth, is that, if copper stays at a reasonable figure, the best mines in Ontonagon, by a very liberal expenditure for underground openings, machinery, and management, can be made to yield a fair rate of interest on the capital originally invested; but that it will not at all pay, with the present outlook of the copper market, to undertake this tremendous preliminary outlay in the poorer lodes, may safely be taken as a foregone conclusion. But here we trench at once on the matter of the Belt mines.

No one knows that the Belt mine is one of the *best* mines in Ontonagon, and therefore its future is entirely enigmatical. To see representations to the contrary from interested parties, which representations are for the sole purpose of deceiving the English stockholders by positive assurances into the immediate expectation of a mine like the Quincy, is monstrous and despicable. Any and all such representations concerning the immediate dividend-paying value of the mine are the grossest fabrications, and are an unmitigated humbug. But we anticipate our historical narrative.

The Bohemian was formerly owned by Philadelphia people, who sold it for no more than $45,000, and who betrayed very marked symptoms of eagerness to part with it at that figure. The Great Western, which, with the Bohemian, comprises the present working part of the Belt property, did not bring more than its neighbor. The Penn, embracing nearly 1500 acres, sold to the syndicate for not much over $20 per acre. These estates were massed together and sold to English capitalists for $850,000. (London *Journal*.) It now appears that, to effect this sale, the most monstrous statements (I will call them no worse names) were resorted to. It was said that, with a liberal outlay of money, the mine would compare favorably with the Quincy, which has two conclusive answers: first, the party making the statement owned a very important part of the real estate which forms and was sold in the Belt transfer; second, the property which the party recommends as being a rival of the Quincy sold for a trifle over a single hundred thousand dollars, while the Quincy is worth $2,000,000. During its entire thirteen years' working, the Bohemian has produced an aggregate of only 216 tons, while the Quincy averaged much more than that every month of 1881, and, I think, 1882. Of course, it is not understood that the Belt is to rival the Quincy alone in expenditures, for that represents an outgo of nearly $15,000,000. The point is here: the Belt property has not been tested, and therefore its value is unknown. When the communications were sent to England that the property could be brought to pay $200,000 annually inside of two years, less than a single hundred feet had been sunk on the Knowlton vein (an entirely new ven ture), and less than sixty feet in the Bohemian on the Butler or Champion vein. Not even the beginning of a drift had been commenced on the Knowlton vein, and less than seventy feet had been driven in either of the two old levels of the Butler vein. These facts carry their own inference. No adequate mill test of the work had been made, and the persons who, in the early part of the transaction, recommended the mine as a rival of the Quincy, to say nothing of laying on the chunk which broke the camel's back by comparing it with the Calumet & Hecla, knew

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as little of the cupriferous contents of the mine as they knew of the contents of Sirius or the Pleiades.

No one knew, dear lambs, no one could know what the mine could do. One who was entirely familiar with the old Bohemian remarked to your correspondent that it was too lightly charged with copper to pay for treatment and handling; but this must not be taken for more than it is worth. The mine may be able to pay something, certainly has some copper in its epidote formations, and I do not wish to throw suspicion upon it. No one knows, however, and those who pay for its stock and remit its assessments ought so to understand. If, under the circumstances, they are willing to undertake the very expensive development of the property, it is well, and their enterprise is most commendable. But honestly, it will be as useless, at the present rate of development, to expect any thing at all in two years, as it will to expect ever to receive such returns as are made by the Quincy, which in turn will be as foolish as to expect the tides to sweep the bars of ingot from the depths of Lizard and Eddystone into the harbors of Cornwall.

One further word: An enormous outlay of capital is making, a mill of Ball stamps and improved washers for treating the Belt rock. I learn, from a recent and interesting article by the editor of the Hancock *Journal*, that preparations are making for laying in a plant of hoisting and compressed-air machinery, though I have obtained no information at this writing when this will take place. It is, as yet, a mystery to what use this elaborate pile of machinery will be put, particularly if the present rate of progress be kept up. The Atlantic sends as much rock through its mill in fifteen days as the Belt has hoisted for openings in its whole thirteen years' operations. The Osceola opens up every two months as much as the Belt (Bohemian) has opened up in its entire history. The Copper Falls was organized at the same time with the early Ontonagon mines, and for a season was dividend-paying; but, although it has the advantage of modern machinery, methods of labor, and efficient management, it has long since ceased to pay any dividends. Six hundred and twenty thousand dollars have been paid in assessments, independently of the original subscription, and I am informed that a new one of $60,000 is being quietly handed in. It has paid precisely $100,000 dividends in its twenty-eight years' existence. If modern machinery could make a Quincy or a Calumet & Hecla out of all the profitable mines of the Bohemian's day, the Copper Falls stock would be worth several hundred dollars per share. As it is, they are not cheap at one.

And finally, your correspondent has written these words of truth and soberness in the kindest humor, and has set down not one thing in malice. He joins the editor of the Hancock *Journal*, in hoping that the mine will richly repay the vast outlay of money which has just begun to be made, and which must be continued for a long space in the future before the mine pays, if, indeed, it ever pays. That the property has been ignorantly or maliciously misrepresented is certain; for no one knows what it can do, nor will he know for some time to come.

SPECULAR.

THE TRANSPORTATION OF HIGH EXPLOSIVES.

NEW RULES FOR THEIR SHIPMENT.

Commissioner J. W. Midgley has issued the following circular, under date of July 21st, for the use of the railroads in the Southwestern Railroad Association, Iowa Trunk Line Association, and Colorado Traffic Association:

Shipments of Hercules powder, Atlas powder, giant powder, and other explosives of which nitro-glycerine forms the basis, when subject to the above associations, except California, will hereafter be transported on the following conditions and at the following classification:

1. That, at the cost of shippers, the bottom of the car containing the above-mentioned explosives must be covered to the depth of at least two inches with sawdust, to absorb possible leakage.

2. That the packages containing the explosives shall be so placed and loaded that the cartridges shall always lie on their sides and not on their ends.

3. That the cars shall be so marked, on both sides and ends, that those who will have charge of them will not do any thing ignorantly to incur danger.

4. In less than car-loads, this property will be received (when made into cartridges only, and not in bulk under any circumstances) on the following conditions:

Packed in wooden cases, in cartridges, each case not exceeding 100 pounds, nor less than five pounds of explosives, provided that such explosives are packed in dry sawdust, as follows:

Each cartridge shall be surrounded on all sides with dry sawdust, and all interstices between such cartridges and a space of least one inch between the outer side of such cartridge and the inner side of the case shall be filled with dry sawdust. Each of these cases shall be plainly marked on at least three of its sides with the name of its contents and "Explosives—Dangerous," so as to be readily seen by those who are to handle it.

5. In no case must the caps, fuse, or exploders used for exploding these powders be loaded in the same car with the explosives, and under no circumstances will the cars be received if so loaded.

6. Any and all nitrate or other explosive preparations not in accordance with such specifications (except ordinary black powder) will in no case be received for shipment.

7. All loss or damage to such property that may result from explosion or from a disregard of any of the above conditions by shippers or by the agents of the lines comprised in the above associations must be assumed by the shipper or owner.

8. Under the above conditions, the rates will be: In quantities less than car-loads, actual weight, twice first-class; in car loads, actual weight, minimum 20,000 pounds per car, first-class. No shipment will be rated at less than 100 pounds.

The right of any of the railroad companies comprised in the above associations to refuse to receive high explosives for transportation under any circumstances is reserved.

This circular is a most important one, as heretofore high explosives were not mentioned in the tariffs of these associations, being accepted by the different lines at special rates.

MINING IN CALIFORNIA.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mining in California may be said to be unusually dull. We hear of but few new enterprises, and of no great successes to mark this season. You have heard, probably, of the sale at last of the Providence mine of Grass Valley to a French company. The price paid for it is said to be $1,200,000, of which 25 per cent is in stock of the new company and $140,000 are to be placed in the treasury for working capital. The purchase includes the adjoining extension claim. A new sixty-stamp mill is to be erected, giving, with the present mill, eighty stamps in all. The estimates of production are made in the usual way, on paper, by multiplication.

Assuming that the quartz will net $8 per ton, and that the mill will crush 200 tons a day, it follows that the net daily product is to be $1600, or close upon half a million a year—a brilliant and beguiling estimate, the realization of which need not be expected. *Nous verrons.*

The sale of the Drum Lummon mine, by Thomas Cruse, to English parties is still the topic of conversation in mining circles. This mine, you are aware, is about twenty miles from Helena, Montana, and has been worked for gold. Cruse is said to have taken out over $125,000 with the aid of a five-stamp mill. The new company is known as the Montana Company, Limited, and has appointed George Attwood, F.G.S., general manager. Extensive and costly preparations are making for working the property on a large scale. The firm of Prescott, Scott & Co. is now constructing an air-compressor of unusual size for this mine.

The Pacific gold mine, of Amador County, which adjoins the Empire, appears to justify the expectation of its value based on the development made in the Empire at and beyond the line. The two properties are now consolidated, and a dividend has been paid. The Pacific shaft is to be sunk to a depth of 1300 feet.

The iron furnace at Clipper Gap, near the railroad in Placer County, which was burned last year, has just been started up again. The iron produced is excellent in quality, especially well adapted to the manufacture of malleable iron castings and of steel. A fine quality of chilling iron is also made, and is now used by the Central Pacific Railroad Company for the manufacture of car-wheels at the Sacramento shops.

Preparations for malleable iron and steel-works at the Bay are now well advanced, and they will be in operation by the first of October or before. Charcoal is abundant and cheap at the mine. This iron and steel enterprise is largely controlled by Mr. Irving M. Scott, of the Union Iron-Works, whose energy, enterprise, and public spirit give assurance that it will be one of the growing and permanent industries of the Pacific coast.

The lead and silver smelting-works of the Castle Dome Company, at Melrose, are in constant operation, and turn out from 250 to 300 tons of refined lead per month, used chiefly for corroding.

The Silver King mine has passed its usual dividend, owing in part to the interruption of the mining by the extremely hot weather, which so impaired the ventilation as to prevent the miners from working. The seventh level is still productive, but a part of the ore is not up to the usual standard. The shaft has been sunk to the eighth; but owing to the lack of ventilation, the drift could not be run into the ore-body. Until recently, a scarcity of water prevented running the mill to its full capacity.

GLÜCK AUF.

SAN FRANCISCO, July 10.

THE PRODUCTION OF COAL IN THE WORLD.

M. Paul Trasenter, of Liége, who is rapidly acquiring the reputation of one of the leading statisticians on mining and metallurgy, has recently collected the figures for the production of the leading countries in the world. Those who have attempted work of this character appreciate the difficulties with which such compilations are beset. It is gratifying to note that the governments in all the leading countries are now making efforts not only to carefully collect the data, but also to get them as rapidly as is consistent with reasonable accuracy. In past years, it was no uncommon thing to have official statistics published from one to three years late; while in other countries, private enterprise had to supply the gap. For a number of years, the figures have been collected in a very desultory way here. This, we are pleased to note, will now end through the enterprise of the United States Geological Survey, and the industry of Mr. Albert Williams, Jr., the chief of the Department of Industrial Statistics. We believe that M. Trasenter's figures in the following table for the years 1879 to 1882 will prove rather too low; but we give them as they stand, adding that the unit is a million metric tons:

	1860.	1870.	1873.	1879.	1880.	1881.	1882.
Great Britain	85·4	112·2	129·0	135·8	149·3	156·6	158·8
United States	15·2	30·7	51·3	63·8	70·3	77.3	88·1
Germany	12·3	34·0	46·1	53·6	59·2	61·5	65·4
France	8·3	13·1	17·5	17·1	19·4	19·9	20·8
Belgium	9·6	13·7	15·8	15·4	16·9	16·9	17·5
Austria-Hungary	3·5	8·3	11·9	14·9	16·0	17·3	18·0
Totals	134.3	212·0	271·6	300·5	331·1	349·5	368·6

In order to complete the record, the following figures are added for a number of countries of minor importance, whose statistics are not complete or not recent:

Russia (1881)	3,245,000 tons.
Spain (1881)	1,171,000 "
Sweden (1881)	120,000 "
Australia (1881)	2,200,000 "
Canada (1881)	1,437,000 "
British India (1880)	1,030,000 "
Chili (1880)	800,000 "
Japan (1879)	530,000 "
China (estimated)	3,000,000 "

Counting the probable production of uncivilized countries, we reach a total production in the world of about 385 millions of metric tons of coal and lignite, which, of course, is not at all apportioned in reference to the narrow extent of the coal territory. Thus, two thirds of the output comes from 15,400 square miles of coal-fields in Eastern Europe, while the coal measures of Russia underlie 19,300 square miles, those of British India 34,740, of the United States 180,000, and of China 520,000 square miles.

The development has been more striking in the United States during

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the past two decades, 1882 showing an output more than six times as great as 1860, while the capacity has probably increased fully sevenfold. Great Britain has barely doubled its yield; while Germany, with its limited area and deep mines, has made progress with a rapidity only equaled by our own. It should be remembered, however, that one fifth of the product is lignite, of a quality which can not take full rank with good coal. France has done well, but is not, from the limited area of its coal-fields, likely to assume a relatively more important position. Belgium, the most intensely active section of the continent industrially, is also bound to lose ground in the race; while Austria, though having a wealth of lignite, which constitutes three fifths of its output, can not boast of great resources of coal.

How much room there is for an expansion of the coal trade in this country may be gathered from a contemplation of the comparative consumption per capita in the different countries. In England, it is 8686 pounds per inhabitant; in Belgium, 5093; in the United States, 3637; in Germany, 3065; in France, 1808; and in Austria, 948 pounds. When the United States has become, like Great Britain and Belgium, one of the workshops of the world, instead of being, as now, restricted to home industries looking only to local markets, and when the domestic consumption of wood as a fuel has been reduced by the cheapness of coal and the growing cost of wood, we shall be the greatest coal producers in the world.

How great are the advantages we possess by the accessibility of vast areas of coal-beds of comparatively great thickness, may be gathered from the following comparative figures of the yield of coal per miner per annum: The United States heads the list with 400 tons, followed by England with 345, Germany with 261, France with 186, Austria with 170, and Belgium with 166 tons. We venture to say, however, that, on the other hand, there is no country in which, not only absolutely but relatively, the wages paid to coal miners are as high as in this country. No one will desire to see this state of affairs changed; but we believe that it should be fully understood that, taken as a whole, the miners share more fully in the profits of the business here than they do anywhere else, and that their receipts far more than counterbalance the difference between the yield per man per annum between the United States and Great Britain, for instance. Another factor which tells against our mines indirectly, by increasing the cost to consumers, is the long haul to market, a fact which is aggravated by the circumstance that coal is usually made to pay profits not alone on watered capital, but also to compensate for the necessarily low figures at which agricultural products must be carried to export points to compete in foreign markets. Against the former, the coal interests have a right to protest vigorously; but they have, on the whole, little objection to the latter, provided that it is fully understood by the agricultural interests that the coal producers are indirectly affording them the means of advantageously marketing a surplus. When their would-be champions attack the manufacturing industries of the country, and are met with the plea that fuel is high, they have no right to make a raid on the miners and shippers of coal who pay the carriers of wheat, corn, and provisions a round share of their profits.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Abandonment of Claims as Affecting Later Applications.—The following letter was written by Secretary Teller to the Commissioner of the General Land-Office:

I have considered the claim of Marcus Daly, involving mineral entry No. 924, Helena, Montana, made December 14th, 1882, upon the Rob Roy lode, lot No. 147, submitted by your letter of the 23d ultimo, for the action of the Board of Equitable Adjudication, as provided by sections 2450–2459 of the Revised Statutes, as amended by the act of February 27th, 1877. The facts which control your action are as follows:

Daly's application covers 0·17 of an acre, which is included in lot No. 57, for which an application had previously been filed by one David Upton for his claim upon the Lookout lode. It also covers 0·13 of an acre, embraced in the placer claim of Josiah Burchett, whose application antedated that of Daly. Neither of the owners of the Lookout lode nor of the Burchett placer offered any opposition to Daly's application, which was filed in the local office March 16th, 1882, and notice of which was duly posted, as required by law. On the 1st of November, 1882, Burchett executed in due form before a notary public an abandonment of so much of his placer claim (describing by notes and bounds) as conflicted with the Rob Roy claim, which abandonment was on the 7th day of November, 1882, placed on record in the office of the Recorder of Silver Bow County. Upton, claimant of the Lookout lode, was adversed by the claimants of the Anaconda lode, lot No. 92. Instead of resisting the adverse, he, on the 6th of October, 1882, duly executed an abandonment of his entire claim, which abandonment was placed of record in the county, October 9th, 1882.

This left the Rob Roy claim without any conflicting application, and the register and receiver, therefore, accepted the money in payment for the ground, and allowed the entry.

You, however, decline to issue patent, the objection being the existence, at the date of Daly's application, of the prior application referred to. The theory of the objection, as I understand, is, that the earlier applications of Upton and Burchett operated to segregate from the public domain the ground covered by their respective claims, and consequently rendered it, or any portion of it, unavailable under the application of Daly, notwithstanding the abandonment of Upton and Burchett. It is true that the effect of an application duly filed may be regarded as a segregation and appropriation of the land conveyed thereby, and that the natural result of an abandonment would be the reversion of the ground to the domain from which it was carved. But where, as in this case, two applications, covering in part the same ground, have been made and accepted, and the one first made has been abandoned, either in whole or as to the portion in conflict, it may, I think, be held under the law that the ground in conflict falls within the purview of the second application and becomes subject thereto. There is nothing in the mining laws to preclude this view, and if there is any thing in the regulations which would by implication tend to prevent such a course, the department may, in a case like this where no one can possibly be wronged by such action, waive its regulation to the extent and for the purpose indicated.

I therefore do not regard a reference of the case to the Board as necessary. Daly appears not only to have acted in good faith, but to have complied with the law in every particular. His claim is now entirely free from conflict. The question at issue is solely between him and the government. No one else is interested. His money has been tendered and accepted in payment for all the ground covered by his application.

No other vested right by purchase has been secured. This department has full jurisdiction to permit or refuse an entry of the land. You hold upon these facts that he has only an equity for the issue of patent. Hence your reference to the Board.

But, for the reasons given, I am of the opinion that the whole case is clearly within the jurisdiction of this department, and that there is no valid objection in law to the granting of patent as asked.

The government, by allowing the two applications for the same ground, may, although the register and receiver erred in allowing the second, be regarded, in considering its own action, as having removed itself two degrees from a full and complete ownership in the premises; and when the superior title fails, by abandonment or otherwise, the inferior may then be recognized and treated as valid, the law having been fully complied with by the applicant.

E. C. Ford, Esq., acted as counsel for Daly in this case.

Lode versus Placer Claims—the Mike & Starr versus *Iron Silver.*—Secretary Teller has rendered the following decision in this case, in a letter to the Commissioner of the General Land-Office:

I have examined the matter of the survey of the claim of the Mike & Starr Gold and Silver Mining Company upon the Gardner lode, . . . Leadville, Colorado, on appeal from your decisions of July 7th and September 16th, 1882, by the former decision holding such entry for cancellation, and by the latter declining to change the former. You held the entry for cancellation because the lode "claim lies completely within the limits of the Moyer placer, . . . which was patented to William Moyer January 30th, 1880," and because by the issue of such patent "the Land Department had exhausted its jurisdiction."

Sec. 2333 of the Revised Statutes provides that, where a vein or lode "is known to exist within the boundaries of a placer claim, an application for a patent for such placer claim which does not include an application for the vein or lode claim shall be construed as a conclusive declaration that the claimant of the placer claim has no right of possession of the vein or lode claim."

Since your said decision, I have held, in construing this section of the statute, that the effect of said section was to carve out of a patent to a placer claim all lodes known to exist at the date of the application, together with twenty-five feet of surface ground on each side. (Becker *vs.* Sears; War Dance *vs.* Church Placer; Mammoth Quartz Mine, Robinson claimant, *vs.* Royder; Shonbar Lode, Barret claimant.)

The mere fact that the placer patent to Moyer by description covers the same ground does not deprive the Land Department of jurisdiction nor prevent it from issuing a patent for a lode within the exterior boundaries of the placer. (Rico Town-Site Case.)

If, in fact, a lode was known to exist at the date of the application for a patent, the statute excepted it out of the placer patent. In the patent issued by your office to Moyer for the placer in question, you excepted and excluded such lode, if known to exist, in the following language: "Should any vein or lode of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposit, be claimed or known to exist within the above-described premises at the date hereof, the same is expressly excepted and excluded from these presents."

In the cases cited, I held that the lode must be known to exist at the date of the application for the placer claim. The date of the Moyer application for patent was November 13th, 1878. The application for said Gardner lode states that it "was discovered and located" on or about the 10th day of March, 1879.

Upon the motion for the rehearing before you, three affidavits were filed, which tend to prove that, by means of a tunnel, constructed in 1876 and 1877, the mineral vein now known as the Gardner lode was discovered in 1876, and that said Moyer, at the time of his said application, knew of said tunnel within the limits of the ground included in his application, and that mineral had been discovered therein. The discovery of the mineral is denied.

The Mike & Starr Company asks that the entry of the Gardner lode be allowed to stand, and that a hearing may be ordered at the local office to determine whether such lode was known to exist.

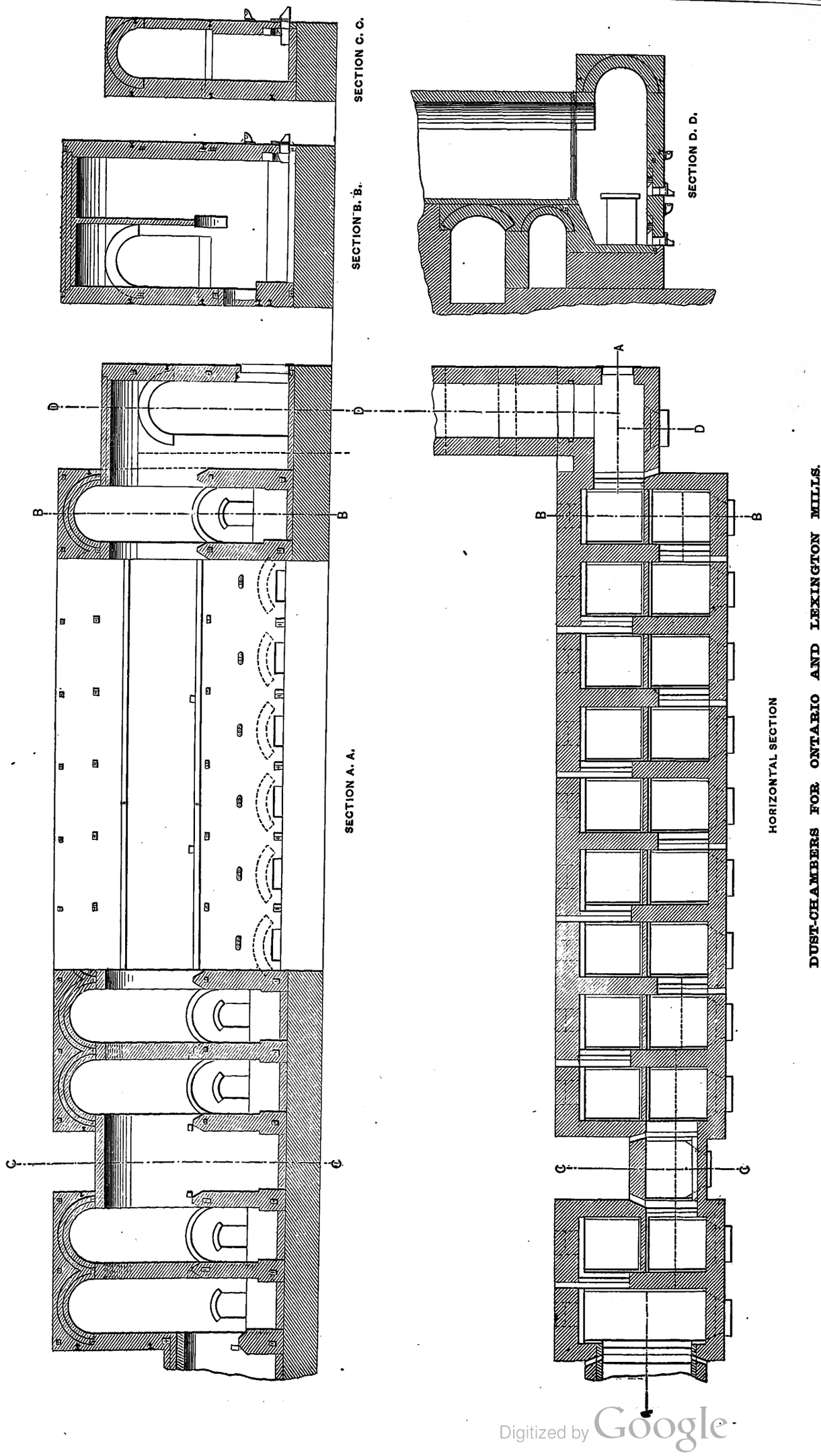
The Iron Silver Mining Company, the present owner of said Moyer placer, has placed on file and called my attention to a newspaper report of a decision, rendered the 18th ultimo by Judge McCrary, of the Eighth United States Judicial Circuit, in the case of said company *vs.* Sullivan *et al.*, in a conflict between the Wells and Moyer placer claim and the Kit Carson and Brooklyn lode claims. The report states that the court "held that the term 'known lode or vein' within Section 2333, which was reserved out of the placer patent grant, meant a known lode or vein mining claim which had been duly located or recorded and owned by some third party before the application was made for the placer patent." No official copy of the decision has been received by this department; but since the material question at issue in this case is being considered by the courts of the district in which the property in dispute is located, I deem it best for all parties that the controversy should be determined by the courts rather than by a hearing at the local office. The application in this case is for 1500 linear feet, with 300 feet surface ground; and notice of application was so published. It will be seen, by reference to decisions already cited, that the claim can not be allowed to that extent.

The application therefore must be dismissed, without prejudice to the claimant being permitted to proceed *de novo*. Should the claimant elect to proceed, "he must be required to show affirmatively the existence of such mine, and its true location, and prove his possessory right and value of work performed," and in all respects show a compliance with the law relating thereto. The adverse claim can then be made, and the controversy determined in the courts, as before indicated.

I reverse your decision.

The case of the claim of the Mike & Starr Gold and Silver Mining Company upon the Goodell lode, ordered by the Commissioner of the General Land-Office to be canceled because found to lie completely within the limits of the Moyer placer, is determined by the above decision, and the commissioner's decision is reversed, and the same direction given.

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DUST-CHAMBERS FOR ONTARIO AND LEXINGTON MILLS.

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NITROGEN IN COAL.

The cheaper production of ammonia is just now the favorite study of more than one chemist. The gas, as most of our readers know, is a compound of hydrogen and nitrogen. Both of these occur in coal. During its destructive distillation in close vessels, as in the ordinary process of gas-making, more than sufficient hydrogen is liberated to combine with all the nitrogen present. Unfortunately, the problem is, how to get that nitrogen out. A good deal of misapprehension exists on the subject, and so well-known an authority as Professor Roscoe states, in the latest edition of his *Text-Book on Chemistry*, that the whole of the nitrogen is, as a matter of fact, given off from the coal. It seems to have been reserved for Professor Foster to show that this is a delusion; but he has not yet advanced beyond this purely negative point. A sample of Durham coal, subjected to destructive distillation in gas or coke-ovens, gives off only about a seventh of its nitrogen. As every hundred parts only contain 1·7 parts of nitrogen, it is obvious that the total quantity obtained is not large, and any process which would increase it would be of enormous importance to commerce. A small portion of the lost nitrogen combines with the carbon of the coal to form cyanogen. This is removed in the usual course of purification to which gas is exposed, but the nitrogen thus evolved is of course wasted. Another portion of the original store contained in the coal remains in the free state in the gas, just as it does in larger quantities in ordinary atmospheric air, and this, again is, commercially speaking, of no manner of use. A fourth installment is left behind in the coke. Thus, when we come to inquire where the original supply of nitrogen in the coal has gone to, we find that very little of it is available for the production of ammonia, and that every hundred parts of the elementary gas are thus disposed of:

Nitrogen of the coal evolved as ammonia in ordinary distillation..	14·50
Nitrogen of coal evolved as cyanogen.....	1·56
Nitrogen of coal which is present in the coal-gas in the elementary condition.....	35·26
Nitrogen remaining in the coke.....	48·68
Total	100 00

These are laboratory results, so to speak—that is to say, they were obtained by special analysis; but it is noteworthy that they do not differ from those attained in the common preparation of gas. It comes to this, then: that, so far as all known processes are concerned, only a quarter of one per cent, or ·25, of the coal comes off as nitrogen, and 1·5 per cent, which the coal undoubtedly contains, is entirely wasted and lost. It is only necessary to state the problem in order that its bearing, not only on the production of the ammonium salts of commerce, but also on the economical use of coal, should be properly felt and adequately studied.

ON DUST-CHAMBERS.

By C. A. Stetefeldt, New York.

Prof. T. Egleston read a very interesting paper at the Boston (February) meeting of the American Institute of Mining Engineers, on the collection of flue-dust at Ems. After describing the successful experiments carried out by Mr. Freudenberg, he remarked, "These experiments have demonstrated the importance of surface over volume," in collecting and settling dust. While the Ems construction of suspending a large number of sheets in a flue, to create a maximum of surface, is undoubtedly new and original, the correctness of the principle has been known to me since 1873, and has been demonstrated in dust-chambers constructed for the Stetefeldt furnace. Without publishing any thing on the subject, I have frequently drawn the attention of metallurgical engineers to the facts, most of whom, however, did not seem to comprehend their practical importance.

It is but natural that I should have given considerable attention to the construction of dust-chambers in the erection of Stetefeldt furnaces, where the complete collection of dust is of vital importance. In erecting the first furnaces at Reno, Austin, Mineral Hill, Belmont, and Belleville, all of which were built in Nevada, in quick succession, I followed the old notion that, by lessening the speed of the current, the fine particles would settle. In every instance, however, I had added a system of narrow chambers. Very soon, I discovered that the amount of dust collected in the large chambers was very slight compared with their volume, and that more dust settled in contracted places—for instance, under the damper at the end of the chambers, and wherever the current was forced to move around a sharp corner and strike a wall. I then abandoned large chambers entirely, and adopted the construction as carried out at the Ontario mill, Utah, and the Lexington mill, Montana, for Stetefeldt furnaces; and also at the Alice and Silver Bow mills, Montana, for Howell furnaces. It is represented in the accompanying engravings. Each chamber is divided by an apron into two parts, and the openings connecting two chambers on alternating sides of the partition-walls commence a considerable distance above the floor, so that the current has to change its direction several times in passing from chamber to chamber, while the dust collected at the bottom remains undisturbed, and can accumulate in considerable quantities before discharging becomes necessary. I will mention here, that in roasting ores with salt, the dust which has been chloridized by passing the flame of an auxiliary fire-place connected with the flue of a roasting-furnace settles much easier than dust which has not undergone this treatment, or has been roasted, merely oxidizing. The reason is easily found. Red-hot ore, roasted with salt, is sticky, and clings whenever it is thrown by the current of gases against a solid surface. Hence, frequent changes in the direction of the current bring the particles into contact with the dust-chamber walls. What is effected at Ems by a maximum of surface, I effect by frequent changes in the direction of the current. Both constructions have their especial application, and whenever dust and fumes from smelting-works are to be collected, the Ems construction is, no doubt, the best. For dust-chambers close to a roasting-furnace, which produces a very large quantity of dust, my construction is preferable on account of working facilities. The first dust-chambers of a Stetefeldt furnace get exceedingly hot, being close to the auxiliary fire-place, and sheet-iron suspended therein would warp, and be destroyed by the acid fumes at such a high temperature. But both systems can be combined with profit in this case, utilizing the Ems construction in the last chambers, and in the flue leading from there to the chimney. How well these dust-chambers operate, the following statistics will show, which are the results of experiments carried out at the Ontario mill with Stetefeldt furnace No. 2. The ore roasted at the time was exceedingly base, and a strong draught was needed to supply sufficient air for oxidation, so that by far the largest portion of the ore was floated out of the shaft and into the flue, thus putting the settling capacity of the dust-chambers to a severe test.

The experiment was carried out in the following manner: All the roasted ore was discharged into iron cars of equal size, and care was taken to fill them uniformly. An accurate record was kept of the number of cars which were discharged—

1. From the shaft.
2. From the flue below the auxiliary fire-place.
3. From the first six dust-chambers.
4. From the last six dust-chambers.

Samples were taken from each car, and the average samples sealed up in glass bottles, to prevent the roasted ore from attracting moisture. In these samples was determined—

1. The value in silver.
2. The percentage of soluble salts
3. The value of the roasted ore after leaching out the soluble salts.
4. The weight of equal volumes, so that relative weights could be calculated from relative volumes. The experiment was continued for ten days. As a check for the accuracy of the work, samples were also taken from the cars transporting the roasted ore to the pans, after it had been cooled and thoroughly mixed on the cooling-floor. The value, solubility, etc., of these samples agreed very closely with the calculated average values of the four sets of samples to which reference is made above, showing that the accounts kept by the furnace-men were correct. The value of the raw ore was $156.15; the percentage of salt used in roasting, 18·4 per cent.

TABULATED STATEMENT, SHOWING RESULTS OF EXPERIMENTS.

Average from ten Samples.	Roasted Ore discharged from:			
	Shaft.	Flue below aux. fire.	First six dust-cham.	Last six dust-cham.
Value in silver.	$114.44	$122.36	$122.55	$102.88
Soluble salts, per cent	24.7	25.9	33.2	37 1
Value after leaching...	$153.23	$164.95	$182.89	$163.93
Weight of equal volumes, calling weight of ore from shaft 100	100	88	70	59
Calling value of raw ore 100, the value of roasted ore after leaching is.....	98	106	117	105
Calling total volume of roasted ore 1000, we find in.....	280	563	141	16
Calling total weight of roasted ore 1000, we find in.....	317	561	112	10
Calling total weight of roasted ore, after leaching, 1000, we find in	325	566	101	8
Calling total amount of silver in roasted ore 1000, we find in.....	1:06	571	114	9

THE SWEDISH IRON INDUSTRY.

From the official returns just published for the period 1881–82, great progress appears to have been made in the iron and coal trades of Sweden.

The winter 1881–82—winter being the season when most work is done in the Swedish furnaces—was an unusually mild one, and the quantity of charcoal brought out from the forests, in consequence, comparatively small. It is a remarkable circumstance that in this country the larger iron deposits, which in some places extend more or less continuously for from fifty to a hundred miles, are entirely denuded of those species of trees from which charcoal may advantageously be made. The consequence of this is, that iron mines are found where there is no charcoal, while charcoal is plentiful in districts where there is no iron ore; and for this reason the wood fuel—and this is the only kind used in Sweden—has to be brought to the furnaces long distances, from places where there are generally no railroads, on sleighs in the winter, when snow and ice cover the country and its water-courses. Although a severe winter is indispensable to a great manufacture by the works, the numerous railroads lately built, partly by the state, but chiefly by private individuals, have during recent years to a great extent made the Swedish iron-master independent of climatic conditions, and the time is doubtless not far distant when easy and cheap means of communication will bring the extensive forests of which the country can boast within easy reach of the iron-works, and the two most important factors in the industry into complete co-operation.

In the spring of 1882, very high prices for iron and steel were anticipated in Sweden, chiefly in consequence of the alleged scarcity of charcoal, which would, it was asserted, curtail the make; but these anticipations were not realized, and this tends further to corroborate the above statement, that the Swedish iron-master is far more able to obtain his supply of fuel at the present day than ten years ago. The two kinds of iron now chiefly made in Sweden are pig and bar-iron, and although the former was in years gone by the chief metal produced in Sweden, the price has gradually gone down. Although it is still made in large quantities by furnaces which are without the modern appliances for the new processes, its export has diminished year by year in proportion to the increase in make. And while the English market was formerly the best for makers of pig-iron, the demand has of late gradually decreased, and the prices have in consequence been very low. This circumstance is, however, not due to any deterioration in the quality of Swedish pig-iron, but to the fact that English foundry pig, which seems to answer the purpose, may be offered at half its price in England, and even exported into Sweden under the cost of common gray Swedish pig. With respect to this kind of iron, little improvement may be expected, as the Swedish manufacturer has not at present the capital necessary to adopt the

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modern processes, which, at a lower cost, produce a metal relatively better, or, at all events, perfectly answering the demands put upon it.

In 1880, there were 193 furnaces making pig-iron in blast in Sweden, turning out a total of 399,500 tons of pig-iron, and 4500 tons of castings directly from the furnace. In 1881, there were 197 furnaces in blast, turning out a total of 416,700 tons of pig-iron, and 5280 tons of castings directly. This is an excess, therefore, in 1881 over 1880 of 17,200 tons, while the average output per furnace in 1881 was 2110 tons, against 2050 tons in 1880. The greatest quantity made in 1881 by one concern was 10,000 tons at the Hofors Iron-Works, where there are two furnaces; and the smallest, 132 tons, by a furnace in the province of Calmar.

If we turn to the latest statistics of the malleable iron industry for 1881, we find that there were 276 works for its manufacture in operation, with 745 hearths, of which four were puddle and three Martin furnaces, making a total of 253,600 tons; while in 1880 there were 270 works in operation, with 731 hearths, of which six were puddle and four Martin furnaces, making a total of 217,300 tons of such iron. The excess in 1881 over 1880 was, therefore, 36,300 tons, while the average return per rolling-mill in 1881 was 920 tons, against 805 in 1880. There were also made during the year 134,000 tons of blooms, against 130,000 tons in the previous year, which had been rolled or drawn into bars at rolling-mills attached to other kind of works.

The manufacture of pig and bar-iron, with castings, during the quinquennial period has been as follows:

	1877. Tons.	1878. Tons.	1879. Tons.	1880. Tons.	1881. Tons.
Pig-iron	335,000	327,000	330,000	399,500	404,300
Bar-iron	222,200	194,000	205,000	217,300	253,600
Castings directly from the foundry	8,470	8,250	6,020	4,500	5,220
Castings by re-smelting pig-iron	18,300	13,200	10,600	12,540	13,530

From these statistics, it will be seen that the production of pig and bar-iron has gradually increased during the last few years, while the making of castings has decreased. There is, however, perhaps no industry which can show such remarkable results as the steel industry of the country during the last few years, which is no doubt owing to the large construction of steel steamers in recent years. Sweden seems thus to be the ship-building mart of the neighboring countries, and last year there was launched a larger number of vessels than in any previous year. The chief customer for these appears to be Russia, in spite of the duty there on all vessels built abroad. The Swedish yards have contracts on hand to last for the present year. Orders from some countries have been declined, while the activity at the works is strained to the utmost. In connection herewith, it should be mentioned that the first contract for the building of a war vessel by a private firm in Sweden, has just been given by the government to the Kockum works, at Malmö, namely, the construction of the iron corvette Freia.

During 1881, there were thirty works manufacturing steel in the country, making a total of all kinds of 48,678 tons, and the following table shows the detailed production of the important metal in the various provinces (län), with the number of works in each. The term Bessemer steel covers all steel manufactured on this principle, irrespective of hardness.

Name of County (Län).	No. of works.	Bessemer steel. Tons.	Martin steel. Tons.	Other kinds. Tons.	Total. Tons.
Vesternorrland	1	.....	.....	5	5
Gefleborg	3	12,115	.....	.....	12,115
Upsala	2	.....	.....	313	313
Kopparberg	4	6,983	1,921	87	8,991
Vestmanland	3	3,224	.....	723	3,947
Orebro	4	6,600	957	17	7,574
Vermland	10	9,636	5,533	220	15,389
Elfsborg	2	.....	.....	343	343
Ostergötland	1	.....	.....	1	1
	30	38,558	8,411	1,709	48,678

Among "other kinds," are some blister, cast, and puddle steel. Bessemer steel was manufactured by the following works: Iggesund, 2973 tons; Sandviken, 7700 tons; Forsbacka, 1450 tons; Domnarfoet, 2975 tons; Langshyttan, 3130 tons; Ulfshyttan, 834 tons; Vestanfors, 3230 tons; Bangbro, 5450 tons; Stjernfors, 1140 tons; Uddeholms Works, 2845 tons; Borgvikshyttan, 504 tons; and Björneborgsshyttan, 2062 tons; total, 38,558 tons. In 1880, there were also thirty steel-works in operation in Sweden; but as these in 1880 returned 36,730 tons of steel, there is an increase in the outturn of very nearly 12,000 tons, which figure speaks volumes for the progress of this industry, particularly as 9122 tons are Bessemer steel alone. The manufacture of steel has advanced during the quinquennial period as follows: 1877, 24,300 tons; 1878, 25,400 tons; 1879, 27,101 tons; 1880, 36,730 tons; 1881, 48,678 tons; and has thus been nearly doubled in five years. One of the principal features of the Swedish steel manufacture is the successful attempt which has recently been made at Bofors to manufacture steel guns from Martin steel on the Terre-Noire method.

Several attempts have also been made to make guns by the Bessemer process; but as these have been unsuccessful, they have been abandoned. The guns are cast at Bofors in molds giving them almost their final shape, and are not subjected to any other treatment before being finished than reheating and hardening, by which their cost is less than if made from other kinds of steel which require forging. Up to the present, ten guns have been cast at Bofors from Martin steel, six of which have been tested, one is under finish, and three are still in the crude form. The testing of four of these guns, which was made in order to try their strength only, was effected with 1060 firings of one, and 2000 firings of the three others, which were then burst under an atmospheric pressure of 5000. The excellent quality of the steel was fully demonstrated. Thus, even after 2000 firings, the guns were just as uninjured as before the trial, and when bursting, the steel showed an elastic limit, which was remarkable even for this kind of steel. The bursting itself showed that the steel was without defect or flaw, while it had stood the test equally well in all parts, even where the strain was greatest, to which, perhaps, the shape of the guns—exactly similar to the Krupp field-pieces—contributes somewhat. In future, the Swedish government contemplates having all the guns required by the artillery made at Bofors of Martin steel, which it is now at liberty to do, the contract between it and Messrs. Krupp having expired this year. For the ensuing year, the government has ordered from Bofors several batteries of field-guns, to be made from hardened Martin steel; and if this new industry should prove to answer, there is every probability of the government having also the guns of the navy made in Sweden. Besides guns, these works delivered last year to the army some thousand rifle-barrels of close forged Martin steel, as well as material of the same metal.

With regard to the finished iron and steel industry of the country, there is considerable progress to record during the last few years. Still, Sweden imports yearly a far larger quantity of such articles than she exports. In 1881, there were 159 works in operation in the country, which turned out 37,500 tons of all kinds of manufactured articles; in 1880, there were 177 such works in operation, turning out 32,500 tons, which is therefore an increase of 5000 tons, although the decrease in the number of works was 18. In 1881, there were made 12,875 tons of plates, 12,600 tons in 1880; 6978 tons of nails, 7300 tons in 1880; 1380 tons of tools and implements, 1400 tons in 1880; and about 16,000 tons "sundry manufactured articles," against 11,400 tons in 1880, under which heading the increase has therefore chiefly taken place. Among these were 2900 tons of machinery, railroad tires and axles of Bessemer metal, 1000 tons of iron and steel wire, 200 tons of chain cables, etc. In 1881, there were employed 6286 workmen at these 159 works, against 5850 in 177 works in 1880. During the quinquennial period, the quantities of manufactured goods were as follows: 1877, 38,500 tons; 1878, 36,100 tons; 1879, 27,500 tons; 1880, 32,500 tons; 1881, 37,500 tons. Last year, there was started a manufactory in Sweden for horseshoe nails by an American firm, which is the only one of its kind in the country. Horseshoe nails have previously been made in Sweden, but only by "clipping." With the modern machinery at the American works, they are, however, forged, which increases their value nearly fifty per cent. The nail hammers at these works are twelve, driven by an engine of 27 horse-power, turning out 10,000 nails a day, while every nail receives from 80 to 90 strokes.

The iron ore production of Sweden has risen considerably during the last few years, and we shall have to go back to the year 1873-74—the most flourishing on record—to find figures which compare with those of 1881. In 1881, ore was raised in thirteen of the twenty-four provinces of Sweden, with a total of 806,000 tons, which is an increase on the previous year of about 50,000 tons. As regards the quantity of ore broken out, Sweden ranks after England, France, and Germany, but before Belgium, Russia, Austria, and Spain. The greatest quantity was raised in the province of Orebro, whose 262 mines produced 220,000 tons; next comes Kopparberg, with 181 mines, 210,000 tons. But Vestmanland shows the greatest concentrated output, as 170,000 tons were raised from fifty-seven mines.

But here are also situated some of the richest deposits in Sweden—Risbergsfältet, whose seven mines alone give nearly 50,000 tons, Klacksbergsfältet, and Morberget. In the provinces of Jönköping and Kronoberg, there were also in the year 1881 raised about 5000 tons of lake or bog ore. During the quinquennial period, the output of "mountain" ore was as follows: 1877, 772,000 tons; 1878, 600,000 tons; 1879, 630,500 tons; 1880, 755,000 tons; 1881, 806,000 tons. If we turn from these statistics of the iron and steel industry to those of trade, we shall find that the latter has during the last few years made as enormous strides as the former. During the last three years, the exports of Sweden were as follows:

	1880. Tons.	1881. Tons.	1882. Tons.
Pig-iron	61,519	55,290	55,500
Bar-iron, rolled or forged	131,220	136,556	154,000
Iron plates, hoops, etc.	50,000	52,000	56,000
Blooms	8,860	8,802	8,000
Rails with bolts, etc.	.....	2	30
Plates, galvanized and otherwise	2,174	2,362	2,200
Nails, 1-6-inch and above	876	1,052	900
Steel, in ingots	8,155	7,165	9,800
Iron ore	29,662	24,232	20,200
	292,466	287,461	306,630

From these figures, it will be seen that the articles which form the staple of export have greatly increased, while the decrease in the export of plates and iron ore bespeaks an increased consumption at home. From the figures we have just given of the exports of 1882, it may be safely concluded that that year will also, as regards the manufacture, show an advance on those of the previous years. As regards the import of iron and steel, the figures for 1881 show an advance on those of 1880, while those of 1882 will no doubt exceed them both. Of steel and iron rails, there were imported from England, in 1882, of steel 6952 tons, of iron 2435 tons, as against 4416 tons and 2222 tons respectively in 1881.

FURNACE, MILL, AND FACTORY.

The Ward Iron Company at Niles, O., has failed.

The Atkinson Diamond Drill Company has sunk a well 475 feet deep at Stapleton, Staten Island, N. Y., for a brewery.

A new machine for perforating all sizes of metal has lately been put in place by Harrington & King, of Chicago, and is working very satisfactorily.

The Dover *Iron Era* reports on the 21st that one hundred and one tons of iron were made in the twenty-four hours ended on Friday morning last, at the Durham Iron-Works, in a single stack.

A new barb fence wire company is to be located at Ottawa, Ill., on the lines of the Chicago, Burlington & Quincy and Chicago & Rock Island railroads. The capital has been subscribed, and the company will begin operations within the next ninety days.

The Stover Manufacturing Company, of Freeport, Ill., manufacturers of special machinery, have completed fifteen barb-wire machines for the H. B. Scutt Company, of Pittsburg.

The beam of the new high-service engine of the St. Louis Water-Works is 84 feet long, 7 feet deep in the center, is composed of wrought and cast-iron, and weighs 68,000 pounds. The pump casting proper weighs 84,000 pounds, the cylinder and jacket weigh 28,000 pounds, the lower and upper head of the cylinder 16,000 pounds, the air-chamber 66,000 pounds, the columns supporting the beam 56,000 pounds, the bed-plates 64,000 pounds, and the pump-plunger and bucket 20,000 pounds. The piston is 85½ inches and the piston-rod 8½ inches in diameter, with 10-foot stroke. The engine is to be run by six boilers 24 feet long, of the pattern known as the drop-flue return boiler. A temporary frame build-

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ing is erecting over the new engine. The foundations connected with the engine have been constructed to accommodate three more engines, and the plan is to place the engines in position before erecting the engine-house. The foundation of the new boiler-house is designed to accommodate twenty-four boilers, which will generate the steam to run the four new high-service engines.

Mr. H. H. Porter has issued a circular containing the following plan for reorganizing the Union Iron and Steel Company of Chicago: A new company is to be formed to buy out the whole property of the present company. The capital stock of the new company to consist of a seven per cent cumulative

Preferred stock of	$3,000,000
And a common stock of	1,600,000
Total	$4,600,000

The preferred stock to be used in paying the indebtedness of the company at par as follows:

First mortgage bonds	$500,000.00
Second mortgage bonds	684,000.00
Bills payable	1,484,389.07
Accounts payable	152,877.89
Total	$2,821,266.96

If the second mortgage bondholders (and holders of more than one half have already expressed their willingness to do so) will take preferred stock at par for their bonds, and the holders of the bills and accounts payable will take preferred stock at par for their notes and claims, the representatives of the "Stone" indebtedness (which is included in the figures given above) will buy the first mortgage bonds at par and will take preferred stock for them.

The whole plan is conditioned on all the creditors assenting to it by August 1st next. On giving said assent, so as to insure the carrying out of the plan, they will, on notice, be expected to deposit the evidence of the indebtedness due them in the hands of some proper trust company for that purpose.

The condition of the new company on this basis would be:

Preferred stock (which would be used in paying the creditors as shown above, any surplus to remain in the treasury of the company for its future disposition)	$3,000,000
Common stock (which would be used in exchange, at par, for the stock of the present company to same amount)	1,600,000

And this new corporation would represent and own:

A. The Union Iron and Steel Company's plant at Chicago.

B. The Union Iron mine on the Menominee range, subject to its royalty contract of 50 cents per ton.

C. About 5700 acres of land on the Menominee iron range (Michigan).

D. Interest in patent of Bessemer Steel Company (Limited).

E. Cash and working supplies to run the steel-works, of a value of from $675,000 to $750,000.

F. Any surplus of preferred stock not required in paying the indebtedness.

G. Some doubtful accounts on which investigation indicates that $100,000 at least should be collected.

I estimate the fair cash value of all the personal property of the company, if used in running the works, to be from $850,000 to $1,000,000, in addition to the plant itself.

It seems to me that this plan is a feasible and practicable one, and is probably the most profitable way of reorganizing the company in the interest of the creditors. An industry of this kind, in the hands of a receiver, is necessarily expensive, unsatisfactory, and injurious to the company, and consequently to the creditors.

If all the creditors will assent to it, I will attempt the reorganization of the company on this basis; and if any of them shall prefer to take 50 cents on the dollar in cash for their indebtedness, instead of preferred stock, I believe I can find parties willing to buy their claims, and take their places in carrying out this reorganization scheme.

Accompanying this is an inventory setting forth the property of the company as presented to the court by the receiver, including the mills, docks, steel-works, furnaces, mining lands, etc., which amount to $2,901,759.37. The circular is also accompanied by a proposition in blank for the signature of the stockholders.

On the morning of the 20th, a fire was discovered in the timbers over the main battery of boilers at Everson, Macrum & Co.'s mill. Second avenue and Monongahela River, Pittsburg. There was a turn at work, the third heat being in the guide, bar, and sheet-furnaces; but the flames spread so rapidly that the employés were driven pell-mell from their work. The boiler-house is located on made ground on the river-bank, parallel with the main mill building, both being iron-clad and iron-roofed. The fire having reached the main building, and made such headway as threatened the entire destruction of the structure, the boiler-house was destroyed, and with it the stack and breeching. The boilers were not damaged. One half the mill building was burned or so much damaged as to require this portion to be rebuilt. The machinery, consisting of three large engines, four trains of rolls, shears, etc., was not damaged. Heats were in the guide, bar, and small sheet-furnaces, and these cooling off will cost something to clear out, although, as the furnaces are sand bottoms, the damage to them will amount to little. The guide mill furnace is the only one that will need material repairs, the stack being in a tottering condition. The loss will not exceed $10,000.

A train going at full speed jumped the track and ran into the works of the East Tennessee Zinc Company, at Knoxville, Tenn., tearing away the whole side of the building and playing havoc with the machinery. The locomotive engine ran into the stationary engine of the Zinc Company, demolishing the latter completely. The damage to the railroad company is about $10,000, and to the Zinc Company $6000. The accident was caused by a misplaced switch.

A contract has been signed by M. C. Bullock, President of the Diamond Drill Manufacturing Company, of Chicago, and citizens at Rich Hill, Mo., to have a hole bored with a diamond drill to the depth of 1000 feet in the vicinity of Rich Hill. The drill will bring out a core about two inches in diameter.

An accident occurred on the 23d at the Onondaga Iron Company's blast-furnace, about half a mile west of the village of Geddes, N. Y. For several weeks, the blast-furnace has been out for repairs. Men have been engaged for several days in removing the fire-bricks of the arch, leaving only the outer course standing. At thirty-five minutes past three o'clock, a gang of eight men was lining the blast-furnace, which is 16-foot bosh and 60 feet high. The men were relaying the bricks on the lower part, and a small scaffold was laid across the furnace eight feet from the ground. Without warning, the lining of the upper part suddenly gave way, and sixty tons of brick fell upon the men. An alarm was at once given, and the workmen at the mill set to work with a will to remove the victims. In less than an hour, the bodies of the eight men were taken from the ruins. The manager claims that the men were warned.

The Cincinnati *Enquirer* says that the managers of the Kentucky Union Company have closed a trade for the Kentucky River Iron-Works property, in Estill County, paying about $500,000 for it. This makes the third piece of valuable manufacturing property bought in that section by the Kentucky Union Company.

The contract has been let and the ground broken for the new pattern-shop of the Dickson Manufacturing Company, Scranton, Pa. This establishment is fast becoming one of the largest of the kind in the United States.

The Dean Brothers steam-pump works, of Indianapolis, have just shipped two large double plunger mining pumps to coal mines in Alabama.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents were promulgated by the General Land-Office during the week ended Saturday the 21st of July:

ARIZONA.

TUCSON DISTRICT.

Solomon Warner, Santa Tomas lode. Horseshoe Mining Company, Alta lode.

CALIFORNIA.

MARYSVILLE DISTRICT.

Henry Downing, Evening Star placer. Norman A. Harris, Lucky Strike placer. J. M. Ward, placer.

SACRAMENTO DISTRICT.

Cyrus T. Wheeler, Wildman quartz mine.

COLORADO.

CENTRAL CITY DISTRICT.

Bullion Tunnel Company, Hamer No. 1 lode and mill-site. Charles C. Emigh, Red Bird lode. Mary G. Peck *et al.*, Gold Dirt lode. Nathan S. Hurd, Creole lode. Robert M. Richardson *et al.*, Pickwick and My Daisy lodes. Lebanon Mining Company of New York, Champion lode and mill-site. William Dillon, Dillon lode. Annie R. Sprenger *et al.*, Edinburgh lode. Benjamin T. Wells, Seven Twenty lode. Peter D. Graham, Graham lode. Consolidated Bobtail Gold Mining Company, Warwick lode.

DURANGO DISTRICT.

Angus Smith *et al.*, Cross, Pittsburg, and Hope lodes. E. P. Suydam, Rico Muldoon lode. Cleveland Consolidated Mining Company of Colorado, Little Bertha lode. E. J. Warner, Boston placer. Dinant du Ponte, Iron Clad lode. Thomas Blair, placer.

LAKE CITY DISTRICT.

David A. McConnell, General Sherman lode. Dolobran Mining Company Pioneer lode and Revenue and Union lodes and mill-sites. Joseph Donnell *et al.* Alps lode. W. Weston *et al.*, Finance lode. Hugh J. Alexander *et al.*, Yellow Jacket lode. Old Reliable Mining and Reducing Company, Little Fraud lode. C. Patz *et al.*, Governor Pitkin lode. Dennis Kenyon *et al.*, Jim Fisk lode. Summit Mining Company, Summit lode.

LEADVILLE DISTRICT.

Samuel Cohen, Grand Prize lode. J. P. Whitney, Milton Belle, Dexter, and Pete Carroll lodes. Thomas Carney *et al.*, Iron and Cavern lodes. Stray Horse Gulch Mining Company, Rarus lode. John A. Smith *et al.*, Fox and Rattlesnake lodes. Elisha A. Buck, Rustler lode. Aaron K. Styles, Paducah lode. Park County Silver Mining Company, Black Hawk lode. Berlin Mining Company, Frisbie placer mine. Excelsior Consolidated Gold and Silver Mining Company, Little Hattie lode. Warrior's Mark Mining Company, Ætna, Warrior's Mark, Queer Name No. 1, Queer Name No. 2, Cassandra No. 1, Cassandra No. 2, Cassandra No. 3, Cassandra No. 4, Cassandra No. 5, and Warrior's Mark No. 2 lodes. Thomas S. Wells, placer. W. Z. Ransom *et al.*, placer. Alleghany Mining, Smelting, Tunneling, and Milling Company, placer. George M. Robison *et al.*, Laura lode. Charles F. Reynolds *et al.*, Main lode. B. B. Hugus *et al.*, Alpha, Beta, and Maverick lodes.

PUEBLO DISTRICT.

W. J. Schoolfield *et al.*, Rappahannock lode.

IDAHO.

BOISE CITY DISTRICT.

Robert C. Chambers, Iris lode. Vienna Consolidated Mining Company, Alturas lode.

MONTANA.

HELENA DISTRICT.

William A. Clark, Missing Link lode. Daniel B. Noble, company lodes and mill-sites. James Thompson *et al.*, Golden Gate lode. Edward King, placer.

NEVADA.

CARSON CITY DISTRICT.

J. H. McNee, Garfield and Arthur salt and borax placers.

EUREKA DISTRICT.

Madeline Goetz *et al.*, Star of the West lode.

NEW MEXICO.

LAS CRUCES DISTRICT,

Patrick Dorsey, Kelly lode. Thomas F. Conway *et al.*, Ivanhoe lode.

UTAH.

SALT LAKE CITY DISTRICT.

Sylvester T. Everett, Chloride Gem and Jim Fisk, Jr., lodes. James McTenny and S. T. Everett, Green-Eyed Monster lode. Romeo Consolidated Mining Company, Romeo lode. James Robbins, Senior, Robbins Eureka lode. Robert C. Chambers *et al.*, Central lode and Washington mill-site. William S. Searls *et al.*, Day Dawn lode. Samuel W. Smith *et al.*, Cornucopia ledge and company lode.

WYOMING.

EVANSTON DISTRICT.

Samuel E. Rogers, oil placers.

GENERAL MINING NEWS.

ARIZONA.

GLOBE DISTRICT.

OLD DOMINION.—Shipments for this week are 335 bars—106,155 pounds. Total to date, 3,694,430 pounds. One furnace will be started on Monday, and a second one as soon as coke accumulates.

GRAHAM COUNTY.

DETROIT.—The Clifton *Clarion* reports that the Detroit Copper Mining Company is making preparations to do business on a large scale. The hoisting-engine on Copper Mountain is nearly ready to start up. The engine-house is completed, and presents a very neat appearance. A winze has been started from level No. 3, and is going down in first-class ore. The stopes all through this mine are looking well, and are producing more ore than at any time previous.

TOMBSTONE DISTRICT.

CONTENTION.—About sixty miners have been laid off. This reduction of the working force is only temporary, and was necessitated by the putting in of the pumping machinery, which will be commenced at once.

CALIFORNIA.

THE BODIE DISTRICT.

VIRGINIA CREEK HYDRAULIC.—The *Free Press* says: Bar No. 1 of the Virginia Creek Hydraulic Mining Company has been melted by A. Soderling, the assayer, giving a value of $2000. This company is operating at the old Mono diggings, and but a few days since began hydraulicking with a little giant. There is an ample supply of water.

BODIE CONSOLIDATED.—The official report for the week ended July 13th shows: Ore crushed, 131¾ tons; average assay value of pulp, $20.33 per ton;

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of tailings, $4.54. Bullion shipped, $3122.18. The west cross-cut, 1000 level, is 297 feet long. North drift, same level, is 315 feet long. The east cross-cut, 1000 level, is in 382 feet. The south drift from bottom of winze No. 2 is in 25 feet. The south drift from winze No. 6, at 640 level, is 197 feet long, and uprise No. 23 from 672 level is up 65 feet.

STANDARD CONSOLIDATED.—The official report for the week ended July 14th shows: Ore extracted and shipped to mills, 1494 tons; bullion shipped, $22,307.65. The east cross-cut, 1200 level, is 378 feet long. The north drift No. 1, 1000 level, is in 229 feet, and shows the vein 1½ feet wide. The south drift No. 3 is 178 feet long; the vein is 5 feet wide and looks well. Uprise No. 1 from this drift has reached the hight of 70 feet, where the vein is 4 feet wide. The west cross-cut from north drift, 700 level, is 348 feet long, and is in hard ground. The south drift from the west cross-cut No. 1 is in 174 feet, and shows the vein 3 feet wide. The south drift No. 2, 385 level, is in 665 feet; vein, 4 feet wide. The north drift No. 2 is 262 feet long, and shows 8 feet of vein. The uprise from south drift No. 2 is up 234 feet, and the uprise from the north drift No. 1 is up 200 feet. The stopes show no change.

SAN BERNARDINO COUNTY.

The *Calico Print* of July 7th has this to say of the mines along the Atlantic & Pacific division of the Southern Pacific Railroad: The Silver King shows up richer as it goes down. The average milling returns of its ore are now a little over $100 to the ton. The Garfield, which is down about 130 feet, has doubled in value within the last week. William Raymond, the owner of this fine mine, has made arrangements to have his quartz mill shipped from Nevada, and in two or three months it will be erected and in operation at the Fish Ponds. The ore taken out from the big copper mines in Ord District will soon be passing through a smelter which Osborn & Co. will put up in a few months. The mill for the Alvord gold mine is bought and active operations are beginning on this rich mine, and it will not be long before one hundred stamps will be reducing its ore. The gold mines at Paradise Valley will also be opened up as soon as the hot weather is over. The Lava Beds, which are beginning to attract so much attention on account of their rich showings, will be the scene of lively times this fall. A town will be laid out and a dozen or more good mines will be employing a large number of men, who will support a good-sized town. The owners of the mines bought from the Clark Brothers for $20,000 will shortly put up a mill, and a branch railroad will be built to the mines, which will be but the commencement of extensive operations. The above enterprises, in connection with the constant operation of the Pioneer, Oriental, Waterman, and Oro Grande quartz mills, will create a large amount of business and traffic in this section of the country.

COLORADO.

BOULDER COUNTY.

GOLDEN STAR.—John Ritchie, of Gold Cliff, the owner of this property, is negotiating for the erection of a concentrator.

NORTH PLATTE MILLING AND MINING COMPANY.—This company has just started up with its new plant of two sets of steam stamps and Rouse concentrating-tables at Gold Hill. The old stamp-battery has been abandoned and replaced by the Sharpneck steam stamp, of which there are two in each battery, having a daily capacity of from 15 to 18 tons. These are run at a rate of 175 drops per minute, although the stamps have an actual capacity of 300 drops per minute, worked on the plan of a steam-hammer. There is no contact of shoe and die when there is no mineral between them, the impact and consequent wear and tear being prevented by a steam-cushion. The stamps take steam directly from the boiler. From the stamps, the pulp passes to an automatic sorter, then to two sets of Rouse concentrating-tables, which have been steadily at work for over a year, making a saving of over 80 per cent on the tellurium ores from the Prussian mine, with the owners of which there is a contract for working 10,000 tons, after which the mill will be ready for general custom work.

CHAFFEE COUNTY.

The new concentrating-works of P. J. Cunningham & Co., at Windfield, will be started up soon.

DOLORES COUNTY.

Under date of the 20th, Mr. Linwood O. Towne sends us the following notes:

ELLA D.—This claim adjoins the South Park, its owners having been sinking a shaft to cut the vein of the latter, which is horizontal. This was effected to-day at a depth of 70 feet, where the same bituminous shale, silver-bearing, was struck. This finding of the South Park vein on adjacent property has occasioned considerable excitement, and shafts will at once be sunk on other claims in the vicinity.

GRAND VIEW.—Mr. H. O. Hofman, of Philadelphia, has just assumed charge as metallurgist, and smelting under him is proceeding with satisfaction. Since the recent shutting down of the furnaces, ore has been constantly bought and important changes made about the works. An additional blower has been put in, and a new engine, which has also been added, will be used for blowers alone, thus insuring uninterrupted blast.

SANTA CLARA REDUCTION-WORKS.—The works are running constantly, making regular shipments of fine gold and silver bullion.

SOUTH PARK.—This property, which has so suddenly come into prominence, continues producing large quantities of high-grade ore, shipments being made to the Rica reduction-works and Grand View smelter. The character of the ore, which is one of the most eccentric ever found in the State, remains practically the same. It is almost a fire-clay in general composition, but nearly black in color through bituminous matter, which is easily burnt off. Shipments to the smelter run from 100 to 350 ounces of silver per ton. It is quite impossible to sort the ore, specimens of which will assay up in the thousands. The silver occurs native and as a sulphide in sulphate of lead.

FREMONT COUNTY.

A correspondent of the Denver *Republican* says, writing from Rosita: While prospecting for a saw-mill site a few days since, close to the line of the Denver & Rio Grande Railroad, and not far from what is known as Cedar Ridge, and about on the line of Custer County, I came on a half-dozen miners working a claim known as the Newsboy, and piling up ore by the ton from a four-foot vein of rich galena. It runs 16½ ounces in silver and from 60 to 66 per cent lead and some copper. The owners are Thomas McEwing, now superintendent of the Julianna, and Hon. Frank Hunter, discoverer of the famous Johnny Bull mine.

GUNNISON COUNTY.

GUNNISON MINING AND MILLING COMPANY.—It is reported that R. D. Smith, of Pekin, Ill., proposes to remodel the concentrator.

LAKE COUNTY.

The erection of a third furnace at the Elgin smelter is under advisement.

The fourth furnace at the American and the fifth furnace at the Arkansas Valley smelter have been blown in.

There is now not an idle smelting-furnace in Leadville. The list of reduction-works is as follows: Cummings & Finn, five furnaces; Elgin, two; Harrison, four; La Plata, five; American, four; Arkansas Valley, five.

MORNING STAR.—A large body of ore in the Morning and Evening Star mines has been opened, which runs 50 ounces in silver and between 40 and 50 per cent lead. It was thought that this ore would not run higher than 20 ounces in silver.

ROBERT E. LEE.—The Carbonate *Chronicle* says: The workings of the Robert E. Lee remain a mystery. The pending sale is expected to be consummated by the latter part of the present month at the farthest. Prospecting has been kept up since the shut-down, and various conflicting reports are current as to the either the new discoveries. That there have been some very valuable deposits value of up there is no doubt, but nothing authentic will be given the public until opened the sale is made to the English syndicate or declared off.

SILVER CORD.—At a quarter-past five Sunday morning, the explosion of a lamp in the boiler-room of the Silver Cord Mining Combination's buildings spread oil and flames in every direction, resulting in the destruction, in less than an hour, of probably $40,000 worth of property. The machinery building was 90 by 40 feet, covered by an iron roof, and contained in the southern end the large one hundred horse-power hoisting-engines, with two drums, and was acknowledged the finest rig of the kind in the State. Next to the engine-room were the compartments containing the miscellaneous machinery, and adjoining it the boilers, three in number. In the former room was a No. 5 air-compressor, a thirty-five horse-power engine for the saw-mill, a twelve horse-power Westinghouse engine, and a twelve-light dynamo machine. Adjoining this was a fully-equipped machine-shop, and beyond it the saw-mill and carpenter-shop, with wood-lathe, saw-gummer, and other appurtenances. The building and its contents were valued at $40,000, and were covered by insurance to the extent of $19,700, of which amount $16,400 were on machinery and $3300 on buildings, including also $500 on the ore-house. The ore-house contained a sorting-floor 80 by 13 feet, and twelve ore-bins, which had a capacity of about eight hundred tons. The fire entailed a loss of time in working the mine of but three hours, as temporary hoisting-engines were immediately set up, and at ten o'clock the mine was again hoisting ore.

SAN JUAN COUNTY.

BEN FRANKLIN.—This mine, recently opened in Eureka Gulch, and owned by Webb & Whilton, has opened out very well.

NORTH STAR.—This property, owned by the North Star Company, has been sold to L. B. Kendal & Co., of Kalamazoo, Mich.

SILVER WAVE.—The owners of this property on Mount Bross have struck good ore.

WESTON CONSOLIDATED.—The Hock, Hocking, and Weston mines, belonging to the Weston Consolidated Mining and Milling Company, have been leased for three years to Messrs. Neftel, Churchill, and Parks, of New York. These gentlemen propose to put in a large amount of machinery, and, as soon as the water can be taken from the mines, to work the whole property to its fullest capacity.

YANKEE GIRL.—This mine is working twenty-two men. The tunnel is in 170 feet, to the bottom of No. 2 shaft, which is 75 feet deep. Shaft No. 1 is 50 feet deep, to where the tunnel cuts the same. From this level, the shaft is down 60 feet, all through solid ore. The shaft is 10 by 14 feet. For the last few feet in this shaft, the ore on the foot-wall is gray copper of high grade. This shaft will be tapped by a cross-cut from the Orphan Boy tunnel, some twenty-five feet in length, when the present output will be doubled and the mine put in much better shape for working. Very little dead-work has been done on this property heretofore, but the company is now fitting up for permanent work. A new boarding-house, 20 by 50, two stories, capable of accommodating seventy-five men, is nearly completed. An ore-house and blacksmith-shop will be constructed at mouth of the Orphan Boy tunnel for the accommodation of both mines. The present output of the Yankee Girl is 20 tons per day, and runs in large lots, from 140 to 150 ounces of silver and 40 per cent lead.

SAN JUAN REGION.

H. A. W. TABOR.—Mr. R. R. Russell has sold to Eaton, Smith & Co., of Gunnison, the H. A. W. Tabor lode, which is situated on the mountain northeast of Ironton. The claim has a fifty-foot tunnel upon it, and the show for a large body of mineral is very good. This claim is one of the group known as the carbonate claims. The purchasers will develop the property as rapidly as possible.

NATIONAL BELLE.—It is currently reported that the National Belle lode has been sold to Eastern capitalists for $180,000 in cash. The National Belle is on Red Mountain, and is situated within a few hundred yards of the town of Red Mountain.

TOMICHI DISTRICT.

LEGAL TENDER.—A body of carbonates and galena carrying from $75 to $100 was struck recently.

DAKOTA.

FATHER DE SMET.—The superintendent reports, July 8th: Herewith express company's receipts for bar No. 162, containing 1012·6 ounces of gold, the result of run of mill for last half of June. We are now beginning to recover from the effects of the disastrous storms and floods which have prevailed during the past three months. At the mine, every thing is running well, and the work of developing and opening up new ground (which was stopped on account of scarcity of fuse) will go on again. The body of ore on the third level from which ore is mined did not equal our expectations as to size. I have just started a cross-cut from this level easterly, to cut the Golden Gate vein, which has never been touched on the third level. The superintendent's report for the week ended July 15th shows: Ore extracted from first level, 800 tons; second level, 700 tons; third level, 600 tons. Ore milled, 2100 tons. Golden Gate header in 137 feet and finished.

IDAHO

A copper mine on Lost River, owned by Mr. Williams and H. Stevenson, of Hailey, has been sold to Brown & Brother, of New York, for $40,000; $2000 were paid cash down yesterday, and a working bond given until November 1st on the balance. The intention of the purchasers is to work the property from the present time to November 1st, and if it proves up what it is believed to be, the company will erect a matting furnace after making the final payment.

MEXICO.

REAL DEL MONTE.—The *Financier* says: Mr. Landero, the director-general of the Real del Monte Company, has shown his sound good judgment in moving the large pumping-engine from the Acosta mine, in the Real del Monte District, to the San Pedro mine here, where he has struck a very wide and rich lode at a depth of 640 varas. This, I am told, will lead to the stockholders getting some fat dividends, as this company owns quite a number of good mines around the San Pedro, such as the following: San Juan, Jacal, Candado, Rosario, Guatemoczin, Milanesa, etc., which it has not been able to work fully, owing to the water coming so rapidly and in such large quantities. Not only will this do good to this company's properties, but also to all mines around belonging to other companies.

MICHIGAN.

COPPER.

COPPER FALLS.—The *Mining Gazette* says: The fiscal year of the corporation ended June 30th, during which time the mine afforded, from one head of stamps, 469 tons 255 pounds of mineral, 256 tons 130 pounds of which were taken out during the last six months of the year. The company is now increasing the size of its dressing-works by an addition of 44 by 48 feet to the wash-floors, which will be fitted up with twelve Collom's jiggers and four of Evans's slime-tables, to accommodate another head of stamps. A contract for a large boiler has been let, which will supply the necessary steam for the enlargements under way, which will be available before navigation closes. A large storage-shed for coal has been erected at the stamp-mill and a new coal dock has been built at Eagle Harbor.

HURON.—Last Saturday, the machinery in the new dressing-rooms on the mine

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was put in motion for the first time, and worked well. A few minor details are perfecting, and it will not be many days now before the stamp-mill will be run regularly on rock for the mine.

IRON ORE.

The following table from the Marquette *Mining Journal* exhibits in gross tons the total lake shipments of iron ore from upper peninsula ports the present season, up to and including July 18th, together with the amount shipped from the same ports during the corresponding period of last year:

Name of port.	1882.	1883.
Escanaba	796,720	546,455
Marquette	442,978	210,449
L'Anse	21,962	20,998
St. Ignace	14,675	5,426
Total	1,276,335	783,327

Showing a decrease of 493,008 gross tons.

HEWITT.—At the mine, preparations are making to sink a working-shaft into the deposit recently discovered by the diamond drill, and where there are, making due allowance for the dip, at least 20 feet of ore. The management is under the impression that this newly-discovered deposit is merely a continuation of that in which the present workings are situated, and which swings off to the south and east, and on that reasoning predicate the belief that it is one of large extent.

MONTANA.

ALICE.—The winze from the 700-foot west drift at the Alice has reached the 800-foot level and exploration-work westward is prosecuted. Work has been resumed in the bottom of the main shaft of the Magna Charta, and the shaft will be sunk to the 600-foot level, which will be opened up at once. The Alice mills are making a remarkably steady run, and are crushing more quartz than ever before; 90 tons of ore are treated every twenty-four hours.

TIDAL WAVE.—Gideon & Root have sold the Tidal Wave mine, near Silver Star, to McCormick & Co., of Salt Lake, for $40,000. The ore on the dump was sold for an additional $2000.

NEVADA.

CHRISTIE.—The Eureka *Sentinel* reports that the owners of the mines at Mineral Hill, John Spencer, John McCabe, J. C. Crombie, Amos Plummer, and William Fleming, who had sold the property to the Christie Company, have begun suit in the District Court against that company and M. D. Munger, P. D. Barker, and H. G. Catlin, to foreclose mortgage, in default of payment of $80,000, in the form of two notes of $40,000 each, which fell due January 1st and July 1st, 1883, with interest on the same at six per cent per annum. Coupled with the suit, an injunction is prayed for to stop the taking out of ore from the mine until a settlement is reached. The $80,000 is a balance only, as a considerable sum has already been paid on the purchase.

MARTIN WHITE.—The mine is now furnishing about 10 tons per day, which is not enough to keep the twenty-stamp mill running. As the mill will crush 1200 tons per month, it will be some months before an amount sufficient to justify starting it has accumulated.

WALES CONSOLIDATED.—Henry Boyle has commenced proceedings in the Superior Court at San Francisco to restrain the Wales Consolidated Gold and Silver Mining Company, Eureka District, Nevada, from collecting by sale the stock assessment of 25 cents a share on the capital stock, alleging that the assessment is illegal.

RICHMOND CONSOLIDATED MINING COMPANY.—The report of the directors, prepared for presentation at the meeting, states that the mining profits for the year ended February 28th is £42,180 3s. 5d., and the net profit £30,258 7s. 10d. When it is remembered that during the whole of the year one furnace only has been running, that the ore has been of low grade, and that an exceptionally large amount of dead-work has been done, which has been charged to working expenses, this result is not unsatisfactory. Out of this £30,258 7s. 10d., with £26,352 18s. 4d.—the balance brought forward from last year's account—the directors have paid in dividends during the year £40,500, and £1632 19s. 5d. for extraordinary expenses in connection with the defense of the mine and the lawsuit with the Albion Company, leaving a balance on February 28th, 1883, to the credit of revenue of £14,478 6s. 9d., and the reserve of £75,000 intact. During the year, 17,088 tons of Richmond ore and 3451 tons of purchased ore have been smelted by the above furnace; and 8387 tons of low-grade Richmond and 108 tons of purchased ore have been smelted by the No. 4 furnace, working in connection with the refinery. The total production for the year from both furnaces is 14,940 ounces of gold, 508,362 ounces of silver, and 4027 tons of lead. The amount received during the year on the sales of the gold, silver, and lead is £396,669 12s. 6d., and the estimated net value of the bullion in transit and at the works, unrealized on February 28th, 1883 (after allowing for all unpaid refining and marketing expenses) is £116,172 19s. 9d.—together, £512,842 12s. 3d.—from which has to be deducted the value of the bullion in hand February 28th, 1882, then estimated at £206,080 2s. 8d., and £94,367 18s. 6d. paid for marketing expenses, refining, freights, commission, brokerage, etc., leaving £212,394 11s. 1d., as the net value of the bullion produced in the year. The cost of mining and hauling, dead-work, smelting, purchased ore, renewals and repairs, and all other working and general expenses at Eureka being £170,591 0s. 6d.; the profit for the year on mining, smelting, and refining is—with £367 12s. 10d. received for sundries—£42,180 3s. 5d. The decrease as compared with last year is caused, not only by the falling off of the reserves of ore, but also by the ore itself being of low grade—averaging only $49.93 per ton, as against $53.46 last year, and $66.11 the previous year. The yield per ton of ore (Richmond and purchased together) has been this year $44.19, as against $49.41 last year. One large furnace was at work until November 15th, when it was shut down, and a smaller one started in its stead. The No. 4 furnace, working for the refinery, was shut down on October 2d, the supply of ore being then insufficient to keep it in work; it was, however, restarted on January 15th, and has been at work continuously since that date. The bullion has realized 82½ per cent of the "Eureka standard assay value," as compared with 77 per cent last year.

The expenses of mining have increased from $10.48 to $13.01 per ton of ore extracted: but this is explainable by the fact that, while the number of tons of ore mined has been considerably less, the expenditure on dead-work, which has been heavier than usual, is included in the mining expenses. The cost of retimbering the main shaft and repairing the air-compressor has also been included in these expenses. The smelting expenses have been reduced from $13.51 to $11.66 per ton. The refinery has been working satisfactorily, and the expenses have decreased from $14.27 to $13.80 per ton of bullion treated. During the year, 10,540 tons of lead have been sold, the stock in hand being now reduced to about 8000 tons. The price is about 4·50 cents per pound at New York, or £18 per ton of 2000 pounds. The exploratory work done in the mine during the year is very large, and consists of 8642 feet of drifts, 322 feet of winzes, and 731 feet of rises, making a total of 9695 feet, as compared with 6907 feet last year. These works, as well as the smelting operations, have been carried on continuously throughout the year, notwithstanding that extensive repairs had to be made to the air-compressor and to the main shaft, and the machinery at the furnaces and refinery kept in efficient working order. The directors regret that up to the present time no large body of ore has been discovered; small pockets of good ore, have, however, been found on the 200, 700, 800, and 900 levels, and low-grade ore and ledge-matter in several other places. Connection has been traced in the ore from the 600 down to the 900 levels, thus establishing the fact that there is at this part of the mine an ore-channel making downward. The 1050 level is now pushed forward, and a fissure has been met with, which is followed. Some iron oxide, assaying $2 per ton, has been found, which is a promising indication. The limestone is favorable for ore, being similar to that in which the other ore-chambers were found in the higher levels. The exploratory work in this level is slow and expensive, on account of the imperfect ventilation; a rise is now going up from the 1050 to the 900 level, to avoid this. A new level has been started at 100 feet, to explore the large extent of ground above the 200 level. Explorations have also been carried on at the Hoosac mine, but no discoveries have been made as yet. An offer of purchasing the Williamsburg mine, situated about two miles from the Richmond, having been made, the company purchased it for £3000. Hoisting-works have been erected and explorations have been commenced; a mass of iron oxide, carrying some lead and silver, was soon met with, and in a recent letter Mr. Probert states that a good find of lead ore has just been made, containing as much as 60 per cent of lead and some silver. This is very satisfactory, as great difficulty has been experienced lately in preventing a heavy smelting loss, owing to the percentage of lead in the Richmond ore being as low as 12 per cent.

COMSTOCK LODE.

UNION CONSOLIDATED.—Mr. William Patton, superintendent, presented the following report at the annual meeting:

RECEIPTS.

Balance from last statement	$1 95
From other mines, for labor, etc.	61,596.25
From San Francisco office, drafts on the president	353,610.57
Total	$415,208.77

DISBURSEMENTS.

Salaries, exchange, etc	$5,388.94
Labor, supplies, etc	266,481.16
Union shaft, one third net expenses	102,790.81
Reduction of ore	30,210.57
Legal expenses	1,610.25
Taxes	5,709.27
Sutro tunnel, royalty on ore	2,968.86
Total	$415,159.86
Balance cash on hand	48.91
	$415,208.77
Gross expense	$415,159.86
Received for labor, etc	61,596.25
Net expenses	$353,563.61

On the 2900 level, the joint Sierra Nevada west cross-cut, which, at date of my last yearly report, had been advanced to a point 74 feet from the joint Sierra Nevada winze, has been extended 159 feet, making a total length of 233 feet from the winze. Water being encountered, the work was temporarily discontinued. The main south drift from the joint winze station, which was started in July, 1882, was connected with the main north drift of the Mexican Company in December last, completing a much needed air-way for this level. A joint Mexican east cross-cut was immediately started on our south line, and has been extended to a point 243 feet from the main north lateral drift. From this point, north drift No. 2 has been extended 82 feet. In January last, a joint Sierra Nevada east cross-cut was started from the joint Sierra Nevada winze and has been extended to a point 287 feet from that winze. When in a distance of 130 feet from the winze, the drift passed through a vein of ore 11 feet wide on the bottom of the drift and six feet wide on the top. The assays averaged $21 per ton. Work done on this ore-vein, since that time, has shown it to extend up 20 feet, and south 63 feet in our ground. In April last, a joint Sierra Nevada winze was started down from the joint east cross-cut, at a point 141 feet from the west side of the ore-vein. This winze reached the 3000 level on June 5th. In March last, an east cross-cut was started from the main south lateral drift, at a point 170 feet south of the joint Union-Sierra Nevada winze, down from the 2500 level, and extended to a point 93 feet from the south lateral drift. The 3000 level was reached from the joint Sierra Nevada winze down from the 2900 level, on June 5th. After cutting out a station, a joint Sierra Nevada west drift was started, which is now in 74 feet, passing through favorable looking vein-matter and quartz, giving low assays. This drift will be continued on a westerly course, to cut and explore the ore exposed on the 2900 level. While our explorations during the past year have as yet shown nothing of value, it is possible that the ore-vein passed through by the 2900 joint Sierra Nevada east drift will develop a valuable ore-body in our ground when the 3000 and 3100 levels are opened up. The drift west from the 3000 station of the joint Sierra Nevada winze (now cut 74 feet) has already passed through much more quartz than was shown east of the ore-vein on the 2900, which is no doubt a new formation coming in in depth. The ore-vein exposed on the 2900 level should be struck within the next 20 feet; and should it be found on this level, its value as a new development will be greatly enhanced.

NYE COUNTY.

TYBO CONSOLIDATED.—The twenty-stamp mill of this company is to be started up soon.

NEW JERSEY.

The diamond drill explorations at Port Oram by the New Jersey Iron Company have resulted in striking a vein, and the workmen have gone over on the hanging-wall and are boring another hole to prove the vein already found.

NEW MEXICO.

BILLING SMELTER.—From Socorro comes the news that the graders have completed their work on the Billing smelter, and the surveying corps is now twelve miles from Socorro, and expects to reach the Magdelenas in two weeks. The track-layers are within a mile of the smelter; but the greatest labor yet remains, a bridge 100 feet long to be built. The prospect is, that the contract for the main track between Socorro and Kelly will not be let before the 1st of September. Every thing will be completed by the 15th of August, and reduction commenced by the 1st of September. Ore from the Kelly mine is now arriving, and there will be three thousand tons of ore in the bins when the furnaces blow in. One hundred tons per day will be taken from the mine after that time. The contractors for freighting this ore from the mine are now hauling fifty tons per day, at five dollars per ton. By next summer, Mr. Billing will also erect refining-works at Socorro.

SIERRE GRANDE.—We have it from a good source that the mine is pretty thoroughly "cleaned" out. The manager, Mr. Robert Bunsen, will leave Lake Valley on the 15th ult.

PENNSYLVANIA.

The Susquehanna Mining and Smelting Company has put its smelting-works at Sunbury in operation, and on the 19th, at six P.M., made the first tapping of its reverberatory furnace. The furnace was charged at about one o'clock with thirty-two hundred-weight of ore. The company has opened three veins of ore, and has at least 5000 tons developed in sight in its drifts, averaging 60 per cent of lead. The lead produced will average from ten to fifteen ounces of silver to the ton. The company is erecting another furnace which will soon be in operation.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, July 27.

Business has been better and of a more widespread character than last week in the mining market, but prices have not materially changed. The fancy stocks dealt in have generally been strong, while the high-priced stocks, which have been but moderately dealt in, have been weak. Sierra Grande suffered a sharp decline in the early part of the week, but improved at the close. Horn-Silver has also declined. We give a summary of the market below. The total number of sales aggregates 235,354 shares, as against 115,559 last week.

The Comstock shares have shown more activity than usual this week, and prices have been steady. California was quiet and steady, selling from 28@32@30c., assessment paid. Consolidated Virginia had a very active business at irregular prices; it sold from 37@31@33c. Sierra Nevada was moderately dealt in and was strong, selling from $3.90@$4.15@$4.10. Union Consolidated records moderate transactions at steady prices, selling from $4.75@$5@$4 90. Mexican was quiet and steady at $2.85. Yellow Jacket sold at $3.25, and Best & Belcher at $4.15. Sutro Tunnel was actively dealt in, and was steady, selling from 20@19c.

The Leadville stocks were very quiet, and were steady. Amie was a trifle strong, under a small business, and sold from 11@15@14c. Chrysolite records a small business at steady prices, selling from $1.10@$1.15 Dunkin sold at 20c. Hibernia was very quiet at 4c. Iron Silver, with a business of 800 shares, sold at $3. Little Chief was weak, under small transactions, selling from 50@40c. Little Pittsburg records a small business at steady prices, selling at 66@65c. Climax sold from 7@8c.

The Bodie stocks were almost neglected, and were steady. Bodie sold at 80c. Standard was moderately dealt in at steady prices, selling from $6.75@$6.50. North Standard sold from 7@10c., with a small business.

The Tuscarora stocks were quiet and steady. Grand Prize sold at 32c. Belle Isle was quiet and a little weak, selling from 44@38c. Navajo was quite strong, under moderate transactions, selling from $2.90@$3.35@$3.15. North Belle Isle sold at 40c. Independence had a fair business at strong prices, selling from 50@55c. Elko Consolidated was quiet and steady at 18@20c.

In the miscellaneous list, Alice was quiet and steady selling from $2.50@$2.75. Caribou sold from 13@14c., with a moderate business. Eureka Consolidated has been quite weak, owing to an assessment of one dollar per share having been levied by the company, and has sold from $5.50 $4.15. Green Mountain had a fair business at steady prices, selling from 72@80c. Horn-Silver was quiet and weak, selling from $7.63@$7.25. Northern Belle displayed some strength under a moderate business, selling from $6.38 $7. Robinson Consolidated has had a fair business at stronger prices, selling fro m 60@70c. Sierra Grande was quite weak at one time, but rallied a little toward the close; it sold from $1@86@97c. Silver King was quiet at $6.88. Our correspondent in San Francisco gives, elsewhere, some points regarding this property. Stormont has been actively dealt in at steady prices; it sold from 35@37c.

Alta-Montana has been very active at prices a little stronger than of late; it sold from 3@5c. Decatur was quiet and irregular, selling from 3@5@4c. Eastern Oregon continues to gain strength, and has been very active; it sold from 76@81c. Harlem was quiet and steady, selling from $1.30@$1.35. Oriental & Miller has been quiet and steady at 13@14c. Sonora Consolidated has had an active business at strong prices; it sold from 24@28c. South Hite at one time was quite strong but became very weak at the close; it sold from 10@27@3c.

The officers of the Iron Silver Mining Company have issued a statement to their stockholders, showing that, after paying the June dividend of $100,000, the company had a cash balance on hand equal to $172,906.

New Mexico copper properties have attracted a considerable share of interest among English capitalists. We understand that the Valverde has been sold, after negotiations which have been pending for nearly a year, and that the Santa Rita will also soon pass into the hands of Englishmen.

The Mackay & Revolution Silver Mining Company is a Utah mine which is now placing in the English market, with a capital of £150,000 in £1 shares.

MEETINGS.

Champion Mining Company, of Bodie, Cal., Room 2, Nevada Block, San Francisco, Cal. Annual meeting of stockholders and election of trustees, July 30th.

Consolidated Excursion Mining Company, Room 12, No. 80 Wall street, New York City. Annual meeting of stockholders and election of trustees, August 7th, at twelve o'clock noon.

Santa Eulalia Silver Mining Company, No. 82 Broadway, New York City. Annual meeting of stockholders and election of trustees, August 13th, at twelve o'clock noon.

Spring Valley Hydraulic Gold Company, No. 61 Broadway, New York City. Meeting of stockholders for the purpose of increasing the capital stock to $300,000, August 2d, at twelve o'clock noon.

DIVIDENDS.

The Boreel Mining Company has declared a dividend of fifteen cents per share, payable July 25th.

The Calumet & Hecla Mining Company, of Michigan, has declared a dividend of five dollars per share, payable August 15th.

The Consolidated Gold Mining Company of Georgia has declared its usual monthly dividend (the twenty-sixth) of four cents per share, payable on and after July 23d.

The Plymouth Consolidated Gold Mining Company has declared a dividend of fifty cents per share, payable immediately.

The Thomas Iron Company has declared a semi-annual dividend of five per cent.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. July 20.	July 21.	July 23.	July 24.	July 25.	July 26.
Albion	.....	.....	.....	.....	.....	.....
Alpha	1¾	.....	2	2	.....	2⅝
Alta	.70	.....	.65	.60	.....	.60
Argenta	.05	.....	.....	.....	.....	.30
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	1⅛	.....	.95	.85	.....	.....
Belle Isle	.....	.....	.35	.....	.....	.....
Best & Belcher	4⅝	.....	.....	4	.....	4
Bodie	.....	.....	.....	.65	.....	.65
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
California	.....	.....	.10	.10	.....	.10
Challar	3¾	.....	3½	3½	.....	3⅝
Con. Virginia	.40	.....	.35	.35	.....	.....
Crown Point	1¼	.....	1	1	.....	.90
Elko Cons	.....	.....	.....	.....	.....	.....
Eureka Cons	4¾	.....	.....	4¾	.....	5
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	3	.....	2⅞	2⅞	.....	2⅞
Grand Prize	.05	.....	.05	.05	.....	.....
Hale & Norcross	6⅝	.....	6⅝	6⅝	.....	6⅝
Independence	.40	.....	.45	.....	.....	.....
Martin White	.30	.....	.....	.....	.....	.20
Mexican	2⅞	.....	2⅞	2⅞	.....	3
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	.....	.....	5½	.....	.....	.....
Navajo	3	.....	3	3¼	.....	3¼
Northern Belle	.....	.....	6¾	6¾	.....	7½
North Belle Isle	.....	.....	.....	.....	.....	.....
Ophir	2½	.....	2½	2½	.....	2⅝
Overman	.....	.....	.....	.....	.....	.....
Potosi	1½	.....	1⅝	1½	.....	1½
Savage	2½	.....	2¼	2¼	.....	2⅝
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nevada	4	.....	3⅞	4	.....	4
Silver King	.....	.....	.....	.....	.....	.....
Tip-Top	.....	.....	.....	.....	.....	.....
Union Cons	4⅞	.....	4¾	4¾	.....	4⅝
Utah	2½	.....	2¼	2¼	.....	2¼
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	3¼	.....	3	2¾	.....	2⅞

PIPE LINE CERTIFICATES.

The petroleum market has gradually and steadily advanced, until to-day shows the strongest price for oil this week. A very active business has been done and considerable excitement has prevailed at the Exchanges. The only news from the oil-fields was the report of the production of the new districts. For the Cooper tract, the production is 3401 barrels from 97 wells, an increase of but 86 barrels from a week ago, and the increase is explained by the fact that six oil-wells were torpedoed. The Balltown District showed a production of 2223 barrels from 25 wells, an increase of only 23 barrels. There has been no further news from the oil regions, but a strong monthly report is expected of the development-work done.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
July 21	$1.06⅝	$1.06¾	$1.04	$1.04⅞	2,217,000
23	1.03⅞	1.03⅞	1.01¼	1.01¾	2,418,000
24	1.01¾	1.03⅞	1.01¾	1.02¾	2,573,000
25	1.03	1.04½	1.02⅝	1.04½	2,779,000
26	1.04⅝	1.08¼	1.04⅝	1.08⅛	3,230,000
27	1.08	1.11¾	1.08	1.08⅞	5,545,000
Total sales					18,792,000

BULLION MARKET.

NEW YORK, Friday Evening, July 27.

There has been a slight improvement in silver in London the past week, which has been reflected in our market; but this change does not promise much steadiness.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
July 21	50 5-16	109⅞	July 25	50 7-16	110⅛
23	50⅜	110	26	50 7-16@½	110⅛
24	50⅜	110	27	50 7-16	110⅛

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29-29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of June.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	.....	$398,410
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont	"	.....	12,604
Bodie, G. S.	Cal	18,946	119,535
Bodie Tunnel, G.	"	3,195	54,642
*Bonanza King, G.	"	67,573	334,223
*Boston & Montana, G.	Mont	.....	72,518
*Central Arizona, S.	Ariz	.....	35,845
*Christy, S.	Utah	27,935	145,671
*Chrysolite, S. L.	Colo	$54,705	240,676
Consolidated Bobtail	Colo	.....	18,723
*Contention, S.	Ariz	81,594	557,428
Crescent, G.	Cal	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak	.....	172,277
*Derbec Blue Gravel, G. S.	Cal	10,420	55,148
Evening Star, S. L.	Colo	.....	47,061
*Father de Smet, G.	Dak	25,058	178,163
*Frisco M. and S. Co., G. S. L.	Utah	.....	$77,084
Gunnell, S.	Colo	.....	58,828
*Head Center Consolidated	Ariz	18,392	26,502
*Head Center and Tranquillity	Ariz.	18,019	60,630
*Hecla Consolidated, G. S.	Mont	.....	293,922
*Homestake, G.	Dak.	.....	419,145
*Hope, S.	Mont	.....	41,963
Horn-Silver, S. L.	Utah	264,000	1,547,000
Idaho, G.	Cal	.....	88,642
*Independence, G. S.	Nev	.....	32,991
Iron Silver, S. L.	Colo	.....	503,831
*Jocuistita, S.	Mex	.....	‡228,022
*Kentuck, G. S.	Nev	2,484	12,876
*Lexington, S.	Mont	107,655	638,488
*Little Pittsburg, S. L.	Colo	7,451	35,645
*Marguerite, G.	Cal	6,998	45,745
*Martin White, G. S.	Nev	.....	136,317
Morning Star, S. D.	Colo	.....	84,428
*Moulton, G. S.	Mont	.....	123,288
Mount Diablo	Nev	60,512	187,823
*Navajo, G. S.	"	67,679	411,942
*North Belle Isle	"	200	2,153
Northern Belle, S.	"	7,381	395,906
*Ontario, S. L.	Utah	87,652	1,038,687
*Oxford, G.	N. S.	7,076	35,255
*Phœnix, G.	S. C.	2,500	7,700
*Pinal Consolidated, S. L.	Ariz	23,218	186,618
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont	.....	101,241
Standard, G.	Cal	133,026	575,822
Star, S.	Nev	.....	27,095
*Stormont, S.	Utah	.....	95,058
Syndicate, G.	Cal	9,043	29,116
Tintic M. and M. Co.	Utah	6,969	14,601
*Tip Top, S.	Ariz	4,876	127,858
*Tombstone, G. S.	"	91,400	414,239
Wyoming Consolidated	Cal	.....	31,541
Yellow Jacket, S.	Nev	10,594	193,658
Total amount of shipments to date			

*Official. †Net value. ‡Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.*

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Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended July 27th, as compiled from various sources, amounted to $228,500, as against $131,262 reported for the previous week. The receipts from January 1st, 1883, to date are $6,523,974.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended July 21st	$321,424
Corresponding week last year	2,469,426
Since January 1st, 1883	7,395,359
Corresponding period last year	38,841,760

Imports.

Week ended July 21st	$193,688
Corresponding week last year	60,695
Since January 1st, 1883	7,380,290
Corresponding period last year	2,082,684

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £417,000 bullion, and the proportion of its reserve to its liabilities was raised from 41 7-16 to 44¼ per cent, against 39 5-16 per cent at this date a year ago. June 26th, the bank gained £60,000 bullion on balance. The weekly statement of the Bank of France shows losses of 300,000 francs gold, and 1,100,000 francs silver. The statement of the Imperial Bank of Germany shows an increase in specie of 6,720,000 marks.

METALS.

NEW YORK, Friday Evening, July 27.

Copper.—The market is dull and lifeless. Manufacturers are well supplied, and there is no outside interest in the metal. It would be difficult to realize more than 15c. for Lake copper, if a holder were forced to sell, while those buyers coming into the market must pay 15⅛c. For other brands, of which there is no abundance, the figures range between 14@14⅛c. The latest cables place Chili Bars at £63 12s. 6d.@£64, and Best Selected, £69@£70.

The following are the Board of Trade returns:

	Jan. 1 to June 30.		
	1883.	1882.	1881.
Imports:	Tons.	Tons.	Tons.
Pure in pyrites	8,658	8,499	6,941
" precipitate	10,616	8,876	10,271
" ore	6,742	5,835	6,508
" regulus	5,260	3,691	2,447
Bars, cakes, etc	17,297	15,977	14,014
	48,573	42,878	40,154
Exports:			
Raw (English)	8,453	5,674	9,107
Sheets	7,984	7,599	6,753
Yellow metal at 60 per cent	5,718	5,517	4,352
Brass at 70 per cent	1,694	1,541	1,524
	23,849	20,331	21,736
Foreign	5,739	5,808	5,673
	29,588	26,139	27,409

Tin.—There has been considerable excitement during the week, the market advancing to as high as 22c. for spot Straits, while a large business, also, was done in futures. At the close, the market was weaker, 350 tons having arrived at the dock. The metal is strongly held, and as there is no more tin due until late in August, it is probable that it will again rally. We quote now 21⅝@21¾ for round lots Straits, spot. England cables £94 5s.@£94 10s.

Lead.—Beyond jobbing lots, aggregating probably from 300 to 400 tons, at 4·30c., there is nothing to report. Holders here of the 2000 tons of Richmond lead, 1500 tons of Pueblo, and 600 tons of Germania are firm, and thus little spot stock is available at current figures. There is no trouble, however, in supplying current wants from the West. We understand that Common lead has been offered here at 4·25c. without finding buyers, and that Corroding has sold in Philadelphia at less than 4·35c. The metal is not in a very strong position, and there are many who look for lower values at an early date. London cables £12 10s. for soft Spanish.

Messrs. Everett & Post, of Chicago, wire us as follows to-day:

As there are no buyers in the market, it is difficult to give figures. Prices are nominally 4·10c. for Common and Refined. Sales aggregate 200 tons. Offerings, however, are moderate.

Spelter.—There have been some sales at private terms, and we learn that new ordinary Domestic has been offered at 4·30c., a figure which, with high prices of ore, a number of Western producers can certainly not meet. London cables £15 5s. for Silesian.

Antimony.—The tone is somewhat firmer, owing chiefly to the fact that spot stocks are light. We quote 9¼@9⅝c. for Hallett's and 10¼@10⅝c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, July 27.

According to the Board of Trade returns, the exports from Great Britain to this country during the first six months of the year were as follows:

	1881.	1882.	1883.
Pig-iron	177,294	237,814	133,773
Old iron for re-manufacture	44,643	53,559	33,963
Steel unwrought	49,345	92,990	22,510
Tin plates	80,253	104,021	100,462
Hoops and sheets	11,940	13,185	14,6.2
Bar, angle, bolt, and rod	6,271	12,383	6,084
Railroad iron, all kinds	159,309	123,442	34,425

This shows a gratifying decrease all round.

American Pig.—We discuss editorially the valuable statistics compiled by the American Iron and Steel Association, which throw a flood of light upon the situation. The market has not materially changed since our last. No. 1 Foundry is scarce, and commands higher prices readily, while No. 2 is in ample supply and is rather dull. Gray Forge is fairly steady. We quote $22@$23.50 for No. 1 Standard to Choice; $21@$21.50 for Ordinary No. 1; $19@$20.50 for Ordinary to Choice No. 2; $18@$20 for Inferior to Choice Gray Forge. Bessemer pig is dull at $20.50 bid, $21 asked, London cabling 50@51s. Spiegeleisen is quiet at $30@$31.

At the Metal Exchange, efforts are making to depress the market. During the week, the following transactions have been recorded: Monday, 100 tons No 1, October delivery, at $22; Tuesday, 200 tons No. 1, October delivery, $21.87½, and 200 tons, November, $22.25; Wednesday, 200 tons, October, $21.87½; Thursday, 100 tons, October, $21 87½, and 200 tons, November, $22.12½; and to-day, 100 tons, September, $21.62½, 100 tons, October, $21.75, and 400 tons, November, $22.

Scotch Pig.—There has been an advance in freights, which are now quoted by cable 9@10s. from Glasgow to this city, which induces importers to assume a firmer attitude, though business is not large and arrivals continue light. We quote ex ship: Coltness, $23.75@$24; Langloan, $23.75@$24; Summerlee, $23@$23.50; Dalmellington, $21@21.50; and Eglinton, $21.

At the Exchange, the following cable quotations were received: Coltness, 61s.; Langloan, 60s. 6d.; Summerlee, 57s. 6d.; Gartsherrie, 57s. 6d.; Glengarnock, at Ardrossan, 55s.; and Eglinton, at Ardrossan, 49s. 6d. Warrants to-day were 47s. 3d.

Rails.—We hear of transactions aggregating 10,000 tons, in small lots, for delivery till the close of the year at $38 at mill for larger lots, and $38.25 and $38.50 for small parcels. The struggle of the Bethlehem Company with the Amalgamated Association is watched with much interest. It does not now seem likely to extend to the other mills, especially since the company has been gaining ground of late.

Old Rails.—Beyond a few unimportant sales, there is very little going on. We quote Ts $21.50@$22.

Scrap is dull at $22@22.50 except for No. 1.

Philadelphia. July 27.

Pig-Iron.—The strong companies are refusing to sell Foundry Iron at less than their own figures, which range from $22@$23.50 for No. 1 iron, and $19.50@$20 50 for No. 2. The special brands command $23.50 without difficulty, and standards average $22.50. These high prices prevent the closing of large contracts at present. Buyers are anxious to cover their summer and fall requirements, and have made numerous offers, which have not been accepted. The opinions on the future probabilities of the market are not uniform. Some believe that a break must come, and that fall supplies can be had on some reasonable terms; but the producers have canvassed the situation pretty thoroughly, and refuse to yield. The aggregate of business is large; perhaps as large as though individual transactions were for much larger amounts. Forge iron of nearly every kind is in abundant supply. The exception is in special brands of Forge, some few of which are pretty well sold up, and could be sold up for ninety days if buyers' offers were accepted. The stocks of all kinds are large, but not troublesome. They will soon disappear when the rolling-mill men begin to purchase. Most of the business transactions are in small lots. There are inquiries for 1000-ton lots, but makers are not disposed to extend concessions asked for. Average selling prices are $17.50@$18, with some at $18.50, and a little at $19, furnace delivery.

Considerable activity has prevailed in Muck Bars, and prices have taken a little wider range, running from $33.50@$35.

Blooms.—Charcoal Blooms run from $57@$60 for average makes, with some inferior stuff a little below. The demand is fair. Anthracite blooms run from $48@$50. Some sales of Northern ore blooms have taken place.

Merchant Iron.—Nothing has taken place to induce change from the retail policy of the past month or two. Consumers are willing to pay higher prices for small lots to carry them over the dull season, hoping that the opening of the fall trade will bring more abundant supplies and lower prices. The rates usually quoted are 2·20@2·25c., but the larger consumers prefer to wait until they can secure stocks at 2·10c. or 2·15c., which they believe they can do. At present prices of gray forge iron, mill-owners do not think that there is room for such rates. The mills in the interior are taking a large share of the trade going, and prices are firm all around. Next month, large lots will be wanted, but orders will not be placed unless 2·15c. rates are satisfactory to manufacturers. A good many mills are working short-handed, and, when they make their full output, there will be an opportunity for lower prices. Some few sales of skelp iron have been made.

Nails.—For a few weeks past, shipments of nails have fallen off, though production has been kept up to the full capacity, and hence stocks are in better shape. Some contractors have placed sixty-day orders, and prices are firm at $3 in large lots, to $3.25 in small lots from mill or store.

Structural Iron.—The inquiries this week are far larger than usual supplies, and in one or two cases, terms have been agreed upon for large deliveries. Mills are well supplied by the steady retail demand. Quotations are steady at 2·40c. for Angle Iron, and a shading from 3·50c. on Beams and Channels, for large orders. The outlook is satisfactory to the manufacturers, and they will wait until larger buyers decide to buy, without yielding much from present figures.

Plate and Tank Iron.—Considerable business has been done in a quiet way, some of it at concessions of one tenth.

Steel rails range from $38@$40. More business is offered than taken. Old material is not selling at any price.

Pittsburg. July 26.

Several of the mills that have been idle for a week or two, making repairs, will resume in a short time. While an active fall trade is anticipated, it must be said that very little activity prevails at the present time, and that the disposition of the iron trade is to purchase as little as possible, and to wait as long as possible, in the hope of lower prices. There is a lack of that confidence which leads to activity. The large available supply of forge iron will continue to check any very active demand until it is actually disposed of. It is a constant threat to production and to steady prices. Quotations have not changed. Some kinds of iron have shown little improvement; but as long as buyers purchase only for temporary wants, the improvement will be trifling. A few consumers of forge iron have been endeavoring to negotiate for large requirements, but at prices below makers' views. Inferior Gray Forge is quoted at $17.50@$18. Offers have been made at $17 and under. No. 1 Foundry is $20@$21; Cold-Blast Charcoal, $28@$30; Bessemer iron sells at $21@$21.50. Sales of Muck Bar have been made at $34.

A good deal of Merchant iron is moving at 1·90c. and for cash at a little less. No very marked improvement is looked for until August.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE												SALES.
	July 21.		July 23.		July 24.		July 25.		July 26.		July 27.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.			2.70				2.75						650
Amie Con., Co.			.13	.12			.13	.11	.15	.14	14		6,650
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.	10.38												45
Belle Isle, Ne.	.41		.44	43			.42		.40	.38			2,900
Belle Cons., Ca.			.80						.80				500
Breece, Co.													
Bulwer, Ca.													
California, Ne.	.30		.28		.29		.32		.30				6,600
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.			.13		.13		.13		.14		.14		2,400
Carysolite, Co.	1.15		1.10		1.10		1.15		1.15		1.20	1.15	4,400
Cons. Va., Ne.	.36		.3.	.26	.30	.35	.34	.31	.33		.33		14,900
Crown Point													
Deadwood Terra, Dk.													
Dunkin, Co.	.20						.20						900
Eureka Cons., Ne.			5.50	5.00	5.50		5.00		4.15		4.75	4.50	1,070
Excelsior, Ca.													
Father de Smet, Dk.	4.00												100
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.													
Grand Prize, Ne.			.32				.32						600
Great Eastern, Dk.									.01				2,400
Green Mountain, Ca.			.75		.75		.72		.78		.87	.79	7,800
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.									.04				500
Homestake, Dk.							16.13						31
Horn-Silver, Ut.	7.63						7.50		7.33		7.25		878
Hukill, Co											.05		500
Independence, Ne			.52	.50	.50						.55		3,200
Iron Silver, Co.							3.00						800
La Plata, Co.													
Leadville C., Co.													
Little Chief, Co.	.50				.40								300
Little Pittsburg, Co.			.66	.65				.65					900
Martin White, Ne.									.25				100
Moose, Co.													
Navajo, Ne.	2.90		3.00	2.90	3.00		3.25		3.35		3.15		2,100
Northern Belle, Ne.	6.38		7.00		7.00	6.50	6.75	6.63	7.00		7.00		1,175
North Belle Isle, Ne.			.40										500
Ontario, Ut													
Opair, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.			7.00										35
Rising Sun, Ca.													
Robinson Cons., Co.	.61	.60	.63	.61	.67	.63	.64	.63	.70	.64	.70	.69	11,600
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	1.00	.94	.92	86	.95	.87	.95	.92			.98	97	7,500
Sierra Nevada, Ne.	4.15	4.00	4.00		3.90		4.15	4.00	4.00		4.10		1,645
Silver King, Ar.					6.88								20
Spring Valley, Ca.													
Standard, Ca.	6.75	6.50	6.50		6.50		6.75	6.50	6.75		6.75	6.50	2,575
Stormont, Ut.	.15				.35		.31	.35	.36	.35	.37	.36	2,000
Tip Top, Ar													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket			3.25										200
....													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES
	July 21.		July 23.		July 24.		July 25.		July 26.		July 27.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta.													
Alta-Montana, G.	.03				.03		.04		.05	.04	.05	.04	19,500
Am. Flag, S.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'lcher, G. S.											4.15		100
Big Pittsburg, S. L.													
Bradshaw, S.	.25												2,100
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G.													
C'lav'r's W. & M. Co.													
Cal., B. H., G.													
Central Ariz'na, S.							.20						500
Cherokee, G.													
Climax, Co.												.08	.07	600
Cons. Imp'r'l, G. S.												.05		6,000
Crowell, G.													
Dahlonega, G.					.03		.03						3,500
Decatur	.04	.03	.04		.03		.05		.04		.04		5,400
Dunderberg													
Durango, G.							.05						200
Eastern Oregon	.77	.76	.78	.77	.79	.78	.8	.73	.80		.81	.80	27,200
Elko Cons.	.18				.18		.20						1,100
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Grauville, G.													
Harlem M. & M. Co.									1.35		1.30		1.35		1,200
Hortense, S.													
Imperial													
Lacrosse, G.					.10								.11		2,300
Lucerne													
Mariposa Pret. G.													
" Com. G.													
Mexican, G. S.	2.85														300
Miner Boy													
Mono													
North Standard, G.	.07				.10										200
N. Horn-Silv'r, S. L.													
Pri'tt & Miller, S.					.14		.14	.13	.13				.11		5,300
Parnell													
Quartz Creek													
Sappahannock, G.													
Red Elephant, S.							.06		.07	.06	.06		.06	.05	6,300
Ruby, of Arizona													
Silver Cliff, S.									.15						200
Sonora Con.	.25		.24		.25				.24		28	.24	.28	.26	21,000
South Bodie, G.															
South Bulwer, G.															
South Hite.	.12	.10	.13		.27	.13	.04				.04		.03		12,200
South Pacific.															
State Line, 1 & 4, S.															
" Nos. 2 & 3, S.															
Sutro Tunnel	.20		.20		.20		.20	.19	.19		.20	.19	23,600
Taylor Plumas															
Tioga									.33						1,100
Unadilla, S.									.02		.03				600
Union Cons., G. S.	5.13		4.90	4.75	4.90		5.00		5.00	4.75	4.90		1,600

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 95,474. Non-dividend shares sold, 130,830.

BOSTON MINING STOCKS.

	July 20.		July 21.		July 23.		July 24.		July 25.		July 26.		Sales.
	H.	L.	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	1.63												100
Amie							.13						500
Atlantic	12.00						11.50						20
Aztec													
Bodie Con.													
Bonanza D.			2.13		2.10				2.00		1.88		450
Bowman Sil	.21		.21		.21		.21	.19	.19	.17			15,200
Bruns. Ant.							14.50						50
Bulwer													
California													
Cal. & Hec.					245		245	245½	245				46
Catalpa	.52½	.50	.52½		.50	.47½	.49		.45				2,800
Central Ariz													
Climax													
Co. Virginia													
Copper Falls													
Copperop.													
Crescent					.22½								100
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin													
Empire													
Eureka Con.									5.65				25
Franklin	10.00		10.00		10.50	10.00							142
Hancock G.													
Harshaw			.50						.62½				200
Huron	1.50						1.50		1.50				750
Independ'ce													
Indian Q'n.													
Little Pitts.	.6						.67½						300
Mammoth													
Mass. & N.M.	.07				.06		.06		.06				27,900
Milton													
Napa													
National													
North. Belle					6.50								25
Ontario													
Osceola	21.00												10
Penn-Breck.													
Pewabic													
Pine Tree					.08								200
Plymouth													
Quincy	47.75				48.50	48.00			45.50				118
Ridge													
Robinson					.60				.65				200
San Pedro											.27½		100
S'ra Nevada					4.00								50
S'ra Grande			1.00										100
Silver Islet					6.50	6.00			6.50				470
Silver King													
Simpson Gd													
So. Pacific													
Standard													
Sullivan	.75	.63½			.70		.67½	.63½					900
Sutro Tun.	.21		.21		.20								500
Sycamore													
Twin Lead.													
Vizina													
....													

PHILADELPHIA MINING STOCKS.

	July 20.		July 21.		July 23.		July 24.		July 25.		July 24.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.16		.16		.15				.17	.16	.17		11,550
Aztec									.01				1,000
Battle Mt.					.03								1,500
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.13	.11							.11				24,500
Comprom'e	.20	.19	.18		.19	.18	.18		.18		.18		22,100
Contention													
Con. Virg.													
Dauntless													
Del Monte	.02		.02		.03		.03		.03		.03		3,000
Denver City											.14		500
Eureka													
Girard	.04	.03	.03				.03				.03		4,300
Governor							.05		.05				2,000
Grand Uni'n	.18		.15		.15		.16	.15	.17		.18		13,000
Green Mt.													
Gunnison			.37½		.35				.35		.35		3,700
Homestake													
Horn Silver													
Iowa Gulch	.07	.06	.07						.07		.07		10,000
Iron Silver									2.95		2.97½		825
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud			.03		.03		.03						5,500
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan								.03		.03	.02	.03	26,000
National									.01				100
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.									.01				3,000
Pembina	.16				.16		.16						2,400
Penn-Breck.	.09	.07	.08		.08	.07	.08	.06	.07		.07		38,100
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis	.27½												500
Rara Avis E.	.09		.09		.09		.09		.09		.09		13,900
Record													
Rico Pion'r.													
Sierra Apac.													
Sierra Be. le.													
Sierra G'nde	1.07½	.95	1.00	.97½	1.10	.87½	.92½	.90	.92½		.95	.90	28,455
Sierra Nev.													
Silver Cord													
Silver King													
Silv'r Plume	.02		.02		.02		.02				.03		10,500
Sonora Con.													
Standard													
Sultana													100
Sutro Tun'l.							.20						1,300
Tombstone	.97½		.97½				.97½						
Victor													
Yale Mt.													

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A fair demand is maintained for nails, and the thirty days' suspension is working out good results. Gas and steam pipes have been sold in fair lots at 75 per cent off; Boiler tubes, 60 per cent off. Steel of low grade is cut by competitors, and there is nothing encouraging in the outlook.

Steel rails are in active demand at $38@$39, and heavy orders have been received for winter delivery. Large orders for cars and locomotives have been given out in this State, and the requirements in this direction and for all kinds of construction iron will be heavy, and will help to give strength to an already improving market.

Cleveland. July 24.

The market for the past two weeks has shown some slight improvement, consumers buying with more confidence and slightly better feeling on part of holders. There has been no pronounced advance in values, but it looks healthier. Best grades Foundry iron are not too plentiful and good softeners are in demand. We quote the same.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, July 27.

Anthracite.

Business is very dull, and we hear of numerous instances of concessions below the nominal circular rates, ranging from 25 to 40 cents, steam sizes being apparently most heavily affected. The question of increasing circular prices for August has been discussed, and the decision has been wisely reached that it will be best to let them alone, and it is urged by the best element in the trade that, unless matters take an exceptionally favorable turn, it will be most judicious not to meddle with them even in September and October. As it is, June prices fairly represent the market. Middlemen in many instances are backward in taking the coal they ordered in June, a proof that buyers have not been as numerous as they expected.

It is believed generally that there will be no interruption of full-time for the remainder of the year.

As yet, no news has come to hand concerning the doings at the meeting of the Western Association at Saratoga this week.

On the Western trade, the Buffalo correspondent of *Coal* says:

Stocks here are very low, but at Western points large. At some Western depots, the docks and yards are so loaded with coal in first hands that no more can be received; but as the places are feeders for still farther points which are bare of fuel, as soon as the army of small dealers in all sections realizes that the supply is under control, and will be furnished only just as it is wanted and no faster, perhaps it will purchase now instead of waiting until later in the season. There is evidently a determination to maintain, and if possible to advance, quotations by the committee, notwithstanding the dissatisfaction existing among the said army.

Bituminous.

There is absolutely nothing to report in the bituminous market, which remains stagnant, with low prices induced by the sharp competition among producers, the rivalry of the two leading regions, and the efforts of new classes of coal to gain a foothold in the market. Quotations remain nominally unchanged.

STATISTICS OF COAL PRODUCTION.

The Production of Bituminous Coal for the week ended July 14th was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	59,808	1,410,353
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	4,723	168,209
Broad Top Region, Pa.		
Huntingdon & Broad Top RR	3,563	103,339
East Broad Top	688	23,811
Clearfield Region, Pa.		
Snow Shoe	4,025	128,010
Tyrone and Clearfield	62,709	1,477,264
Alleghany Region, Pa.		
Pennsylvania RR.	7,312	236,089
Pittsburg Region, Pa.		
West Penn RR.	8,150	234,972
Southwest Penn. RR.	1,688	57,822
Penn & Westmoreland gas-coal, Pa. RR	22,208	723,355
Pennsylvania RR	10,865	271,837
Total	185,739	4,635,06

Comparative statement of the production of anthracite coal for the week ended July 14th, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	51,063	1,841,418	81,938	1,684,190
D. L. & W. RR. Co.	69,472	2,333,724	105,979	2,200,224
Penna. Coal Co.	22,233	659,925	37,153	650,245
L. V. RR. Co.	*	525,965	41,546	569,744
P. & N. Y. RR. Co.	4,036	104,054	4,173	102,903
C. RR. of N. J.	*	1,202,078	50,152	1,180,658
Penna. Canal Co.	6,634	172,371	13,228	196,926
North & West Br. RR.	15,358	245,612	.....	.....
	168,796	7,085,147	340,169	6,584,959
Lehigh Region.				
L. V. RR. Co.	*	2,333,044	111,856	2,360,031
C. RR. of N. J.	*	1,126,889	56,660	1,082,886
S. H. & W. B. RR.	2,561	29,656	.....	20,000
	2,561	3,489,589	168,516	3,462,917
Schuylkill Region.				
P. & R. RR. Co	109,141	3,401,305	161,071	3,232,487
Shamokin & Lykens Val.	29,236	704,215	10,581	585,209
	138,377	4,105,520	171,652	3,824,696
Sullivan Region.				
St Line & Sul. RR. Co.	896	31,996	1,298	29,071
Total	310,630	14,712,252	681,633	13,901,634
Increase				
Decrease				

* Reports for week ended July 14th have not been received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878..... 8,028,518 tons.
" " " 1879..... 13,120,529 "
" " " 1880..... 11,107.215 "
" " " 1881..... 13,663,325 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 424,253 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended July 14th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	2,300	48,950	38,547
Coal for shipment at South Amboy	9,738	415,168	431,252
Coal for distribution	11,805	405,712	375,177
Coal for company's use	3,229	77,723	68,252
Total	27,072	947,553	923,228
Increase		34,325	
Decrease			

The Transportation of Coke over the Pennsylvania Railroad for the week ended July 14th, and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	640	50,993
West Penn. RR	2,040	56,648
Southwest Penn. RR	42,569	1,088,389
Penn. & Westmoreland Region, Pa. RR	3,990	121,186
Pittsburg, Penn. RR.	32	501
Snow Shoe (Clearfield Region)	173	10,931
Total	49,444	1,328,648

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports, per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Newburg	3 95	3 95	3 90	4 00	4 20	4 25
Scranton at Hoboken	3 90	3 90	3 90	4 15	4 45	4 55
Lackawanna at Weehawk'n	3 90	3 90	3 90	4 15	4 45	4 60
Wilkes-Barre at P. Johnston	3 90	3 90	3 90	4 15	4 45	4 45
Plymouth R. A. at P. John.		4 25		4 45	4 90	4 50
LEHIGH COAL.						
Honey Brook at Port John.	5 00	4 25		4 40	4 45	4 45
Fulton at South Amboy	5 25	4 40		4 40	4 30	4 40
U.L. & Coun. Ri'ge at Eliz'pt						
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash	4 85	4 85		4 25	4 60	4 35
Free-Burning White Ash		3 90		4 15	4 60	4 35
Schuylkill Red Ash				4 25	4 80	4 35
Shamokin				4 40	4 80	4 45
Lorberry				4 55	5 00	4 45
Lykens Valley (Brookside).			4 85	5 15	5 50	5 15
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 50	4 50	3 75	3 90	4 25	4 00
Free-Burning White Ash		3 55	3 55	3 80	4 25	4 00
Schuylkill Red Ash				3 90	4 45	4 00
Shamokin				4 05	4 45	4 10
Lorberry				4 05	4 55	4 10
Lykens Valley (Brookside).			4 35	4 65	5 00	4 65

Jermyn coal, at Hoboken, is quoted per ton of 2240 lbs.: Lump, $3.90; Steamer, $3.90; Broken (grate), $3.90; Egg, $4.15; Stove, $4.45; Chestnut, $4.45; Chestnut, No. $23.

Wholesale Prices of Bituminous Coal.

Clearfield, at Philadelphia	$3.10@$3.25
" " South Amboy	3.80@ 3.90
" " New York, alongside	4.10@ 4.25
Cumberland, at Baltimore	3.15@ 3.25
" " Georgetown	2.90@ 3.10
" " South Amboy	4.00@ 4.20
" " New York, alongside	4 20@ 4.40

FREIGHTS.

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Per ton of 2240 lbs.

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PORTS	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria	.75	.....	.....
Annapolis	.....	.....	.....
Albany	.....	.....	.....
Baltimore	.50§	.....	.....
Bangor	1.35@1.40	1.60	.....
Bath, Me	1.30@1.35	1.50	1.10
Beverly	1.30	.....	1.10
Boston, Mass	1.25@1.35	1.50	1.05@1.10
Bristol	1.15	1.45	.....
Bridgeport, Conn	.....	1.40	.55
Brooklyn	.75§	1.30	.....
Cambridge, Mass.	1.30@1.35	1.65	1.10
Cambridgeport	1.30@1.35	1.65	1.10
Charleston, S. C.	.70@.80	.75	.....
Charlestown	1.30	1.65	1.10
Chelsea	1.25@1.30	1.50	1.10
City Point	.....	.....	1.10
Com. Pt., Mass.	1.35	.....	1.10
E. Boston	1.25@1.30	1.50	1.10
East Cambridge	1.30@1.35	.....	1.10
E. Gr'nwich, R. I.	1.15@1.20	.....	.80
Fall River	1.15@1.20	1.45	.80
Galveston	.....	.....	.....
Gardiner, Me	.....	.....	.....
Georgetown, D.C.	.75	.....	.....
Gloucester	1.30@1.35	.....	.....
Hartford	.....	.....	.....
Hackensack	.....	.....	.....
Hudson	1.00§	.....	.....
Lynn	1.40@1.45	1.80	.....
Marblehead	1.40	.....	.....
Medford	.....	.....	.....
Millville, N. J.	.....	.....	.....
Milton	.....	.....	.....
Newark, N. J.	.....	1.40	.....
New Bedford	1.15	1.45	.90
Newburyport	.....	1.85	1.20
New Haven	.....	1.40	.55
New London	.....	1.40	.70
New-Berne	.....	.....	.....
Newport	1.15	1.60	.80
New York	.75§	1.25	.....
Norfolk, Va	.60	.70	.....
Norwich	.....	1.65	.75
Norwalk, Conn	.....	1.60	.....
Pawtucket	.....	1.60	.....
Philadelphia	.....	.....	.....
Portland	1.25@1.30	1.50	.....
Portsmouth, Va.	.60	.65	.....
Portsmouth, N.H.	1.30@1.35	1.70	1.15@1.20
Providence	1.15@1.20	1.45	.80
Quincy Point	1.40	.....	.....
Richmond, Va.	.85@.90	.....	.....
Rockland, Me	.....	1.60	.....
Rockport	1.60	1.80	.....
Roxbury, Mass.	1.30@1.35	1.60	.....
Saco	1.40¶*	.....	.....
Sag Harbor	.....	.....	.....
Salem, Mass.	1.50	1.60	1.10
Saugus	.....	.....	.....
Savannah	.....	1.00	.....
Somerset	1.15	1.45	.85
Staten Island	.....	.....	.....
Trenton	.....	.....	.....
Troy	1.00§	.....	.....
Wareham	.....	.....	.....
Washington	.75	.....	.....
Weymouth	.....	.....	.....
Williamsbg, N.Y.	.....	1.30	.....
Wilmington, Del.	.80	.....	.....
Wilmington, N.C.	.....	1.00	.....
St. Thomas, W. I.	.....	.....	.....

* And discharging. † And discharging and towing. ‡ 3c. per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. ** Below bridge. †† Towing and pilotage, $75. ‖ Hoboken. *** Bridge rate.

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Something About Bread-Making.

By the process of bread-making it is intended to convert the flour of certain grains into a cellular structure, in which it is most easily chewed, saturated with the fluids of the mouth, and digested. In order to arrive at this end, alcoholic fermentation is resorted to from olden times, by introducing the same in the dough by means of brewers' yeast. Thus a small part of the flour is converted into glucose, which again is transformed into alcohol and carbonic acid. The former is recognized by its peculiar vinous odor, exhaled by the loaves, when sufficiently raised. Both gases produce the raising of the dough—that is, the porous and spongy appearance.

By this fermentation, the flour not only loses weight,

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but the bread also attains qualities which may injure the process of digestion.

In order to evade these inconveniences, chemists have long ago searched, to impart the spongy structure of the dough by other means than yeast, respectively by substances evolving gaseous bodies, or which, in the oven, are transformed into gases themselves. To the best known belong the bicarbonate of soda and cream of tartar, certainly well known to all housewives. And with regard to most of the baking powders of the trade, they are mainly preparations containing these substances. However, it can not be said of any of them that they exert a beneficial influence on the system, not to speak of the adulterations to which most of them have lately been subjected.

We are glad to learn that *Prof. E. N. Horsford*, of Cambridge, Mass., who held the chair of chemistry in Harvard University, invented, some time since, a baking preparation forming an exception to those spoken of, which has already attained universal reputation.

The idea by which Prof. Horsford was guided, was not only to furnish a substitute for brewers' yeast, but also to provide those nutritious constituents of the flour lost in the bran in the process of bolting. These are the so-called phosphates, which are also the nutritive salts of meat, and of the utmost importance for the building up of the organism. If we take into consideration that the nutritive value of wheaten flour is from twelve to fifteen per cent less than of the wheat grain, and that this loss is now restored by Prof. Horsford's invention, then we must look upon it as of the greatest national economic importance. As Justus von Liebig, said: "The result is the same as if the fertility of our wheat fields had been increased by one seventh or one eighth."

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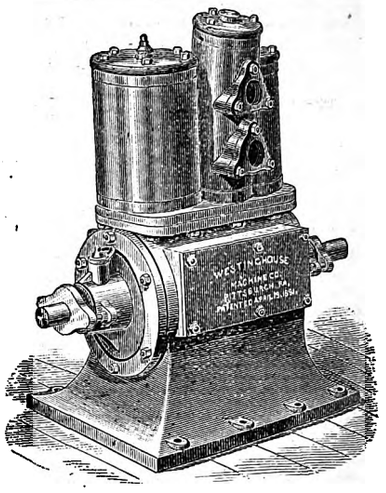
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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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DR. THOMAS M. DROWN, Secretary of the American Institute of Mining Engineers, announces that the fall meeting will be held in Troy during the second week in October. As the meeting will be devoted mainly to the reading and discussion of papers, the Secretary is making arrangements to print and circulate in advance any papers which the writers desire fully discussed, provided they are sent to him early in September.

THE closing down of the Harrison Reduction-Works, in Leadville, on account of scarcity of ore, is a significant fact, which the knowledge of the ability of the management to work as closely as local circumstances will permit makes all the more worthy of attention. The outside smelters, the Grant, Hill, Pueblo, Eilers, and Royal Gorge, are taking many of the large contracts, aggregating probably closely upon one half the output, while the six Leadville works are nearly capable of treating the entire product by themselves. Some of the heaviest producers, the Evening and Morning Star, the Iron Silver, and Silver Cord are shipping one half or one third of their output out of the camp, because the outside smelters are able to offer better terms than the local works. Utah works, too, have recently appeared as competitors.

VERY satisfactory progress has been made in our rolling-mills, steel-works, and blast-furnaces in the introduction of the best types of modern steam-engines, and we have had occasion repeatedly to note that in some of our latest silver and gold mills a spirit of true economy has prompted managers to call for similarly good work. As our mines grow deeper, and fuel in many instances becomes more expensive, it will be well for mining engineers, too, to look further than the average hoist. In many instances, the use of cut-off engines will prove economical. Automatic cut-off engines will save but little when the mines are not deep and when the hoisting is done rapidly, because the variations in the load between the full weight at the beginning and complete throttling at the end of the lift are so great in so short a space of time. Nor is it advisable to use an automatic cut-off when hoisting slowly from shallow depths; but when the weight of the hoisting-rope is not well balanced, it is best to arrange the automatic cut-off by means of a governor, because the handling of a cut-off lever is not desirable.

FOR many months, the market reports of both crude and manufactured articles have had but one story to tell: that of a constant decline in values under the pressure of a heavy production and the influence of an unparalleled timidity of buyers. In a number of trades, leading firms have succumbed, and in many others there is a feeling of doubt and uncertainty as to the future, which has led to a conservative dealing so general that business has fallen off very much, while ready money has been accumulating at such a rate at financial centers that it does not bring more than two per cent, and often less. This universal desire to retrench and to hold surplus funds in reserve for any possible emergencies has affected not only the stock exchanges, whose dealings with the outside public have dwindled away completely, in spite of many efforts to engineer a return of the old interest, but legitimate trade in all branches has also suffered. That this should be so in spite of promising crops and a fair degree of activity on the part of our railroads, is a subject over which many people are anxiously pondering, and while there is little disagreement as to the existence and extent of the evil, we have yet to hear of any plausible explanation of the causes.

THE German iron-masters have been indulging in a somewhat rambling discussion as to what measures should be taken to get their ship-builders to stop buying their iron ship plates and shapes in England and to take them from home mills. The occasion was furnished by the reading of a paper by Herr JACOBI, of Sterkrade, before the Society of German Iron-Masters, who gave the following reasons for the inability of the German works to compete with their foreign rivals. A ship-builder applying to an English firm for prices for raw material, for a ship of given tonnage and value, gets an offer to furnish it for a lump sum. A German works calls for a specification, picks out what part of the work it can do, estimates on it, and passes the rest of the work over to some other mill, so that the builder has to deal with a number of establishments instead of with one, and must go through a long process of figuring to get at the cost. Moreover, the English iron is much cheaper. This, the Germans assert, is because they do not currently make in large quantities material as poor as the plates produced in Middlesborough. They assert that if they could get Lloyd's to make special reductions for proved increase in the mechanical qualities of the raw material, and if the German railroads would put down their rates to compensate the mills for the fact that raw material for ship-building is on the free list, they could compete for the orders of the German yards. There is undoubtedly much truth in the assertion that English plates and shapes are very often of such very poor quality that many of the mysterious disappearances of vessels must be attributed to this fact; but it will take a long time before German mills can as promptly and as satisfactorily fill orders as their English rivals for the German merchant marine. The German navy is now almost exclusively supplied by the works of the country.

IN a quiet way, copper is the subject of considerable discussion in the trade, and there are many who are inclined to take a hopeful view of its future. It is argued by many that prices can not go any lower, while the likelihood is, that they will move upward. The situation is tolerably clear on this side of the Atlantic. We have shipped abroad, and are still shipping, large quantities of refined and crude copper and furnace material and ores, and have latterly begun to export largely also manufactured goods. At present prices here and abroad, this movement will continue unabated, and it may increase in volume should prices abroad harden. They are now under an artificial influence; a business firm which is well known as having been formerly an extensive speculator in tin having been holding the market for a long time. Should its movement prove successful, we may look forward to a hardening of prices here. But the trade must also face the possibility

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of a failure of the speculation alluded to; and in that case, the future of our market would not be so bright. It might check our shipments, and turn into home channels considerable quantities of metal, under which the market would find it hard to rally. So far as our production goes, it is undoubtedly heavier in almost every quarter than it has been. The lake mines are in the aggregate increasing their output, and, taken all in all, the Southwest, including Arizona and New Mexico, will be ahead of last year. The Northwest, Montana principally, is developing wonderfully, but the great bulk of the material produced there goes abroad. The weakest spot in our markets, the outside brands, are now showing comparatively more strength than lake, a proof that for the present the supplies available to our refiners are not by far as heavy as they used to be. Altogether, the situation here is good; but it is imperiled by whatever may happen in England, and there the future is not so well defined as it is here.

EVIDENCE is accumulating that the Connellsville coke interests are to be consolidated in the hands of a few. The famous region has been the scene of an unparalleled development during the past few years, and its expansion of business has been the cause of a lively struggle by a number of great railroads. The Baltimore & Ohio has just appeared as a formidable rival of the Pennsylvania Railroad, and now the Vanderbilt-Gowen interest appears upon the scene, in a characteristic manner. Mr. VANDERBILT has taken the first step by building the Pittsburg, McKeesport & Youghiogheny Railroad from Pittsburg, with a branch into the coke regions, and is now at work preparing for the second one, that of securing a goodly share of the business of the region. It is stated, with much show of authority, that a syndicate has been formed embracing such men as H. C. FRICK, A. A. HUTCHINSON, with their thousands of coke-ovens, THOMAS CARNEGIE, DAVID HOSTETTER, D. A. STEWART, THOMAS MELON, and others, who, with the VANDERBILT interest, have been securing the co-operation of some coke-producers and have acquired control of the make of others. Possibly, the depression which has made so many of those interested uneasy during the past months may have obtained a share of its intensely acute character artificially, the object being to make the weak-kneed feel the blessings of submission. It is not likely that rival railroad interests will stand idly by and see their business thus pass to the control of a new-comer, and the producers of the region may have the pleasure of seeing three rich corporations bidding for their patronage. Ultimately, however, we presume the majority of the ovens might as well be branded "P.," "B. & O.," or "V."

Blast-furnace men will look upon this movement with alarm. With the Lake Superior iron ore miners holding the candle as high as the price of foreign iron, *plus* the duty and freights, will allow, and the coke-railroad alliance keeping the fuel at the highest notch which the "business will bear," their prospects of making large profits in times of prosperity, or any at all in periods of depression, are meager indeed. They should sell out to a "syndicate," and shift the burden on the rolling-mills and foundries.

ON THE SUPPOSED HUMAN FOOT-PRINTS RECENTLY FOUND IN NEVADA.

During the past summer, various accounts have been published of the discovery of human foot-prints in sandstone near Carson, Nevada, which Prof. O. C. Marsh has recently written on in the *American Journal of Science*. The locality is in the yard of the State's prison, and the tracks were uncovered in quarrying stone for building purposes. Many different kinds of tracks were found, some of which were made by an animal allied to the elephant; some resembled those of the horse and the deer; others were apparently made by a wolf. There were also tracks made by large birds.

The foot-prints occur in series, and are all nearly in the same horizon. Some of the smaller tracks are sharp and distinct, but most of the impressions are indefinite in outline, owing apparently to the fact that the exact surface on which they were made is not usually exposed.

The supposed human foot-prints are in six series, each with alternate right and left tracks. The stride is from two and a half to over three feet in extent. The individual foot-prints are from eighteen to twenty inches in length, and about eight inches wide. The distance between the line of right-hand and left-hand tracks, or the straddle, is from eighteen to nineteen inches. The size of these foot-prints, and especially the width between the right and left series, are strong evidence that they were not made by men, as has been so generally supposed. A more probable explanation is, that the impressions are the tracks of a large sloth, either *Mylodon* or *Morotherium*, remains of which have been found in essentially the same horizon. In support of this view, it may be said that the foot-prints are almost exactly what these animals would make, if the hind feet covered the impressions of those in front. In size, in stride, and in width between the right and left series of impressions, the foot-prints agree closely with what we should expect *Mylodon* or *Morotherium* to make. The geological horizon of these interesting foot-prints is near the junction of the Pliocene and Quaternary. The evidence, at present, appears to point to the Equus beds of the Upper Pliocene as the nearest equivalent. Since the above communication was read, Professor Marsh has had an opportunity of examining photographs and casts of the Carson foot-prints, and is confirmed in his opinion that the supposed human tracks were made by large Edentates. The important fact has recently been determined that some of these tracks show impressions of the fore feet. The latter are somewhat outside of the large foot-prints, as would naturally be the case, if the animal changed its course.

MINERAL PRODUCTS OF THE UNITED STATES.

A report, entitled *The Mineral Resources of the United States*, is now in press, and will shortly be published by Mr. Albert Williams, Jr., Chief of the Division of Mining Statistics and Technology, United States Geological Survey, Hon. J. W. Powell, Director. This report is for the calendar year 1882 and the first six months of 1883. It contains detailed statistics for these periods and also for preceding years, together with much technical and descriptive matter. The compilation of special statistics has been placed by Mr. Williams in the charge of leading authorities in the several branches, and the results will therefore be accepted with confidence. The following totals of the production of the more important mineral substances are from advanced proofs:

Coal.—The only statistics in which the trade is interested are those relating to the amount of coal which is mined for and reaches the market. There is, besides, a local and colliery consumption which is usually disregarded in statistics, and which ranges from 5 to 6¼ per cent on the total shipments. Of what may be called the commercial product, the quantities in 1882 were: Pennsylvania anthracite, 29,120,096 gross tons; bituminous, brown coal, lignite, and small lots of anthracite mined outside of Pennsylvania, 57,963,038 gross tons; total, 87,083,134 gross tons. The spot value of the commercial product was as follows: anthracite, $65,520,216; bituminous and other coals, $72,453,797; total, $137,974,013. During the first six months of 1883, the output was: Pennsylvania anthracite, 14,010,767 gross tons; bituminous and all other coals, 30,000,000 gross tons; total, 44,010,767 gross tons. The spot value of the commercial product during the first half of 1883 was: Pennsylvania anthracite, $31,524,226; bituminous and other coals, $37,500,000; total, $69,024,226. Including the local consumption, etc., the total product in 1882 may be stated at 92,219,454 gross tons; namely, 31,358,264 tons of Pennsylvania anthracite, and 60,861,190 gross tons of other coals; and the value at the mines was: Pennsylvania anthracite, $70,556,094; bituminous coal, etc., $76,076,487; total, $146,632,581.

Iron.—The principal iron statistics for 1882 are as follows: Pig-iron made, 4,623,323 gross tons; spot value, $106,336,429. Iron ore mined, 9,000,000 gross tons; spot value, $32,400,000. Domestic iron ore consumed, 8,700,000 gross tons; spot value, $31,320,000. Imported iron ore consumed, 589,655 gross tons. Total iron ore consumed, 9,289,655 gross tons. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications, $171,336,429. Anthracite consumed in all iron and steel-works, including furnaces, 3,800,000 gross tons. Bituminous coal consumed in all iron and steel-works, including furnaces, 6,600,000 gross tons. Coke consumed in all iron and steel-works, including furnaces, 3,350,000 gross tons. Charcoal consumed in all iron and steel-works, including furnaces, 107,000.000 bushels. Limestone consumed as flux, 3,850,000 gross tons; spot value, $2,310,000.

For the first six months of 1883, the totals are as follows: Pig-iron made, 2,352,019 gross tons; spot value, $47,040,380. Iron ore mined (and consumed), 4,500,000 gross tons; spot value, $12,375,000. Imported iron ore consumed, 185,000 gross tons. Total iron ore consumed, 4,685,000 gross tons. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications, $71,000,000. Anthracite consumed in all iron and steel-works, including furnaces, 1,810,000 gross tons. Bituminous coal consumed in all iron and steel-works, including furnaces, 3,140,000 gross tons. Coke consumed in all iron and steel-works, including furnaces, 1,780,000 gross tons. Charcoal consumed in all iron and steel-works, including furnaces, 38,750,000 bushels. Limestone consumed as flux, 1,950,000 gross tons; spot value, $1,072,500.

Gold and Silver.—The Mint authorities furnish the following statistics for 1882: Gold, $32,500,000; silver, $46,800,000; total, $79,300,000; or an increase of $1,600,000 over the output in 1881. For the first six months of 1883, the product is estimated at $16,250,000 gold, $23,400,000 silver, and $39,650,000 total; the rate of production being assumed to be the same as in 1882.

Petroleum.—The production of crude petroleum in the oil-fields of Pennsylvania and New York in 1882 was 30,053,500 barrels of 42 gallons each, worth, at an average spot value of 78⅞ cents per barrel, $23,704,698. During the first six months of 1883, the yield was 11,291,663 barrels, worth, at an average spot value of $1.00⅛ per barrel, $11,305,778. In addition to the quantity above stated, California produced in 1882 about 70,000 barrels.

Copper.—The production of copper in 1882 was 91,646,232 pounds, worth, at an average value of 17¼ cents per pound in New York, $16,088,091. For the first half of 1883, the production is estimated at 58,000,000 pounds, worth, at an average price in New York of 14·65 cents per pound, $8,500,000. The spot value of the copper at the point of production is a matter which can not be stated with any accuracy; nor was any attempt made to ascertain the tons of copper ore mined. In 1882, 3,325,000 pounds of bluestone, worth $191,187, were made; and in the first half of 1883, the manufacture of bluestone is estimated at 1,662,500 pounds, worth $95,593.

Lead.—In 1882, 132,890 net tons of lead were produced, worth, at an average value of $95 per net ton on the Eastern seaboard, $12,624,550. For the first half of 1883, the production is estimated at 70,000 net tons, worth, at $90 per ton, $6,300,000. In this case, as with copper, it is impossible to state the average spot value of the lead, or the tons of lead ore mined. A very large proportion of the lead ore smelted is argentiferous, and is worked for its silver contents and not for the value of the lead. In the census year ended May 31st, 1880, the amount of white lead corroded was reported at 123,447,890 pounds, worth $8,770,699.

Zinc.—The production of metallic zinc in 1882 was 33,765 net tons, worth, at an average value of 5·4 cents per pound in New York, $3,646,620. The production during the first six months of 1883 is estimated at 18,000 net tons, worth, at an average value of 4⅝ cents per pound in New York, $1,665,000. In addition to the spelter and sheet-zinc made in this country, there is also a large manufacture of zinc oxide made directly from the ore. As in the case of copper and lead, it is impossible to fix an average spot value for the product, and the collection of statistics of zinc ore mined has not been attempted. In the census year 1880, the amount of zinc oxide manufactured, including that made from scrap-zinc, was reported at 20,121,761 pounds, worth $766,337.

Quicksilver.—In 1882, the production of quicksilver was 52,732 flasks (of 76½ pounds each = 4,033,998 pounds), worth, at an average price in

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San Francisco of 36⅞ cents per pound, $1,487,537. During the first six months of 1883, the production was 22,740 flasks (= 1,739,610 pounds), worth, at an average price of 35½ cents per pound, $613,213. During the year 1882, 700,000 pounds of vermilion were made in the United States, having a total value of $315,000.

Nickel.—The production of pure grain nickel in 1882 was 277,034 pounds, worth, at $1.10 per pound, $304,737. There was also a production of 50 per cent copper-nickel alloy, containing 4582 pounds of nickel, worth $5040. The total nickel production was therefore 281,616 pounds, worth $309,777. The only nickel reduction-works in the United States were closed during the first half of 1883.

Cobalt.—The value of cobalt ores and matte for 1882 was about $15,000. The amount of cobalt oxide made was 11,653 pounds, worth $32,046.

Manganese.—The production of manganese ore in 1882 was 3500 gross tons, and the spot value at the mines, estimated at $15 per ton, was $52,500.

Chromium.—The production of chrome iron ore in 1882 was about 2500 net tons, worth, at an average price of $40 per ton in Baltimore, $100,000. The spot value can not be ascertained.

Tin.—A trifling amount of tin ore was mined in 1882 and the first half of 1883, and production of metallic tin began on a small scale toward the close of the latter period.

Antimony.—The production of metallic antimony, so far as ascertained, was 60 tons in 1882, worth about $12,000.

Building-Stone.—It is estimated that the value of the building-stone quarried in 1882 was $21,000,000.

Brick and Tile.—It is estimated that the total value of the brick and tile made in the United States in 1882 was $34,000,000.

Lime—There were 31,000,000 barrels (of 200 pounds each) made in 1882, having a total spot value of $21,700,000 at the kilns.

Cement.—The amount of artificial Portland cement made in 1882 was 85,000 barrels, worth, spot, $191,250. Of the cements manufactured from natural cement rock, there were 3,165,000 barrels made, worth, spot, $3,481,500. The total production of cement was 3,250,000 barrels, worth $3,672,750.

Clays.—Complete statistics of the quantity of fire and potter's clay mined in 1882 were not obtained. The value of the whiteware made was over $5,000,000.

Precious Stones.—The spot value of the precious stones found in 1882, before cutting, was between $10,000 and $15,000; after cutting, between $50,000 and $60,000.

Corundum.—It is estimated that 500 tons were mined in 1882, worth on an average only about $12.50 per ton, crude and unground; total, $6250. The value of the ground corundum manufactured during the same year was about $135,000.

Grindstones.—The value of the grindstones made from domestic rock in 1882 is estimated by leading dealers at $700,000.

Pumice-Stone.—There were 70 net tons quarried in 1882, worth about $1750.

Phosphates.—The production of washed phosphate rock in 1882 by the land mining companies of South Carolina was 191,305 gross tons; spot value, $1,147,830. By the river mining companies, 140,772 gross tons; spot value, $844,632. Total, 332,077 gross tons; spot value, $1,992,462.

Marls.—In New Jersey, 1,080,000 net tons of marl were dug in 1882. The average spot value at the pits is 50 cents per ton, making the total $540,000. There was a small yield of marls in some of the Southern States, the amount of which has not been ascertained.

Gypsum.—The most complete statistics for 1882 are those of the output of Michigan, namely, 37,821 net tons of land plaster and 135,655 barrels (of 300 pounds each) of stucco. The manufacture of plaster of Paris on the Atlantic seaboard was 525,000 barrels (of 250 pounds each), chiefly made, however, from Nova Scotia stone. Colorado produced 10,350 sacks of 100 pounds each. The production of California and some other States was not ascertained.

Salt.—The amount of salt made in 1882 was 6,412,373 barrels (of 280 pounds each = 1,795,464,440 pounds), having a spot value of $4,320,140. During the first six months of 1883, the production is estimated at 3,206,186 barrels (= 897,732,080 pounds), worth $2,160,070, the rate of production being assumed to be the same as in 1882.

Borax.—The production in 1882 was 4,236,291 pounds, having a spot value at the works of $338,903. For the first half of 1883, the output is estimated at 2,800,000 pounds, worth, spot, $224,000.

Sulphur.—Complete statistics were not obtained, The production in the census year was stated at 1,200,000 pounds, worth $21,000.

Barytes.—The amount of crude barytes mined in 1882 was 20,000 tons, worth at the point of production $160,000. The value of refined and ground barytes manufactured from the crude product above stated, was about $440,000.

Mica.—The quantity of merchantable mica mined in 1882 is estimated by leading dealers at 75,000 pounds, worth $250,000. The production is rapidly increasing.

Soapstone.—The amount quarried in 1882 is estimated at 6000 net tons, worth $90,000 at the quarries.

Quartz.—The amount of quartz mined in 1882 for glass-making and abrading purposes is estimated at 75,000 net tons,

Asbestos.—Amount mined in 1882, 1200 net tons, worth $36,000 at the point of production.

Graphite.—Amount mined in 1882, 425,000 pounds, worth, crude, at the point of production, $34,000. During the first six months of 1883, the production is estimated at 262,500 pounds, worth $21,000.

Carbonate of Soda.—Over 1,600,000 pounds were produced in 1882 from native deposits.

Asphaltum.—The production in 1882 was 3000 net tons, having a spot value of $10,500.

Alum.—No statistics. In the census year, the amount of manufactured artificial alum was reported at 39,217,725 pounds, worth $808,165.

Copperas.—The amount of copperas manufactured in 1882 is estimated at 15,000,000 pounds, worth $112,500.

The production of the following-named substances was insignificant: Apatite, arsenic, bismuth, infusorial earth, iridium, lithographic stone, nitrate of soda, ozokerite, platinum, strontia.

No reliable statistics were obtained of the following substances: Buhrstones, chalk, feldspar, fluor-spar, mineral paints, pyrites (for acid manufacture), sulphate of soda, talc (other than "soapstone").

None of the following substances is known to have been mined in 1882 or in the first half of 1883: Carbons, cryolite, rottenstone, wolfram.

Totals.—It is impossible to state the total mineral product in any form which shall not be open to just criticism. It is evident that the production statistics of such incongruous substances as iron ore, metallic gold and silver; the spot value of coal mined and the market value of metallic copper after having been transported hundreds of miles; the spot value of a crude substance like unground, unrefined barytes, and the value of a finished product like brick (in which the cost of manufacture is the leading item), such details can not well be taken as items in a general summary. The statistics have been compiled with a view to giving information on those points which are of most interest and utility, and are presented in the form usual in the several branches of trade statistics. The result is, that the values stated for the different products are necessarily taken at different stages of production or transportation, etc. Theoretically perfect statistics of mineral products would include, first of all, the actual net spot value of each substance in its crudest form, as taken from the earth; and yet for practical purposes such statistics would have little interest other than the fact that the items could be combined in a grand total in which each substance should be rated on a fairly even basis. The following groupings, therefore, are presented with a full realization of the incongruity of many of the items:

VALUES OF THE METALLIC PRODUCTS OF THE UNITED STATES IN 1882.

Pig-iron, spot value	$106,336,429
Silver, coining value	46,800,000
Gold, coining value	32,500,000
Copper, value at New York City	16,038,091
Lead, value at New York City	12,624,550
Zinc, value at New York City	3,646,620
Quicksilver, value at San Francisco	1,487,537
Nickel, value at Philadelphia	309,777
Antimony, value at San Francisco	12,000
Platinum, value at New York City	1,000
Total	$219,756,004

VALUES OF SOME OF THE NON-METALLIC PRODUCTS OF THE UNITED STATES IN 1882 (ALL SPOT VALUES, EXCEPT CHROME IRON ORE).

Bituminous coal, brown coal, lignite, and anthracite mined outside of Pennsylvania	$76,076,487
Pennsylvania anthracite	70,556,094
Crude petroleum	23,704,698
Lime	21,700,000
Building-stone	21,000,000
Salt	4,320,140
Cement	3,672,750
Limestone for iron flux	2,310,000
Phosphate rock	1,147,830
New Jersey marls	540,000
Crude borax	338,903
Mica	250,000
Crude barytes	160,000
Chrome iron ore, value at Baltimore	100,000
Soapstone	90,000
Manganese ore	52,500
Asbestos	36,000
Graphite	34,000
Sulphur	21,000
Cobalt ore and matte	15,000
Precious stones, uncut	12,500
Asphaltum	10,500
Corundum	6,250
Pumice-stone	1,750
Total	$226,156,402

RESUME OF THE VALUES OF THE METALLIC AND NON-METALLIC MINERAL SUBSTANCES PRODUCED IN THE UNITED STATES IN 1882.

Metals	$219,756,004
Mineral substances named in the foregoing table	226,156,402
	$445,912,406
Fire-clay, kaolin, potter's clay, common brick-clay, terra-cotta, limestone used as flux in copper and lead smelting, iron ore used as flux in lead smelting, pyrites (for acid-making), zinc white made directly from ore, marls (other than New Jersey), apatite, gypsum, tin ore, bismuth, arsenic, iridosmine, mill-buhrstone and stone for making grindstones, lithographic stone, talc (other than "soapstone"), quartz, feldspar, fluor-spar, terra alba, chalk, crude mineral paints, nitrate of soda, carbonate of soda, sulphate of soda, native alum, ozokerite, mineral soap strontia, etc.—certainly not less than	8,000,000
Grand total	$453,912,406

The grand total might be considerably reduced by substituting the value of the iron ore mined for that of the pig-iron made; by deducting the discount on silver; and by considering lime, salt, cement, borax, etc., as manufactures. It will also be remarked that the spot values of copper, lead, zinc, and chrome iron ore are much less than their respective values after transportation to market.

DYNAMITE STRUCK BY LIGHTNING.—The following well-authenticated case of the firing of a dynamite magazine is of interest: About a month ago, the company operating the salt mines at Avery's, or Petit Anse, Iberia Parish, La., received a large quantity of dynamite for blasting purposes. The same was stored in a magazine situated about four hundred yards from the works. Large trees were in close proximity. On Saturday, July 21st, a few minutes past twelve o'clock, a terrific storm burst on the island. Torrents of rain fell, and peal after peal of lightning rent the skies. The workmen had barely left and reached the boarding-house, situated at some distance from the works, when the lightning struck the magazine, and immediately there followed an awful explosion. For a few minutes, all seemed entirely paralyzed. Recovering, some rushed out to ascertain the cause. It was then discovered that the whole building in which was stored the explosive compound had disappeared, and in its place was left a yawning chasm fifteen or twenty feet deep by about one hundred feet in length. The trees surrounding were prostrated and shattered. One, 2½ feet in diameter, was carried by the immense power in the blast two hundred yards from where it previously stood. Every building on the island contiguous to the mines was shaken in a terrible manner, causing every glass door and window to part with its glass. The buildings containing the mills and machinery were much damaged, preventing access to the shaft for the time being. Eight box-cars, ready to be loaded, were entirely crushed in their upper part, the running gear remaining intact.

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THE DIVINING-ROD.*

By Rossiter W. Raymond, Ph.D., New York City.

The extent to which the divining-rod is still used in this country for the detection of hidden treasure, mineral veins, or springs, is much greater than educated persons would be likely to suppose. For many years, wells have frequently been located by its aid in New England, where the belief is widely extended among the farmers that, in the hands of peculiarly gifted persons, this instrument possesses special virtue. Large numbers of the oil-wells of Pennsylvania have been bored at points designated by the so-called "oil-smellers." More than one adept with this instrument is practicing now in the Western mining region. I encountered, a few months ago, in Southern Colorado, a party of capitalists who were accompanied by such an expert, and whose purpose was to discover a mine, by his aid, and to buy the property thus made valuable. Still more recently, a paragraph in the Tombstone *Epitaph*, of Arizona, announced that a party of gentlemen from Chicago, whose names were given, had been scouring over the hills in the neighborhood of Tombstone, for more than a week, in company with an expert of Colorado, who had been employed to ascertain "with his well-known divining-rod" the localities of mineral wealth, and who had declared the existence of large bodies of ore in at least two places not yet developed. It is also reported, with what truth I do not know, that the Central Pacific and Southern Railroad companies have employed the divining-rod successfully in the discovery of water, and have located by this means their artesian wells in the desert. Last, but not least, a small book entitled *The Divining-Rod*, and published in Cleveland in 1876, contains an essay on this subject. read before the Civil Engineers' Club of the Northwest, at Chicago, in 1875, by Mr. Charles Latimer, a well-known engineer who has had charge of several important railroads, and who testifies in the most unqualified manner to the virtues of the divining-rod as a means of determining the position and the depth of subterranean water-courses, and claims to have discovered certain new and important laws of its operation, connecting if not identifying it with the force of electricity.

These circumstances, taken together with the fact that the "dowsers," or experts with the rod, still enjoy considerable local authority in Cornwall, and that believers in its efficacy may still be encountered among the German miners (although I think in that country the faith is more nearly extinct than elsewhere), certainly justify me in regarding this subject as one not solely of historical interest. Yet a consideration of its history and literature will throw important light upon the question, whether the phenomena which it has presented, and continues to present, are to be ranked under the head of self-delusion, deliberate deceit, or both; or, on the other hand, indicate, after all reasonable deductions for human error and credulity, a residuum of important scientific truth.

Before sketching the history of this instrument, it will be well to say a few words concerning its form, material, and use. Yet this is a work of no little difficulty. The immense literature of the divining-rod shows nothing more clearly than the boundless confusions and contradictions of its advocates and professors. Of the dozen different schools of practice, each is necessarily obliged to reject half of the asserted principles and certified facts put forward by the rest.

The most common divining-rod, perhaps, has always been a forked branch of witch-hazel in the shape of the letter Y. This wood may have been selected because it forks in such a way as to give two branches of equal size, or because of its supposed affinity for springs of water. But other woods, such as peach, ash, pitch-pine, and even metals, have been recommended at different times, and different professors of the art have also varied the shape of the rod, employing sometimes a straight twig with a small fork only at one end, or an elastic twig or whalebone without any fork. The dowsing-rod used by the expert mentioned in the Tombstone *Epitaph* is, I believe, an instrument made of two prongs of whalebone united in a stem which terminates in a case similar to a rifle cartridge. The contents of this case are a secret. (Similar cases, used in the middle ages, are said to have contained mercury.) This rod, like the ordinary forked hazel switches, is held in the two hands, each grasping the extremity of a prong, with the fingers closed not too tightly and the palms upward, the shank or stem of the rod being horizontal or vertical, or variously inclined, according to the principles of the practitioner. When carried in this manner by the operator, walking over the surface of the ground, the rod is said to turn or dip above treasure, mineral veins, springs, etc., but there is an elaborate and complicated science based upon the various degrees, directions, and force of this dipping. Unfortunately, the rules as determined by one or another celebrated operator have been found not to work for his rivals or successors, so that each authority lays down rules of its own. The straight rods were either balanced in various ways on one or both hands, or sprung bow-like between the two hands. The most peculiar rod described in ancient books was made of two pieces of wood, one of which was pointed and the other provided in the end with a socket. This rod, being delicately held, was said to indicate the presence of the object sought for by a peculiar revolution of the point in the socket.

An inquiry into the uses of such rods leads us at once to the history of our subject, in the study of which it will appear that divining-rods were first used in antiquity mainly or wholly for moral purposes; that, in the middle ages, their employment was for a long period confined to the discovery of material objects; that, toward the end of the seventeenth century, the moral use was again asserted: and that, in the eighteenth century, the divining-rod was relegated to the material sphere, and assumed the comparatively modest functions in the discharge of which it still lingers among us.

I would recommend to those who have not the means of an extended research the perusal of the book of Professor Fiske, of Harvard, on *Myths and Myth-Makers* (Boston, 1873), in the second essay of which, on *The Descent of Fire*, this subject is treated in the light of comparative mythology; also the work of Louis Figuier, *Histoire du Merveilleux dans les Temps Modernes* (Paris, 1860), half of the second volume of which is devoted to the divining-rod; and, finally, the book of Chevreul, *La Baguette Divinatoire* (Paris, 1853), which is a conclusive summary from the stand-point of modern science and experiment. I do not mention the work of Mr. Baring-Gould, *Curious Myths of the Middle Ages*, which Professor Fiske compliments with frequent quotations, for the simple reason that Mr. Baring-Gould's essay on the divining-rod is made up almost wholly of portions of Figuier's work, often translated *verbatim* and without credit. A brief, interesting, and impartial discussion of the divining-rod from the stand-point of the middle ages, together with a curious engraving illustrating its use, will be found in the well-known work of Agricola (*De Re Metallica*, Basle, 1546), published in the sixteenth century both in Latin and in German, copies of which, though not very common, are still to be met with in the antiquarian bookstores of Europe. I believe the library of the School of Mines of Columbia College contains a German copy. In the preparation of this paper, I have made use of the Latin edition, which is the only one in my possession. An excellent summary of the subject, containing many curious details, will be found also in Prof. Moritz Gaetzschmann's *Auf- und Untersuchung der Lagerstätten* (Freiberg, 1857). The Brooklyn Library contains a copy of a work entitled *Jacob's Rod: A Translation from the French of a Rare and Curious Work, A.D. 1693, on the Art of Finding Springs, Mines, and Minerals by Means of the Hazel Rod. To which is Appended Researches with Proofs of the Existence of a More Certain and Far Higher Faculty with Clear and Ample Instructions for Using it.* Published by the Translator: Thomas Walton, 13 Grafton street, Fitzroy Square, London. This book was published, I believe, in 1875. The title-page bears no date. The original French treatise, the translation of which occupies the first part, is probably the one entitled *La Verge de Jacob, ou l'Art de trouver les Trésors*, which Figuier (*Histoire*, etc., vol. ii., p. 257) speaks of as well-known to the adepts in occult sciences, and Chevreul (*La Baguette*, etc., p. 30) mentions as an example of the use of the term "Jacob's Rod," in those sciences, to signify a rod possessing marvelous properties. The origin of this signification will be found in Genesis 30. I suspect that neither Figuier nor Chevreul had seen this book: both of them fail to give either the name of the author or the date of publication, an omission especially noticeable in the case of Chevreul, who is usually both full and careful in his references. The translator gives the date as 1693, and names the author as M. Baritel. Of the fidelity of the translation I have no guaranty except internal evidence, from which I judge that it is honest rather than intelligent. This translator, Mr. Walton, is himself a mesmerist and electro-biologist, and declares his wife to be possessed of clairvoyant powers, of the exercise of which he believes the discovery of water, metals, etc., to be but one subdivision. The object of his translation and "addenda" is to connect the ancient phenomena of rhabdomancy, the observations and theories of Reichenbach, the fanciful speculations of Bulwer-Lytton, and numerous modern wonders (accounts of which he extracts from the *Spiritual Magazine*), and his own and his wife's alleged experience.

To the works above named I am indebted for nearly all the facts cited in this paper, and for many quotations made at second hand.

Professor Fiske, following Dr. Kuhn, whose treatise on the *Descent of Fire* was published in Berlin in 1859, traces the divining-rod to a wide-spread Aryan myth, connected with the forked lightning. Without going so far back, we may find in written history many evidences of the use of the rod, not only as a symbol of earthly power, but also as the instrument of supernatural effects, and particularly of divination. It will be remembered that the Egyptian sorcerers confronted by Moses carried rods, as Moses and Aaron also did. The prophet Hosea denounces the use of rods for divination by the Jews (Hosea 4:2). According to another prophet (Ezekiel 21:26), the king of Babylon consulted rods or arrows to decide his course. The Scythians, Persians, and Medes used them. Herodotus says that the Scythians detected perjurers by means of rods. The word *Rhabdomancy*, originated by the Greeks, shows that they practiced this art; and the magic power of the rods of Minerva, Circe, and Hermes or Mercury, is familiar to classical students. The *Lituus* of the Romans, with which the augurs divined, was apparently an arched rod. Cicero, who had himself been an augur, says in his treatise on divination, that he does not see how two augurs, meeting in the street, could look each other in the face without laughing. At the end of the first book of this treatise, he quotes a couplet from the old Latin poet Ennius, representing a person from whom a diviner had demanded a fee as replying to this demand. "I will pay you out of the treasures which you enable me to find." This ancient joke, by the way, has been adopted in all seriousness by the "oil-smellers" of Pennsylvania, who, as I am informed, are accustomed to locate oil-wells on precisely this condition, receiving nothing if the well proves unsuccessful, and fifty dollars if oil is struck.

Marco Polo reports the use of rods or arrows for divination throughout the Orient, and a later traveler describes it among the Turks. Tacitus says that the ancient Germans used for this purpose branches of fruit-trees. One of their tribes, the Frisians, employed rods in church to detect murderers. Finally, if we may trust Gonsalez de Mendoza, the Chinese, who seem to have had every thing before any body else, used pieces of wood for divination.

Thus we perceive that the application of the divining-rod in historical antiquity was mainly or wholly moral; that is, it was employed to detect guilt, decide future events, advise courses of action, etc., etc. There are but two passages which have been quoted to prove its use for physical purposes: one from Ctesias (*apud Phot. Bibl. Cod.*), who speaks of a rod of the wood *Parebus*, which attracted gold, silver, other metals, stones, and several other things: the other from Cicero (*De Officiis*, lib. i.), who says, "If we could obtain with the so-called divine rod every thing pertaining to food and clothing" (*ad victum cultumque*), etc.

On the other hand, the silence of many authors is significant, as Chevreul has pointed out. Varro does not mention the use of the rod for the discovery of subterranean waters or metals. Vitruvius, discussing the means of discovering springs, says nothing of it. Pliny, in Book xxx. of his Natural History, omits it from his enumeration of magical arts and methods, and in Book xxxi., describing (after Vitruvius) the means of discovering springs, and in Book xxxiii., describing explorations for metals, is equally silent concerning it. Columella, Palladius, and, in the sixth century, Cassiodorus, are likewise dumb, though the latter in one of his epistles (*Theodoric*, liii.) extols the utility of the pro-

* Read at the Boston Meeting of the American Institute of Mining Engineers.

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Fig. 3.

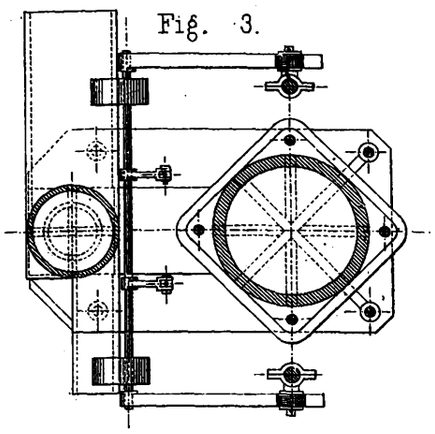


Fig. 4.

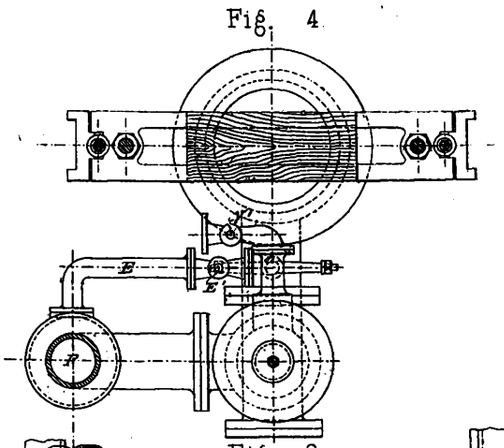


Fig. 1.

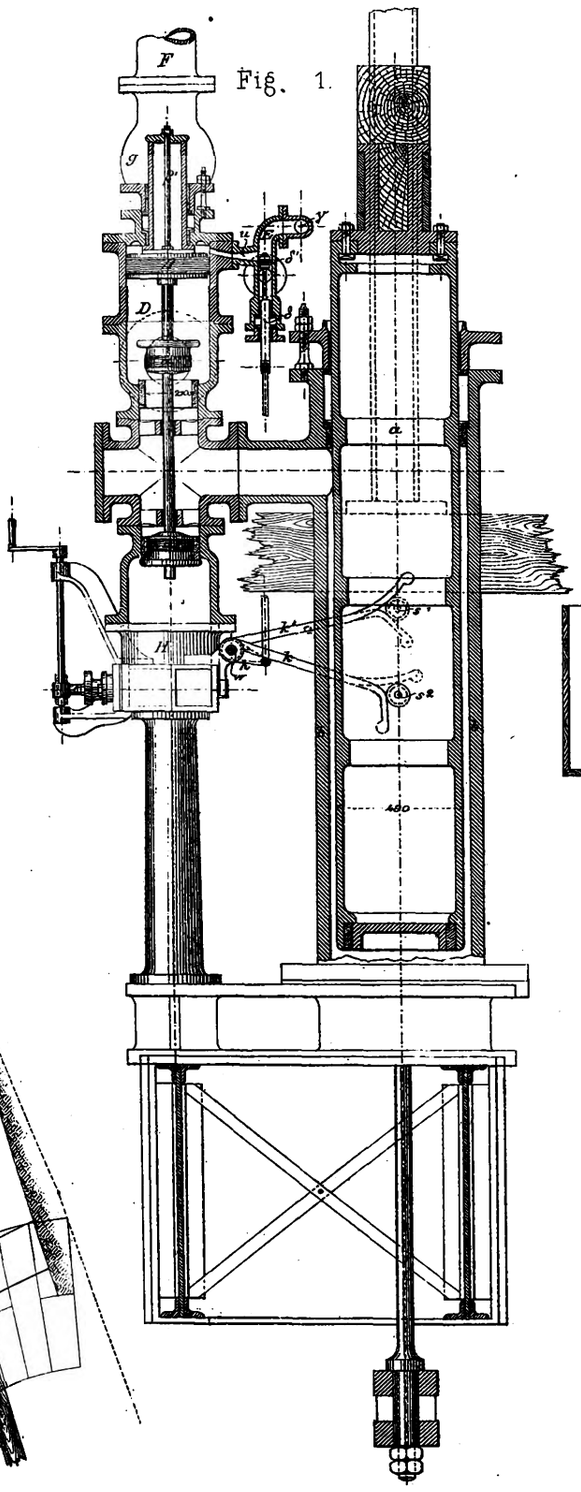
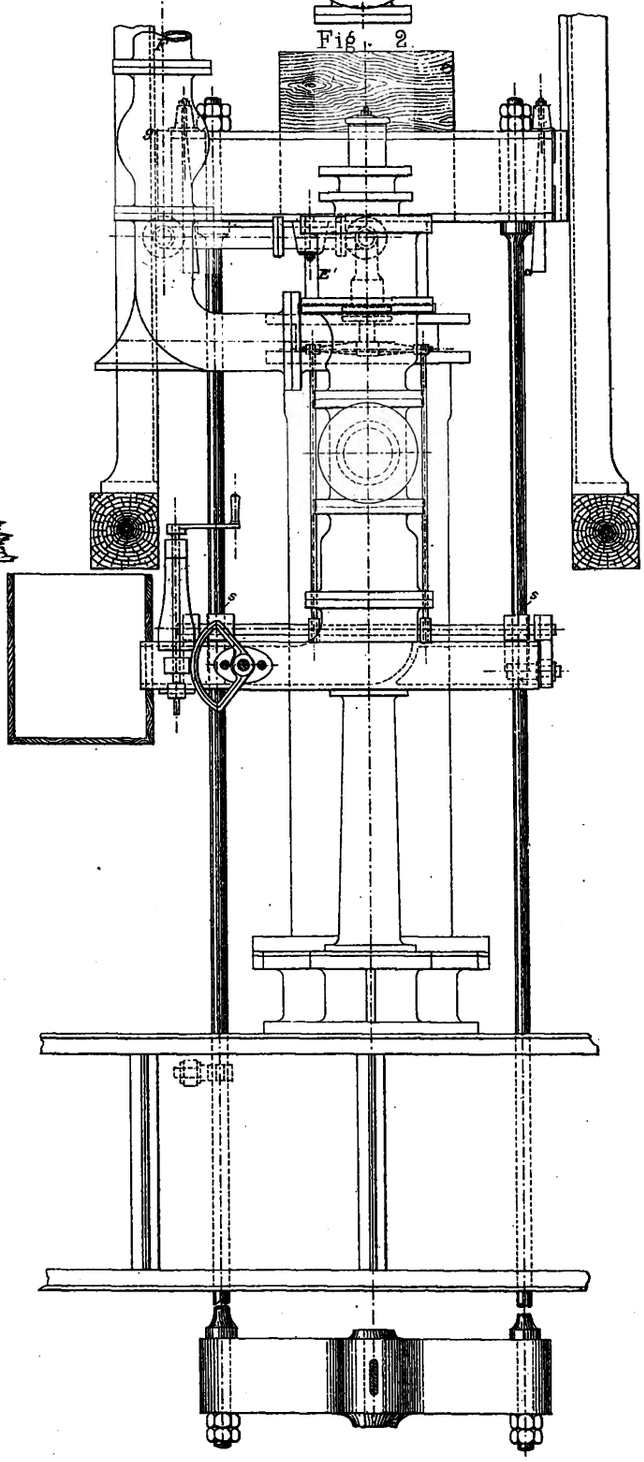
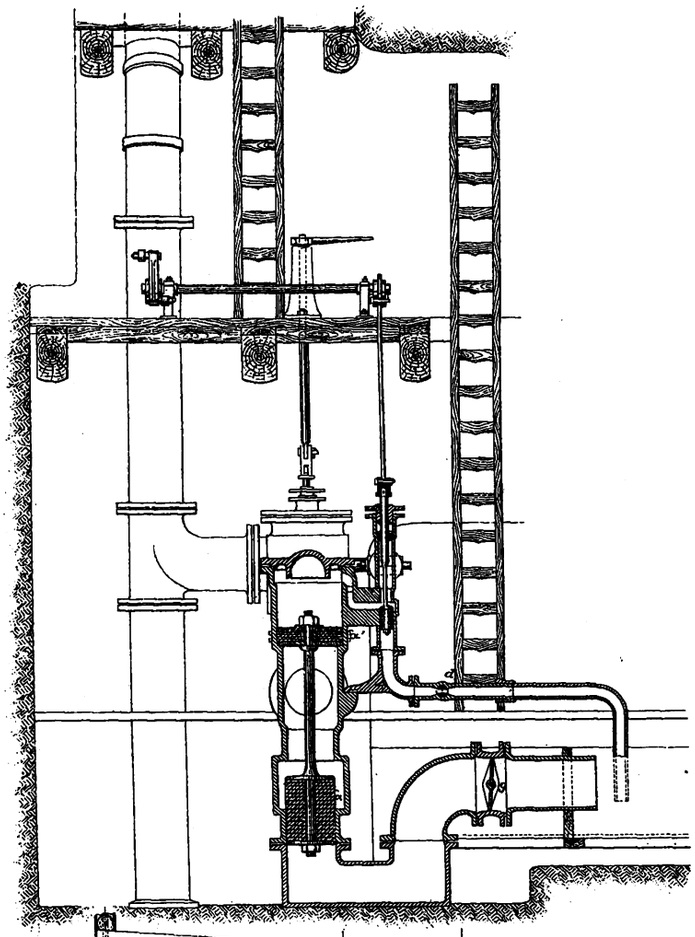


Fig. 2.



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Fig. 5.



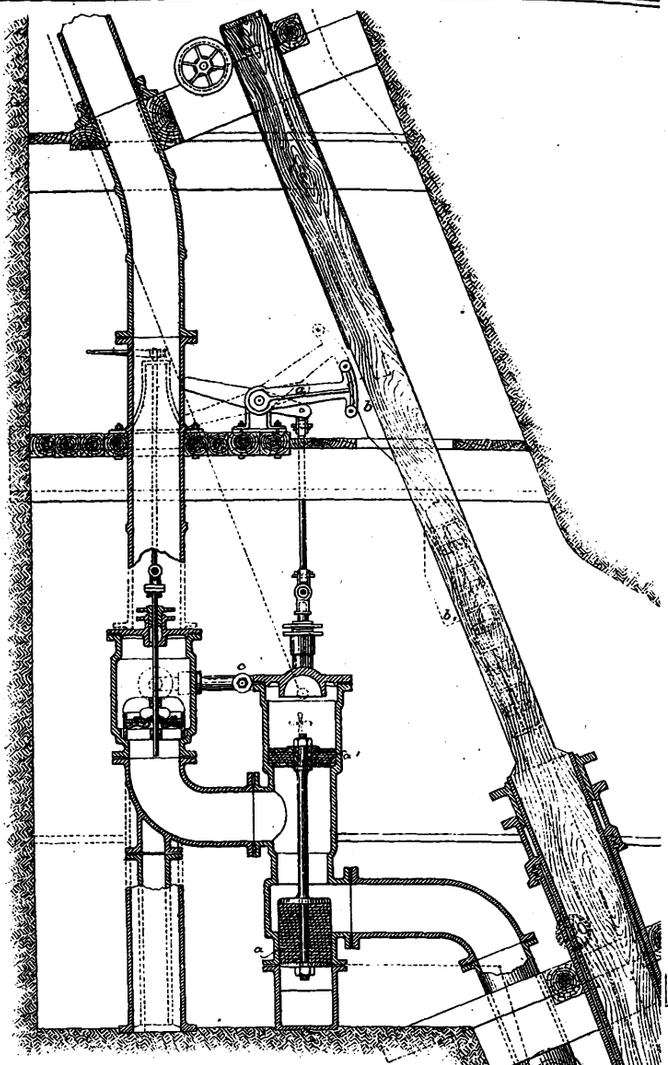


Fig. 6.

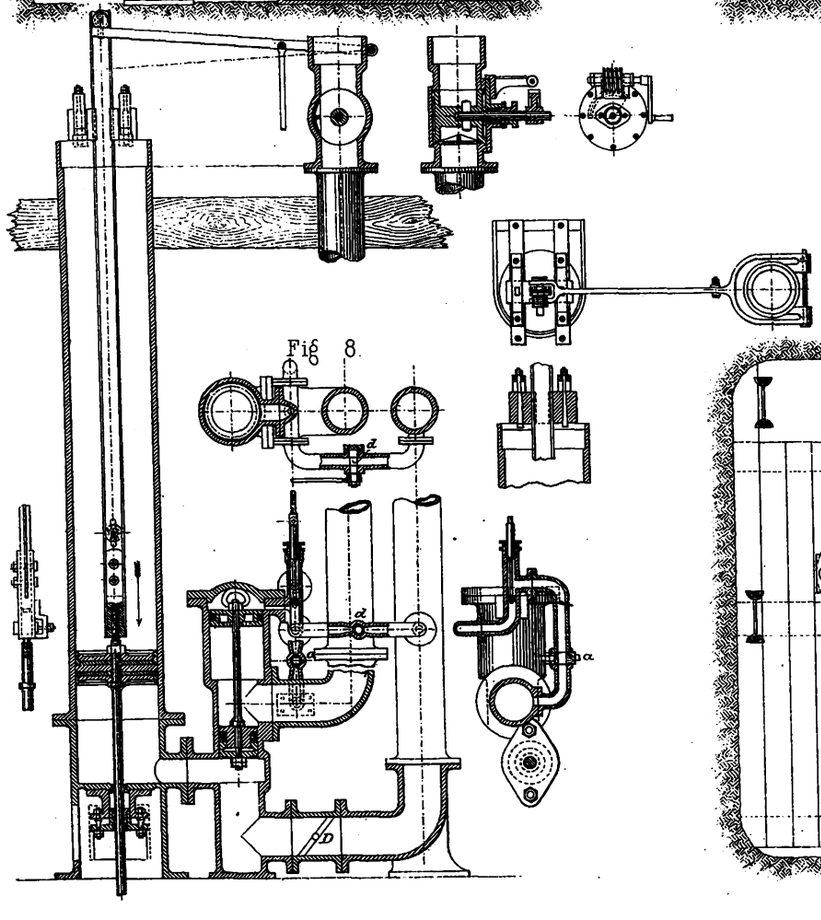


Fig. 7.

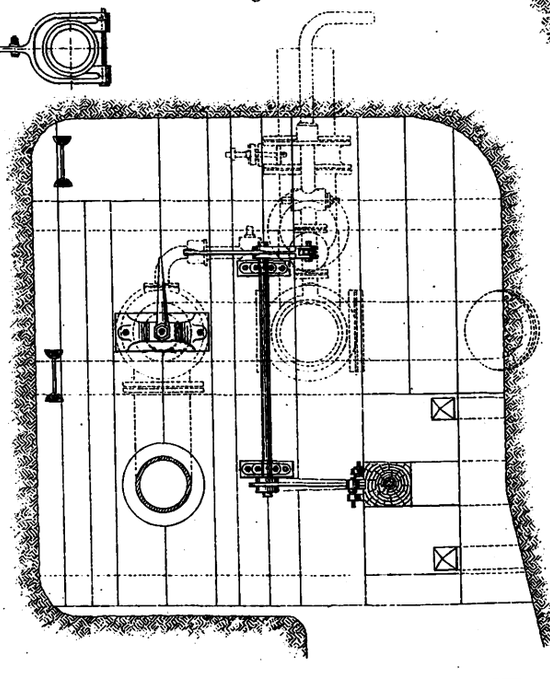


Fig. 8.

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fessional water-discoverers. Even as late as 1569, a book printed in Orleans (*L'Art et Science de trouver les Eaux et Fontaines cachées sous Terre autrement que par les Moyens vulgaires des Agriculteurs et Architectes*, par Jacques Besson, Dauphinois, mathématicien), contains no allusion to the rod. It is a curious circumstance that this work emanated from Dauphiny, the home, a century later, of the most famous diviners and water-discoverers.

But the alchemistic literature brings the physical uses of the divining-rod to the front. The first mention is usually credited to the *Novum Testamentum* of Basil Valentin, a Benedictine monk and hermeneutic philosopher of the fifteenth century. But it must be remembered that the existence, even, of this man is not beyond doubt. It is attested by Gadenus (*Historia Erfordiensis*, 1675), who says that Basil was living at the convent of St. Peter's at Erfurth in 1413. Yet the *Testamentum* was actually first printed at the beginning of the seventeenth century, though manuscript copies had been circulated earlier. Of these, Chevreul possesses one (a French translation) dated 1651, and from it quotes the famous passage according to which, at the time of the writer, the divining-rod was worn in the belt or the hat, and was used to discover metals. Basil describes seven varieties of the rod, according to its different motions.

Whatever its antiquity, the use of the rod to discover hidden treasure or metallic ore became general in Germany, and was extended thence through Flanders, England, Sweden, France, Italy, and Spain, before the end of the seventeenth century. It must be remembered that in those days the practice of burying money and plate was universal. A rod that would discover buried treasure only would, at the present time, be of comparatively little value. We know well enough where the large masses of gold and silver are piled. It is not ignorance, but bolts and bars, that prevent our getting at them; and a large class of the diviners of the middle ages would be obliged, if they lived to-day and practiced their profession, to become burglars or cashiers.

The scientific explanation of the divining-rod at this period, like the scientific explanation of nearly all facts in chemistry and physics, was "affinity," a word under which was concealed a little science together with a vast amount of ignorance and superstition. Philip Melanchthon (1497–1560), the friend of Luther, adopted this theory to explain the effects of the divining-rod. We must confess that, in an age when the attraction of the magnet for iron and of electrified amber for light bodies was known, but not understood, there was no necessary absurdity in supposing that similar phenomena might be exhibited by other classes of substances. And this natural presumption, joined with the inherent credulity of ignorance and the tendency to generalize upon imperfect data, caused a very general acceptance of the alleged operations of the divining-rod as true, and consequently the promulgation of crude quasi-scientific theories to account for it. On the other hand, it must be remembered that the belief in demoniac agencies was still active and all-pervading, so that when facts could not be scientifically explained, they were at once referred to witchcraft or to the devil directly. So long as the discussion remained within the field of science, it was conducted with courage and candor; but when it entered the demoniac domain, the boldest philosopher, unless he were willing to sell his soul to Satan, became dumb. This may explain the attitude of the great Agricola (*De Re Metallica*, lib. ii.) a keen observer and wise reasoner, who, after saying that the alleged virtues of the divining-rod are subject to much dispute, and stating both sides of the dispute with admirable clearness, demolishes in a few words the supposed analogies of magnetism and electricity, but declares that, if the divining-rod derives any power from spells and incantations, that is a matter neither permissible nor agreeable for him to discuss. He proceeds, moreover, to assert, as the general result of experience in his time, that the professors of the divining-rod, though they sometimes succeed in discovering veins, quite as frequently fail, and have to dig like other people if they wish to find any thing. Wherefore, he advises the respectable and sober miner to study the indications of nature, and then dig at once, without further fooling. In a quaint woodcut which accompanies this passage, a miner is represented in the background as cutting his hazel twig; while another in the foreground is proceeding with it in due form for the discovery of the mine; and (whether in sarcasm or not, I do not undertake to say) at the very point to which the latter is steering, two of Agricola's "good and sober" miners have already found ore by the homely process of digging.

Paracelsus (1495–1541) condemns in his works, as uncertain, illusory, and unlawful, the use of the rod. His disciples did not uniformly agree with this view. Goclenius, author of *Essays on the Virtue of Plants and the Unguent of Arms*, believes in the efficacy of the rod, and does not condemn its use. Libavius, author of the *Syntagma Arcanorum Chimicorum* (died 1616) believed in it from experience, and explains its action by sympathetic affinity. This theory, already announced by Melanchthon, was also held by his son-in-law Peucer, by Porta (*Magia Naturalis*, 1569, lib. xx., cap. viii.), by Keckermann (1573–1609, *Systemata Physica*, lib. i., cap. viii.), by the author of one of the discourses published with those of Maiolus, Bishop of Volturara (1614), and by Michael Mayer, the prolific author of alchemistic allegory (*Verum inventum, hoc est Munera Germaniæ*, cap. iv.), who, describing the invention of gunpowder in Germany and the use of hazel-charcoal in its original manufacture, mentions the sympathy which hazel-wood has for metals, and its consequent employment in the form of the divining-rod.

On the other hand, the Jesuit father Laurentius Forer (*Viridarium Philosophicum seu Disputationes de Selectis in Philosophiâ Materiis*, 1624) condemns the use of the rod as a superstitious practice. We must distinguish therefore three different views of the question: two of which accepted the efficacy of the rod as proved, and ascribed it respectively to a physical property of the rod, and to demoniac agency, while the third discredited the alleged facts, and pronounced the practice to be a superstition.

A fourth view was indeed advanced, according to which the operator, as well as the rod, was the recipient of a divinely-given faculty. It was no doubt with the purpose of removing the odium attached to dealings with the Evil One that the professors of this science, particularly in Germany, surrounded it with ceremonies and formulas of a highly pious character. It is true that the rules sometimes prescribed for the cutting of the twig partook largely of heathen sorcery and astrology. They were indeed, to some extent, unconscious reminiscences of the old Scandinavian, and even of the Aryan, mythology. But this was atoned for when the rod was duly Christianized by baptism, being laid for this purpose in the bed with a newly baptized child, by whose Christian name it was afterward addressed. The following formula, cited by Gaetzschmann, may serve as an example: "In the name of the Father, and of the Son, and of the Holy Ghost, I adjure thee, Augusta Carolina, that thou tell me, so pure and true as Mary the Virgin was, who bore our Lord Jesus Christ, how many fathoms is it from here to the ore?" In this case, the rod was expected to reply by dipping a certain number of times, corresponding to the number of fathoms.

Such devices, however, were not everywhere successful in diverting from the practitioners of this occult science the evil name of sorcery. A striking and pathetic instance is furnished in the seventeenth century by the history of the Baron and Baroness Beausoleil. The baron, born in Brabant, devoted himself to mineralogy and mining, and became, undoubtedly, one of the foremost mine-engineers of his time. He visited and studied the mines of Germany, Hungary, Bohemia, Tyrol, Silesia, Moravia, Poland, Sweden, Italy, Spain, Scotland, England, and France. The emperors Rudolph and Matthias appointed him counselor and commissary-general of the mines of Hungary. The Archduke Leopold made him director of the mines of Tyrol and Trent. The dukes of Bavaria, Neuburg, and Cleves gave him the same title. Finally, the pope did the same for all the papal states. He appears to have amassed from these various employments a considerable fortune.

In 1600, he was engaged by the comptroller-general of the mines of France to open mines in Languedoc and some other provinces, and in 1626 this commission was still further extended. During this period, he met and married his wife, who devoted herself with enthusiasm to his profession, studying and traveling extensively with him in Germany, Italy, Sweden, and perhaps Spain. They even made a voyage to the shores of the new world. In 1627, their house was robbed under the legal forms of search on the charge of sorcery preferred by a local official. Their loss was estimated at one hundred thousand crowns. They easily obtained acquittal of the charge; but it is an instructive commentary on the justice of the time that they never were able to recover their property. They went to Hungary, but returned to France in 1632 under a new commission from Louis XIII. In this year, the baroness, who was an accomplished author, published an account of one hundred and fifty mines already discovered in France, and of some medicinal springs. They expended, in further explorations, nearly the whole of their fortune; but were unable, in the face of their jealous rivals and enemies, to obtain from the government the grants which had been promised them, and by means of which they expected to reimburse themselves. Finally, the baroness published a work, addressed to Richelieu, and entitled *The Restitution of Pluto* (reprinted at Paris in 1779), in which, with eloquent indignation, she declared the deserts of her husband and herself, and asserted their right to the rewards promised them, urging the cardinal-minister at the same time, by every consideration of the glory and greatness of France, to encourage the development of its mineral resources. Unfortunately, in this work she furnished new material for the slanderous accusation of sorcery. In magnifying the art of discovering mines and springs, and the skill required for this purpose, she gives a description of the means employed, showing that these hidden treasures are to be detected—

1. By digging, which is the least important way;
2. By the herbs and plants which grow above springs of water;
3. By the taste of the waters which flow from them;
4. By the vapors which arise from them at sunrise;
5. By the use of sixteen scientific instruments and of seven rods (the seven rods of Basil Valentin), connected with the seven planets, etc.

The first four means were undoubtedly real and really employed. Under the fifth head, we have an illustration of what is so common in the alchemistic and other mediæval writers, namely, the covering of the facts of nature and the methods of investigation with assumed mystery, to hide them from the vulgar. So long as the baron and baroness were spending their own money for the good of the state, they were permitted to go on, and even received complimentary notices from time to time, which, indeed, could not be withheld from persons of such eminent reputation. But when they became troublesome in their demands for more substantial favors and came in collision with the "rings" which infested the kingdom, the charges of sorcery renewed against them furnished a convenient pretext for putting them out of the way. Richelieu may even have supposed that he was behaving in this case with lenity, since instead of having them burned to death, as he did with another sorcerer of the same period, he only put the baron in the Bastille (1642) and his wife in Vincennes, where they soon (about 1645) died in destitution and misery, victims not so much of the superstition as of the corruption of the times.

It will be noted that the treatise of the baroness did not claim for the divining-rod any moral virtue. What the Beausoleils appear to have done for this instrument was to bring forward its use in the discovery of springs as well as metals. The literature of that period seems to ignore in the main any powers of the rod in prophecies or moral discrimination.

(TO BE CONTINUED.)

A MINER'S RECKLESSNESS.—John Sykoski, the miner's laborer burned at Plymouth and removed to the hospital, is dead. The death of this man was scarcely less than suicide. If his act was not suicidal in intention, it was as bald a piece of stupidity as one ever encounters in mining operations. He had been up nearly all the night before playing pool, and without any need for powder, went to a covered box, removed the lid, took out a can of powder, unscrewed the cork and somehow brought the contents in contact with the flame of his lamp. The only theory that can be gleaned from the facts is, that he mistook a powder-can for an oil-can and poured the powder into his burning lamp. But the oil and the powder are kept separate, and in boxes at least sixty feet apart, and the man had been working five months in that chamber and knew all about it. He must have been stupid and dazed by drink and loss of sleep. He was burned too badly to explain how the accident happened.

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THE FLOW OF WATER THROUGH PIPES.*

By Hamilton Smith, Jr., M. Am. Soc. C.E.

The following table gives the results of 88 experiments as to the discharge of water through circular pipes, ranging from 4 feet to ½ inch in diameter, and with velocities varying from 20 feet to ¼th of a foot per second. The pipes were of rolled and cast-iron, glass, and wood; their interior surfaces varied from the almost perfect smoothness of glass to the roughness of old iron, much incrusted by the continued action of soft water. Of the 88 experiments given, 71 were made by the writer of this paper, and 17 have been selected from standard authorities, for the purpose of more extended comparison.

Experiments Nos. 1 to 15, inclusive, etc., were made at North Bloomfield, California, with three pipes laid side by side across a ravine about 100 feet lower than the pen-stock. They were made of single-riveted No. 14 sheet-iron; the rivet-heads had worn pretty smooth, and no deduction for them was made in computing the areas. The pipes had been carefully coated when first laid with a mixture of coal-tar and asphaltum, and their interior surfaces at the time of these measurements were quite smooth. They were put together in slightly conical joints, the greatest variation in diameter being about ¼ of an inch. The main joints were some 20 feet in length, put together stove-pipe fashion, as is always done in the California hydraulic mines. The various heads were obtained by adding to the length of the pipes at their outlets. The heads, lengths, and mean diameters are given with exactness. The amount of discharge was measured by running the water over an iron weir, the coefficients of whose discharge, with varying depths, had been carefully determined by absolute measurement, but at another point, and under conditions not exactly similar. This gauging was done with all the care practicable, the hight of the water being measured with a Boyden hook gauge, reading to ·001 of an inch. The limit of possible error in these experiments is probably not over 2 per cent. Experiments Nos. 6 and 7, however, are somewhat unreliable, owing to the stoppage of a stone passing through the pipe. The coefficient of contraction is assumed at 1 in these pipes, as each of them had a short funnel-shaped inlet, which was included in the measurement of their lengths. In Nos. 1, 6, and 10, the discharge was into a pool of water at the outlet-box; in the other 12, the discharge was into the air. There were two angles in the line of these pipes, one of 9 degrees and the other of 11 degrees; for the remainder of the distance, they were nearly straight; in the computations, no deduction was made for these bends.

No. 17 is based chiefly upon data given to the writer by the engineers who had the hydraulic works of the Spring Valley Mining Company in Butte County, California, in charge. It may be incidentally observed that this pipe was laid in 1870, and has remained in perfect condition ever since its construction. It is made of double-riveted sheet-iron, having a thickness of ⅜ths of an inch at the point of greatest pressure, where the actual head is 887 feet. The maximum tensile strain on the iron is 17·549 lbs. per square inch. The rivet-heads for one half the length of the pipe no doubt perceptibly retarded the flow of water. Round stones weighing about 25 pounds passed through the pipe with a velocity of 9·0 feet per second, while the computed velocity of the water was 10·78 feet.

No. 18 was a single-riveted sheet-iron pipe, with the interior surface worn quite smooth, and with joints put together stove-pipe fashion. The mean diameter, head, and length are given with exactness; the discharge was measured through a series of apertures, no great accuracy being practicable. The limit or possible error in this case may be as much as 4 per cent.

Nos. 22 to 28, inclusive, are the early experiments of Couplet, and seem to be reliable. The authorities for Nos. 16, 19 to 21, and 29 to 34, inclusive, are given in a note. Nos. 29 and 30, being the Rochester supply main of two different diameters, show an apparently excessive discharge. This was stated to have been directly measured by the filling of a reservoir of known size. Nos. 31 and 32 are given as illustrations of extremely rough surfaces. Mr. Kirkwood states that in No. 32—the Jersey City main—the pipe was comparatively new, which makes the very low coefficient of discharge quite remarkable.

Nos. 35 to 87, inclusive, were made by the writer at New Almaden, California. All these experiments were with straight pipes, and were made with considerable accuracy. The mean diameters were computed by the weight of water contained in the pipes, taken by the sum of the weights in the several joints, which varied slightly from the mean of the end diameters as directly measured. The discharge was determined by filling a tank of known size. The iron gas-pipes were joined by their usual couplings. The ends of the glass pipes were smoothly ground, and a water-tight joint made by an outside rubber band. The wooden pipe was joined by usual plug couplings. The funnel mouth-piece for the inch gas-pipe was 10¼ inches long, with a mouth 6¼ inches in diameter; the funnel for the inch glass pipe was 3¼ inches long, with mouth 5 inches in diameter. These mouth-pieces were not included in the given lengths of the pipes. Nos. 35 to 52, inclusive, were made with the same pipe, which was new and in good order; it was first used without a mouth-piece, then with a mouth-piece, and afterward the pipe was dipped in a bath of boiling coal-tar and asphaltum, giving it a very smooth coating. Nos. 53 to 56, inclusive, were with a shorter section of the same pipe. The pipe used in Nos. 57 to 63, inclusive, has been in use for several years, was rather rusty, and was slightly incrusted by the action of lime-water. The method of obtaining the diameter—by the quantity of water contained—gave the exact size of the pipe at the time of the experiments. The glass pipes used were new and unscratched, of French manufacture, and somewhat conical. There were twelve joints of the inch pipe, which were nearly evenly matched in diameter at the junctions; the largest diameter was ·0875′, and the smallest, ·0717′. The measuring tank held 15·2 cubic feet, and the times were determined to ¼th of a second.

No. 88 was with a new inverted siphon of double-riveted sheet-iron pipe, with a pressure of about 800 feet at the lowest point, with a maximum tensile strain of 16,500 pounds per square inch, and with most of the joints made by sleeves with lead packing. It was coated with the usual mixture of coal-tar and asphaltum. No deduction was made for rivet-heads, which for over one half the length doubtless formed noteworthy obstructions, as the pipe was of comparatively small diameter—17 inches. The mean diameter, head, and length are given with exactness. The discharge was measured first by the flow over a weir, and afterward through standard apertures; these determinations were not as satisfactory as could have been desired, although three separate trials gave nearly identical results. The chances are, that the discharge was slightly underestimated. A noticeable feature in this experiment is the fact that blocks of wood, loaded to a specific gravity of 1·05, passed through it with a velocity of 20·9 feet per second, while the calculated velocity of the water was only 20·13 feet. In several of the other experiments, similar tests always showed a less speed of the blocks of wood or stone than that of the water, which is readily to be accounted for by the blocks striking the rivet-heads. In No. 18, there was no noteworthy difference between the velocity of unloaded wooden blocks and that of rough stones.

In all the experiments made by the writer, the actual or total head was either the difference in elevation between the surface of the water in the pen-stock and that in the outlet-tank, or the difference between the water in the pen-stock and the center of the escaping jet, where the pipe discharged into the air. Experiments 35 to 87, inclusive, were made under the latter condition.

The standard of measure used was that of the United States Coast Survey. The temperature of the water in Nos. 35 to 87 was about 65 degrees Fahr. In the other experiments, from 50 to 55 degrees Fahr.

The writer here desires to express his obligations to the North Bloomfield Gravel Mining Company, and to Mr. J. B. Randol, manager of the Quicksilver Company, for the facilities afforded by them in pursuing these investigations.

These 88 experiments have all been reduced to the simple formula:

$$v = m\left(\frac{d\,h'}{l}\right)^{1/2}$$

Where v = velocity in English feet per second.
d = mean diameter.
l = length.
h' = effective head.
m = variable co-efficient.

This is identical with the usual form:

$$v = n\,(rs)^{1/2};\ 2\,m = n.$$

The effective head h' was derived from the total head h, as follows, c being coefficient of contraction at entrance:

$$h - h' = \frac{v^2}{2\,gc^2}.$$

The comparative results of these experiments when shown by graphic delineations, the coefficient m being used as abscissæ, and the velocities in feet per second as ordinates, prove that the value of m varies with:

First. The character of the interior or wetted surface, being very low with small, rough pipes.

Second. It increases with the velocity with smooth pipes, but this increase is slight with small, rough pipes.

Third. It increases with the diameter, which is to some extent a sequence of the first proposition.

It may be observed, in connection with the second proposition, that the coefficient m will be infinitesimal, with an infinitesimal velocity. In fact, with a minutely appreciable head, m will probably still remain infinitesimal, owing to the viscosity of the water.

The value of m at first increases very rapidly with the increase in velocity; this increment gradually diminishes until, with high velocities, m becomes nearly constant.

Mr. I. T. Fanning, in his *Treatise on Water Supply Engineering*, arrives at the same three general conclusions as those here given.

In the larger pipes, one of which discharged fifty cubic feet per second, it was not practicable to measure the water directly, on account of the large outlay which would have been requisite to build measuring-tanks. Any indirect measurements of flowing water, either over weirs or through standard apertures, are always unsatisfactory, as the slightest change in the conditions will affect the accuracy of the results. A discordance, however, is to be noted in these experiments (35 to 87), which is the low value of m in the pipe 16⅜ feet long, when compared with its value in the pipe 60 feet long (49 to 52) of the same diameter. This discordance leads to the belief that the usual correction for loss of head, due to imparting velocity to the water $\left(\text{loss of such head} = \frac{v^2}{2g}\right)$ should be modified. The discrepancy can hardly be caused by the deduction for contraction at the orifice, as experiments 35 to 41 and 42 to 48 give practically identical curves, and where first a considerable correction was given for the contraction, and afterward, with the same pipe, a very slight correction for the same cause. An extended series of experiments with pipes of the same size, but of widely differing lengths, made with proper care, is much to be desired, in order to definitely settle this point.

It may be remarked that some 150 additional experiments, made by standard authorities, have been carefully tabulated for purposes of comparison with the 88 here given. Their results were often contradictory, although generally confirming the correctness of the three general propositions before stated. The importance to the hydraulic engineer of this question is best appreciated by the statement that the experiments given show a variation in the value of m from 33 to 67. The first 87 had been tabulated by the writer before he designed and built the Texas Creek pipe—No. 88. The expected value of m for this siphon was then fixed at 66·5, this value being deduced from the preceding tests. The trial test of this pipe showed a value of 65·56, which, as stated before, is probably slightly less than its real value.

* A paper read before the American Society of Civil Engineers.

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FLOW OF WATER THROUGH CIRCULAR PIPES. FORMULA $V = m\left(\frac{d}{l}h'\right)^{\frac{1}{2}}$. EXPRESSED IN ENGLISH FEET.

No. of Experiment.	l Length.	d Mean diameter.	a Mean area.	h Total head.	c Coefficient of contraction.	$2g$ Gravity.	h' Effective head.	D Discharge per second.	V Velocity per second.	Velocity of stones sent through pipe.	m Variable coefficient.	Remarks.
1	684·8	·9105	·6511	24·220	1·00	64·29	22·650	6·542	10·048	9·42	57·90	Experiments 1 to 15 inclusive were with riveted sheet-iron pipes of No. 14 iron, coated with coal-tar and asphaltum, and having been in use some five or six years; these three pipes were laid side by side across a valley about 100 feet lower than inlets, with no very sharp curves or angles. Pipes all fairly smooth, and joints put together stove-pipe fashion.
2	697·0	·911	·6518	19·005	do.	do.	17·832	5·661	8·685	.....	56·89	
3	713·9	·911	·6518	12·850	do.	do.	12·098	4·531	6·952	5·79	55·95	
4	721·3	·911	·6518	10·200	do.	do.	9·618	3·986	6·115	.....	55·49	
5	730·6	·911	·6518	6·555	do.	do.	6·203	3·099	4·755	.....	54·06	
6	684·9	1·056	·8758	24·510	do.	do.	22·711	9·419	10·755	.....	57·47	
7	699·6	1·056	·8758	16·690	do.	do.	15·519	7·601	8·679	7·4 (?)	56·71	
8	709·2	1·056	·8758	10·885	do.	do.	10·127	6·115	6·982	.....	56·86	
9	718·4	1·056	·8758	5·130	do.	do.	4·799	4·039	4·612	.....	54·91	
10	684·4	1·230	1·1882	24·390	do.	do.	22·036	14·617	12·302	11·88	61·82	
11	695·6	1·230	1·1882	18·930	do.	do.	17·132	12·773	10·750	9·58	61·76	
12	705·0	1·230	1·1882	12·720	do.	do.	11·592	10·120	8·517	.....	59·89	
13	710·7	1·230	1·1882	9·550	do.	do.	8·713	8·714	7·334	.....	59·72	
14	712·4	1·230	1·1882	8·545	do.	do.	7·813	8·152	6·861	.....	59·07	
15	719·9	1·229	1·1863	3·915	do.	do.	3·014	5·217	4·398	.....	55·99	
16	5·280·	4·	12·57	5·	.....	.....	5·	43·46	3·46	.....	56·22	Rankine. Section of long pipe.
17	12·798·	2·43 (?)	4·64	150·0	.....	.....	150·	50·0	10·78	9·0	63·88	Measurements of discharge, 51·5, 48·5, and 52·8 feet per second. 50 feet is nearly correct.
18	1·193·8	2·154	3·643	22·067	1·00	64·29	19·596	45·92	12·605	11·24	67·03	Discharge not measured with accuracy.
19	29·580·	1·3333	1·396	420·	.....	.....	420·	9·516	6·816	.....	49·54	Colinton pipe.
20	25·765·	1·3333	1·396	230·	.....	.....	230·	7·333	5·252	.....	48·14	do.
21	3·815·	1·3333	1·396	184·	1·00	64·4	180·7	20·25	14·505	.....	57·72	do.
22	3·836·6	1·599	2·007	12·885	do.	do.	12·697	6·981	3·478	.....	47·81	Versailles pipe.
23	7·481·7	·4441	.....	·496	.....	.....	·496	.....	·1786	.....	32·92	Iron and earthen pipe.
24	7·481·7	·4441	.....	1·007	.....	.....	1·007	.....	·2801	.....	36·23	do.
25	7·481·7	·4441	.....	1·488	.....	.....	1·488	.....	·3665	.....	39·00	do.
26	7·481·7	·4441	.....	1·872	.....	.....	1·872	.....	·4268	.....	40 49	do.
27	7·481·7	·4441	.....	2·132	.....	.....	2·132	.....	·4629	.....	41·15	do.
28	7·481·7	·4441	.....	2·220	.....	.....	2·220	.....	·4728	.....	41·19	do.
29	50·776·	3·	7·0686	16·517	143·720	.....	27·00	143·72	14·360	2·0315	.....	65·031	Hemlock lake compound pipe, cast and wrought-iron.
30	51·495·	2·	3·1416	127·203		.....	16·72			4·5709	.....	
31	11·217·	3·	7·069	20·215	.....	.....	20·215	21·204	3·00	.....	40·8	Croton main, much incrusted by soft water.
32	29·715·	1·6667	2·182	30·262	.....	.....	30 262	3·256	1·492	.....	36·22	Jersey City main. Comparatively new pipe (?), but much incrusted.
33	44·400·	1·25	1·227	226·	.....	.....	226·	4·25	3·46	.....	43·4	Crawley pipe.
34	6·600·	1·	·7854	34·5	1·00	64·4	34·3	.....	3·568	.....	49·5	Carlisle pipe.
35	60·172	·0878	·006054	8·330	·800	64·287	7·641	·03224	5·325	.....	50·43	One-inch new gas-pipe, untarred, and no funnel.
36	60·172	·0878	·006054	6·590	do.	do.	6·059	·02829	4·673	.....	49·70	
37	60·172	·0878	·006054	4·850	do.	do.	4·471	·02390	3·948	.....	48·88	
38	60·172	·0878	·006054	3·272	do.	do.	3·027	·01922	3·175	.....	47·77	
39	60·172	·0878	·006054	1·663	do.	do.	1 550	·01304	2·154	.....	45·29	
40	60·172	·0878	·006054	·787	do.	do.	·738	·00860	1·421	.....	43·30	
41	60·172	·0878	·006054	·473	do.	do.	·451	·00580	·958	.....	37·34	
42	60·247	·0878	·006054	8·317	·980	do.	7·847	·03261	5·387	.....	50·38	One-inch new gas-pipe, untarred, and funnel at mouth.
43	60·247	·0878	·006054	6·506	do.	do.	6·147	·02850	4·708	.....	49·74	
44	60·247	·0878	·006054	4·847	do.	do.	4·588	·02421	3·999	.....	48·01	
45	60·247	·0878	·006054	3·276	do.	do.	3·107	·01953	3·226	.....	47 94	
46	60·247	·0878	·006054	1·669	do.	do.	1·591	·01331	2·199	.....	45·67	
47	60·247	·0878	·006054	·784	do.	do.	·751	·00869	1·435	.....	43·38	
48	60·247	·0878	·006054	·491	do.	do.	·473	·00637	1·052	.....	40·97	
49	60·264	·0873	·005986	8·353	do.	do.	7·873	·03258	5·443	.....	50·97	One-inch new gas-pipe, tarred, with funnel.
50	60·264	·0873	·005986	6·597	do.	do.	6·230	·02850	4·761	.....	50·12	
51	60·264	·0873	·005986	3·313	do.	do.	3·145	·01930	3·224	.....	47·77	
52	60·264	·0873	·005986	1·703	do.	do.	1·623	·01329	2·220	.....	45·78	
53	16·685	·0876	·006027	4·620	do.	do.	3·853	·04148	6·882	.....	48·39	
54	16·685	·0876	·006027	3·179	do.	do.	2·667	·03388	5·621	.....	47·50	
55	16·685	·0876	·006027	1·514	do.	do.	1·283	·02275	3·775	.....	46·00	
56	16·685	·0876	·006027	·623	do.	do.	·535	·01406	2·333	.....	44·02	
57	60·247	·0853	·005715	[8·315	do.	do.	8·020	·02438	4·266	.....	40·03	One-inch gas-pipe, with funnel; pipe had been several years in use.
58	60·247	·0853	·005715	6·563	do.	do.	6·332	·02156	3·773	.....	39·85	
59	60·247	·0853	·005715	4·846	do.	do.	4·679	·01835	3·211	.....	39·45	
60	60·247	·0853	·005715	3·278	do.	do.	3·167	·01497	2·619	.....	39·11	
61	60·247	·0853	·005715	1·684	do.	do.	1·630	·01045	1·829	.....	38·07	
62	60·247	·0853	·005715	·780	do.	do.	·757	·00683	1·195	.....	36·50	
63	60·247	·0853	·005715	·474	do.	do.	·461	·00520	·910	.....	35·62	
64	60·127	·0523	·002148	8·354	·825	do.	8·010	·00833	3·878	.....	46·46	Five eighths inch new gas-pipe, no funnel.
65	60·127	·0523	·002148	6·593	do.	do.	6·331	·00728	3·385	.....	45·62	
66	60·127	·0523	·002148	4·867	do.	do.	4·680	·00615	2·863	.....	44·87	
67	60·127	·0523	·002148	3·306	do.	do.	3·186	·00493	2·295	.....	43·60	
68	60·127	·0523	·002148	1·710	do.	do.	1·653	·00339	1·578	.....	41·62	
69	60·127	·0523	·002148	·813	do.	do.	·789	·00221	1·029	.....	39·28	
70	63·902	·0764	·004584	8·670	970	do.	8·255	·02296	5·009	....	50·42	One-inch glass pipe, with funnel.
71	63·902	·0764	·004584	6·840	do.	do.	6·522	·02009	4·383	.....	49·64	
72	63·902	·0764	·004584	5·036	do.	do.	4·812	·01689	3·685	.....	48·58	
73	63·902	·0764	·004584	3·387	do.	do.	3·244	·01350	2·945	.....	47·29	
74	63 902	·0764	·004584	1·661	do.	do.	1·598	·00896	1·955	.....	44·73	
75	34·941	·0622	·003039	5·072	·820	do.	4·630	·01329	4·373	.....	48·17	Three fourths inch glass pipe, no funnel.
76	34·941	·0622	·003039	3·660	do.	do.	3·349	·01114	3·666	.....	47·48	
77	34·941	·0622	·003039	2·059	do.	do.	1·896	·00806	2·652	.....	45·65	
78	34 941	·0622	·003039	0·673	do.	do.	·628	·00425	1·398	.....	41·81	
79	11·127	·0418	·001372	3·025	do.	do.	2·569	·00609	4·439	.....	45·19	One half inch glass pipe, no funnel.
80	11·127	·0418	·001372	2·155	do.	do.	1·846	·00502	3·659	.....	43·94	
81	11·127	·0418	·001372	1·266	do.	do.	1·095	·00373	2·719	.....	42·39	
82	11·127	·0418	·001372	·816	do.	do.	·716	·00285	2·077	.....	40·05	
83	62·05	·1052	·008692	8·524	·800	do.	8·138	·03465	3·986	.....	33·93	Wooden one and a quarter inch pipe, no funnel.
84	62·05	·1052	·008692	6·696	do.	do.	6·395	·03059	3·519	.....	33·80	
85	62·05	·1052	·008692	4·942	do.	do.	4·722	·02615	3·008	.....	33·62	
86	62·05	·1052	·008692	3·309	do.	do.	3·161	·02146	2·469	.....	33·73	
87	62·05	·1052	·008692	1·567	do.	do.	1·501	·01437	1·653	.....	32·77	
88	4·438·7	1·416	1·571	303·6	·920	64·4	296·1	31·69	20·13	20·9	65·56	Pipe carefully tarred and comparatively new.

AUTHORITIES.—Nos. 1 to 15, both inclusive, Hamilton Smith, Jr., North Bloomfield. No. 16, J. M. Gale, Inst. Engineers in Scotland, 1869. No. 17, Surveys for Spring Valley Mining Company. No. 18, Hamilton Smith, Jr., North Bloomfield Nos. 19 to 21 inclusive, Institution of Civil Engineers, 1855. Nos. 22 to 28, inclusive, Couplet. Encyc. Brit., 8th Ed., "Rivers." Nos. 29, 30, Report of Engineer Rochester Water-Works. Nos. 31, 32, James P. Kirkwood, Brooklyn Water-Works. Nos. 33, 34, Inst. of Civil Engineers. Nos. 35 to 87, inclusive, Hamilton Smith, Jr. New Almaden. No. 88. Hamilton Smith, Jr. Texas Creek.

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ON THE DEVELOPMENT OF THE WATER-PRESSURE ENGINES IN THE FREIBERG MINING DISTRICT.*

By Gustav Hahn, Obergruna.

(WITH SUPPLEMENT.)

Though more than seven hundred years old, the Freiberg silver mining industry has shown its vitality even under adverse circumstances. It owes its development not only to the richness of the ores, but to the extensive utilization of cheap water-power for hoisting and pumping. The oldest of this class of machinery, partially still at work, consists of large water-wheels, and, in spite of the large head of the water, they were almost exclusively used until 1820, a number of them often being placed below one another, in order to utilize the power. It is true that Mende built engines of a different type as early as 1768, but none of them is now in use, nor did they have any important bearing upon the development of the water-pressure engine in the Freiberg District, which must be dated from 1820, when Brendel rebuilt an engine put up in the Reicher Bergsegen mine to utilize a head of 287·75 feet. His design attracted a good deal of attention. It was put into the Alte Mordgrube, and had a head of 328·7 feet, a 16·72-inch cylinder, an 8·36-feet stroke, and, making four strokes per minute, showed an efficiency of 70 per cent. Its work encouraged the building of water-pressure engines in the district, and since then there have been built to date thirty water-pressure engines for pumping and hoisting purposes.

The Freiberg system for obtaining water-power is exceedingly elaborate. Eleven collecting-ponds are distributed near the Bohemian frontier, connected by ditches and tunnels. They have a capacity of 176,800 million cubic feet of water, and furnish the mines with from 1600 to 2175 gallons a second. The total length of the ditches and supply tunnels is 257,322 feet, paid for by the mines. For this water conducted into the mines, an outlet had to be provided, and thus a large number of tunnels were driven, the latest being the famous Rothschoenberg, which, with branches, is 166,572 feet long, and, according to locality, decreases the lift of the pumps and increases the available head of water by from 308 to 498 feet.

The water-power thus created, during so long a time and at so great an outlay, had to be utilized by the mechanical engineers of the Freiberg mines by water-pressure engines, and their principal aim has been to improve the valve-gear. One of the principal drawbacks of the valve-gear is, that it admits too great a velocity of the water when entering the cylinder, and that the cutting off of the pressure-water takes place too suddenly, so that strong concussions are brought about. Braunsdorf tried to get over the trouble by using an auxiliary valve-piston, while Schwannkrug tried double pistons.

It is important, to secure quiet working of a water-pressure engine, to have the descending rods move slowly, so that the masses moving with an accelerated velocity toward the end of the stroke can be stopped toward the end of the stroke without shocks. This is partly accomplished by throttling the water flowing from the main cylinder, and partly by an hydraulic counterpoise.

The engines shown on the accompanying supplement show the principal variations adopted in the Freiberg mines. Figures 1 to 4 exhibit the engine designed by Gustav Hahn for the Reiche Zeche mine. It was to be put in on the level of the Rothschoenberg tunnel, to be supplied with 6½ gallons a second of power water with a head of 404·7 feet, and making four 6·56 foot strokes per minute, lift the water from the fifth level, 337·3 feet below the tunnel and the water obtained in sinking the shaft down to the 6th level. The engine has a piston a, with cross-head moving in the working cylinder b, the latter being mounted on a base-plate resting on two iron beams. The regulating mechanism consists of two regulator cylinders, the main regulator cylinder D and the auxiliary regulator cylinder E, the regulator shaft w, upon which are mounted the levers k for the up-stroke, and k' for the down-stroke, moved by s' and s^2. By the oscillating movement of the shaft w, which is imparted to it alternately by k and k', the lever h and the auxiliary regulating piston attached to it are moved up and down. The auxiliary regulator cylinder E is connected by a pipe with the supply-pipe F, and may be cut off by the cock E'. The water entering through this pipe flows into the auxiliary regulator cylinder between the pistons δ and δ', and when these two pistons occupy their highest position, it is conducted through the channel u into the main regulator cylinder. The motive water enters the main regulator cylinder D through the pipe F F and the cock g, between the piston β and the piston α, and escapes to the tunnel through the piston α'. This water may be throttled by means of a valve at H, thus retarding the down-stroke of the driving-piston. In the position shown, the engine is just beginning its up-stroke, s^2 has, through the medium of the levers k and h, depressed the auxiliary regulator piston to its lowest point, the space above the piston β is connected through u and γ with the discharge-pipe, and therefore, as the surface of β is larger than that of α, the piston β will move to its highest position; α and α' follow this movement, α opening the supply-valve, admitting motive water into the driving-cylinder while α' has simultaneously closed the exhaust-valve. When the driving-piston has reached its highest point, the roller s' has lifted the lever K' to its highest point, and with it the piston δ δ'. The motive water flows from F through E and u over the piston β, pressing it downward, closing α' and opening α. In order to prevent the piston β from suddenly attaining its highest position under the great pressure to which it is subjected in the beginning, when the supply-valve is not yet closed, it is important to throttle the exhaust motive water by the valve γ,' so that by flowing off slowly it permits only a slow following of the regulator piston.

Figures 5 to 7 show a water-pressure engine designed by Herr Braunsdorf for the Rudolf shaft at Marienberg. It has a working cylinder with only one regulator piston α and the auxiliary piston α'. The arrangement of the auxiliary regulator cylinder is shown in the drawing. The lever a is moved up and down by b and b', and this movement is transmitted to the auxiliary regulator piston. The engine has a head of water of 183·7 feet, a supply of motive water of 25 gallons a second, a stroke of 7·69 feet, and makes 4·6 strokes a minute. The velocity of the water entering the engine is 5·58 feet, but nevertheless it works quietly. This engine is also supplied with a throttle for the motive water at c, for the exhaust at d and at g.

The third engine, Fig. 8, is one designed by Herr Bornemann for the Zenith mine at Oberschoena. It differs from the two others in that the driving-piston is not a plunger, and that it works with an hydraulic counterpoise, the engine being mounted below the level of the tunnel, so that it has a counter column of 6·56 feet, an arrangement justified by the fact that the engine must on its up-stroke run a lifting set and on its down-stroke need only counterbalance a weak wrought-iron pump-rod. The arrangement of the main regulator cylinder with the two double pistons, the throttle-valves a, d, and D, is similar to that of the other machines.

* A paper read before the Saxony Section of the German Society of Engineers.

UTILIZING ASHES.

Mr. J. A. Shinn, of Pittsburg, has been for some time experimenting with, and has obtained a patent for, the use of ashes in making mortar. In the city of New York about 700,000 cubic yards of ashes are annually produced, which require to be carted to the docks, loaded upon boats, and taken to the lower bay in order to dispose of them, at a cost to the city of over $400,000.

In addition to this, the large manufacturers dispose of their own ashes in like manner at their own cost. The fine portion of the ashes of domestic production, that is, stoves, grates, ranges, and heaters, is capable of being converted, with a small proportion of lime, into a mortar having a tensile strength of from four to five times that of common sand and lime mortar, or about 80 pounds per square inch, one month old, to sand mortar 20 pounds at the same age, and, when mixed as béton, gives a tensile strength of 140 pounds and a crushing strength of over 1100 pounds per square inch. one month old.

It will thus be seen that, by utilizing the ashes for mortar, a large part of the expense of removal could be saved, together with the whole cost of procuring sand for that purpose, and at the same time a very superior article of mortar be produced.

In consequence of the small quantity of lime required (10 per cent), it would be necessary to mix the mortar by machinery at a mill and deliver it ready for use. This practice prevails to a great extent in European cities on account of the superiority of milled over hand-made mortar. Ash-mortar has the additional advantages of resisting the action of water as soon as it has set (in from two to three days), and also the combined action of fire and water, the quantity of lime being so small and the chemical union with the ash so complete, that the application of heat does not produce free oxide of lime, as in the case of sand-mortar, and consequently does not swell when water is applied to the heated mortar. The weight of ash-mortar is about one half that of sand-mortar when both are dry, and it works soft and smooth. Ash-mortar forms, when set, a silicate of lime and alumina, and hardens uniformly throughout, like cement; while sand-mortar, when set, is but an imperfect carbonate of lime, the sand furnishing but the nucleus around which the carbonate forms.

Ashes made under steam boilers, or in other fires where a high degree of heat is maintained, are not suitable for mortar, owing to the chemical change which takes place in the fire; the finest part of such ash, that found behind the bridge-wall of the boiler, being found to be of the same nature as the coarse clinker, having no special affinity for lime, and being only fit for combination with cement or plaster.

THE TRANSVAAL GOLD-FIELDS.

The last mail from South Africa brings intelligence of a very satisfactory character from the gold-fields now opening up in the Transvaal. Various reports of the richness of the deposits in the neighborhood of Lydenburg have been received from time to time, notwithstanding efforts on the part of those who were first in the field, and endeavoring to obtain concessions, to keep the facts secret. There are now, however, several mining engineers in the district, surveying on the part of capitalists in Cape Town and elsewhere, and several of the newspapers have sent special correspondents to the fields, who all concur in giving the most satisfactory accounts of the quantities of gold lying ready to be worked. In many cases, the precious metal lies close to the surface, the loose soil requiring only to be dug up and worked. In others, rich quartz-veins extend in an unbroken line for two or three miles. On a slope of the Spitzkop farm, two claims which have been quietly worked for the last twelve months have yielded £6000 worth of gold; and the prospectus states that the deeper they go the richer the ground becomes. There is no hard quartz to break, the reef having become rotten or disintegrated by the action of the weather. Nuggets of twenty ounces and thirty ounces in weight have been picked up in the rubbish. Two diggers actually threw away lumps of quartz, which they have not the necessary appliances for crushing, but which have been proved to contain four ounces of gold to the ton. In consequence of these and similar facts, shares in claims owned by Cape Town adventurers have risen in value from £24 to £50 each. At another claim adjoining, a month's wash-up produced 420 ounces of gold, worth £1470. At a third claim, known as Gwynne Owen's concession, on the water-fall property, the ground is even richer, there being large deposits of alluvial soil, consisting in some places of nearly half pure gold. On Berlin, Lisbon, and Hermansburg farms, old Portuguese workings, forgotten for centuries, have been discovered, partly buried beneath overgrowing vegetation, but intersected with rotten reefs, yielding from 5 to 20 ounces of gold per ton. It would seem probable that these workings were abandoned from the same cause which has driven recent explorers back from the country farther north, in Matabele land and Eersteling fields—namely, the hostility of the natives, who prevented several parties from taking away specimens of gold. When proper machinery is erected on these new gold-fields, their value will be increased many times, the diggers at present employed there being satisfied to use merely the pick and shovel, and to wash the stuff in rude appliances through which a large quantity of gold is lost. In one case, a corresponident of the *Friend of the Free State* reports that "quartz is thrown away when actually gold is discernible to the naked eye."

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PENNSYLVANIA BITUMINOUS COAL AND CANADIAN IRON ORE.

The Buffalo correspondent of *Coal* has the following important communication in this week's number, and it is well worthy of consideration: Now here is some "brain-food" for your readers. Perhaps it may be conducive to their pecuniary advantage, and if so, I hope they will financially remember your correspondent. Closely connected with the coal production in the counties of Clearfield, Elk, Jefferson, and Indiana, Pennsylvania, which lie south of Buffalo from one to two hundred miles, are the iron and especially the steel industries, likely at no very distant day to become the leading industries of all that region. The carbonates of iron of the coal measures, which were formerly used in the smelting furnaces in some of these counties, are inferior, both in quality and yield, to the primitive ores so abundant in the Lake Superior regions. It takes on an average three tons of the carbonates to produce one ton of not very good iron, while one ton and a half of the northwestern ore will yield one ton of the best steel and iron; the same quantity of Canadian primitive ore, found near Kingston, produces the same quantity of iron; in both cases, the fuel required is in proportion to the weight of the ore. These primitive ores can be brought here in vessels and taken into the coal regions for use in the iron-works as return loading for coal cars, while the returning ore-carrying vessels can carry back coal, which will always be wanted in the cold climates north and west of us. It seems clear that these rich iron ores will supersede the lean ores of the coal measures for the reasons above given; their use will tend to the advantage of the coal trade. This makes it proper, while treating of coal, to speak of its kindred industries, steel and iron-making. By the by, it is a fact which has a bearing upon our railroad and navigation interests that vast amounts of the excellent iron ores of Elba, Spain, Algiers, and other regions in the old world are brought to Johnstown, Pa., for use in the extensive Cambria Iron and Steel-Works, to the entire exclusion of the local ores of that vicinity. If we should have direct railroad lines to that point from Buffalo, there seems to be no good reason why the ores of Lake Superior should not be sent there and fully supply their works with all the needed qualities.

FLAMELESS COMBUSTION.

Two papers have recently been published on this subject, which are of considerable interest. One by Mr. Fletcher, in *Dingler's Polytechnisches Journal*, 246, 293–5, states that, in experimenting with gas and air-burners, the author found that the smaller the flame produced, the greater was the heating effect which could be obtained from the consumption of a given quantity of gas. This result led him to reduce the flame as much as possible, and ultimately it was proved that under the most favorable conditions the flame would disappear entirely. If, for instance, a ball of iron wire be heated in the flame of a gas blow-pipe, and the supply of air be gradually increased, the jet of flame will become smaller and the temperature will gradually rise. Then, if after the ball has been heated, the gas tube be pinched for an instant so as to extinguish the flame, it will be found that there is a sudden increase of heat, and that the iron will be melted. A similar increase of heat during flameless combustion is shown if a lump of fire-clay be substituted for the iron wire, and petroleum vapor may be used in the place of coal-gas. The author's experiments are still in their infancy; it is hoped, however, that they will be the means of effectually utilizing much of the heat at present wasted. These experiments of Mr. Fletcher's have been repeated by Mr. Fischer—*Dingler's Polytechnisches Journal*. 247, 32–35—with the view of investigating the combustion products. For this purpose, iron wire was wound around the end of a thin clay pipe, so that a ball from 6 to 8 cm. thick was produced. This was treated as suggested by Fletcher, and while the ball was at its most intense heat, a sample of gas was withdrawn from the interior, the gas being drawn through the clay pipe and examined over mercury. The experiments corresponding to samples of gas I. and II. were made with the ordinary gas pressure; in experiment III., the pressure was increased, while the pressure in experiment IV. was still greater. The ball in experiment II. was made of very thin wire; in experiments I. and III., the wire was one mm. in thickness; and in experiment IV., the ball consisted of a mixture of both wires:

	CO_2	CO	CH_4	H	O	N
I	5·11	....	.....	....	6·26	88·63
II	5·03	....	.....	....	3·34	91·63
III	6·60	....	.....	....	4·98	88·42
IV	7·72	1·08	traces	0·32	traces	90·88

The composition of the gas corresponds with that of the gaseous mixture at the point of the flame of a blow-pipe or Bunsen burner; the small proportion of oxygen, however, shows that part of it is retained by the iron; moreover, it was found that, when thin wire was used, one half of the fused mass consisted of ferrosoferric oxide. Referring to the practical application of flameless combustion, the author considers that it is not available for solid fuel.

FURNACE, MILL, AND FACTORY.

It is stated, as a result of the strike of the workmen in the rolling-mills at South Chicago, where 1800 men are usually employed, that the management has decided to shut down for an indefinite period.

The double shift at the Bethlehem steel mills continues, and on the 1st the fires in the puddle mill were started. A large body of union men was addressed in the morning by Vice-President Lee and William Jones, of Pittsburg. Money is distributed liberally among the men who are loyal to the union.

The preliminary steps have been taken to establish at Newport News, Va., extensive fertilizer and chemical works, the latter for the production of sulphuric acid from iron pyrites, which abound along the line of the Chesapeake & Ohio Railroad, the supply being, it is said, inexhaustible and rich in sulphur. The effect of these works will be to reduce the price of fertilizers by cheapening the cost of the acid, which is one of their principal constituents.

The Harrison Boiler-Works, Philadelphia, Pa., have been having tests made of their boiler by Professor Morton, of the Stevens Institute of Technology. In his preliminary report, Professor Morton informs the company that it can safely guarantee an evaporation of nine pounds of water into high-pressure steam for each pound of coal burned, and that under all conditions the steam is completely dry, showing a slight amount of superheat. In regard to capacity as compared with rated size, a 50-horse-power boiler developed (on a basis of thirty pounds of water) from 64 to 75 horse-power, varying with the kind of coal used. Neither of the coals used showed less than 16 per cent of refuse. The evaporation during the capacity tests above referred to was, per pound of coal, from 9·25 to 9·93 pounds, and per pound of combustible from 11·04 to 12·5 pounds of water. The feed-water was heated to 212 degrees, and the pressure under which the water was evaporated was about 70 pounds per square inch. In a test with a blower, the 50 horse-power boiler developed 137 horse-power.

The new plate mill of the Springfield Iron Company, which was recently started, is thus described by the Illinois *State Journal*:

The outfit of new machinery consists of a Porter-Allen automatic cut-off engine, with a cylinder 44 by 48 inches, and a fly-wheel 27 feet in diameter, and weighing something over 30 tons. This engine is calculated to make over 100 revolutions per minute. Then comes the train of three-high plate rolls, which are 31 and 20 inches in diameter and 110 inches long. They are furnished with massive housings, pinions, spindles, and coupling-boxes, and also with a pair of small steam-engines, whose only office is to work the screws which raise and lower the rolls. Accompanying the rolls are two massive tilting-tables, each 30 feet long, with driven rollers, which receive the steel as it comes from the furnace and send it backward and forward through the rolls until the work on it is complete. The operation of these feeding-tables is very complete as well as interesting. By their use, very heavy plates can be rolled, and with a very great saving of labor. When the plate is finished, it is to be pushed off the end of one of these tables endwise on to a cooling-bed. This consists of a series of cast-iron boxes, filled with water to keep them cool, and furnished with loosely-fitting covers. The plates rest on these covers and become perfectly straight and smooth while cooling and before removal. This bed is over 40 feet long, and arranged to accommodate a very long plate. When the plates are cool, they are raked off this bed sidewise by hydraulic machinery on to a bed, where they can be allowed to accumulate if necessary. From this they are taken by a hydraulic crane, and either distributed on the floor preparatory to marking for shearing, or they are taken directly to the shears, to be trimmed and cut into shapes desired by the customers for whom they are intended. These shears are a curiosity. They weigh over 70 tons, are driven by an engine big enough to run a flouring-mill, and will take off at a single bite a piece of steel 100 inches long and 1¼ inches thick. When the plate is sheared, another hydraulic crane takes it up and swings it on to the cars on which it is to be shipped, a railroad track having been laid directly into the new mill for that purpose.

The following concerns were the contractors for the different parts of the new plant: The Southwark Foundry and Machine Company, of Philadelphia, furnished the engine; the rolls and train were made by A. Garrison & Co., of Pittsburg. Mackintosh, Hemphill & Co., also of Pittsburg, furnished the feeding-tables; and Morgan, Williams & Co., of Alliance, O., the cooling-bed, cranes, and shears.

The capacity of the Siemens and Pernot furnaces is 500 tons of steel ingots per week without forcing. They are charged into two very large Siemens gas heating furnaces. After heating, they are drawn out by hydraulic machinery and deposited on the feeding-tables before referred to, and the process follows as already described. The weight of these ingots will generally be about a ton, but some have been made of two tons, and sometimes even up to 6000 pounds. The thickness of the ingot is from 9 to 12 inches, according to its weight, and its width is 20 inches. When the plate is finished, its thickness has been reduced to about one quarter of an inch. The width is any thing desired up to 110 inches, and the length as desired up to 30 feet.

GENERAL MINING

ARIZONA.

BIG BUG DISTRICT.

Gus F. Stoddard, of Stoddard, has sold to Marcius de Leon an interest in the Hold Fast, Bonanza, Fair, Wide Awake, and several other valuable mining claims in the Big Bug and Agua Fria districts, the consideration being $8000. These claims, so far as developed, are remarkable for their richness, and possess every indication of true fissure-veins, and will undoubtedly prove rich bullion-producing properties, as they are situated in a section of country noted for its mineral wealth.

COCHISE COUNTY.

CAVE.—From Bisbee, it is reported that in this mine, on the eastern slope of Copper Queen Hill, a large cave containing considerable quantities of copper ore has been discovered.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—The Clifton *Clarion* says: In the report of Messrs. Williamson and Rankine, the Scottish engineers who visited Clifton last month, we find the following in regard to three groups of mines belonging to this company:

QUEEN MINES.

In our first report, we touched lightly upon the ore found in these mines, as the works had not progressed to any advanced stage. Since then, a large amount of work has been executed, and the Queen mines have now developed into a valuable property. The vein to which we referred as being irregular has proved to be a true fissure-vein, which has been drifted into by upper and lower levels, disclosing a large quantity of high-grade ore. The width of the vein runs from two to three feet, and an output of over thirty tons per day may now be regularly had for many months at small cost, even supposing nothing more should be disclosed. Of course, mines must be continued in the strike of the ore and the greater depths. The ore, to all appearances, continues to improve as the mine deepens, the strike of the vein being indeed traceable on the surface to depths below that to which it has already been opened out. The mines have now been connected with the private railroad by a self-acting incline, 1500 feet in length, of excellent construction, as all the inclines are, so that the ores may be readily sent to the works.

CORONADO MINES.

A large amount of work has been executed at these mines. The day tunnel has been drifted nearly through the crest of the hill, having advanced a total length of about 1400 feet, measured from both ends, which will reach connection within from forty to fifty yards. A greater length of it is in barren ground than we anticipated; but that is partly accounted for by the fact that latterly the object has been to push it through in the ground where the material was softest. Some exploring side mines and shafts have been also driven, but these have not been generally so successful in finding ore as we should have liked. On the other hand, additional shafts and short mines farther down the hill, on the Boulder and Horse Shoe claims, have disclosed rich and valuable bodies of ore, so that altogether we see no reason to depart from the opinion we formerly expressed regarding the value of this group. A considerable quantity of ore has been accumulated at various dumps, and there will be no difficulty in sending away and maintaining a daily output of thirty or forty tons.

METCALF MINES.

The work done at these mines has been of considerable extent. A self-acting incline, 1200 feet in length, has been completed to these mines, and a proportion of the ore now used is regularly sent to the smelters. There is a quantity of ore, estimated at 800 tons, on the dump, and we see no difficulty in obtaining a regular supply of over 40 tons per day, at a moderate cost per ton, from these

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mines; but we have not the requisite data for offering an opinion as to the permanence of the output.

The railroad for connecting the works at Clifton with the public railroad at Lordsburg is making rapid strides toward completion. At the time of our inspection, forty-two miles, next Lordsburg, were completed, which we traveled over by train. Some delay had occurred in the delivery of rails; but assuming these to be sent regularly forward, as we understand will be the case, the works otherwise are so far advanced that the line may be completed to within about six miles of Clifton in a few weeks. The facilities that will be given by the railroad will tend very much to the economical and regular working of the whole properties of the company.

SILVER KING.—The Pinal *Drill* says: The men are working on the 700-foot level, extending the sill-floor in the breast north and east, and also stoping on the second, third, fourth, fifth, and sixth floors of the same level, extending the sill-floor of the 500-foot level still, preparatory to stoping. All work has been stopped on the 800-foot level until the air improves with our summer rains, and which one good shower will accomplish. We have had no rain at the King, but plenty at Pinal. The blower is set, only waiting for pipes, so as to be independent of seasons, and permit the workers to have good air, whatever the weather. About 100 men are employed.

YANKEE BOY.—A big strike is reported in the Yankee Boy, situated a little north of the Silver King. The Yankee Boy has lain still for some time on account of too much water in the shaft, but now, since relieved of that inconvenience, the gravel has been passed, and large deposits of rich ore in the main lead have been found.

SILVER DISTRICT.

CLIP.—Only ten months ago, this mine was considered a prospect, nothing more; but Hiram Shipman and A. G. Hubbard saw a fortune in the claim, and secured a bond on it, and G. W. Bowers became interested with them in the property. Immediately after securing the option of the property, a thorough development of the ledge was made, and the mine was purchased. A road was built to meet the county road, and the grading for the mill at the river begun. Every thing on the property was done in an economical, systematic manner. The ledge was cut at various places, another shaft sunk, and careful samples taken of all the ore in sight. The Clip mine is about seven miles from the Colorado, in Silver District, and distant from Silent five miles north. The ledge is fully 125 feet wide in places on the surface, and can be distinctly traced beyond its side-lines on to the Alberta mine. The croppings and ledge-matter cut by the tunnel are 150 feet high and give good No. 1 ore, ranging from 18 to 27 feet between walls, all pay. This rich body of ore is known to extend fully 300 feet in length, and how much more can only be determined by further explorations. In addition to this great mass of ore uncovered, there is a quantity of $20 rock, enough to run a mill for years. Rock going $20 per ton, in this mine, can be worked to a profit, as the ore is easily mined, scarcely any powder being used. Four men can take down fifty tons of mineral per day. The $20 rock, however, is only a reserve, as there is sufficient ore of higher grade to keep the mill busy for two years to come. A cable road conveys the car loaded with rock to the ore-bin from the mine.

TOMBSTONE DISTRICT.

TOMBSTONE.—Under date of the 22d ult., Prof. John A. Church has sent the following report to this company:

We made a good strike in the West Side fourth level yesterday, and to-day it showed some very rich galena, value not known, but probably from 60 to 70 per cent lead, and I presume above 500 ounces of silver per ton. This kind of ore was found only toward evening, and I shall not see it until to-morrow. Aside from its value, the find is important, because it occupies a block of ground which was barren on the third level.

As you know, we have just south of the No. 3 shaft, on the third level, a ∧ shaped stope, the ground dipping both ways from an apex, and carrying ore on both stopes. On the third level, there is no ore between the two stopes of the ∧, but the new strike is between them. It dips southward, parallel with No. 2 winze from the third level, which has gone down to the fourth on ore, and is about 35 feet distant there from the new strike. I suppose this new body of ore is developed from 4 to 6 feet thick.

Northward, the fourth level has passed one ore-streak about two feet thick, and this morning appeared to be approaching another. In this direction, the inclined portion of No. 1 winze has been carried about half-way down to the fourth level; and if it continues as it has every appearance of doing, should reach the fourth about 120 feet north of the shaft. From present appearances, the large ore-bodies which stretch for 80 feet along the third level near shaft No. 3 will cover 200 feet on the fourth level. These stopes on the third are yielding largely and continually and of high-grade ore. They are already the thickest we have had in the West Side, and are getting larger every day. We have not yet carried them to the second level, though the ore is known to rise to that point. I have frequently spoken of the fact that on the third level the ore lies in sheets crossing the line of the vein and ending on the west in the main vein and on the east in a branch from it. One of these sheets measures 34 feet in length, from 2 to 4 feet in thickness, and, so far, has been carried 75 feet high. Within the ∧ shaped mass we have had, so far, three of these sheets dipping northward, and two dipping southward; and if they all have the same length, we shall get twice the usual quantity of ore out of a given length of vein. In many ways, this portion of the mine is looking even much better than I expected to see it. Hitherto, our attention has been given principally to the branch vein, which was much larger than its parent; but lately we have been stoping in the latter, and it seems to be as large as the average in this mine, and yields very high-grade ore. It looked small simply by comparison. Though it is somewhat early to venture an opinion, I suppose the fourth level will yield twice as much ore as the third, and the grade can not fail to be an improvement.

At the south end, No. 1 shaft will be connected down to the third level within two days. I shall then timber it and drift southward with strong hopes of adding from 200 to 300 feet to our ore-ground. Northward of the No. 3 shaft and the large stopes near it, we are not doing so well. The drift is 120 feet from the shaft, but the vein is small and the rock black and blocky. The presence of ore in the survey shaft, 400 feet north of No. 3, is our only encouragement there; but these conditions are likely to improve on the fourth level.

No. 3 shaft is going down, and is thirty feet below the fourth level. We are likely to reach the fifth level some time before the fourth is fairly opened, and our work will then be a long way ahead of our needs.

No. 7 on the Tough Nut looks as well as ever, but is not worked hard.

At the mill, our bullion shipments are $1000 ahead of last month, and the little interregnum of low-grade ore of which I spoke in my last letter is passed. Yesterday's amalgam was 150 pounds more than we have had before.

The furnace is running well; but we have got to a part of our old pile of concentrates that was made from Gird tailings at a time when the ore carried little lead, and our shipments have fallen off in weight, while they have increased in value per ton.

The new concentrating mill has part of its machinery in place. Mr. Handley is working vigorously, and when every thing is finished, our work will be done on the best methods and our whole plant be the most perfect in America.

We took 500 tons of manganese from the Stonewall last month; and as that mine is now closed, I shall increase the force at the Lucky Cuss somewhat. That property is still looking well. We are working in two places and know of four others where manganese can be had.

The new prospect found on the Tribute proves to be small—only four inches thick; but the ore seems to be high in grade. It is worked by the discoverers on tribute at present.

The rainy season proves to be violent only in wind. The prospect is, that our dam will hold.

CALIFORNIA.

THE CALICO DISTRICT.

BLACKFOOT.—Work is progressing on this claim with favorable results. An incline-shaft has been sunk twenty-four feet, in about the center of an open cut some fifty feet in length. It is estimated that the body of ore that is opening is at least 100 feet wide, and it extends to the bottom of the shaft. How extensive the deposit of ore is, can not be definitely determined, but, judging from the work already accomplished, a great many thousand dollars will be extracted before it is exhausted. Ore has been stoped out twenty feet on both sides of the shaft. About ten tons have been shipped to San Francisco, and there are about fifteen tons of ore on the dumps, including 113 sacks. Another milling will be made shortly.

SNOW BIRD.—A few days ago, work on the Snow Bird was suspended, but operations will be resumed within a month. This mine, although it was not so rich as was first expected, has been yielding very good returns in bullion to its owners. A number of rich pockets of ore on the surface have been exhausted apparently, but new places have been opened that have yielded well. Recently, in a cut along a vein which is now fifteen feet in length, seven tons of ore were taken from a place broken up by one blast of powder. This ore was taken to the Oriental mill, twenty-one sacks of which assayed 400 ounces, and the rest from 75 to 219 ounces. The last shipment of ore to the Alhambra mill averaged very high—the returns from the first grade of the same, $520 to the ton and the second grade, $239. The cut mentioned above is running in a body of ore about fifty feet in length, and twelve or fifteen feet in width. The men are down over six feet, and there is ore on the bottom. This body of ore will no doubt yield many thousand dollars before it is exhausted.

INYO COUNTY.

MONTEZUMA.—About ten days ago, a new body of ore, measuring many tons, was opened on the Montezuma mine. It is of fine grade, and gives promise of being as extensive as the body heretofore opened and developed. The new find is situated about 300 feet below the present dump, and dips into the hill as if it ran into and formed a part of the deposit from which the old body of ore is an output. It is exceedingly suggestive in that it indicates the presence of a very extensive deposit throughout the entire hill. Explorations at this point will be vigorously prosecuted, and it is confidently expected that the results will largely increase the extent and value of the property. It is the opinion of several leading experts who have recently examined this property that the Montezuma is a large and permanent mine, and that the wonderful product of Cerro Gordo will be here rivaled. On Monday last, the Furnace site was located and surveyed; a side-track laid out, and at the present time, the grading and track-laying are carried forward to connect the site with the main railroad track. The material and lumber for the furnace are *en route*, and will all be on the ground by the first of next week, when work will be begun and prosecuted in earnest. The mine and furnace are owned by the Owens River Mining and Smelting Company. The station and grounds have been named Elma, in honor of the daughter of Mr. W. P. Miller, superintendent of the company.

NEVADA COUNTY.

The county board of equalization at Nevada City has made reductions in the assessments of hydraulic mining properties aggregating nearly $200,000. These reductions were confined to the North Bloomfield, Eureka Lake, and Milton companies. The assessment on the Manzanita Company was increased $16,000. The quartz mines were allowed to stand as assessed.

The suit of Hill & Hill *vs.* the Eureka Lake & Yuba Canal Consolidated, which was an ejectment to recover certain property valued in the neighborhood of $50,000, has been compromised and dismissed from the Superior Court, where it has so long been on trial. Defendant pays to plaintiffs the sum of $5500.

CANADA.

LAKE SUPERIOR.

SILVER ISLET.—A rich strike is reported from Silver Islet, the miners having struck a rich pocket of silver in the 1160-foot level. These pockets of silver have been phenomenal in this mine, and, whenever found, have always been very productive in silver. The news had the effect to send up the price of stock in the Boston market, where it is principally held, from four to eight dollars per share.

COLORADO.

Governor Grant has appointed John T. McNeil, of Clear Creek County, State Coal Mine Inspector, in accordance with the recommendations of the Board of Examiners, which has been sitting at the State House. The applicants were Mr. McNeil, Thomas J. Williams, and Mr. Dwight, all of Coal Creek; John Nichols, of Golden; Henry Brigs, of Denver; and Daniel Rees, of Erie. The examinations were very rigid, and all contestants are satisfied with the manner in which they were conducted.

CLEAR CREEK COUNTY.

The *Register-Call* prints the following statistics of production for the first six months of this year:

Smelting ore sold	$488,175.00
Gold bullion	463,9[illegible]0.80
Tailings sold	219,240.00
Gold from United Gregory	35,000.00
Ore sent directly to smelters and sampling-works in Denver	50,000.00
Total	$1,256,315.80

The total production of Gilpin County for 1882 was $2,006,516, and a glance at the figures of the first half of 1883 shows an increase of $250,000. The outlook for the ensuing six months of the present year is such as to warrant the prediction that the amount of smelting ore and mill-dirt that will be marketed and treated will equal if not exceed that portion of the year reviewed.

The Union Reduction Company has its new mill and concentrator about completed, and will start the new machinery within a week or ten days. Ore is received from all parts of the district, and by the time the mill starts, there will be a sufficient amount of ore on hand to keep it going for some time. All the ore received thus far is high grade.

CYCLOPS.—The main shaft has been sunk 92 feet, and timbered in a substantial manner; plats have been cut and levels inaugurated at the respective depths of 375 and 440 feet. The present depth of the main shaft is 450 feet. In addition to these improvements, 200 feet of winzes have been sunk, 800 feet of levels driven, and 75 fathoms of ground stoped out, which produced 275 tons of ore which has been sold to the smelters, containing 24,680 ounces of silver, having a currency valuation of over $26,000. In addition to that sold, a large amount of ore, suitable for concentrating, has accumulated on the dumps. The management has had but one object in view, that of developing the property thoroughly and sytematically. The above statement is the best attestation of that fact. The main shaft will continue down to the depth of 800 feet, stations

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and levels adopted at convenient intervals below the 440-foot levels. The mine has more than paid for all dead-work. Over the main shaft is a conveniently-arranged shaft and ore-house, and a powerful plant of machinery.

GUNNISON COUNTY.

The Rose & Reed concentrator has shut down until stamps can be put in. It was discovered that the rolls would not effectually crush the ore, and it was deemed advisable to waste no further time with them, but to set about immediately putting in stamps. Operations will probably begin in two or three weeks.

LAKE COUNTY.

The Harrison Reduction-Works, at Leadville, will close down temporarily on account of scarcity of ore.

The Esty & Sampson concentrating-mill is running on material from Catalpa waste-dump, and also slums and tailings from a lot of refuse material known as the "Seventh street dump." The stuff had all been run through an imperfect concentrating device once before; but Mr. Esty states that the mill is doing very well with it.

ADLAIDE.—The lessees of Adlaide and Terrible mines, according to all reports, have struck the largest bonanza yet opened by lessees in this district. The mine now shows a breast of ore nearly one hundred feet long and of exceptional strength. Conservative estimates place the resources at 5000 tons, which will net at least $100,000. So far this month, the mine has shipped at least twenty thousand dollars' worth of ore. The shipments average thirty tons a day of ore having an average value of forty-five dollars per ton. Deducting royalty, smelting charges and cost of mining, the ore leaves the lessees about twenty dollars per ton, and it is said that the average daily income is at least five hundred dollars. The ore-body was opened near the Adlaide No. 2 shaft. The lessees are Messrs. E. R. Holden, A. Chanute, Charles Taylor, and L. P. Feustman.

ARGENT.—The mining reporter of the *Herald* has visited the Vining mine, on Rock Hill, the property of the Argent Mining Company, of Philadelphia. The mine is working under the management of Mr. J. L. Loomis, and for eighteen months past has proved a limited but regular producer. The shaft on the property has a depth of about 340 feet, passing through boulder wash and porphyry for 300 feet, and penetrating the underlying limestone about 40 feet. The underground workings show quite extended developments radiating on the line of contact, in all directions from the shaft. The limestone shows numerous and heavy rolls, and frequently irregular elevations. The favorable appearance of the cap-rock, as well as the underlying limestone, would indicate a generous contact and fine ore. An inspection of the mine, however, soon corrects this erroneous opinion, and shows the visitor that Mr. Loomis has had much to contend with in keeping the mine in a producing condition. The ore-bodies where found are generally weak and irregular. The mineral seems to be located on the highest points of the lime, and occurs in thin sheets, ranging from two to twelve inches in thickness. Occasionally, the mineral fills cavities and subordinate sags in the bedding-floor, but these are generally quite limited in their extent. The prospects for opening larger resources are favorable, and a great deal of judicious exploration-work is going on. The resources of the mine, while not large, are nevertheless sufficient to guarantee a regular production for a considerable time in the future, and permit the mine to make continuous shipment while prospect work is carried on. The ore is a gray sand carbonate, running well in both silver and lead.

AUSTRALIA.—Upon Little Ellen Hill is situate the Australia, a property that has come into recent prominence, and which has made phenomenal strides during the present season. The operators have a six-foot body of carbonate ore, from which they are shipping between fifteen and twenty tons per day that nets them about $30 per ton. There is a shaft eighty feet deep upon it, from which an incline runs west over 30 feet.

BRADSHAW.—The principal workings of this mine, on Printer Boy Hill, has been a tunnel, which has been worked to a distance of 800 feet. A two-foot vein of gold ore has been struck, an assay of which returns the handsome amount of six ounces in gold. The ore is sacked and shipments will soon begin.

CATALPA.—The Catalpa and Crescent mines show very little ore at present, and appearances would indicate that the mines are about worked out. The ground has been thoroughly prospected, and after this month no more money will be expended in exploration-work. The lessees have also nearly exhausted their available resources. The Catalpa mine shows large masses of fine iron ore, but the mineral can not be extracted at a profit at the present price of iron ore.

CHRYSOLITE.—A contract has been closed within the past few days which will give Leadville a new twenty-stamp mill as soon as it can be erected. For some time past, Messrs. N. H. Cone and Eben Smith have been negotiating with the Chrysolite Company for the large dumps of low-grade iron ore on its premises. The officers of the company, after considering the matter thoroughly, finally advised giving the contract, and last week the board of directors of the Chrysolite Company authorized its officers to close negotiations with Messrs. Cone and Smith, on a contract whose term of existence is nominally placed at forty-five years. The ores embraced in their contract are the large dumps of iron and mineralized vein-matter scattered over the premises of the Chrysolite consolidated mines, and estimated to contain about 40,000 tons of milling ore. The mineral is the same as that on which Mr. Clark made numerous experiments in concentrating, etc. After thoroughly testing the ore, it was found impossible to do any thing with it, except to run it through a crushing and amalgamating mill. The dumps were next measured and sampled, and their contents ascertained, which were found to be only thirty pounds of lead to the ton and not silver enough to pay for smelting. A profit of from two to three dollars per ton was, however, estimated as possible, by treating the ore under stamps. These results were reported to the company, and the directory seeming rather averse to making any heavy expenditure for a stamp-mill, and assuming the consequent responsibility, decided to let the present contractors assume the risks and put up a mill. The contract calls for the ores now on the dump and such ore as may in the future be taken out, that can be milled at a profit, but is of too low a value to make a profitable smelting ore, and will be paid for at a stipulated price per ton. The milling material now out and that which it is expected will be extracted in pursuing work in the mine, is calculated to keep a twenty-stamp mill continuously employed for the next three years, and will give the Chrysolite Company from $75,000 to $100,000. The company also furnishes the mill with water privileges, a mill-site, and a right of way for tramways from the different dumps to the mill. Regarding the mill, Mr. Cone said it would be at least twenty stamps, and fully equipped with the latest improved machinery now in use in silver mills. He has been in correspondence with manufacturers of the Boss continuous amalgamating process, and thought very favorably of it, but wished to satisfy himself on a few points before making a final decision.

GOLD LEAF.—The lessees of the Gold Leaf, belonging to the Humboldt Mining Company, are at present sacking and shipping considerable high-grade ore. The recent strikes in the Gold Leaf carry with them a great deal of importance, as they are the first strikes of any consequence on the south slope of Carbonate Hill.

PILOT.—In this property, which is located on the California Gulch slope of Printer Boy Hill, a new strike of exceptional magnitude has been made by the lessees, including Messrs. F. X. O'Brien, Phil Golding, and Sport Goris. It was at a distance of 400 feet in the tunnel on this property and 175 feet from the surface that a winze was started. The object of this policy was to connect with an uprise that had been run from the Bradshaw, which was abandoned on account of water, when the lessees concluded to open the ground from above. They had sunk but fifteen feet, when they came upon a crevice of matter that is heavily impregnated with horn-silver. The vein is small, but there is every reason to believe that this is simply a streamer from a large body of mineral

SAN JUAN COUNTY.

The San Juan *Herald* contains a long description of a number of claims in Dry Gulch, about a mile and a half above Delmino. Carbonates of copper and galena carrying silver have been found.

The Stahl concentrator is pushed to completion as rapid as possible, and Professor Stahl intends having the mill in operation by the fifteenth of August. There are hundreds of tons of ore on the dump of the Sampson and other mines awaiting the starting of the mill.

Seven concentration-works will be running in the Upper Animas country by the 15th of August.

BEN FRANKLIN.—This mine is located about one mile up the right-hand Fork of Eureka Gulch, almost on a level piece of ground, and the open cut where the rich mineral was found is where the trail to the Sunnyside mine crosses it. Two years ago, Mr. Howard sold it to Messrs. W. E. Webb and W. A. Whiton for $1000. These parties did nothing with it, except patent it, until this spring, when they set a few men at work, making an open cut and shaft within a few feet of the creek. In sinking this shaft 14 feet, they took out nothing but solid lead ore, and at the depth of 13 feet they struck between three and four feet of rich antimonial silver and gray copper, from which assays ran from 500 to 2000 ounces in silver. Water beginning to come in rapidly, work had to be abandoned in the shaft. At this point, the mountain rises about one hundred feet at an angle of thirty-five degrees, and the croppings extend over this rise and show the lead ore on the surface. Men were set to work blasting and quarrying out the mineral on this side-hill. The mineral is known to be 30 feet wide, and how much wider is not known. Forty feet below the cut, the width of the mineral exposed is 75 feet. A cross-cut tunnel, now in 65 feet, is running to cut the vein at a depth of about 100 feet after running some thirty feet more.

HIGHLAND MARY.—The main tunnel has reached a depth of 2680 feet, being 2375 feet below the surface of Innes Mountain; and when the tunnel has been completed to the Bald Eagle fissure, it will be 3450 feet below the surface of the vein. The tunnel is now going ahead with unusual prosperity, and an average of 75 feet each week made with the Ingersoll drills. We were informed that about 2200 feet would have yet to be run before any remuneration could be expected from the mine, when they expect to cut the Bald Eagle lode.

NATIONAL BELLE.—The parties in negotiation for this property are Mackey, of Nevada, the silver king, and Senator Osbiston, who have a price of $800,000 now at their disposal. They will purchase the property on these conditions: First, to investigate the mine, and, if the price is suitable, they will take it upon conditions that they have ninety days to explore the same, keeping all the ore to defray the expenses of exploration. If they find the property to be worth dollar for dollar of $800,000, they will pay that; if not, they will make an offer for just what is in sight.

NORTH STAR.—The *Herald* says that the rumor that the North Star mine, on Sultan Mountain, had been sold for $450,000 is contradicted, and by reference to the recorder's office, we find a bond and trust deed has been given to Mr. Lucius B. Kendall, with a cash payment of $10,000 giving L. B. Kendall & Co. entire control of the mine. This will be somewhat of a surprise to those interested, as the North Star is considered worth at least one quarter of a million. We are informed that Mr. Kendall has purchased the mine for the purpose of proper development, and expects to expend $25,000 before any remuneration will be expected. Two big contracts will be let upon the North Star in the third and fourth levels, and the property otherwise developed in systematic shape for production. Mr. J. L. Lattin will be retained as manager and resident superintendent, and all work at the mine will be contract work.

SUMMIT COUNTY.

GOVERNOR.—The Governor Mining Company, on the Upper Blue, is putting up a building 40 by 75 feet, to put machinery in for concentration, which, when completed, will treat forty tons of crude ore per day. The machinery is ordered and will soon be on the ground. The mill ordered for the Governor is similar to that used by the Payrock Mining Company at Georgetown, which has proved a complete success in every particular on ore similar to that of the Governor group.

DAKOTA.

FATHER DE SMET.—The report of the superintendent, from July 14th to July 22d, shows ore extracted from the first, second, and third levels, 1900 tons. Ore milled 1900 tons. Golden Gate east cross-cut, third level, advanced 12 feet; commenced 5th July. The clean-up of the mine for the first half of July yielded $15,065.31.

IDAHO.

BANNER.—The Banner mill started up the other day with 15 stamps, and already several assays have been made. The assaying is better than ever before, running from 109 ounces to 113 ounces.

WOOD RIVER REGION.

MOUNTAIN BOY.—The Little Wood River Mining and Smelting Company has purchased the Mountain Boy mine for $10,000. The mine is situated at Muldoon, and is regarded as one which, if developed, will give large profits over all expenses.

NORTH STAR.—The ore-bodies are opening up so well that the superintendent has ordered concentrating-works, which will be delivered in two or three weeks. As he will have every thing else ready when the engine and jig arrive, it will not require over a week thereafter to start up the works.

STAR.—The Star group of mines, which is located in Star Gulch, about a mile and a half southwest of Hailey, has changed hands, the purchase price having been paid over last night. The figures are unknown, but variously stated at from $65,000 to $100,000. The sellers are David Falk and A. Wolters. Mr. Falk retains a fourth interest in the property. The purchasers are Moses Hirschman, Louis Martin, Emanuel Kahn (of Kahn Brothers), and J. W. Willard. All are Salt Lake parties. The Star was one of the earliest locations made in the Lower Wood River valley, and one of our first yielding mines. It has never been worked very steadily—probably not over eighteen months, all told—yet it has yielded to date some $85,000 worth of ore which averages probably as high as $175 per ton. The ore carries some sulphur and zinc, but that only means an additional cost of $7 to $10 per ton for smelting—an extra expense for which the high grade of the ore more than compensates.

MICHIGAN.

COPPER.

WILMOT.—The Wilmot Mining Company is the name of a new organization, on lands owned by Dr. Garlick and others, of Ohio, and O. N. Andrews, of this place, being the S. ½ of S. W. ¼ and S. W. ¼ of S. E. ¼ of Sec. 15, and N. ½ of N. ½ of Sec. 22, and N. W. ¼ of N. W. ¼ of Sec. 23, all in town 50, range 42. This is the tract where explorations were carried on last season, with a view of locating the Nonesuch vein in the slate belt. The land lies about five miles to the south and east of the Nonesuch mine, and two and a half miles southeast of the White Pine mine. Early this spring, Dr. Garlick sent up a steam oil-well drill under the superintendence of Mr. Stratton, which has been set up and found to work admirably. One hole has been put down 44 feet on to the conglomerate

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belt, which lies under the slate belt in which lies the Nonesuch vein. The drill has been moved about 100 feet northwest, and will continue its work until the outcropping of the vein has been found, when a shaft will at once be sunk on it.

IRON.

The entire force, numbering 400 men, at the Republic mine, at Humboldt, went on strike on the 1st, for an advance of wages of 12½ cents. The president of the company told the men to confer with the executive committee at Cleveland. Much excitement but no disorder prevails.

MONTANA.

DEER LODGE COUNTY.

ALICE.—The *Miner* says that the Alice has for some time past been looked upon as the mine which would eventually solve the problem as to the depth of silver-bearing ledges in this camp, and especially on what is known as the Rainbow lode. The systematic methods of mining and extensive operations of this company have already developed the three veins of the Rainbow lode sufficiently to fully demonstrate their value and extent to a lower depth than has been reached in any other mine. The ledge, which has been stripped for a horizontal distance of nearly 400 feet on the 100 level, has also been developed on the 200 and tapped on the lower levels. The winze from the 700 has been sunk in ore the entire distance to the 800, at which point a cross-cut has been run to the north wall of the ledge and one is driving south. Thirty feet of vein-matter are now exposed in the cross-cut, and it is expected that the south wall will be reached in a distance of 30 feet farther. The ledge maintains the same general characteristics as in the upper levels, and further cross-cutting will undoubtedly develop the same sixty feet of vein-matter carrying the three veins of pay-ore so well known as the north, south, and center veins of the Rainbow lode. A west drift has been run 30 feet on the ledge from the bottom of the winze, and the drift has now two feet of good pay in the face, while the ledge maintains the general character developed above.

HOPE.—Prospecting with the diamond drill is successfully prosecuted in the Hope mine at Phillipsburg. In five weeks, 1100 feet have been drilled at an average cost of sixty cents per foot.

The Granite Mountain Company has ordered a diamond drill with which to prospect its valuable property. If the experiment proves satisfactory, several other drills will be used in the camp.

NEVADA.

Reports reach the Eureka *Sentinel*, through reliable sources from Osceola, that the Monroe & Linton mine, located at that place, has been sold to Charles Tozier, of San Francisco. The purchase price is not stated, but it is thought to be about $25,000. Machinery for a mill is on the road by way of Salt Lake. The mill will be located within a few hundred yards of the mine. If the mill proves a success, there is a bright future before Osceola.

A committee from the Carson mills visited all of the ranches along the river, where to find the most shameful waste of water. In some instances, the ranchers had turned the water on the sage-brush, and were letting it run to waste, simply to keep other ranchers from using it. In places, they found bodies of water ankle deep, covering hundreds of acres, and doing no good to any one. Some years ago, the United States Court gave the mills a perpetual injunction against the ranchers for the use of the water. Carson City is threatened with a water famine, and one man who illegally diverted the water has been sent to jail for 250 days and fined five hundred dollars. The law will be invoked against the ranchers to compel them to give the mills enough water to run their stamps.

COMSTOCK LODE.

The joint Union Consolidated and Sierra Nevada west cross-cut, on the 3000 level, says Tuesday's *Enterprise*, is still driving ahead. This cross-cut found the ore-vein cut on the 2900 level to be 30 feet in width on the 3000, whereas on the level above it had a width of but 11 feet. After passing through this thirty-foot vein, the cross-cut came to a streak of porphyry nine feet wide, and next found a vein of milling ore seven feet in width. West of this, porphyry again comes in, and the cross-cut had last evening been advanced into this about five feet. They will push ahead, as it is not unlikely that, after going a few feet farther in porphyry, they will again come to ore. It is some 500 feet to the west wall of the Comstock lode, and the ground into which they are now passing has a very kindly appearance. The seven-foot streak is something new. It did not show on the 2900 level. The 30-foot vein is undoubtedly the continuation of the 11-foot vein found on the level above. Even though nothing be found in going farther west, they may now start a drift south, the full width of which will be in milling ore. This new streak, and the formation into which they are now passing, look well for Sierra Nevada. There are indications that the ore will make north as well as south. There is also much of interest about the winze (down from the 2900 to the 3000 level) and in the east end of the cross-cut therefrom. This winze will, in a day or two, be continued toward the 3100 level, and it will start off in quartz. Before it is 50 feet in depth, it will cut into the fine streak of quartz (in all, some ten feet wide) which was claimed by many to be the vein cut above on the 2900 level. This is a different character of quartz from that of the eleven-foot vein above. It shows very little gold. Both this and the quartz streaks cut in the winze are essentially silver-bearing material, while the thirty-foot vein and the seven-foot vein run unusually high in gold. It is not unlikely that the porphyry separating all these streaks and veins will wedge out before the 3100 level is reached, thus forming a large ore-vein. However, supposing them to hold as at present, the cross-cut from the winze will have but a short distance to go on the 3100 level before it will reach the thirty-foot vein.

EUREKA DISTRICT.

ALBION.—Albion has been shipping ore daily for the last week to the Eureka Consolidated furnaces at the rate of 15 tons per day. Prospecting and ore extraction are carried on with a force of 20 tributers and men on day's pay. The mine shows considerable improvement generally. The tributers have good paying pitches, and the company's men are at work on good ore.

CHRISTIE.—The tailings at Mineral Hill owned by this company amount to 30,000 tons, an average of which taken for sample by R. D. Clarke, superintendent of the Geddes & Bertrand, who has lately inspected the property, assays from $15 to $20 to the ton. The question is, how to reduce these tailings at a profit. They can be made to pay by the ordinary mill process now in use on the premises; but a cheaper way is looked for, by which the maximum can be saved and a big clean-up made. Mr. Clarke makes a safe estimate that a leaching-plant can be put up on the grounds at a cost of $25,000 that will reduce 40 tons per day and save $6 above all expenses per ton. The profit on the 30,000 tons at this rate, less $25,000 for leaching-works, would leave a net balance of $155,000. In addition to this, there are 15,000 or 20,000 tons of $25 and $30 ore on the dump near by, that could be reduced at a profit of $5 per ton by the same process. This ore then, taking the lowest figures, should net $75,000, which, added to the profit from reducing the tailings, $155,000, would swell the total profit to $230,000.

EUREKA CONSOLIDATED.—The drift from the new shaft is in 140 feet without any change of formation, continuing in black lime. The drift is still dry, no water having been encountered. At 80 feet, the drift entered a body of clay which gave some trouble, requiring very heavy timbers. The ground in the face is firmer, and does not swell. The progress in drifting is about 40 feet per week. The Eureka Consolidated mine has not changed in any noteworthy manner since the last report. Another, the second, furnace was started up on Friday. The two furnaces together reduce about 100 tons per day.

NEW MEXICO.

The smelter of the Colorado & New Mexico Mining and Smelting Company, located at Magdalen, Socorro County, New Mexico, and owned by Messrs. Kerr, White, Fairley, Clark, and Sinclair, has been blown in. It is treating the ores taken from the mines of this company, and from eight to ten tons of bullion are shipped daily.

The Rankin Smelter, at Copper City, yesterday shipped 7000 pounds of copper bullion to Bernalillo. It is the first shipment, and it shows conclusively what there is in the district.

PENNSYLVANIA.

A vein of iron ore has been found in Plum township, on the eastern border of Alleghany County, which is said to assay 60 per cent. Native ores ordinarily assay from 25 to 40 per cent. Some of those who have seen it say it is the best foundry ore found in this section. The vein is located three miles from Logan's Ferry, on the Alleghany Valley road, on the farm of Alexander McJunkin. The man who discovered it was formerly a puddler. Mr. McJunkin has been busily at work digging out the ore for some time past, and will soon send down to Pittsburg three car-loads, which will be used by some of the iron mills there. The vein has a regular thickness of eight feet, and is said to be solid.

UTAH.

CAVE.—The main working tunnel, starting in the western face of the mountain, a good distance up, yet not so far but that a good wagon-road has been made to it, has been driven in 700 feet. Here, a hundred yards beyond the old workings, a stained kind of a wall was struck, which was followed southward two hundred feet or so, when it began to change into ore; and while this new country has not been thoroughly explored as yet, there are estimated to be perhaps 12,000 tons of $30 (net) ore in sight. The general average of the ore in car-load lots is 50 lead, 26 silver, and half an ounce of gold, with perhaps 25 per cent iron, the lead being all carbonate and fluxing itself, making the iron in the ore available for fluxing dry ores. It is no longer delivered at Frisco; it is proposed to induce the railroad to extend a switch out near the mine from Milford, and send it, as also the ores of the Carbonate mine, to Sandy.

EMMA.—Work on the old Emma mine, Alta, is progressing finely. The shaft has reached a depth of 200 feet and is still going down. A cross-cut on the 135-foot level has penetrated 165 feet, and will soon tap an incline sunk by the present company some three years ago, at which time work was suspended on account of water. This cross-cut is in good ground, and has tapped the ledge 250 feet below the workings of the old Emma. Thirty men are employed on the property, and it is probable ore-shipping will begin within a few months.

MAMMOTH.—The Salt Lake *Tribune* says that the Mammoth property, Tintic, is in a fair way to be placed in working order soon. It will be remembered there has been trouble, which a few months ago caused the smelters and mines to shut down, since which they have remained idle. This trouble came mostly through the failure of the English parties who had taken hold of the property, and failed to make payments to employés and creditors. Mr. Goodhart came here from London a short time ago, as attorney for the English capitalists who had invested in the property, and made the McIntyre Brothers a proposition, which has been accepted, and which, on the payment of certain moneys next month, will place the property in the hands of the English purchasers. If they comply with their part of the contract, it is probable that within the next thirty or forty days the mine and smelters will be again put in operation.

ONTARIO.—The big tunnel for the Ontario mine will soon be completed and in full running order. This tunnel starts from a point below the mill, under which it runs, ninety feet below the batteries, and ends at shaft No. 3, where the big Cornish pump is located. The distance is 5742 feet, nearly all the way through hard rock. Work was begun in June, 1881, but the progress was slow the first year, as the work was all done by hand. Since introducing air-drills, one year ago, the progress has been very rapid; in fact, the best speed at driving such tunnels that we know of has been made. An intermediate shaft 300 feet deep was used to expedite the work, and at one time there were four headings in progress at the same time. Since last March, the work has been pushed more rapidly than ever, and during the time 2900 feet were pierced. On the night of July 22d, connection was made between shaft No. 3 and the intermediate shaft, and nothing now remains to begin using the tunnel in draining the mine except to place a flume 2800 feet in the bottom, to complete the water channel. This will require about three weeks' time, and then the lift of water from the mine will be shortened 500 feet from what it is now. At present, the water is pumped from the eighth level to the union tunnel, 100 feet below the surface, while the new tunnel taps the shaft on the 600-foot level. The cost of hoisting water will be reduced to less than one third that of the old system, and this will gradually increase as the mine is sunk below the 800-foot level. A short time ago, there was an increase of water in the mine, and it rose some distance, but did not get up to the 600-foot level, as reported, by a long ways. Extracting ore goes steadily on from all the levels, and the property is looking as well as, if not better than, ever before.

STORMONT.—The superintendent's report, dated July 14th, shows that the mine and mill are running on full-time, and the shipment of the full quantity of ore required to mill. The strike on winze 15 is producing well, and also strike on winze 23; and during the week, about 75 tons of good ore were hoisted from the old Buckeye works. The total ore for the week sent to mill was 287 tons. On the 12th of July, work was begun on sinking the main incline to the sixth level. The vein on the incline is similar in appearance and quality of ore to that in the fifth level south. Assays, July 15th, showed as follows: 10 inches, $8.11 per ton; 12 inches, $116.84 per ton; 12 inches, $116.21 per ton. Gross bullion to July 1st, $114,307.95.

YOSEMITE.—This mine, at Bingham, is turning out its regular quota of ore, and is operated by a force of twenty men. In this mine, there is an immense body of ore, part of which is low-grade, requiring concentration. For this purpose, the company, some time ago, erected a concentrator, operated by a small steam-engine, and it does its work to the satisfaction of the owners. First-class ore is sent to the sampler without concentrating, and this amounts to about one half the product in tons, or 100 tons per month of first-class ore and 100 tons concentrated. The process of concentrating is simple and not very expensive. Second-class ore as it comes from the mine is emptied from the cars by dumping on to a slanting screen. The finer portions pass through the screen and fall on one portion of the floor, while the lumps pass beyond. On this floor is the rock-breaker, and beneath it a feeding-apron. The ore in lumps is thrown into the crusher and the finer on the apron, and all is fed to the Cornish rolls below, so as to pass evenly through them, dropping into a spout which conducts into a revolving screen. In this spout the ore is caught and carried by a stream of water, which aids in washing away the lighter and useless portions, while the ore drops through screens and reaches the jiggers. There are three of these revolving screens set on an angle, so as to give a good fall from the crusher to the end of the last screen. Each screen has its jiggers to complete the work of concentration. The mill treats thirty or forty tons of crude ore per day, reducing three and five to one. The mine is operated by an incline, and has good hoisting-works, pumps, etc. George W. Crow is superintendent of the mine and mill. All the water used in concentrating ores is pumped from the mine, and the quantity is not great enough to keep the mill running more than about twelve days per month, which is ample at present to do the work for the quantity taken out. All the ore is hauled by teams to the sampling-works at Sandy.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Aug. 3.

The mining market this week has been very dull, and the transactions have been mostly confined to a few stocks. Of these, Consolidated Virginia, Robinson, Eastern Oregon, Sonora, and Alta-Montana take the lead. Prices have generally been steady, but there is no marked change either way to note. Below is given a full summary of the market The total number of sales aggregates 190,513 shares, as againnst 235,354 last week.

The Comstock shares have had a fair business at steady prices. California was active and strong, selling from 26@38c. Consolidated Virginia had a very active business and was also strong; it sold from 28@36c., assessment unpaid. Sierra Nevada was quiet and steady at $4@$4 15. Union Consolidated sold at $4.85. Mexican was dealt in to the extent of 300 shares at $3@$3.10. Hale & Norcross sold at $6. Sutro Tunnel was moderately dealt in at steady prices, selling from 19@20c.

The Leadville stocks were very quiet, and were steady. Amie sold from 15@14c., with a small business. Chrysolite was quiet and steady, selling from $1 15@$1.20. Dunkin sold at 22c. Iron Silver, with a business of 700 shares, sold at $3.05. Leadville sold at 51c.

The Bodie stocks were also very quiet at steady prices. Bodie sold at 70c., and Bulwer at 76c. Standard records a small business, and was strong, selling from $6.25@$6.13@$6.50.

The Tuscarora stocks were moderately dealt in, and were steady. Belle Isle sold at 43@40c., with a small business. Navajo was strong, selling from $3.10@$3.25. North Belle Isle sold at 35c. Independence was quiet and weak, declining from 50@43c. Elko Consolidated was moderately dealt in at irregular prices, selling from 19@14@15c.

In the miscellaneous list, Alice has been quiet and weak, selling from $2.50@$2.25. Bassick was a little weak at $10@$9.75. Eureka Consolidated has been strong under a small business, selling from $4.50@$5.50. Green Mountain was quiet and steady, selling from 75@77c. Horn-Silver records a moderate business, and was irregular, selling from $7.25@$8@$7.63. Hukill, with a small business, was quite weak, declining from 6@4c. Northern Belle sold from $7@$6.75, with small transactions. Robinson Consolidated was very actively dealt in at very irregular prices; it sold from 72@90c., then declined to 62c., closing to-day at 68c. Sierra Grande has had a small business at irregular prices, selling from 96c.@$1@95c. Stormont records a fair business, and has been steady, selling from 37@35c.

Alta-Montana, with a very active business, has been irregular, selling from 8@5.@6c. Central Arizona was quiet and steady at 15c. Decatur sold at 4c. throughout the week; the transactions were small. Eastern Oregon was very actively dealt in at strong prices; it sold from 81@85c. Sonora Consolidated was active and irregular, selling from 28@24@26c. South Hite had a small business at weak prices, selling from 1@6@2c.

MEETINGS.

United States Bullion Refining Company, No. 56 Broadway, New York City. Special annual meeting for the election of trustees, August 8th, at twelve o'clock noon.

DIVIDENDS.

The Horn-Silver Mining Company, of Utah, has declared a quarterly dividend (No. 10) of $300,000, payable August 15th.

The Standard Consolidated Mining Company, of California, has declared its monthly dividend of twenty-five cents per share, payable August 13th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows on the petroleum market:

The principal factor in the market this week was the appearance of the monthly statement of development-work in the oil regions, which was far more bearish than expected. It showed 32 more wells drilling than thirty days ago, and 87 more rigs up and building than a month ago. Thus there are practically 119 more wells under way than on the 30th of June. Coupled with this was another bearish fact, namely, the increase in surplus of oil held in the custody of the Pipe Line companies of 404,461 barrels. Furthermore, Porcupine well No. 8 came in during the week, producing 800 barrels the first twenty-four hours, and now yielding at the rate of about 500 barrels daily. Several other wells came in as pretty fair producers, and there appears to be no scarcity of the crude product. Added to all this was the reduction of the price of refined oil ⅛c. per gallon. All these bearish influences served rather to prevent an advance than to cause a decline. The highest price, $1.09¾ was succeeded by $1.05¼ for the lowest, and at this writing prices are back to $1.08⅛. Opinion as to the future course of prices is about equally divided, and no radical change is likely to occur for some days, although the market is active.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
July 28	$1.08¾	$1.09¾	$1.06⅝	$1.06⅞	2,885,000
30	1.07	1.09	1.05⅞	1.08	3,432,000
31	1.07¾	1.09½	1.06⅜	1.06⅝	3,933,000
Aug. 1	1.06⅜	1.07½	1.05¼	1.06⅞	2,443,000
2	1.06⅞	1.07½	1.06¼	1.07	3,244,000
3	1.07⅝	1.08⅛	1.07¼	1.08⅛	2,492,000
Total sales					18,429,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. July 27.	July 28.	July 30.	July 31.	Aug. 1.	Aug. 2.
Albion						
Alpha						
Alta	.65	.65	.65			
Argenta						
Bechtel						
Belcher	.85	.85	.90			
Belle Isle	.35					
Best & Belcher	3⅜	3⅜	3⅜			
Bodie	.65	.65	.65			
Bullion						
Bulwer						
California	.25	.25	.25			
Challar	3⅛	3	3⅛			
Con. Virginia	.35	.30	.30			
Crown Point	.80	.80	.85			
Elko Cons	.25					
Eureka Cons	4¾	4⅞	6			
Exchequer						
Gould & Curry	2⅛	2⅛	2¾			
Grand Prize						
Hale & Norcross	6	6	6⅜			
Independence	.50					
Martin White		.20	.25			
Mexican	2¾	2¾	2⅞			
Mono						
Mount Diablo		5¾	5			
Navajo	3¼	3¼	3¼			
Northern Belle	7⅛		7			
North Belle Isle						
Ophir	2⅛	2⅝	2⅝			
Overman						
Potosi	1⅛	1⅛	1⅛			
Savage	2⅛	1⅞	2			
Scorpion						
Sierra Nevada	3⅜	3⅜	3⅜			
Silver King						
Tip-Top						
Union Cons	4¾	4¾	4¾			
Utah	2¼	2¼	2⅝			
Wales Cons						
Yellow Jacket	2¾	2¾	2⅞			

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Aug. 2.

Since our last report, the market for copper stocks, although ruling extremely dull and inactive, has shown a somewhat firmer tone, and prices, as a rule, are a shade higher. There is no change in the market for ingot copper, which is selling about 15⅛@15¼c. for Lake, and other grades proportionally lower; but the feeling seems to be quite prevalent that the bottom has been reached, and some parties are quietly picking up all the stray lots of the dividend-paying stocks that are offered, in the expectation that higher prices will prevail before the year closes. There is no speculative element in the market, and in consequence all the non-producing mines are inactive, with only a sale now and then of a hundred or two shares, as a reminder that they are still in existence. Calumet & Hecla continues to advance, and sales at $245@$246 are recorded. The stock is not abundant in the market, and only small lots come out even at the advance; in fact, only two shares have been sold the past week at $246, although $247 has been bid for it, and it is doubtful if much could be bought even at $250. Franklin has shown some considerable activity and firmness at about $10, with a 50-share lot sold at $10¼, buyer 60. The holders of this stock are not disposed to part with it at this price, to any extent, and have not lost all hope of a dividend some time during the ensuing fall. Quincy is now selling, ex dividend ($3 per share), at $45½, which is about $½ higher than the last sale, dividend on. There is not much stock offering, and holders are well satisfied with the present outlook at the mine. A sale of five shares of Atlantic at $12 is the only transaction for the past two weeks. Osceola is steady at $21, but not much doing in it. The sale of the delinquent stock of the Pewabic and Huron mining companies on which the assessments have not been paid was held last week. Of the Pewabic, about 1000 shares were sold, the price ranging from $2½@$3¼ per share. Of Huron, less than 2000 shares were disposed of at an average price of about $1½ per share.

In the general market, Pewabic sold at $3¼, and Huron at $1½. Brunswick Antimony put in an appearance the past week with sales of small lots at $15@$16. The Douglass mine, of Maine, has levied an assessment of 25 cents per share, and the stock is offered in the market at 65 cents, assessment paid. This mine continues to look promising. The ore improves in the lower levels, and the production is about 1½ tons of ingot copper per day, and it is said that the company is fully paying its expenses. Should this mine prove a success, it will give a great impetus to mining interests in Maine.

In silver stocks, there is but little doing. Silver Islet, which had its "spurt" up to $7½, has declined to $5, and is now offered at that, $4 being best bid. Sullivan declined to 62½c., and is now offered at same price, 50c. bid. Catalpa advanced to 52½c., but declined to 47½c., which is now bid. Harshaw sells at 50c., and parties stand ready to take all offered at that price, although there is said to be about 70 cents in the treasury to divide among the stockholders. Only 250 shares of Bonanza have been sold the past two weeks, at $1⅞@$2.

At the Mining Exchange, there is but little of interest. Sales of Bowman Silver at 16@20c., closing at latter price bid. Massachusetts & New Mexico has faded from the public view, selling under 5c. per share, and, according to a rule of the Exchange, is no longer quoted. Empire is dull at 15c. bid, 20c. asked. Considerable business is developing in railroad shares, Toledo, Cincinnati & St. Louis being most prominent.

3 P.M.—The market closes dull and lifeless. For Calumet & Hecla $247 is bid. Quincy sold at $45½, and same bid. Franklin, $10 bid. Pewabic, $3. Osceola, $21.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Aug 3.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has collected the following statistics for 41 furnaces, relating to stocks and production in July:

Grade.	Stocks. July 1.	Stocks. Aug. 1.	Production in July.
No. 1	1,714 tons.	1,833 tons.	5,635 tons.
No. 2	4,505 "	4,968 "	2,582 "
Forge	5,868 "	5,807 "	8,612 "
Not specified	2,147 "	2,550 "	1,777 "
Total	14,234	15,158	18,606

These figures do not indicate that there has been any particular cause for improvement.

American Pig.—The market has been very quiet during the past week, and though there has been no change in prices and some grades are very firmly held, we find that it has lost rather than gained in strength. The supply of No. 2 is ample. We continue to quote $22@$23.50 for standard to choice No. 1, ordinary brands being obtainable at a concession of 50 cents; $19.50 $20.50 for ordinary to choice No. 2; and $18@$20 for inferior to choice Gray Forge. Bessemer Pig is dull at $20.50@$21 at tidewater, London cabling unchanged, 50@51s. for Nos. 1 to 3. Spiegeleisen is dull at $31@$32 for 20 per cent. The arrivals of English metal of high grade in quantity are pressing upon the market. Our American furnaces are now succeeding in maintaining a high grade over long periods regularly, but, of course, are unable to supply more than a small part of the demand.

At the Metal Exchange, the following transactions in pig-iron have been recorded thus far this week: Tuesday, 100 tons, No. 1, October delivery, at $21¾. Wednesday, 400 tons, No. 1, November, at $21⅝, and 300 tons, November, at $22. Thursday, 200 tons No. 1, October, at $21¾, 300 tons No. 1, October, at $22, and 100 tons, October, at $21⅞; and to-day 300 tons, November, at $21¾, 100 tons, November, at $21⅞, 100 tons, November, at $22, 300 tons, October, at $21⅝, and 100 tons, October, at $21¾.

Scotch Pig.—There has been an advance in

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.	Capital Stock.	Shares. Number.	Par Value.	Assessments. Total levied to date.	Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. July 28. H.	L.	July 30. H.	L.	July 31. H.	L.	August 1. H.	L.	August 2. H.	L.	August 3. H.	L.	Sales.	
1	Advance M & M. Co.																					S. F.
2	Albion, S. L.	Nevada	$15,000,000	150,000	$100	$622,500	July	1883	.50													S. F. B.
3	Allouez, C.	Michigan	2,000,000	80,000	25	200,000	January	1883														S. F.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50													S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	2,137,200	July	1883	.25													
6	Alta-Montana, G.S.L.	Montana	5,000,000	500,000	10					.07	.06	.08	.06	.08	.06	.06	.05	.05	....	.06	....	16,350	
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25													
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*																
9	Battle Creek																					
10	Bear Creek	California	300,000	300,000	1																	
11	Beauce																					S. F.
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10													S. F.
13	Best & Belcher, G. S.	Nevada	10,080,000	100,800	100	1,396,190	May	1883	.50													
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																
15	Black Jack, G.	California	250,000	100,000	2½																	
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																
17	Bonanza King, G. S.	California	1,000,000	10,000	100	*																
18	Bondholder	Colorado	500,000	200,000	2½				.25													
19	Boston Con., G	California	10,000,000	100,000	100	95,000	October	1882														
20	Boulder Con.	Colorado																				
21	Bradshaw, S.	Arizona	2,250,000	225,000	10																	
22	Buckeye	Colorado	2,000,000	400,000	5	*																
23	" preferred	Colorado				*																
24	Bull Domingo, S. L.	Colorado	10,000,000	200,000	50	*																S. F.
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,767,000	May	1883	.20													
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																
27	Calaveras, G.	California	500,000	500,000	1	*																
28	Cal. W'r & M. Co, G.	California																				
29	Caledonia, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15													
30	Catskill, S.	Nevada	1,500,000	30,000	5																	
31	Central Arizona, S.	Arizona	10,000,000	100,000	100					.15		.16								.15		800	B.
32	Chapparal	California																				
33	Cherokee, G.	California	1,500,000	150,000	10																	S. F.
34	Chollar, S.	Nevada	11,200,000	112,000	100	521,000	March	1883	.50													
35	Climax																					
36	Colorado Central, S.	Colorado	3,000,000	300,000	10																	
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50																	
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05													
39	Con. Pacific, G.	California	6,000,000	60,000	100	150,000	March	1883	.15													B.
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*																
41	Crowell, G.	North Car.	500,000	500,000	1																	
42	Dahlonega, G.	Georgia	250,000	250,000	1	*																
43	Dardanelles, G.	California	1,000,000	100,000	10																	
44	Decatur									.04		.04		.04		.04		.04				3,700	
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*																
46	Durango, G.	Colorado	500,000	500,000	1	*																
47	Eastern Oregon									.81		.83	.82	.83	.82	.84	.83	.84		.85		19,500	
48	Elko Con., S.	Nevada					April	1883	.15			.19	.16			.15	.14	.15		.15		2,800	B.
49	Empire, S.	Utah	10,000,000	100,000	100																	
50	Enterprise	Colorado																				
51	Exchequer	Nevada	10,000,000	100,000	100	650,000	June	1883	.20													
52	Fannie Barret, S.	Colorado																				
53	Globe Copper	Arizona																				
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*																
55	Goodshaw, G.	California	10,000,000	100,000	100	210,000	June	1883	.10													
56	Granville, G.	North Car.	300,000	300,000	1	*																
57	Harlem M. & M. Co, G.	California								1.30												800	B
58	Harshaw, S.	Arizona	10,000,000	100,000	100																	
59	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20													
60	Hortense, S.	Colorado	2,000,000	200,000	10																	
61	Julia, G. S.	Nevada	11,000,000	110,000	100	1,405,000	April	1883	.10													
62	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15													
63	Lacrosse, G.	Colorado	1,000,000	100,000	10	*																
64	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25													
65	Lucerne, S.	Colorado	5,000,000	500,000	10	*																
66	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881														
67	" common, G.	California	10,000,000	100,000	100	1,975,000	February	1883	.25													
68	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20													
69	Mayflower, S.	Colorado	10,000,000	100,000	100	*																
70	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,319,400	July	1883	.50							3.10	3.00					300	S. F.
71	Michoacan Synd.	Mexico																				
72	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																
73	Miller	Nevada	5,000,000	200,000	25																	S. F.
74	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20													
75	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																
76	Moulton, G. S.	Montana	10,000,000	400,000	25	*																
77	Nevada Syndicate																					
78	North Standard, G	California	10,000,000	100,000	100	20,000	November	1881	.10													
79	North Horn-Sil., S. L.	Utah		400,000																		S. F.
80	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00													
81	Old Dominion, C.	Arizona	3,000,000	300,000	10	*																
82	Oriental	Nevada	2,000,000	200,000	10																	
83	Oriental & Miller, S.	Nevada	10,000,000	400,000	25					.14		.14										2,200	
84	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25													
85	Parnell																					S. F.
86	Potosi	Nevada	10,200,000	112,000	100	556,640	May	1883	.25													
87	Quartz Creek				100																	
88	Rappahannock, G.	Virginia		250,000		*						.08										200	
89	Red Elephant, S.	Colorado	500,000	500,000	1	*						.06								.07		2,500	
90	Retort M. & M. Co.	Colorado			10																	
91	San Pedro, G. S. L.	New Mex.		400,000																		
92	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*												12				600	B., P.
93	Silver Islet	Canada	1,000,000	40,000	25																	
94	Sonora Con.	Mexico								.27		.28	.26	.27		.27		.26	.24	.26	.24	16,200	
95	South Bodie, G.	California		100,000		100,000	March	1882	.15													
96	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25													
97	South Hite	California	10,000,000	100,000	100		January	1883	.05	.03	.01	.02		.04	.03	.06	.05			.02		6,200	
98	South Pacific	California			5																	
99	State Line, No. 1, S.	Nevada		200,000	1																	B.
100	" No. 2, S.	Nevada	5,000,000	200,000	25																	
101	" No. 3, S.	Nevada	5,000,000	200,000	25																	
102	" No. 4, S.	Nevada	5,000,000	200,000	25																	
103	" Nos. 1 and 4, S.	Nevada			25																	
104	" Nos. 2 and 3, S.	Nevada																		.03		1,000	
105	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25													
106	Sutro Tunnel	Nevada		2,000,000		*				.20	.19	.20		.20	.19	.20				.20		7,200	B. B., P.
107	Taylor-Plumas	California			10																	
108	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10													
109	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15													
110	Unadilla, S.	Colorado	50,000,000	500,000	100	*								.02								1,000	
111	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,670,000	July	1883	.50					4.85		4.85						200	
112	Utah, S.	Nevada	2,000,000	20,000	100	1,420,000	July	1883	1.00													
113	Vandewater	Nevada	20,000,000	200,000	100	*																S. F.
114	Washington	Arizona	2,000,000	200,000	10																	
115	Whalen Copper	Nevada	2,500,000	100,000	25																	
116	Wide West																					
117	Willshire	California	250,000	50,000	5	*																

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 82,050. Total shares sold, 190,513.

to carry themselves over the summer season. Neither quotations nor actual selling prices have changed Concessions are of rare occurrence. No new factors have appeared. A good deal of difference of opinion is expressed as to the shape trade will take during the latter part of this month and next. The leading companies are indifferent as to the course of demand, and are satisfied that the actual requirements will protect their interests against the low prices that some buyers talk about. The best makes of special Foundry iron still command $23.50, and prices range from that all the way down to $21.50, as usual. The most of this week's business was done between $22 and $22.50, and it seems probable that these figures will be maintained, as makers are putting forth no efforts to attract buyers. It is announced that some few furnace companies will resume in September; but this is uncertain as yet, as fall demand can not be accurately predicted. No. 2 iron commands $19.50@$21. Quite a number of small sales are recorded at $20@$20.50. The output during the past few weeks has not been up to the average. In Gray Forge iron, some few inquiries for 1000-ton lots have been made, and purchases have been partly arranged for. The surplus of anthracite iron is sufficient to protect buyers' interests. At present prices, there is very little room for further decline, and no temptation to increase the

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supply. The mill-men hold back, and makers and brokers are not trying to push stocks on the market. The average business is done quietly, and both sides are waiting for something new. More or less inquiry is made for Bessemer iron, but transactions are unimportant. Buyers name $20. During the past week, some fresh inquiry has been developed for spiegeleisen. Sales foot up between 5000 and 6000 tons at $30.25 for 20 per cent.

Manufactured Iron.—Western competition is beginning to be felt in offerings at 2·10c., and hence buyers predict a drop in Eastern prices. The market is easy, and the consumptive requirements seem to be presented in a regular and even way, and are easily met by manufacturers. Selling prices average 2·20c., but large lots can not be moved at this price. Fall buying is expected to be done at 2·15c. Retail lots move easily at 2·25c.

Skelp Iron.—Sales are heard of, on private terms. A good deal of common iron has been bought at country mills. The lowest transactions known of are 1·90c.; highest, 2·10c.

Plate Iron.—This week's business has been similar to others. Sales run from 50 to 500-ton lots. A fair amount of business has been done. Where large orders are concerned, present quoted prices have been shaded. Prospective requirements are heavy.

Structural Shapes.—A fair business has been done, and prices are quoted firm.

Sheet-Iron.—Transactions are increasing in volume for fall requirements, and prices for large lots are perceptibly firmer, especially where prompt delivery is insisted upon. Galvanized iron is 40 per cent off; demand fair.

Steel Rails.—Small lots are chiefly called for, at $38.50. Winter deliveries are held at $38; buyers offer $37, at which figure negotiations are now in hand.

Old Rails.—No sales have been effected. Quotations are nominal.

Scrap is dull at $23@$25.

Pittsburg. Aug. 2.

The sensation here this week is the failure of L. B. Ward & Co., of Niles, O. It was brought about by the Graff, Bennett & Co., the Stone, and the Brown, Bunnell & Co. failures. The assets are trifling, and the liabilities are half a million dollars.

The iron market is healthier than it has been for months. The chief underlying causes are the facts that prices have reached the lowest possible limit; that production has been restricted; that stocks are low in consumers' hands; and that the future requirements of consumers are now presented. Prices are firmer but not higher. Offers made a month ago are now withdrawn. Inquiries are in hand for lots of iron from 100 to 1000 tons. The blowing out of so many furnaces is working good results. Quotations range from $16.50 for Mottled; $17@$17.50 for Gray Forge; $19@$20 for Foundry; Extra Forge, $18; Extra Foundry, $21; Bessemer Pig, $21, cash; Muck Bars, nominally $34. No sales.

BULLION MARKET.

NEW YORK, Friday Evening, August 3.

The market is firmer abroad to-day on a higher rate for exchange on India, but not quotably higher. An advance in sterling exchange here has slightly improved the rate here.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
July 28	50 7-16	110⅛	Aug. 1	50 7-16	110⅛
30	50 7-16	110⅛	2	50 7-16	110⅛
31	50 7-16	110⅛	3	50 7-16@½	110¼

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended August 3d, as compiled from various sources, amounted to $194,000, as against $228,500 reported for the previous week. The receipts from January 1st, 1883, to date are $6,717,974.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discounts, and it remains at 4 per cent. During the week, the bank gained £350,000 bullion; but the proportion of its reserve to its liabilities was raised only ⅛ per cent—from 44¼ to 44⅜ per cent, against 36¾ per cent a year ago. August 2d, the bank gained an additional £112,000 bullion on balance. The weekly statement of the Bank of France shows losses of 4,025,000 francs in gold and 1,300,000 francs in silver.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended July 28th	$177,675
Corresponding week last year	1,729,428
Since January 1st, 1883	7,537,034
Corresponding period last year	40,571,188

Imports.

Week ended July 28th	$223,946
Corresponding week last year	13,093
Since January 1st, 1883	7,554,236
Corresponding period last year	2,095,777

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of June.	Year from Jan. 1st. 1883
*Alice, G. S.	Mont.	$72,913	$471,323
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal.	18,945	119,535
Bodie Tunnel, G.	"	3,195	54,642
*Bonanza King, G.	"	67,573	334,223
*Boston & Montana, G.	Mont.	.....	72,318
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah.	27,935	145,671
*Chrysolite, S. L.	Colo.	$54,705	240,676
Consolidated Bobtail	Colo.	.....	18,723
*Contention, S.	Ariz.	81,594	557,428
Crescent, G.	Cal.	.....	13,000
*Custer, G. S.	Idaho.	.....	43,572
*Deadwood-Terra, G.	Dak.	.....	173,277
*Derbec Blue Gravel, G. S.	Cal.	10,420	55,148
Evening Star, S. L.	Colo.	.....	47,061
*Father de Smet, G.	Dak.	25,058	178,163
*Frisco M. and S. Co., G. S. L.	Utah.	.....	§77,084
Gunnell, S.	Colo.	.....	58,828
*Head Center Consolidated	Ariz.	18,392	26,502
*Head Center and Tranquillity	Ariz.	18,019	60,620
*Hecla Consolidated, G. S.	Mont.	.....	293,922
*Homestake, G.	Dak.	.....	419,148
*Hope, S.	Mont.	.....	41,963
Horn-Silver, S. L.	Utah.	264,000	1,547,000
Idaho, G.	Cal.	.....	88,642
*Independence, G. S.	Nev.	———	32,991
Iron Silver, S. L.	Colo.	.....	503,831
*Jocuistita, S.	Mex.	.....	‡228,022
*Kentuck, G. S.	Nev.	2,484	12,876
*Lexington, S.	Mont.	107,655	638,488
*Little Pittsburg, S. L.	Colo.	7,451	35,645
*Marguerite, G.	Cal.	6,998	45,745
*Martin White, G. S.	Nev.	———	136,317
Morning Star, S. D.	Colo.	.....	84,428
*Moulton, G. S.	Mont.	.....	123,288
Mount Diablo	Nev.	60,512	187,823
*Navajo, G. S.	"	67,679	411,642
*North Belle Isle	"	200	2,153
Northern Belle, S.	"	7,381	395,906
*Ontario, S. L.	Utah.	87,652	1,038,687
*Oxford, G.	N. S.	7,076	35,255
*Phœnix, G.	S. C.	2,500	7,700
*Pinal Consolidated, S. L.	Ariz.	31,492	181,485
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	.....	101,241
Standard, G.	Cal.	133,026	575,822
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah.	18,651	114,308
Syndicate, G.	Cal.	2,043	29,116
Tintic M. and M. Co.	Utah.	6,869	14,601
*Tip Top, S.	Ariz.	4,876	‡27,858
*Tombstone, G. S.	"	91,400	414,239
Wyoming Consolidated.	Cal.	.....	31,541
Yellow Jacket, S.	Nev.	10,594	193,658
Total amount of shipments to date			

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, August 3.

Copper.—The market is quiet. There is little demand for Lake, and very little of this class of copper is offering, the range being about 15@15⅛c. Other brands of copper show more strength, and there is a disposition on the part of those who handle them to hold out for higher prices. We touch on some of the features affecting the future editorially. London cables lower, £68 10s. for Chili Bars and £69 17s. for Best Selected.

Tin.—This metal has been moderately active, the spot stock, which probably does not aggregate more than 1000 tons, being firmly held by strong parties, so that it is a difficult matter to get round lots of spot Straits or Malacca, which we quote 21⅛@21⅝c. Australian is easier. By cable, the shipments for the period of July 15th to 31st, from Singapore are advised as 230 tons to the United States, and 200 tons to Great Britain. London cables to-day £94 10s.

Lead.—The situation in this metal has not changed materially. Sales are on a jobbing scale exclusively, and while Common is freely offered at 4·30c., bids do not go higher than 4·25c., at which holders decline to sell as yet.

Messrs. John Wahl, of St. Louis, wire us as follows, to-day:

Our market is dull. Soft lead is freely offered at 4·05c. Sales for the week sum up over 300 tons of Refined at 4·03c. The best bid obtainable now is 4c. Hard Lead is quoted nominally at the same figure.

Messrs. Everett & Post, of Chicago, send us the following dispatch:

The market continues very dull, with no buyers. Business consequently has been very quiet and of a limited character. Prices are nominally 4·10c. for both Common and Refined.

Spelter.—This metal continues dull, with values ranging nominally between 4⅝@4⅝c. for good Western.

Antimony.—This metal is quiet, with quotations at 9¼@9⅝c. for Hallett's and 10¼@10⅝c. for Cookson's.

COAL TRADE REVIEW.

NEW YORK, Friday, Aug. 3.

Coal summarizes the situation as follows:

The trade continues with but few signs of encouragement. Current business is small in volume and is forced, notably on steam sizes, while middle-men are still engaged in placing the heavy amounts ordered by them in June, a work which is rendered more difficult because they have not the plausible argument of a nominal advance by the companies to fall back upon. One of them which is noted for taking good care of its contractors, will, as rumor has it, announce an advance in two weeks. So far as the others are concerned, they seem to have discussed the matter, arriving at the wise conclusion to let prices alone. Notice of a general advance of 10 cents a ton in the tolls on coal shipped both by rail and canal was given by the Philadelphia & Reading Railroad Company, to take effect August 1st. The new circular announcing the line and city and harbor prices of coal has been issued by the Philadelphia & Reading Coal and Iron Company. There is no change in the line and city prices, but the harbor prices embody the 10 cents advance in tolls, and are as follows: $4.30 for lump, steamboat, broken, and egg; $4.40 for chestnut; $4.55 for stove; and $2.55 for pea. These rates are for white-ash coal, and they are 25 cents higher on stove and chestnut, and 15 cents lower on pea than they were one year ago. Lump, steamboat, broken, and egg are unchanged from the prices of last August.

There is a good deal of speculation as to the probable quantity of coal which the market will be expected to take this year. On the 1st of July, the increase of this year over last was roughly 1,450,000 tons, in spite of the fact that there have been 51 idle days. This is usually interpreted as showing how much more active consumption has been, while it should really be read as showing how much the productive capacity has increased, probably partially under pressure. A large share of this increase has gone to Western distributing points, which are now full to overflowing, so that Buffalo is now beginning to stock to some extent. As yet, the work of distribution of this great quantity of coal has not fairly commenced, and the trade will look with anxious interest to the time when the good work is fairly started. The movement Westward must, however, soon abate to some extent, and the tidewater markets will receive greater quantities, which must be kept moving. With full-time and with a moderate line trade only, *it is* feared that there will be some accumulation here, and this is what consumers are looking and holding off for. A heavy domestic consumption later on may easily dispose of this coal, but until the middle or end of August not much business of this character can be looked forward to. The manufacturing industries are dull, and bituminous coal is very cheap, so that the trade for steam sizes is very quiet.

Such is the situation as it is now. Should the future prove a disappointment, which we sincerely trust that it will not, only one of two things is possible, either prices can not be maintained or production will have to be curtailed again. It is, therefore, a little too early to figure out the output, because it is possible that there may be more coal than is wanted. It will all be needed if domestic consumption is heavy; but this is a factor which is always uncertain to some extent.

At the meeting of the Western Association at Saratoga last week, prices were let alone. The chief topic of discussion was the adjustment of railroad freights to a number of inland competitive points upon which uniformity was aimed at. These points involve a great deal of detail, and are difficult to settle satisfactorily to all parties concerned.

Bituminous.

The trade is as dull as ever, with no new features worthy of note.

Horsford's Acid Phosphate

In Liver and Kidney Troubles.

Dr. O. G. CILLEY, Boston, says: "I have used it with the most remarkable success in dyspepsia and derangement of the liver and kidneys."

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DIVIDENDS.

HORN-SILVER MINING COMPANY, Office, 44 Wall Street,

NEW YORK, July 31, 1883.

DIVIDEND NO. 10.

QUARTERLY DIVIDEND of $300,000 has been this day declared, being three per cent on the capital stock, payable to stockholders of record on the 15th day of August next, at the office of the company. Transfer-books will close on August 8th, and reopen August 16th.

W. S. HOYT, Secretary.

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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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Advertising Rates.—See page vii.

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Mr. O. D. Cotton, Columbus, O., is our accredited representative for Ohio, Kentucky, and Indiana.

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THE Amalgamated Association of Iron and Steel-Workers is indulging in its annual convention in Philadelphia, and is making a great show of secrecy. It is stated that financially the Association is falling behind, and that an assessment to cover a heavy drain from the treasury is soon to be called. The association reports a membership of 49,000.

ONE of the most gratifying signs of progress in the utilization of steel is its adoption as the raw material in the manufacture of nails. Among makers it appears to be now the great topic of discussion and the principal object of experimental work. Thus far, the latter has afforded much encouragement, and we hear from a number of sources that the building of steel plants to produce a suitable raw material is contemplated.

WE regret to announce the sudden death, from paralysis, on the 10th ultimo, of Mr. RAIMUNDO DE SANTA MARIA, at the residence of M. ADELON (the legal adviser of Prince NAPOLEON), at Arpajon, near Versailles. Mr. DE SANTA MARIA was a graduate of the Ecole Spéciale des Hautes Etudes, was admitted as a public assayer of the French Mint, and likewise as consulting chemist of several metal-working establishments at St. Denis. He was, during a brief residence in the United States, connected with the Canada Consolidated Gold Mining Company as assayer. His social qualities had attracted many friends to whom his untimely death in the twenty-fourth year of his age will prove a great shock.

FROM Colorado comes the news that the Grant Smelting-Works and the Omaha Smelting and Refining Company were consolidated some time since. For years, the relations of these two concerns have been close, like a number of other works engaged on the one hand, in the smelting of ores, and on the other, in the refining and desilverizing of the base bullion so produced. In their efforts to obtain regular supplies of base bullion, refiners have repeatedly endeavored to do their own smelting in subsidiary works ; but the present consolidation is, we believe, the first on record where two great, independent works have united their interests. For many reasons, the advantages of such a course are great, and we should not be surprised to see the example set by the Grant and Omaha works followed by others.

A SUGGESTION comes from England, which, we believe, spelter manufacturers would do well to consider seriously. All over the world, spelter is cast in thin slabs, probably because it has always been done so since spelter was made. Mr. J. B. SHARP, of Birmingham, urges that in that form it is about as bad as it could be for causing loss by volatilization, when melting in the preparation of copper-zinc alloys, and for retaining lead impurities, which adhere to the lower part of the film in thin flakes which are not removable. He insists that the best way would be to cast the spelter in the form of round 3 or 4-inch ingots, vertically, keeping the mold hot when casting and allowing it to cool slowly. The form would be more convenient and more advantageous for remelting, and the lead would gather at the bottom in a piece which could easily be detached.

MUST THE FARMERS GO?

In the trial of the suit of the People of the State of California *against* the Gold Run Ditch and Mining Company, some interesting evidence was given concerning the injury done by agriculture to the "navigable waters" and alluvial bottom-lands of that State. In California, as everywhere else, the cutting down of the forests on the mountain-sides, while it has not, in our opinion, changed the annual rain-fall perceptibly, has increased the tendency to freshets and floods, by accelerating the collection and flow of meteoric waters. Together with this change, another agency has made itself felt. The annual plowing of the valley soils, loosening the sand, loam, and clay of which they are composed, has given rise to vast quantities of easily-moved *débris*, which are carried down into the rivers and bays. The aggregate injury thus inflicted is undoubtedly greater than any which can fairly be ascribed to the *débris* from hydraulic and placer mining, although in single localities the latter industries may be responsible for direct damage.

A strong argument, which might have been made still stronger by more abundant details, was based upon these facts, in the case alluded to. The shoaling of such streams as the Sacramento having been ascribed to the hydraulic mines, although in fact due in great degree to agricultural *débris*, a comparison was instituted with other streams, at the headwaters of which no mining is carried on. A good example is furnished by Pacheco Creek, in Contra Costa County, the drainage area of which comprises 177·3 square miles of valley and hill land, and 6·5 square miles of marsh. The valley is bounded on the east by the Monte Diablo range (less than 4000 feet high) and on the west by low hills. There is little disintegration from frost.

The soil of this valley is black "adobe," hard in summer and soft when wet. Before 1862, there being little or no plowing in the valley, no change was noticed in the surface of the valley ; but since that time, the hill-slopes have been cut up with innumerable ravines, and the *débris* from this natural hydraulic operation have been carried down to near the mouth of the creek, have covered up 2500 acres to the average depth of two feet, and have formed a large bar in Suisun Bay. Pacheco, once the largest town in the county, has been covered to the depth of eleven or twelve feet, and is nearly abandoned by its inhabitants. Vessels are already unable to come up beyond a point one and a half miles below the old "embarcadero ;" and the entire abandonment of navigation on the creek can only be prevented by vigorous appropriations in the River and Harbor bill.

The above facts indicate that agriculture has led to the average degradation of the surface of this drainage area at the rate of at least one foot in 443 years (assuming the deposit of two feet over four square miles in twenty years, and leaving out altogether the bar in Suisun Bay).

Similar calculations show that Alameda Creek is degrading its drain-

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age area at the rate of one foot in 783 years, and Quercus Creek, draining only twelve square miles on the west slope of Mount Diablo, has brought down 2,600,000 cubic yards of *débris* in four years, or at the rate of one foot average depth in eighteen years.

The following estimates are given for the purpose of comparison:

Authority.	Stream.	Drainage area in square miles.	Years required to erode 1 foot from this area.
Humphreys and Abbot	Mississippi.	1,244,000	4,640
Everest	Ganges.	400,000	1,751
Lombardini	Po.	26,490	729

Professor DAVIDSON, of the U. S. Coast Survey, has estimated the drainage area of the Sacramento at 25,000 miles, and its erosion, from all causes other than mining, at 19,000,000 cubic yards, washed annually into the lower river. The State Engineer, on the other hand, estimates the total amount of material carried by the Sacramento in suspension (apart from sand rolled along the bottom) at 18,000,000 yards, and charges mining with 13,200,000 of this. According to Professor DAVIDSON, the Sacramento *natural* erosion would degrade its area one foot in about 1550 years; according to the State Engineer, the rate is only one fourth as great; or, in other words, the Sacramento Valley suffers much less natural erosion than that of the Mississippi, the Ganges, or the Po, although smaller valleys in the State show much more. The State Engineer's conclusion is not probable; Professor DAVIDSON'S is probable; and we wait with interest for somebody to raise the cry that the farmers must go! But these long conflicts are a great waste of time. Why not make every body go, and done with it?

NEW PUBLICATIONS.

THE MATERIALS OF ENGINEERING. Part II. IRON AND STEEL. By ROBERT H. THURSTON, A.M., C.E. New York: John Wiley & Sons. 1883. 8vo, 680 pages. (*Index.*)

We have looked forward with particular interest to Professor Thurston's second volume on *The Materials of Engineering*, because it is in iron and steel that he has done much original work, and because, during the past ten years, such an enormous mass of material has been accumulated by investigators and engineers, both here and in Europe, which Professor Thurston's skill could be trusted to present in a well-digested form. He has gone much farther in one respect than we had expected, and probably, knowing how many who seek in vain for information, in convenient form, on the methods of manufacture of iron and steel, he has reserved more than one third of his work for a treatise on that subject. Forming, as it does, a somewhat elaborate introduction to the main subject, the mechanical qualities of iron and steel, it comes up for discussion first. On the whole, it is well written, and will be sure to give the mechanical engineer a fair idea of the methods and aims of the iron-master and the steel-maker. After a number of chapters, general and historical in character, Professor Thurston takes up iron ores, giving fairly well their characteristics, notes on their occurrence, and numerous analyses from leading localities. He is occasionally led into slight errors, among which we may instance that, on page 71, he declares that zinc found with spathic iron ore is of value in the process of reduction. In speaking of the character of ores, page 95, Professor Thurston says: "When possible, magnetic ores are selected, where the cast-iron produced is to be made into fine cast-steel. Specular or magnetic ores are suitable for 'low' steels and fine wrought-iron, and the other ores make foundry iron of various qualities." We fear that the majority of iron-masters do not live up to these rules, even if they have the choice. Turning to blast-furnace practice, a number of rather ancient-looking furnaces and hot-blast stoves are illustrated, the chapter otherwise being a careful compilation from the very voluminous literature on the subject. The chapter on wrought or malleable iron is similarly elaborate, and particular attention is paid, as should be the case, to rolling, because it is at this stage that the interest of the constructing engineer in the methods of manufacture begins, and here too, Professor Thurston is evidently more at home. Over fifty pages are devoted to the manufacture of steel, and constitute the best summary of that industry which we have yet seen.

This concludes the first part of the work, the chapter following treating of the properties of iron and steel, a chapter into which Professor Thurston has crowded much of the material so industriously accumulated by engineers and metallurgists, during the past ten years, on the relations between the mechanical properties and the chemical composition of metals. This chapter, too, is worthy of close study by both mechanical and metallurgical engineers. Chapter IX., on the strength, elasticity, and resilience of iron and steel is of course the *pièce de résistance* of the work, covering, as it does, over one hundred pages. It discusses elaborately the methods of testing, and gives the results of standard work in this direction, while the following chapter discusses the conditions affecting strength, the effect of temperature and time, age and exposure, crystallization, the flow of metals, shock, overstrain, and repeated variations of load as modifying the resistance of iron and steel. A useful chapter on specifications, tests, and inspection brings the work to a close. We do not hesitate to urge all those who are interested in the subjects discussed—and what iron and steel master and mechanical engineer is not?—to closely study the book, which presents so much valuable material in a clear form, much of it being directly available to those only who have access to large libraries. A very large proportion of the data is the result of personal researches and inquiry.

THE air-receiver at Grace furnace, owned by the Brier Hill Iron and Coal Company, of Youngstown, Ohio, exploded recently, dangerously wounding the engineer and injuring two others. The engine-house was blown to pieces.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Statistical Position of Copper.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to the letter from your correspondent "Specular," in your issue of June 2d, in which he figured a surplus of 75,000,000 pounds of copper to be on hand at the end of the current year, and to your editorial in your issue of August 4th on the Copper Market, I beg leave to submit the following detailed figures, which I believe to be nearly correct:

	Pounds.	
1. "Specular" assumed a surplus of 42,000,000 pounds on hand January 1st, 1883. I believe this to be too large; but for the sake of comparison I start on the same basis,		42,000,000
2. You state in your editorial that the lake production is increasing; but the figures for the June production show a falling off of 750,000 pounds of fine copper, as compared with the average of last year—assuming the production to be the same—and present prices are certainly no encouragement for increased production. The production will be 55,000,000		55,000,000
3. The Western mines at present producing, known to the writer are:		
Arizona—The Copper Queen	7,500,000	
Detroit	3,000,000	
Old Dominion and Long Island	3,500,000	
Longfellow	2,500,000	
All others	2,500,000	19,000,000
Montana—Montana Copper Company	8,000,000	
Parrott Copper Company	6,000,000	
Belle Copper Company	2,500,000	
Anaconda and Allied mines	6,000,000	22,500,000
Other production and importation		7,000,000
Grand total		145,500,000
The export sales already made are:		
Lake Copper		10,000,000
Arizona bars		2,000,000
Montana mattes		12,000,000
Other ores, bars, and mattes		3,000,000
Ingot copper not lake		3,000,000
Total		30,000,000

Deducting this amount exported from the total production, we have left 115,500,000 pounds, and taking from this "Specular's" estimated consumption of 72,000,000 pounds, we have left a balance of 43,500,000 pounds.

Necessary stocks on January 1st:	
Lake copper to fill sales from January 1st to June 1st	20,000,000
Stock accumulated at mines	8,000,000
Stocks in hands of dealers, consumers, and in transit; say one month's consumption	6,000,000
Stock in refiners' hands and in transit to refineries	5,000,000
Total	39,000,000

Which, deducted from the above balance, leaves a surplus above bare necessity of 4,500,000 pounds.

If present prices continue, there must still be exported:	
Montana mattes	4,000,000
Ingot copper not lake	1,000,000
Arizona bars (all bars not held here by contract with refiners, as at least one cent per pound of copper more can be realized by shipping than by refining here)	4,000,000
Other ores, mattes, and bars	1,000,000
Total	10,000,000

or a deficiency of 5,500,000 pounds.

In other words, instead of showing a pressing surplus, the indications are, that the market will be short of copper this winter unless a change in prices stops the outward flow of copper. "REFINER."

[The letter of our correspondent confirms, in a general way, the conviction that has been gaining ground, and to which we have repeatedly given expression recently, that here the statistical position is favorable, even taking the lake product at 58,000,000 pounds, which we believe it will certainly reach, especially when the new plant of the Calumet & Hecla is running to full capacity. We presume that the product of the Boston & Colorado works, at Butte City, Montana, is included by our correspondent in the lump figure, 7,000,000, which represents the product of California, Nevada, New Mexico, Colorado, Wyoming, Missouri, the Eastern and Southern States, and copper in imported ores and pyrites. We are inclined to doubt, notwithstanding the fact that Vermont has stopped work and Utah has shipped very little, whether this figure will cover the entire output, but it does not affect the main issue that the metal is now in good shape. The only danger to it is a falling off of values abroad.—ED. E. AND M. J.]

NO MELTING CHARGE ON TRADE-DOLLARS.—At the suggestion of Superintendent Snowden, of the Philadelphia Mint, the acting director of the mint has issued an order to remove the melting charge imposed on trade-dollars deposited at the mint on account of sales of silver bullion. This action was prompted by the thought that, as all holders of trade-dollars who bought them at par and who offered them for conversion into bullion, suffered a loss of 18 per cent, it would be an additional hardship to compel them to pay the melting charge, which amounts to $1 for every "melt," or one per cent.

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THE DIVINING-ROD.*

By Rossiter W. Raymond, Ph.D., New York City.

(*Continued from page* 65.)

The Jesuit father, Cæsius (*Mineralogia*, 1636), inclines to deny the efficacy of the rod.

Robert Fludd (*Philosophia Moysaica*, 1638), after mentioning the sympathy existing between the crab or oyster and the moon, between the rue and the fig-tree, between myrtle and the pomegranate, adduces as an instance of similar sympathy between plants and minerals the dipping of a hazel-rod over a vein of silver or gold.

The celebrated chemist, Rudolph Glauber (*Pars Secunda Operis Mineralis*, 1652) affirms from experience, and attributes to a physical property, the efficacy of the rod in exploring for metals.

The Jesuit father, Jean François (*Science des Eaux*, 1653), seems to admit the power of the rod to discover springs, but condemns its use.

The erudite Jesuit father, Kircher (*De Arte Magnetica*, 1654, *De Mundo Subterraneo*, 1678), having proved by experiment that rods of wood alleged to be sympathetic with certain metals, were, when balanced upon pivots, not at all affected by the proximity of these metals, concluded that the sympathy was chimerical. In his later work, he declared roundly that, if the movement of the rod did not proceed from a joke or a cheat on the part of the operator, it was not natural, and ridiculed those who fancied it could be caused by a vapor disengaged from the metal.

Edo Neuhusius (*Sacrorum Fatidicus*, 1658), believes in the working of the rod, and attributes it to a sympathy, or to the stars, or some other cause.

The Jesuit father, Gaspard Schott (*Physica Curiosa*, 1662), pronounces the use of the rod superstitious, or rather diabolical. But he adds, in a foot-note, that pious and honest men have assured him both with regard to the turning of the rod and with regard to the striking of the hours by a ring suspended within a glass (*pulsum annuli filo intra scyphum suspensi et horas indicantis*), that the experiment does not always succeed, and hence, he will not assert that the demon is always acting. The argument appears to be that, if the devil had it in hand, it would not fail. The pious and honest men aforesaid also protested that the phenomenon was natural and not due to fraud or fancy. "*Sed nondum persuaserunt*," pithily concludes Schott. The passage is noteworthy as containing a reference to the wonderful pendulum, which became, at a later day, the subject of scientific treatises, and still survives as a puzzle and amusement for children of all growths.

Sylvester Rattray (*Theatrum Sympatheticum*, 1662) believes in the sympathy of vegetables with minerals. According to him, the hazel is suitable for the discovery of silver, wild pine for lead, olive and palm for gold and silver.

It was in 1666 that Robert Boyle put the question, as member of the Royal Society of London, whether the divining-rod is really moved by the proximity of metal—a pertinent inquiry, which no one seems to have answered by authoritative and thorough experiments, unless we may accept as sufficient those of Kircher above mentioned. The accumulation of contradictory testimony from witnesses of all degrees of competency went on.

Matthias Willenius, a German author, published in 1671 or 1672 a book called *A True Account of the Rod of Mercury*, in which, as the title indicates, he appealed to astrology for the partial explanation of his theme, asserting that the influence of the stars under which the operator is born contributes to the turning of the rod over metals, "by the effect of the harmony established between heaven and earth."

Frommann (*Tractatus de Fascinatione*, 1674), says that, after long hesitation, he has decided that the use of the rod is lawful.

The Jesuit father, Dechales (*De Fontibus Naturalibus*, 1674), inclines to the same opinion, and speaks of the hazel as having been in all times (*omni tempore*) used as an index to springs. This is a curious illustration of the rapidity with which a tradition may come to be considered immemorial. In fact, if we except the striking of the rock in the desert by Moses—which is certainly not a case in point—the first trace of the use of the rod for discovering springs is in the works of the Beausoleils, scarcely fifty years before Dechales wrote his treatise.

Le Royer, a lawyer of Rouen, published in 1674 his *Traité du Bâton universel*, and in 1677 his *Traité des Influences et des Vertus occultes des Etres terrestres*. He declares that the rod by its sympathetic virtue can discover all hidden objects, metals, springs, etc. But he ascribes to it no moral power.

The Abbé Hirnhaïn (*De Typho Generis Humani, sive Scientiarum Humanarum Inani ac Ventoso Humore*, etc., 1676), while scoffing at many reviewed beliefs, admits without question the efficacy of the divining-rod.

St. Romain (*La Science naturelle degagée des Chimères de l'Ecole*, 1679) was one of the first believers in the rod to reject the sympathies and antipathies and to substitute the Cartesian corpuscular hypothesis—of which I shall have more to say hereafter.

Finally, the celebrated botanist, Ray (*Histoire des Plantes*, 1686), classed the divining-rod among superstitions.

This review of the literature of the subject has brought us to the end of an important period, namely, that in which the physical effects of the rod were exclusively discussed, its earlier uses for general divination having gone out of fashion and recollection. Indeed, any attempt to maintain these would have incurred the censure of the church, which would have settled at once the vexed question of agency by denouncing this unauthorized intrusion upon its spiritual prerogative as diabolic. This is indeed what speedily happened, as we shall see. The lost doctrine of moral power reappeared, not among the learned, but out of the obscure mass of the people. In the province of Dauphiny, in the south of France, the practice of the divining-rod, introduced perhaps by the Beausoleils, had become, fifty years after their death, an art followed by many experts, who were called *Hommes à Baguette*. They were employed to find springs of water, hidden treasure, mines, etc., and also to detect criminals, and even to settle disputes as to boundaries when the landmarks were gone. Two farmers, for instance, having a dispute as to the boundary between their farms, instead of going to a lawyer or judge, would send for a diviner. He, walking over the disputed ground, would indicate by the dipping of his rod the spot where the old landmark formerly stood; and this decision was accepted without appeal. Considering the expense of litigation in all times, and the peculiar character of the justice which at that time was sold so dear and worth so little, we may fairly say that, whatever be the merits of the divining-rod, the peasants of Dauphiny acted wisely in employing it.

In 1692, a mysterious murder was committed at Lyons. A wine-merchant and his wife were found dead, lying in their cellar near the bloody ax with which they had been slain. A neighbor urged the authorities (who seem to have had no clue to the murderers) to employ a rich peasant of Dauphiny, already famous as an expert with the divining-rod. This man, Jacques Aymar by name, was sent for—or rather it was not necessary to send for him, since he proved to be already on hand in the city, by the time it was decided to engage his services. This fact is significant, as giving the key to what turned out to be an extraordinary piece of clever detective work. A careful analysis of the numerous official and other records of this case show it to be quite possible that the diviner had obtained important clues before he was publicly set to work. He first demanded to be taken to the scene of the crime that he might get his "impression." This consisted in a sort of shuddering, accompanied with signs of agitation, pain, and exhaustion, and manifesting itself besides in the dipping of his rod. This took place at the spot where the bodies had lain, the spot where the ax was found, and also in the shop above, at various points which he declared to have been occupied or touched by the criminals. Having thus obtained a thorough impression, after the fashion of a bloodhound getting a scent, he started, though it was night, and followed with his rod the alleged course of the fugitives, passing without hesitation through many unlikely places, as far as one of the gates of the city. Next morning, he resumed the trail, and tracked it to the house of a gardener, where he declared that the criminals, either two or three in number, had stopped. The gardener and his wife denied all knowledge of them, and Aymar, consulting his rod, declared that neither had touched the murderer. But the rod dipped violently over two young children of the house, who thereupon confessed that three men had stopped there the day before, and had drunk wine at a table, which, by the way, had also been indicated by the rod. The children said they had kept this a secret, because they feared being punished for leaving the door unlocked while their parents were away. After some further delays and preliminary tests, the magistrates determined to let Aymar pursue the murderers. He declared that they had taken a boat down the Rhone, and he followed them with an escort in the same manner, landing from time to time at different points where he said they had stopped. His pursuit was continued for a number of days with various interruptions, the assigned causes of which seem to have been sometimes but pretexts, and permit the suspicion that the intervals were employed by him in getting information in other ways. However this may be, he finally brought up at the prison of Beaucoire, and after applying his rod in succession to the inmates, pointed out as one of the Lyons murderers a hunchback, recently arrested for larceny. This man, being taken back to Lyons, was recognized at several points on the road as having passed just after the murder, and finally, frightened by the accumulated evidence against him, made a full confession, and was subsequently broken alive. The other two murderers Aymar professed to follow to the sea, and at sea along the coast, until, as he alleged, they escaped from the kingdom.

So long as there was no doubt of Aymar's sincerity, this discovery of the criminal by the aid of the divining-rod seemed indeed marvelous. But it is not more wonderful than many detective operations in which the rod has played no part; and it is easy to trace the possible or probable methods which he employed. If, for instance, during the period just preceding his engagement by the magistrates, he had, in coming to town from his residence, fourteen leagues distant, or in hanging about the town, where every body was talking of the crime, picked up in any way the circumstances of the three fugitives entering the house where the children were, it is almost inevitable that he would have obtained also some general description of their appearance, and I need scarcely remark that the subsequent tracking of a hunchback would be no very difficult matter. It should be added here that the judges who sentenced the hunchback explicitly declared that they attached no weight to the indications of the rod as direct evidence of his guilt, but condemned him wholly upon his own confession, confirmed by abundant circumstantial evidence.

But this achievement of the rod, attested as it was by official records and by the public confession and execution of the criminal, made a great sensation in France; and Aymar was called to Paris, where both the court and the *savants* interested themselves greatly in his mysterious powers. Many marvelous feats are reported of him there; but the shrewd and rigorous experiments of the Prince de Condé exposed the emptiness of his pretensions. It was Aymar's claim that his rod was sensitive to the particular object which he was at the time seeking. When he sought a given murderer, the track of some other murderer would not divert it. When he was pursuing a criminal, he could not be led astray by subterranean water or treasure. If he felt these things in passing, his feeling was nevertheless distinguishable from that connected with his intention, etc. He could, at will, seek any given object, and, when doing so, could not be deceived. Unfortunately for this claim, the tests of the prince deceived him very often. For instance, a purse of money was shown him, and after he had got his "impression" of it, it was taken out to be buried in the garden, but, instead of burying it, the person who had it kept it in his pocket. Aymar proceeded to the garden, and, undisturbed by the immediate neighborhood of the money in the pocket of a bystander, located the spot where he said it was buried. In another case, he detected the gold of the gilding of a chair which was covered so as to permit a glimpse of its ornaments; but he sat on a similar chair, and walked through a saloon containing many of them, all completely covered, without discovering any gold. In another case, a window was designedly broken in a palace. Aymar was sent for to trace the thief, who, he was informed, had recently stolen some money from the palace. His rod promptly indicated the broken window

* Read at the Boston Meeting of the American Institute of Mining Engineers.

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as the road by which the thief had entered, and he proceeded to trace also the route of flight, although no such theft had ever occurred. But so long as these and similar failures were not made generally public, Aymar continued to enjoy much celebrity, and no doubt it was enough to turn the head of a peasant to be the object of such attention. Growing more audacious, he undertook to reveal character with his rod, and on one occasion, having received a fee from a gentleman of the court, with the request that he would discover whether the gentleman's sweetheart was true to him, he sent for the lady's servant, and demanded of him another fee as a condition of certifying her virtue. Scandals of this kind became so bad that the Prince de Condé publicly exposed Aymar, and he returned to his home. On the way, however, in passing through a village, he took occasion to designate five or six of the most respectable houses as the abodes of wicked women, which made a great uproar. I wish I could say that nothing more was afterward heard of him; but unfortunately, it appears that, as late as 1703, this man was employed during the civil war to point out with his divining-rod Protestants for massacre, under the plea of punishment for crimes they had committed.

We find connected with the exploits of Jacques Aymar a new theoretical explanation of the divining-rod. Many persons of more or less scientific training, not doubting the honesty of the man and the genuineness of the sensations which he manifested, cross-questioned him on the subject, and thus accumulated a mass of supposed data for the formulation of the natural law underlying these phenomena. It was at this time that the Cartesian philosophy was dominant in France, and the "subtle matter," "corpuscles," "animal spirits," and "vortices" of Descartes furnished convenient hypotheses to explain almost any thing. The two doctors of Lyons first supplied such hypotheses to the case of Aymar; but the subject was treated at still greater length by the Abbé de Vallemont, in his treatise on the divining-rod entitled *Physique Occulte*, and published in 1693. In this work, he declares that by insensible transpiration particles escape continually from our bodies; that such particles pursue a vertical direction, and strike the divining-rod, which is thus caused to move up and down, assuming a line parallel to the path of the corpuscles. The holder of the rod receives corpuscular effluvia from other human bodies, and various substances, and communicates them through his pores to the rod, thus producing also a movement of revolution. The difference of the skin in different people results in various degrees of susceptibility to particular impressions; but Aymar was, according to the abbé, possessed of an epidermis which could receive all kinds of impressions without confounding them. The abbé says that there is a difference of form among the corpuscular effluvia of springs, minerals, bodies of thieves, those of assassins, those of naughty women, those of landmarks, etc., etc.; in other words, he recognizes the existence of aqueous matter, larcenous matter, murderous matter, etc., and the last-named variety was the only one which produced upon Aymar very painful impressions. This was due, according to his scientific expounder, to the vehemence of remorse which pervades the corpuscles of an assassin. The fact asserted by Aymar that he had detected and followed the trail of a murderer twenty-five years after the murder, and the fact that in almost every instance he necessarily began his researches a day or two after the crime—to say nothing of the cases in which he determined the locality of the landmarks which had been missing for an immemorial period, forced the abbé to a wild hypothesis of the extraordinary levity of the corpuscles, by virtue of which they remained a long time suspended in the air in spite of rain, wind, and even other corpuscles of later origin.

Father Lebrun, in a pamphlet on *The Illusions of Philosophers concerning the Divining-Rod*, printed at Paris in 1693, seriously refuted the system of Vallemont. This pamphlet was republished in the third volume of Lebrun's *Critical History of Superstitious Practices* (Paris, 1702).

But Father Lebrun and a large proportion of those who took part in the discussion rejected the scientific theory altogether and attributed the facts to Satan. It was asserted that not only wicked people might obtain the divining power by a league with the devil, but that such an alliance might be made unconsciously and that the power might be conferred upon an unwilling subject as a means of ruin to his soul. Several cases are described at length in which persons in whose hands the divining-rod pointed out springs, etc., had been, by prayer and fasting and the help of their spiritual advisers, delivered from this dangerous gift. The authorities of the church favored this view, at least so far as any moral uses of the divining-rod were concerned. In 1701, the Inquisition of Rome condemned the divining-rod and all writings in support of it.

I condense from M. Chevreul's book the following list of the principal authors on the subject, for the period now under consideration:

Dr. Chauvin, of Lyons (a letter to the Marquise de Senozan, dated September 22d, 1692, published in the brochure *Superstitions anciennes et modernes*, Amsterdam, 1733; also in an appendix to the second edition of Lebrun's *Histoire critique des Pratiques superstitieuses*).

Dr. Pierre Garnier, of Lyons (a letter to M. de Sève, published November 10th, 1692, at Lyons). This, like the letter of Dr. Chauvin, advanced the corpuscular hypothesis.

Two anonymous letters concerning the divining-rod, published in the *Mercure* of January and February, 1693. The first combats the corpuscular hypothesis; the second argues that, although this explanation is to be rejected, there is, nevertheless, nothing supernatural, magical, or diabolic about the phenomena, and they are probably to be referred to physical causes as yet unknown.

M. de Couriers, a blind man and thorough partisan of the divining-rod (a letter in the *Mercure* of March, 1693).

M. L. de Vallemont, priest and doctor of theology (*Physique occulte, ou Traité de la Baguette divinatoire et de son Utilité pour la découverte des Sources d'Eau, des Minières, des Trésors cachés, des Voleurs, et des Meurtriers fugitifs*, Paris, 1693, 12mo, 608 pages). The argument of this book has been summarized above. Its purpose was to diminish the category of "occult" things by showing that the phenomena of the rod, like those of magnetism and electricity, were explicable by the physical corpuscular hypothesis.

Two letters published in the *Mercure* for April, 1693, by order of the Prince de Condé. One is anonymous; the other is addressed by M. Robert, *procureur du roi*, to Father de Chevigny. These are the documents which record the failures of Aymar; and the second concludes as follows: "His Serene Highness desires the assurance to be given to undeceive the public that the rod of J. Aymar is nothing but an illusion and a chimerical invention. These are the prince's words."

Father Lebrun (*Lettres qui découvrent l'Illusion des Philosophes sur la Baguettes, et qui détruisent leurs Systèmes*, Paris, 1693; also *Histoire critique des Pratiques superstitieuses qui ont seduit les Peuples et embarrassé les Savants*, Rouen and Paris, 1702). These publications have been alluded to above. The letters comprise an interesting correspondence among Father Lebrun and three of the foremost *savants* of France, Father Malebranche, the Abbé de Rancé (the celebrated Abbé de la Trappe), and the Abbé Pirot, Chancellor of the University of Paris. Lebrun (writing before the Lyons murders) narrates the alleged powers and performances of the diviners of Dauphiny, and asks Malebranche what he thinks of the matter. The latter, reasoning acutely on the data offered, decides that, as to physical objects (for example, springs), if the action of the rod is real, water on the surface must agitate it more powerfully than water underground, also that it can not be possible by any natural law to distinguish between the action of a small spring near the surface and a larger spring lying deeper. As to moral effects (discovery of murderers, missing landmarks, etc.), he concludes that, if the rod really does this without fraud, it can only be from a supernatural cause (presumably demoniac), and that the use of the rod is therefore to be condemned. Lebrun rejoins, agreeing with this view as to the moral effects, but suggesting the corpuscular hypothesis as to material objects. A second letter of Malebranche declines to yield this point, and positively ascribes the whole thing to the devil. Meanwhile, the Abbé de la Trappe consulted by Malebranche, and (like the latter) assuming for the sake of the argument, but not accepting fully the reality of the phenomena, says the discovery of murders, etc., must be ascribed to Satan, but the physical effects may be the result of a physical cause. Nevertheless, the use of the divining-rod should be discouraged altogether on religious grounds. Chancellor Pirot takes the same position, saying that the curés should forbid this practice as unlawful.

In his *Histoire Critique*, Father Lebrun gives a large number of instances in which the divining-rod has failed. He cites the provost of the Isle of France, who testified that he had often employed experts with the rod, both to detect criminals and to discover springs, and had never found one in whose hands the instrument was not "often variable and very often false." He shows the fundamental contradiction between two schools of practitioners, one of which declared that touching the rod with the same substance as the hidden substance which was causing it to move would stop the motion; while the other declared that this proceeding argumented the motion. The conclusion of the argument is, that the phenomena of the rod (which Father Lebrun appears to believe are sometimes free from conscious imposture) are due to an intelligent cause of some kind, and that this cause must be satanic.

Father Ménestrier (*Indications de la Baguette pour découvrir les Sources d'Eau, les Métaux cachés, les Vols, les Bornes déplacées, les Assassinats*, etc., published at the end of the author's *Philosophie des Images énigmatiques*, Lyons, 1694). This author takes the same view as the preceding.

M. Baritel (*La Verge de Jacob, ou l'Art de trouver des Trésors*, 1693). The translation of this book by Thomas Welton has been already mentioned. The author appears to hold the corpuscular theory of the Abbé Vallemont, with the addition (which I do not find in any of the views of Vallemont's book), that he ascribes the capacity of different men in the use of the rod to the effect of the planets under which they were born, and defines this effect to consist in opening the pores of some more than others, and filling some more than others with "active particles," which, being crowded out through the aforesaid open pores by the intrusion of exterior particles (from springs, metals, murderers, stolen goods, boundary lines, etc.), powerfully affect the rod. Whoever has from his favorable stars both particles and pores galore, can discover with the rod any thing he reasonably seeks. But he who has "only plentitude of particles with closed pores," will be sensitive to certain things only, to wit, such as move him most strongly, because the particles emanating from them violently eject *his* interior particles in spite of his less abundantly perforated epidermis.

The condemnation expressed by so many ecclesiastical authorities and by the Inquisition (October 26th, 1701) undoubtedly checked the use of the divining-rod for moral purposes. At least, we hear little of such applications in the eighteenth century. But believers in the rod were still numerous, and practitioners abounded, particularly in Dauphiny. The discoveries of Galvani put into the hands of the crude science of the day the materials for a new hypothesis, which was first applied to the so-called hydroscopes or water-diviners. One of the most celebrated of these, Bartholemy Bleton, was born in Dauphiny in 1750, and in 1780 was called to Lorraine by Dr. Thouvenel, who wished to study a good specimen of this art. The doctor, like his predecessors a hundred years before, tried credulous experiments and asked questions in abundance, and obtained a mass of supposed facts, out of which he immediately made a book, published in 1781, and called *Mémoire physique et medicinal montrant des Rapports évidents entre les Phénomènes de la Baguette divinatoire du Magnetism et de l'Electricité*. It would be useless to give the voluminous details of his investigation. The following points are, however, especially noteworthy. In the first place, Bleton apparently did not profess to discover immaterial qualities or facts, but chiefly confined himself to the detection of running water. In the second place, he frankly avowed that the rod possessed no power in itself by virtue of its form or material, and that it was merely an index, outwardly exhibiting to the spectators his inward feeling. This feeling the doctor declared to be a tremor, attacking first the diaphragm and communicating itself through the body and hands to the rod. In the third place, this tremor was found by Dr. Thouvenel to be weakened, though not destroyed, when Bleton was on a tree or ladder or another person's shoulder, instead of the ground, or when he touched electrified substances; but the tremor and also the movement of the rod were completely stopped when Bleton was insulated from the ground. Upon facts of this kind he based his electrical theory. I remark, by the way, that the observations and the theory of Mr. Latimer, in his recent work on the divining-rod, already mentioned, recall in a striking manner the performances of Bleton and the theory of Thouvenel. Mr. Latimer claims to have made the new discovery that the effect of the divining-rod is destroyed by insulating the

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practitioner, as, for instance, by placing him upon a platform supported by glass bottles. If he had known how thoroughly this claim had been examined and refuted, almost exactly one hundred years ago, he would have had less faith in its novelty and value.

Thouvenel's book made no little sensation, and in 1782 Bleton was called to Paris, where a remarkable series of experimental tests were applied to him. A newspaper report of the day declares that, in the presence of many thousands of spectators, he followed a subterranean aqueduct in the garden of the Luxembourg for fifteen thousand yards without a mistake. The chief-engineer of the water-works is reported to have said that the trace was so accurate that, if the maps of his office had been lost, Bleton's footsteps would have constituted a complete survey to replace them. It is just possible that the *Journal de Paris* was tempted to make a sensation of this case, and it is also quite possible that a keen observer might notice indications other than those of his own diaphragm, by which he could follow the line of buried pipes. A large number of experiments, more calmly reported, certainly do not sustain the enthusiasm of this account. It was found, for instance, that Bleton often passed over running water, when blindfold, without noticing it; and that when taken several times over the same course, he would not point out accurately each time the spots which he had previously marked. For example, of sixteen points once indicated, he recognized with the rod on the second round but eight, and missed the other eight. A single point to which he was repeatedly brought blindfold, he indicated three times and missed three times. Of seven channels of running water which he was made to cross repeatedly, he indicated one once in four times, another once in four times, and another once in three times, while still another, which he crossed in two spots, affected his diaphragm at one crossing, and not at all at the other. The insulation experiment was repeated by a physician at Paris. As a point where Bleton's rod was powerfully affected by alleged subterranean water, he was mounted upon a stool with glass legs, and immediately the rod ceased to be affected. When the stool was removed, however, and he stood upon the ground, the rod resumed its sensitiveness. But Dr. Charles, who conducted this experiment, took occasion, while Bleton stood upon the stool, to bring the top, without his knowledge, into electrical communication with the earth by means of a good conductor, thus destroying the insulation completely, though the hydroscopist supposed it still to exist. Under these circumstances, the rod remained inactive, and the destruction of insulation did not produce the slightest result. This was declared at the time to be a proof of Bleton's charlatanry; but, as we shall see hereafter, it is equally consistent with the hypothesis of unconscious mental and muscular action.

As a final test of Bleton's capacity as a hydroscopist, he was taken blindfold into the new church of St. Genevieve, where there was known to be no water for one hundred feet below the floor, the vaults, foundations, etc., actually extending all that distance below. Here he professed to discover at numerous points large and small streams of water. Thouvenel subsequently asserted that his *protegé* had been affected by currents of damp air circulating in the cellar; but this explanation was universally considered as a desperate attempt to maintain a theory already brought into discredit by experimental tests. Bleton, however, though he ceased to be seriously respected by impartial scientists, continued to receive much attention, and to do a thriving business, both in Paris and subsequently in the provinces. Here, however, he no longer worked blindfold, or professed to see with his diaphragm. He proceeded, like the ordinary water-diviners, with open eyes, studying all the natural indications, and coming to his decisions with abundant leisure; and under these circumstances it is beyond doubt that he rendered many valuable services to landed proprietors by successfully locating wells. In many cases, however, he failed entirely, and it is reported that, even in those in which he succeeded, he was seldom right as to the depth at which water would be found or the quantity which would be obtained. It should be mentioned that in Dauphiny, where Bleton discovered a large number of springs, he was regarded with an esteem never given to Aymar and some other famous hydroscopists. In other words, the people who knew most about the art of discovering water pronounced Bleton to be a real expert, while they believed Aymar and Parangue (of whom a word presently) to be more or less charlatans. A review of all the facts leaves little doubt that in Bleton's case there was an unusually large proportion of the skill of the prospector, combined with rather less than usual of the mysterious claims of the wizard.

Concerning Jean Jacques Parangué, mentioned above, it will be sufficient to say that he was born in 1760, near Marseilles, was said to have been peculiarly sensitive as a child to the presence of subterranean waters, and became famous as a hydroscopist; but he used no rod at all, and the scientific theory advanced by his friends was one of clairvoyance. His eyes was described as very peculiar, and it was asserted that he saw water through rocks, earth, or masonry, but, strangely enough, not through wood, crystal, or glass. Like Bleton, he often deceived himself as to the volume and depths of the springs he discovered.

Dr. Thouvenel never saw Parangue, but defended him against the incredulity of the physicists, and undertook to show that the phenomena of clairvoyance even was merely a case under his electrical theory. According to his explanation, the delicate nerves of the eyes were affected by the electrical currents traversing the body, and therefore the clairvoyant really experienced the sensation of vision by an internal, not an external excitation. Those who have read the admirable treatise of the late Dr. Clarke upon *Pseudopia* will notice with interest that in this case Dr. Thouvenel, explaining imaginary facts by an untenable hypothesis, nevertheless came very near a true physical theory of visions.

The worthy doctor emigrated at the time of the French revolution, and carried with him to Italy another Dauphinese hydroscope named Pennet, whom he exhibited from city to city in support of his electrical theory. Pennet professed to find with his rod not only water, but buried metals and coal. I will not go at any length into the experiments. Some of them were striking and successful, and impressed even such *savants* as Spallanzani, more or less predisposed to expect discoveries in the new domain of animal magnetism. In many other cases, however, the experiments failed. For instance, in a trial of three days, at Padua, before a commission of *savants*, Pennet promenaded for two hours on the first day in a garden in which had been buried at different points four metallic masses and a thousand pounds of coal. He could not find the metals at all, and only after much difficulty indicated the coal. On the second day, his ill success was equally marked. Finally, on the third day, of three metallic deposits, he failed to find the first, came pretty near the second without exactly hitting it, and found the third. The area covered by the search was only eight hundred and forty square feet. Upon this test, Spallanzani revoked his favorable opinion. But at Flor ence, as reported by M. Bilot (*Mélanges Scientifiques et Litteraires*, 1857, tome ii., p. 80), though I do not know on what authority, Pennet was so completely disgraced as to render worthless all evidence furnished by his career. A walled inclosure was prepared for experiment. It contained ninety small divisions, in five of which metals had been hidden. Dr. Thouvenel having discovered that wet weather hindered success, the experiment was delayed until after eight dry fine days, and it was then fixed for the following day. During the night which intervened, Pennet climbed by means of a ladder into the inclosure. A suspicious person who was watching the ground removed the ladder, and whatever the divining-rod could show, it was unable to show the prisoner the way out. This adventure, being made public, destroyed the credit of Pennet at Florence. Dr. Thouvenel could not deny the fatal fact, but, with true loyalty to science, declared that Pennet's moral defects had nothing to do with his physical faculty. It is only fair to add that no such passage as this is cited from Dr. Thouvenel's works.

(TO BE CONTINUED.)

SOME TESTS FOR THE EVAPORATION OF THE HORIZONTAL STEAM-BOILER

Prof. Henry Morton, of the Stevens Institute of Technology, Hoboken, N. J., has been making some tests for the evaporation of the horizontal steam-boiler, in order to ascertain what the efficiency is. His trials so far have demonstrated that the usually rated 50 horse-power horizontal boiler, with a heating surface of 850 square feet, and 24 feet grate surface, will be 9·25 pounds of water per hour with a bituminous coal containing 16 per cent of refuse matter, from the temperature of 212 degrees feed-water, with a rate of combustion of ten pounds of coal per square foot of grate surface per hour, or 11·04 pounds of water per pound of combustible, the temperature in the chimney being 375 degrees Fahr. The tests are not complete, and are to be carried on further, when a fuller report will be made. A very extended trial is to be had, which will include natural and forced draught and the various other circumstances under which the boiler may or might work.

THE STRENGTH OF WIRE ROPES.

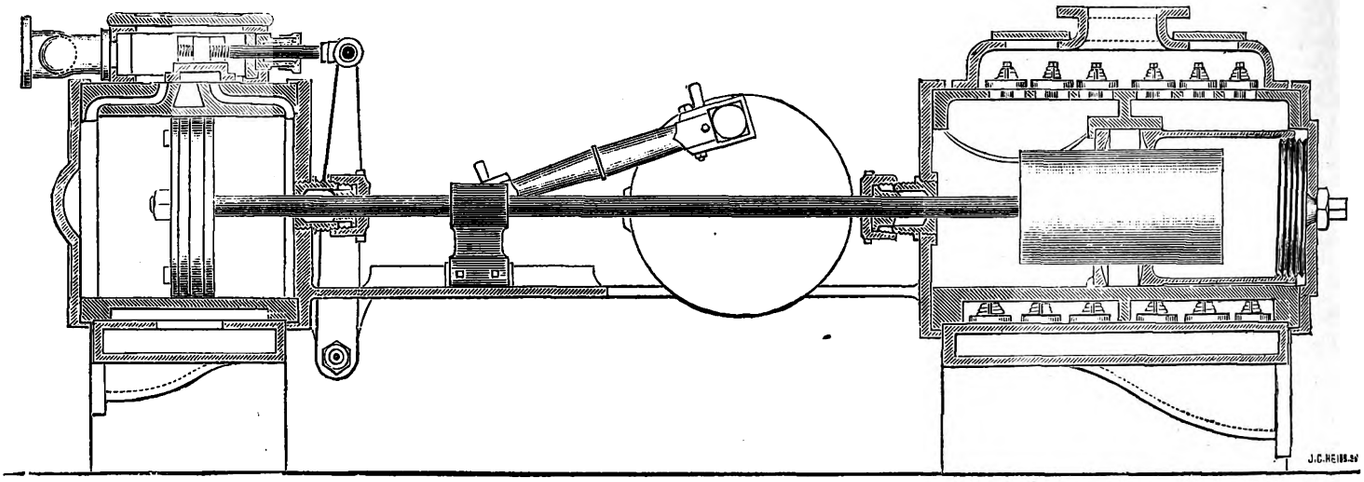
Winding-ropes when in use stretch from 4 to 1 per cent of their entire length, without impairing their strength. This usually takes place during the first six months of working; but while this lengthening process is going on, if the wires are not twisted to the same extent, considerably more strain will be put on some than others; therefore to mitigate this, the strands are wound around a central core of hemp, as ropes with wire *centers* have not given satisfactory results in practice, although a greater breaking strain is obtained with a relatively smaller rope. The same may be said of iron centers. These will not stretch and accommodate themselves to the elongated strands; consequently, the center is liable to break and spoil the rope. In the case of hemp centers, they stretch with the strands and also allow the wires to bed themselves with more solidity. To provide for the stretching of the ropes, large links are put between the detaching-hook and cap. These are kept in sets of 1, 2, 3, and 4, so that if the rope had stretched 1¼ feet, and 4 links were in, these would be replaced by a set of two. When all the links have been removed in this way, then an additional coil will have to be put round the drum-shaft if the rope requires further shortening. Sometimes *strands* are made with eight or more wires wound around a hemp core, but are not recommended, except in the case of wet pits, with galvanized steel wires; in this way they have been found to answer very well, as they do not corrode. For ordinary work, experience demonstrates that ropes are best made with hemp *centers* only, which should be hard and well rounded up. Six strands of nineteen wires each make the most durable ropes. These work better than one composed of six or seven wires in a strand, as the latter, being larger and less pliable, are more likely to snap in bending around wheels and drums. When three of four of these large wires break near together, the rope is hardly fit for work, whereas the breakage of that number of small wires would be of little consequence. The small wires last a long time, as there is not much friction where large pulleys are used, and the inside wires are not affected by it at all. However large the wire may be, the least wear on the outer surface weakens it considerably. At the same time, a strand of seven wires, equal in size, is nearly perfect, each touching its neighbor, and also the center one. Six strands in a rope are better than four or five, as they make it rounder, and consequently the friction is better distributed.

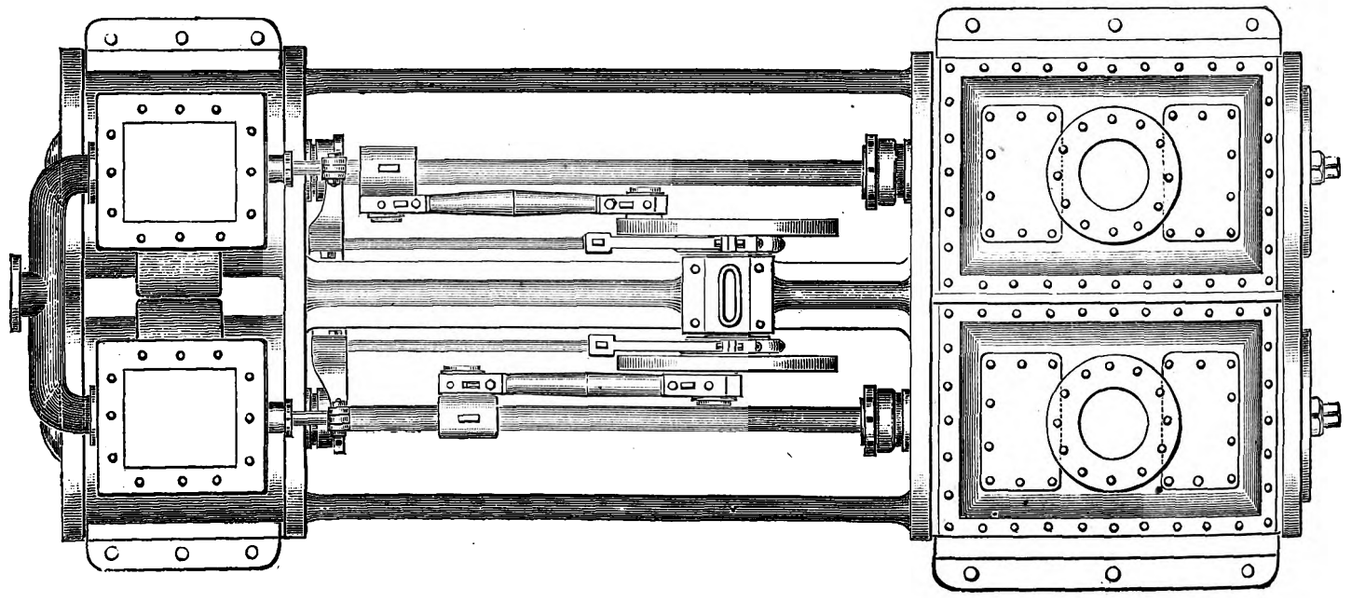
A COKE-BURNING LOCOMOTIVE.—Several experienced Western mechanical engineers visited Philadelphia recently, to inspect the new locomotives of the Reading Railroad. One of these engines was prominently brought into notice by its performance on the Chicago, Burlington & Quincy Railroad during the Chicago Exhibition, and afterward on the Baltimore & Ohio Railroad. Particular interest attaches to the capacity of the locomotive to use coke for fuel, as that combustible, being entirely free from smoke, will not only at once relieve the Western companies from the penalties for infractions of the laws for the prevention of the smoke nuisance, but will secure greater comfort and pleasure to the traveling public. The tests of the locomotive demonstrated that continuous runs of two hundred miles can be made with coke fuel, without any further attention on the part of the fireman than simply feeding the furnace, and that meanwhile no clinker or other obstruction to the draught occurred during the trials, which were of a most exacting nature. The coke used was the product of the Connellsville Coke and Iron Company, and its chlorific efficiency was found to be in excess of seven pounds of water evaporated for each pound of coke consumed. At the request of the visiting experts, further evaporated tests of the same kind of fuel are to be made in one of these locomotives.

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THE HENWOOD DOUBLE-ACTING PUMP.

As the result of twenty years' experience in the building of mine and quarry machinery, Messrs. Henwood, Whitaker & Co., of Philadelphia, have recently brought out a new design of double and direct-acting steam plunger pump which has a number of features of special merit. Our illustrations will aid in fully explaining their character and scope. With a view to overcoming the trouble and expense incident to the wearing of cylinders and metallic packing rings, especially when dirty or gritty water is handled, the pump proper is made as follows: The plunger has no metallic contact, but works through hemp or elastic packing in the internal stuffing-box shown in the accompanying vertical section. The packing may be compressed at will about the plunger by a movement of the cage, the back end of which screws upon a brass junk ring threaded on the outside. Fastened to the junk ring is a wrought-iron stem which passes through





the pump cylinder-head and ends in a square bolt. After loosening the lock-nut, a wrench may be applied, the junk ring be turned, and thus the cage with its annular end be forced forward, compressing the packing. We are informed that the packing will last from one to six months, according to the character of the water and the duty required, and then the replacing of three rings of hemp requires only ten minutes' time. The water-ways are large and direct, as will be seen, thus giving free passage to sand and mud. In a number of tests made under unfavorable circumstances, the pump discharged from 30 to 35 per cent of river sand.

The plain steam valves are made with the necessary lap to expand the steam from 15 to 40 per cent, so that to a great extent the advantages of compound pumps are secured, without sacrificing simplicity. The slide-valve is worked by a lever which gets its motion from the eccentric, which has one half the throw of the valve, thus giving an advantage in the smaller sizes of pumps, where the eccentric is placed on the circumference of the crank-wheel. The engines are geared at right angles, the cross-heads being attached directly to the connecting-rods and piston-rods and working on guides as shown in the drawing. Being a crank-pump, it has a positive motion and positive length of stroke through all variations of speed. The suction and steam exhaust pipes are placed beneath the pump, thus making every thing free and clear about the pump.

HIGH SPEED IN ENGINEERING.

Mr. Percy Westmacott, President of the British Institution of Mechanical Engineers, in his annual address before the recent Liége meeting, made the following interesting remarks: There is a proverb, "More haste, less speed," but this, though true of human labor, which ceases to be accurate when forced beyond a certain rate, does not hold good of mechanical processes. Generally, it may be said that rapidity of working not only reduces cost, but improves the result, and also confers great benefits from the way in which it brings out and perfects the highest qualities of the engineer. To be able to do a thing leisurely and quietly, simply requires the rudest materials and the rudest workmanship; but if the work is to be done quickly, or the appliances made to move quickly, the case alters. Mechanical energy increases as the square of the speed; and so it may be said that the mental energy and skill required to carry on work increase also at something like the square of the speed with which that work is performed. The materials used must be far stronger and far finer; every thing must be well proportioned and balanced; there must be the most perfect arrangement in each structure and in every part of a structure; the most perfect workmanship in the fitting of these parts together; and thus we may almost reverse the proverb, and say of mechanical processes, "The higher the speed, the better the work."

This view opens out so wide a field for contemplation that to traverse it even rapidly would require rather a volume than a paper. All that can be done at present is to give a very few obvious illustrations of the subject. Take, for instance, the steamship with her engines and accessories, more especially the modern ship of war. There is scarcely any structure which requires so much care and skill, both in its design and execution. Not only does it involve all the problems which occur in erecting steam machinery on land, but in addition the vessel has to contend against the heavy and uncertain strains due to wave action during the roughest weather. Hence all parts of the structure, and especially the engines and boilers, should be so designed and constructed, and the materials so selected, that their weight may be reduced to the lowest point. Every increment of speed attempted to be given is accompanied with complex questions of increasing difficulty, taxing the skill and power of the engineer to the uttermost. The development of the compound condensing engine, for instance, is largely due to the marine engineer, who was

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driven by necessity to study most closely the economy of fuel, in order thereby to gain speed.

The torpedo-boat is an excellent example of the advance toward high speeds, and shows what can be accomplished by studying lightness and strength in combination. In running at 22½ knots an hour, an engine with cylinders of 16-inch stroke will make 480 revolutions per minute, which gives 1280 feet per minute for piston speed; and it is remarked that engines running at that high rate work much more smoothly than at slower speeds, and that the difficulty of lubrication diminishes as the speed increases: doubtless the experiments on friction which are now conducting by this institution will throw light upon this subject.

An important experiment in high speed in light vessels, which will doubtless be watched with much interest, is now carrying out. Mr. Loftus Perkins is building a steel vessel with a screw at each end. She is 150 feet long; her boiler pressure will be about 800 pounds per square inch, and she has a four-cylinder compound condensing engine of 800 horse-power working on to a single crank, and making from 400 to 500 revolutions per minute. When this vessel is laden with 300 passengers, her total weight will not much exceed 150 tons. Should this experiment be successful, it will materially advance the solution of the problem, how to put the largest possible amount of propelling power into a vessel, and so to drive her at the highest possible speed.

Again, in touching upon speeds, the mind naturally reverts to railroad traveling. Here, however, it would seem as if, for the present, we had reached a maximum. It is surprising how soon the speed of the locomotive was brought up to something approaching its present limit. George Stephenson was laughed at in 1825 for maintaining that trains would be drawn by a locomotive at twelve miles an hour; but the Rocket herself attained a speed of twenty-nine miles an hour at the Rainhill competition, in 1829, and long afterward ran four miles in four and a half minutes. In 1834, the average speed of trains on the Liverpool & Manchester Railroad was twenty miles an hour. But by 1840, there were engines on the Great Western Railroad capable of running fifty miles an hour with a train, and eighty miles an hour without. In 1841, we find Stephenson himself ranged on the side of caution, and suggesting that forty miles an hour should be the highest regular speed for trains. Now, it is a remarkable fact that the highest speed at which locomotives run in ordinary practice scarcely seems to have been raised during the last twenty-five years; on the other hand, the weight of the trains has been perhaps doubled. Although the average running time of express trains has in many cases been improved, this has been almost entirely due to their making fewer stoppages. At the same time, the speed occasionally attained is very great. Engines on some of our principal lines have repeatedly run fifteen miles in twelve minutes, or at a speed of seventy-five miles an hour, and express trains run regularly at fifty-three miles an hour. It does not follow, however, that there is never to be any increase in the speed of trains, and it seems a point well worth consideration in what way the time of transit between important centers of trade can be shortened.

What are the causes which have tended to prevent any improvement in this particular? In the first place, it may be said that the permanent way would suffer seriously by further increase in speed; but this could surely be overcome in time by improving the permanent way itself, which also remains very much in the same condition and of the same construction as it was twenty-five years ago. Again, it may be said that the running at a higher speed would require more powerful engines, and hence that trains now worked by a single engine would require two, or would have to be split up into two trains, at a great increase in running expenses. This, however, assumes that it is not possible so to improve the engine that it shall be able to exert a considerably higher power without an inadmissible increase in weight. By utilizing a larger part of the total weight of the engine as adhesion weight, it would be easy to obtain the amount of adhesion required for the increased tractive force; and for this purpose Mr. Webb's compound locomotive (to be described by the author in a paper he has prepared for this meeting), which enables the number of driving-wheels to be increased without the use of coupling-rods, appears to merit particular attention.

Another point in which improvement may possibly arise in the future should be noticed. On the Russian railroads, where both coal and wood are dear, the burning of petroleum has now taken a practical form. Our member, Mr. Thomas Urquhart, has been very successful in this direction, and is now running locomotives regularly which use only petroleum refuse, and which show a marked economy over coal or wood. To test the point, he prepared three locomotives of exactly the same type, and started them on successive days under exactly similar conditions of weather, train, and section of road. The trips were made both ways, and the results per verst, including fuel required in lighting up, were as follows:

Anthracite, 52·9 Russian pounds, cost	26·35 copecks.
Wood, 0·0107 cubic sashin, cost	23·54 "
Petroleum refuse, 27·36 Russian pounds, cost	11·64 "

There is thus in this instance an economy of at least 50 per cent on the side of petroleum, the boiler pressure being from 120 pounds to 130 pounds, and the gross load over 400 tons. At the same time, the weight of fuel used, as against coal, is diminished by about 50 per cent, which is a most important item.

Although petroleum is scarcely a product of Western Europe, we have to notice on the other hand the progress which has lately been made in the extraction of oil as a waste product from coal, etc. Mr. Jameson has extracted as much as nine gallons per ton from mere shale. It is suggested that markets for such oil will be difficult to find; but it seems allowable to hazard the idea that we may hereafter see our locomotives, even in England, running with oil fuel, which would be at once much lighter and much more easily renewed than the coal which is used at present, and get rid of the intolerable nuisance of smoke and dirt. There might, in fact, be an oil-tank and a water-tank side by side at every stopping station, and the engine would replenish her store of fuel at the same time as her store of water.

For a special case, where speed is not only a means of doing work well, but an indispensable condition of doing the work at all, we may take the construction of long tunnels. As to this, we have the advantage of two very valuable papers on the St. Gothard Railroad, prepared by Herr Wendelstein, of Lucerne, one of them already published in our Proceedings, the other to be read at the present meeting. The piercing of a tunnel nine miles in length through the main chain of the Alps would be a financial if not a physical impossibility, but for the enormously increased speed of working which has been offered us by the invention of dynamite on the one hand and of rock-drilling machines on the other. As a result, we find that the St. Gothard Tunnel, nine miles long, was completed in nine years; while the Arlberg Tunnel, begun with the advantage of the St. Gothard experience, will be completed, it is confidently expected, at a rate 50 per cent quicker. As regards the driving of the leading heading (the crucial point in tunnel work), the rate at the Laveno Tunnel is stated to have reached 19 feet per diem. Even in the hard granite of the Pfaffensprüng on the St. Gothard, the rate of advance, with the Brandt hydraulic drill, reached a maximum in May, 1880, of 13 feet per diem. At the Arlberg Tunnel, I believe that still better results have since been attained with the same machine.

HISTORY OF THE IRON INDUSTRY IN THE LIEGE DISTRICT, BELGIUM.

By M. Edouard de Laveleye, of Liege.*

It is difficult to say exactly how the art of working iron originated in those provinces of ancient Belgium, which have since become known as the district of Liége. It is certain that Asia was the cradle of iron working, and it is possible that the Eburones and the Nervii, the ancestors of the present Belgians, brought with them from the Euxine, where they had their origin, secrets which had been already known for ages in that district. However this may be, it is almost certain that, when Cæsar arrived in Gaul, he found among the tribes he subjugated a knowledge of the art of transforming the ores of iron into a metal which they used for different purposes, especially that of arms. The discovery, in 1870, of ancient furnaces, still filled with materials, at Lustin, near Namur, enables us to understand the primitive method employed for the manufacture of iron. The furnace consisted of a single excavation in the ground, oval in form and rounded at the bottom; it was about twelve feet long by nine feet wide and three feet deep, and was formed in a bed of clay; a channel pierced through the clay allowed air to enter the bottom of the furnace. In this hollow was found the metal, which contained 93·48 per cent of iron, 0·37 of carbon, 4·94 of fusible materials, and 1·21 of sulphur and phosphorus. It is probable that the Romans communicated to the ancient Belgians the use of the bellows, which had long been known to them; and that other improvements were made during their rule in the art of treating iron ores. The invasion of the German tribes probably stopped the impulse given by the Romans to the manufacture of iron. In the eighth century, under Charlemagne, appeared the furnace) called the *borneau à masse*, or Stückofen, which was higher than the old furnaces, and thus allowed a greater concentration of heat. Between the eighth and the twelfth century, the iron trade developed considerably, and the metallurgist Karsten cites the Low Countries as the district where the manufacture of iron at that period had reached its highest perfection. From thence to the fifteenth century, the progress realized was small. In 1468, moreover, the iron-works of the Liége District were almost entirely destroyed by the troops of the Duke of Burgundy. It should be remarked that up to this time malleable iron was almost the only product; but Karsten who has been cited above, observes that the first apparatus for producing cast-iron was established in the Low Countries, whence the art extended into Sweden and England. The oldest blast-furnace appears to have been constructed near Namur, in 1340. It is, at any rate, certain that before 1400 the foundry pig blast-furnaces of Les Vennes and Grivegnée, near Liége, were well known. During the succeeding three centuries, the number of blast-furnaces grew so rapidly that in 1700 an edict of the Prince-Bishop of Liége forbade the erection of any new furnaces for the next twenty-five years. The use of coke as fuel for blast, was introduced from England at a relatively recent period. In 1769, an attempt to smelt iron ores by means of coke was made at Juslenville, near Spa, but without success. On the other hand, wood becoming scarce, raw coal had been used for the finishing of malleable iron as early as 1627; but its employment in the process of transforming cast-iron into malleable iron was also of foreign importation. This process became common in England while it was still unknown in Belgium. It was in 1784 that Cort and Partnell invented in England the puddling-furnace and grooved rolls. Those improvements were introduced into Belgium, but the French revolution shortly afterward put an end to all progress in industrial arts, and the works of the Liége District were in great measure reduced to a condition so deplorable that it was necessary to close them. There was, however, no long intermission of activity. In 1800, circular blast-furnaces were found to be replacing the octagonal furnace hitherto in use. Their hight was at the same time raised from 15 feet to 25 feet. In 1803, the casting of cannon was commenced at Liége, and soon became the largest industry of the province. The idea, however, was still general that the coal of Liége was not fit for making coke, and it was not until 1823 that an Englishman, whose name has become celebrated—John Cockerill—erected at Seraing the first blast-furnace, using coke as its fuel. This furnace remained unique of its kind until 1830; it was the origin of the works of the Cockerill Company, one of the most important on the continent. About the same time—in 1821—Michael Orban erected at Grivegnée the first puddling-furnace and the first rolling-mill on the English pattern. After 1830, the iron trade of Liége made a sudden start under the double influence of the introduction of railroads and the inauguration of large financial companies. In 1839, and afterward in 1848, serious crises occurred in the trade; but these reverses were succeeded on both occasions by new advances in prosperity. Hitherto, the only ores treated in Belgium had been those from the district of the Ourthe and that between the Sambre and the Meuse. These ores are now almost exhausted down to the level from which water could be pumped to give a profit, and the iron trade of Belgium could not have continued had not new raw material been brought into use. There exists in the Devonian formation an important bed of oligiste or specular ore, of an oolitic character; but for a long time this mineral was considered impossible to reduce. In 1853, however, the blast-furnaces of Ougrée produced a revolution in the Belgian iron trade

* Institution of Mechanical Engineers.

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by succeeding in the utilization of these ores, and the trade then entered upon a new series of prosperous years. We may now proceed to the improvements introduced into blast-furnace working. In 1803, the bellows, which had been in use from the earliest times, began to be replaced by blowing-engines with metallic pistons; and in 1837, the Cockerill Works took the initiative in introducing the hot blast. It was the same works which introduced into Belgium the making of Bessemer steel. The first converters were erected in 1863. It is probable that the discovery of the cementation process for the making of steel had its origin in Liége. At the beginning of the seventeenth century, in 1613, a permission to convert iron into steel is found to have been officially accorded to two armorers of Maestricht, a town which then belonged to the province of Liége. Karsten is, therefore, right in saying, "England, which has now become the school of iron metallurgy, owes to the continent"—in fact, as we have said, to the district of Liége—"two great discoveries, namely, that of the blast-furnace and that of cemented steel." Our notice of the iron trade may be concluded by some details as to its situation at the present time. The discovery of the means of reducing the specular iron ores, at the time when the old ores were exhausted, saved the district from ruin. At this moment, however, the former ores in their turn are nearly exhausted, and the blast-furnaces are almost exclusively supplied, as far as pig-iron for puddling is concerned, from ores raised in the Grand-Duchy of Luxembourg, and, so far as steel pig is concerned, from ores raised in Spain. Thus, during the year 1882, the blast-furnaces consumed 394,405 tons of foreign ores, of which 182,842 tons came from Luxembourg, and 152,023 tons from Spain and Algeria. On the other hand, only 82,612 tons were indigenous ores. As a set-off to this disadvantage, the Belgian works are placed in the center of a district producing coke, which is cheap and of good quality. They are in a country where prices are in general favorable, where labor is abundant, and where workmen are skillful. The ores of Luxembourg are relatively poor in iron, and contain a good deal of phosphorus; but they fuse with great rapidity, inasmuch as they frequently contain a flux within themselves. They have gradually modified the nature of the Belgian trade. A restricted make of superior quality, has given place to a largely increased make, but no longer of so high a character. The tendency at this moment is, however, to place the blast-furnaces in the localities where ore is raised, and the works for finishing the iron at the centers of the production of the fuel. It is found more economical to carry over the same distance a ton of coke and a ton of pig than to carry three tons of ore and flux. This has produced a displacement of the pig-iron industry, which has been transferred in part to the southern part of the Luxembourg province, in the neighborhood of the mines. On the whole, the Belgian iron trade has thus received a fresh advance, in place of declining, as a consequence of the exhaustion of its native ores. In spite of all the disadvantages which weigh on the country, the care given to every detail, and the application of strict economy even in the smallest points, have preserved to Belgium her place in the metallurgic world, and enabled her to contend successfully against the most powerful competitors. A few figures will be enough to show the progress which has taken place. It is known that the low hearths formerly in use produced in 1546 about 300 kilograms of iron—6 cwt.—in twenty-four hours. At the end of the sixteenth century, the blast-furnace then in use produced about three tons per day. At the end of the eighteenth century, it remained almost the same. A furnace at Chimay produced about 720 tons per annum. For any very great advance upon this, we must go forward to the coke-furnace erected at Seraing by John Cockerill in 1823. This furnace produced about 10 tons in the twenty-four hours. About 1840, furnaces of a new type, erected about the same time in the Cockerill Works and in those of Espérance and of Grivegnée, regularly produced 14 tons of foundry pig or 20 tons of refinery pig per day. In 1848, 24 tons were considered a good average make per day; and in 1860, the Grivégnée furnaces, which gave the best results in production, did not run more than than 9000 tons of pig per annum, or about 25 tons per day. The make has now very largely increased. The Seraing furnaces produce from 65 to 68 tons of Bessemer pig per day, while at Ougrée, two furnaces produced altogether in 1882 more than 41,000 tons. In making pig-iron for ordinary puddling, a make of more than 90 tons per day has been attained. The blast-furnaces at Esch, on the Alzette, in the Grand-Duchy of Luxembourg, produce as much as 110 tons per day. As to wrought-iron, it is difficult to give exact figures. The skill of the workman is a main element in the quantity produced; and the improvements effected by the substitution of coal for wood have had a large influence on the price, without greatly changing the capacity of production. The attempts to puddle by machinery have had little success, and progress has been realized chiefly in the economy of fuel by means of gas-furnaces, especially the Bicheroux furnace. Whereas formerly about one ton of coal was required for every ton of puddled bar produced, 550 kilograms (11 cwt.) are now sufficient. As regards steel, we shall only consider the steel produced by the converter process. The first Bessemer converters, erected at Seraing in 1863, gave from 10 to 12 tons of steel per day. At present, each pair of converters may be reckoned on to give from 150 to 160 tons in the twenty-four hours; and on the new American system, 340 and even 360 tons have been obtained. As a matter of statistics, the annual production of the works in the province of Liége was estimated in 1829 at 7078 tons of pig-iron, 660 tons of castings, 5011 tons of wrought-iron, and 4778 tons of iron manufactured for various purposes. The manufacturing works employed 711 workmen. In 1850, the make of pig-iron had risen to 65,393 tons, that of castings to 7688 tons, that of wrought-iron to 28,252 tons, and, lastly, that of manufactured iron to 7093 tons. In 1882, we find that the province of Liége contained 13 blast-furnaces actually in blast, and employing 1215 workmen. The make of pig-iron was 238,968 tons. The production of wrought-iron and manufactured iron was 126,461 tons, and occupied 5180 workmen. Lastly, the steel-works contained 9 converters, produced 171,937 tons, and occupied 2747 workmen. The average wages of the workmen employed at the blast-furnace is 3 francs per day; those employed at works for making or for working up wrought-iron get an average of 3·46 francs per day; while those employed at the steel-works, properly so called, have on an average 3·58 francs per day. These works, on the whole, have been actuated by 478 engines of various kinds, giving a total of 14,688 horse-power.

CHEAP COAL.

There is hardly an important industry in the cost sheets of which fuel does not constitute an important item, directly and indirectly. During periods of depression like the one through which we are now struggling, every factor is closely scanned by the producer, adversity teaching many methods of economy which prosperity slighted. Improved construction of boiler furnaces and the highest class of modern engines are carefully studied with the view of carrying down the coal bills. Consumers have become very close buyers, and many of them have frequent occasion to rejoice over their success in getting cheap supplies of fuel. Undoubtedly, low figures often tempt them to disregard true economy and sacrifice quality to quantity; but on the whole, there are many evidences that consumers have learnt a good deal during the past year which they are not likely to forget. The question frequently comes up whether it is or is not probable that the benefits of cheap bituminous coal, which consumers throughout the country are now enjoying, are likely to outlast the present period of dullness.

A comparison of the quotations of bituminous coal from a variety of sources in the leading markets will show what point we have reached, and will form the basis upon which a further discussion may take place:

New York.

	Jan. 1, 1882.	July 1, 1882.	Jan. 1. 1883.	July 1, 1883.
Cumberland	$5.00	....	$4.65	$4.00
Clearfield	5.00	$4.20	4.60	3.75

Boston.

Cumberland	....	....	5.45	4.50
Clearfield	....	4.90	5.50	4.45

Philadelphia.

Cumberland	3.60	....	3.30	3.15
Clearfield	3.60	3.45	3.30	3.10

Pittsburg.

Pittsburg, lump	6c. per bush.	5¾c.	...	5c.
Coke at oven	$1.65	$1.50	$1.30	90c.

Cincinnati.

Youghiogheny, 2d pool	10c. per bush.	8c.	8½c.	7¾c.
Kanawha	9c. "	7c.	7c.	6½c.
Ohio River	7c. "	6c.	6c.	5½c.

New Orleans.

Pittsburg coal	36c. per bush.	28c.	35c.	30c.

Cleveland.

Brier Hill	....	....	$3.45	$3.25
Massillon	....	....	2.75	2.60
Tuscarawas	....	....	2.25	2.15

Chicago.

Indiana Block	$4.00	$3.25	$3.40	$2.85
Hocking Valley	5.00	4.00	4.00	3.25
Wilmington	3.50	2.75	3.00	2.50

The principal causes of the low figures quoted above are a very great increase in the output and capacity of our mines, a very rapid extension of the railroad system directly tributary to the coal traffic and indirectly affording it increased facilities to leading points; and a general scaling down of wages. Taking up these points in their order, so far as they affect not alone an absolute but also a relative decline in the prices of bituminous coal, we may first note the evidences of a striking growth in the output and capacity of the mines. As to their production, we need only point to the eloquent fact that our mines yielded about fifty-eight million tons of bituminous coal in 1882. We have not, unfortunately, comparative figures on the growth of the capacity of the same mines; but the very fact that the mines were busy during the census year, while, generally speaking, they were working only three-quarter time or less last year, proves that in all likelihood their capacity has grown in even a much greater ratio. Competition, not alone among the producers of our region, but also among regions which have only of late come into conflict, will therefore tend to keep prices low, as no scarcity need be feared.

The extension of our railroad system during the past few years has been phenomenal, and, save the development of the system opening out the Western agricultural regions, the railroads distinctively called "coal roads" have multiplied more than any other. Coal is recognized among railroad managers as one of the best-paying classes of freight, and aside from this fact, the tempting opportunities for the acquirement of wealth by individuals having close relations with the railroads may have contributed much toward stimulating this class of enterprise. Pennsylvania has seen the starting of the Vanderbilt lines southward, through almost a continuous belt of coal territory. A number of rival lines are approaching to tap the Clearfield region; the Rochester & Pittsburg has begun shipments from new territory; the Pennsylvania, Baltimore & Ohio, and Vanderbilt roads are struggling for supremacy in the Connellsville coke district; and a number of minor enterprises are opening out smaller fields. In Virginia and West Virginia, the Chesapeake & Ohio, the Pittsburg & West Virginia Central, and the Norfolk & Western have entered districts in which great mineral treasures lie dormant. In Alabama and Tennessee, coal mining has had a strong and undoubtedly lasting impetus. In Ohio, Indiana, Illinois, and other Western States competitive lines are multiplying, and in the far West the building of a large number of new roads has fairly started an industry that is capable of great development. Almost as great an influence upon the prices of coal and the variety of sources available to the markets has been exercised by the building of railroads not primarily intended to develop coal territory. It has created and fostered a competition which has not only run down freight rates, but has also placed a formidable rival to interior and ocean navigation. A survey of the situation, cursory though it may be, will, we believe, convince the unbiased observer that there is no probability of a heavy increase in the cost of carriage.

The only factor which is liable to perhaps a strong upward movement is that of labor, which is undoubtedly now low. This, however, will probably be counterbalanced by a wider use of labor-saving devices both in mining and in handling the coal. There may therefore be, in times of greater activity, an upward movement in prices; but we do not look for any relative increase.—*Coal.*

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AN ELECTRICAL LAUNCH.

A launch propelled by electricity was shown on the Thames on several occasions last year, and attracted a good deal of attention. It was propelled by a screw driven by a Siemens motor and Sellon-Volckmar accumulators. To a certain extent, the experiment was successful. Recently Messrs. Yarrow & Co., of the Isle of Dogs, took the matter up, and, working with the Electrical Power and Storage Company, a very handsome launch has been fitted up, intended for the Vienna Exhibition, with which many experiments have been made. On Tuesday, this little boat made a run from the Temple Pier to Greenwich in thirty-seven minutes, with a moderate tide. Some delay was, moreover, caused by the propeller fouling a basket, an event well known to every one who has had any experience with steam launches on the Thames. The distance is six miles, so that, making allowance for the tide, it may be said that a speed of over seven miles an hour was attained, and full power was not employed save for a portion of the time. On the measured mile, an average speed of over eight miles an hour has been obtained.

The boat is 40 feet long and of good beam. She had twenty-one persons on board, including the steersman and a man to look after the machinery, if such it may be called. The boat is completely unencumbered from end to end, no trace of the propelling mechanism being visible. This consists of eighty cells of Sellon-Volckmar accumulators, of which fourteen are disposed under the seats, seven at each side, and the remainder in the bottom of the boat under the floor. The screw is turned by an A Siemens dynamo commutated as a motor. No gearing is used, the spindle of the armature being coupled directly on to the end of the screw-shaft. The thrust-block is just aft of the dynamo, which is placed under the floor in the stern-sheets. It lies flat and occupies very little space. There are four brushes, two for going ahead, two for going astern, and two small lines going to a becket beside the steersman enable him at a moment's notice, by pulling one or the other, to go ahead or astern; a cylindrical switch beside him enables him to stop or go on at pleasure. This switch is graduated so that the current from forty, sixty, or eighty cells can be used at pleasure. The weight of the whole—batteries and dynamo—is about two tons, or as nearly as possible that of engine, boiler with water, and coal for a steam-engine competent to propel her at the same speed.

This pretty launch is the very perfection of a pleasure-boat; no heat, no smoke, no dust, no steam, no smell of oil, no splashing of pumps. There is no noise of any kind to be heard save the bubbling of the water from the propeller, and the faint hiss caused by the commutator rubbing against the brushes. There is no smell and no "blacks;" and the boat will run for six hours continuously, or about forty-five miles.

During the trip to which we are referring, the current passed through the dynamo was 41·22 ampères from sixty cells, the electro-motive force being 112·5 volts, and $\frac{41{\cdot}22 \times 112{\cdot}5}{746} = 6{\cdot}21$-horse power. The loss by friction, etc., must be very small; for six indicated horse-power could certainly not have propelled the boat at the speed she readily attained. It has long been known that the screw is an extremely wasteful propeller. It may be that further investigations will show that the screw is not so much to blame as the combination of screw and engines. At any rate, the system of electrical propulsion opens up a new field of inquiry, because it renders possible the use of screws of extremely fine pitch revolving at a great speed. The dynamo in Mr. Yarrow's boat makes about 680 revolutions per minute. The propeller is of steel, two-bladed, 19-inch diameter, and 13-inch pitch. There is absolutely no vibration, and very little disturbance of the water in the wake of the boat.

No matter what may be the opinions formed concerning the utility of the electrical propeller for commercial purposes, there can be no doubt that the Electrical Power and Storage Company and its manager, Mr. Collett, and Mr. Yarrow, have together proved that the system is admirably adapted for pleasure purposes. In fact, for such work as that now done by steam launches on the Thames, the electrical system is simply perfection. The expense will be, on the whole, about that of steam; but to those who keep steam launches, expense is a secondary consideration, and it must not be forgotten that a 20-foot electrical launch will afford at least as much accommodation as a 30-foot steam launch. Thus, in Mr. Yarrow's boat, quite 11 feet of the best part of her would be occupied by engines and boilers. As to the supply of storage-cells, that can easily be managed. Many private gentlemen could keep their own engine and dynamo on shore to do the charging, and for the rest it would suffice to establish at certain places on the banks of the river, as at Kingstone, Staines, Maidenhead, etc., depots where, during the summer season, dynamos driven by stationary engines would keep on charging batteries. By calling at any of these stations, enough power for a six hours' run could be obtained either by charging the cells in the boat directly, or by taking the run-down cells out and replacing them with charged cells.

We may add that certain very important improvements have been made in the Sellon-Volckmar accumulator, concerning which we shall have more to say. As now made, they have an E.M.F. of 2·3 volts per cell at starting, and will give five ampère hours per pound of battery—a very admirable result.

A NEW FOUNDRY-PATTERN VARNISH.—A varnish has been patented in Germany for foundry patterns and machinery, which it is claimed—we do not know how justly—dries as soon as put on, gives the patterns a smooth surface, thus insuring an easy slip out of the mold, and which prevents the pattern from warping, shrinking, or swelling, as it is quite impervious to moisture. This varnish is prepared in the following manner: 30 pounds of shellac, 10 pounds of Manila copal, and 10 pounds of Zanzibar copal are placed in a vessel, which is heated externally by steam, and stirred during from four to six hours, after which 150 parts of the finest potato spirit are added, and the whole heated during four hours to 87 degrees C. This liquid is dyed by the addition of orange color, and can then be used for painting the patterns. When used for painting and glazing machinery, it consists of 35 pounds of shellac, 5 pounds of Manila copal, 10 pounds of Zanzibar copal, and 150 pounds of spirit.

A NEW EXPLOSIVE.—Herr Koppel has devised a new explosive substance, which he expects to be less costly than any other, to give out no injurious fumes, and not to be liable to explosion by shock or friction. The following figures give the composition of two kinds, the first of each pair of figures relating to explosives suitable for hard rocks, such as basalt, and the second pair for softer, such as sandstone:

	No. 1.	No. 2.
Saltpeter	35·00	42·00
Soda	19·00	22·00
Sulphur	11·00	12·50
Sawdust	9·50	10·00
Chlorate of potash	9·50	.....
Charcoal	6·00	7·00
Sulphate of soda	4·25	5·00
Prussiate of potash	2·25	.....
Refined sugar	2·25	.....
Picric acid	1·25	1·50
	100·00	100·00

UTILIZATION OF COKE-DUST.—The Chief-Engineer of the Lyons Gas Company, M. Craponne, works up the coke-dust produced at the Perache Gas-Works into briquettes or patent fuel. The coke-dust is first mixed dry with pulverized pitch, and the mixture, raised by an elevator, is subjected to the action of a jet of steam, at from 45 to 75 pounds pressure per square inch, which melts the pitch. The pasty mass is then compressed into briquettes in the Durand and Marais machine, made by Dupuy & Co., of London and Paris. One of the greatest difficulties was found to be the grinding effects of the particles of coke, which acted like emery-powder on the metallic surfaces of the press, and rapidly wore them out. Various parts were accordingly made of chilled cast-iron, from 15 to 20 horse-power being required for driving. At first, the dust was ground, but this has now been found unnecessary. A previous washing is, however, found advisable, which operation reduces the percentage of ash to from 10 to 12 per cent. The briquettes, weighing rather over two pounds each, serve for firing the retort furnaces, being mixed with coke in the proportion of 40 and even 65 per cent of the quantity originally consumed. Some of the briquettes are also sold to iron-masters, for use in the blast-furnace. A ton of this fuel costs rather over 16 francs = 12s. 9d. to produce, or 17 francs = 13s. 9d., including interest on capital and depreciation. The complete works and plant cost 45,000 francs.

INSULATING SUBSTANCES.—M. Eric Gerard, the Belgian telegraphic engineer, professor of applied electricity at the Liége Mining School, has recently published a treatise on the insulating substances used in the various applications of electricity. He remarks that glass may be called the classical insulator, but its fragile and hygrometric properties are to a certain extent inconvenient. Porcelain he considers an excellent substance, its slight porosity being corrected by the process of enameling. He urges the necessity of keeping insulators well cleaned, as dust is capable of impairing their properties. Horn, bone, and ivory are often used in delicate telegraphic appliances; but M. Gerard does not recommend their adoption, as they contain in various proportions organic substances liable to decomposition. Wood has the disadvantage of being hygrometric. He considers ebonite as more suitable for use in instruments of precision than the foregoing substances. Silk is in itself a suitable material; but it is recommended not to employ that substance when dyed in the salts of copper or iron—as is usually the case with green shades—because it thereby acquires a certain amount of conductibility. Gutta-percha and India rubber are well known in connection with the purposes indicated; but M. Gerard gives special prominence to a combination of the latter with a large proportion of sulphur in the form of ebonite. He, however, remarks that it is, after a certain length of time, affected by the oxygen in the air, with which the sulphur unites, the surface of the ebonite becoming greenish and dull. Among various other systems which have been tried for cables, that of Brooks is referred to, which includes an iron tube containing the conductors simply covered with cotton and soaked in petroleum. A Swiss firm of electrical engineers, Messrs. Berthond, Borel & Co., is said to have resolved in the following manner the questions affecting the use of paraffine. The conductors are covered with a wrapping of cotton, and are made into a cable which is plunged into boiling paraffine. The cable subsequently passes through an appliance which gives it successively one layer of resin and two coverings of lead separated by a layer of bitumen. It is said that the electrical properties of such a cable differ but little from those of cables with gutta-percha covering, while its price is notably lower. It is further remarked that for industrial purposes it is not generally necessary to have perfect insulation, but rather to employ such insulating substances as are but little affected by air and heat.

FURNACE, MILL, AND FACTORY.

The Calumet Iron and Steel Company, Chicago, has executed a mortgage for $300,000 on what are known as the J. B. Brown Iron-Works, to A. J. Ives. It is understood to be for the purpose of clearing up outstanding accounts.

S. B. Whitney, of Pottsville, has been appointed General Superintendent of the Lehigh & Wilkes-Barre Coal Company. He is the successor of Charles Parrish, of the Wyoming and Audenreid Division.

The Scranton Steel Company is at present rolling rails which weigh seventy pounds to the yard and 120 feet in length. The four finished rails, after sawing, weigh 2800 pounds. The company, running only single turn, recently made 1008 tons of rails. It has been compelled to double the capacity of its rail-shed and has now four rail-straightening presses in constant use. It is also connecting the mill with the converting department, thereby lengthening the mill about 60 feet and making it 800 feet long.

Representatives from the firm of Edwin P. Allis & Co., of Milwaukee, the successful bidders for the contract for putting up the new pumping machines for the Alleghany water-works, arrived in Pittsburg recently, and engaged in consultation with Superintendent Armstrong about the manner in which to proceed with the work.

A test that proved successful was made recently in Philadelphia of the Ellithorpe patent air-brake and patent air-cushion connected with the elevators in the new building of the Liverpool, London & Globe Insurance Company. The car was weighted with iron rope, and, when disconnected from the hoisting apparatus, fell with great rapidity; but upon the application of the brakes, its descent was instantly checked, the distance traveled from the time of applying the brakes to its actual stoppage being only six inches. In spite of the sudden arrest of the movement of the car, there was no jarring. In testing the air-cushion, the car was allowed to drop from the top story to the bottom, a distance

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of about 70 feet. As it reached the ground, the compressed air broke the fall, and the car landed easily and safely. Among those present who witnessed the tests were Messrs. Albert Foster and J. E. Wootten, of the Reading Railroad Company; John Price Wetherill, of the Pennsylvania Railroad Company; Mr. McDowell, of the Shenandoah Valley Railroad Company; A. Atwood Smith, B. S. Janney, and B. W. Andrews.

There is a rumor that Stanhope furnace No. 2, Stanhope, N. J., will have to be blown out for repairs.

Rhodes & Bradley, iron merchants, Chicago, obtained a judgment for $82,422 against the Cleveland Rolling-Mill Company, in the United States Circuit Court July 28th. Judge Drummond delivered the decision. In 1879, the Cleveland mill made a contract with Rhodes & Bradley for the delivery of 8000 tons of pig-iron during the next year at $45 per ton. There were 3421 tons delivered on this contract, when, in March, 1880, the price of iron having greatly fallen, notice was served on Rhodes & Bradley that no more iron would be accepted at that price. The iron firm then made tender of the other 4579 tons, which was refused, and began the suit for damages on the contract. The court decided that they were entitled to the difference between the contract price, $45 a ton, and the market price in March, 1880, which was $27 a ton. This amounted to $18 a ton, or $82,422 on the rejected amount. A motion was entered for a new trial, and the amount of the defendants' bond was fixed at $120,000.

On the afternoon of July 24th, Alice Furnace No. 2, at Birmingham, Ala., was blown in. Alice No. 2 is the largest furnace in the State, and there is only one larger in the South—the Victoria furnace, in Virginia. The stack is 75 feet high, with a bosh of 18 feet. It has eight tuyeres and eight iron columns, 21 feet high; Witherow & Gordon's latest improved patent adjustable tuyere stocks; four cooling-plates in the bosh above the tuyeres, with a water-breast below. The bell is lifted and lowered by a special steam-engine with a water-brake attachment. The hoist is Crane Brothers' latest patent; the cast-iron columns used in this elevator, which is 101 feet high, were made in Birmingham by C. P. Williamson. The three stoves, 19 feet in diameter and 76 feet high, are the new Whitwell hot blast in all its completeness, with gas and air-valves and facilities for cleaning. The lining of the stoves is built of Ohio brick. The furnace has a battery of 20 boilers for both furnaces, each 46 inches in diameter and 34 feet long, with two 16-inch flues. The stack is 75 by 18 feet. The two blowing-engines weigh 80 tons each, the weight of the wheels being 16 tons, 16 feet diameter. They were built by the Cuyahoga Forge and Furnace Company, of Cleveland, Ohio. Just in the rear of the furnace plant are 251 coke-ovens, all making coke, with the exception of a few which will be fired this week. Ample storage is provided for stock. The coal storage-room is one of the largest in this region, and has a capacity of 5500 tons. A large number of chutes make a convenience for emptying the coal into larries, which are run upon an hydraulic hoist—the simplest, cheapest, and most durable mode of elevating heavy material in large quantities. It is the expectation of the Alice Company to make 90 tons of iron daily with the new furnace. The average of the old is about 50 tons.

The Cummer Engine Company, Cleveland, has just put in place a 500 horse-power engine for the Brush Electric Light Company, to be used in the manufacture of storage batteries. The company is also sending a 250 horse-power engine to Minneapolis, and has about completed ten large Class B engines, which go to New England. Five of these will be shipped this week. The Cummer Company finds its facilities are not equal to the demands of its trade, and the contemplated addition, 100 by 60 feet, will be erected as soon as possible. This space will be devoted to erecting work, will be swept by three traveling cranes, and will enable the company to carry forward and complete forty engines together. The system of special tools is such that its engines are put together without any lining or facing up, or any special fitting whatever, and its facilities for shipping are so complete that a one-horse outfit is not kept busy half the time, every thing being received and shipped directly to and from the works. In passing through the works, it was noticed that there was a system of electric call-bells and errand-boys, by which a workman could secure any tool he needed without loss of time. It was also noticed that the castings fresh from the molds were unusually smooth and perfect, and the most complete system prevailed in all departments. The Cummer Company has evidently come to stay and to be an aggressive competitor among the manufacturers of high-grade engines.

The Brown Hoisting and Conveying Machine Company, of Cleveland, is fitting a coal storage-house on the Milwaukee dock with three of its hoists. The building is 400 feet by 164, 50 feet high, and will have a capacity to store 35,000 tons of anthracite. The three tramways are suspended from the roof-frame, and adjustable so as to enable the operator of the hoisting apparatus to deposit the coal in any part of the building he desires. The plant will be capable of handling from a vessel and depositing in the building from 1000 to 1200 tons per day, the machines each being operated entirely by one man. The company has shipped and now has in operation an extensive plant for handling coal from canal-boats to storage house at Varrangeville, France. There are also three of its machines in operation on the New York, Pennsylvania & Ohio ore-dock in Cleveland, and another plant is erecting on the dock near the water-works.

The Cleveland (O.) Forge and Iron Company has just placed in its shops a sixty-foot lathe with sixty-inch swing, made by Thomas Shanks & Co., Johnstone, near Glasgow, Scotland.

E. P. Allis & Co., of Milwaukee, Wis., have recently built a pair of blowing-engines for the Edgar Thomson Steel-Works, Pittsburg. The air-cylinders of these engines are 56 by 56 inches, and the steam-cylinders 36 by 56 inches. The aggregate horse-power is 1100.

The government is constructing at the naval arsenal in Washington two six-inch steel rifled guns, and will shortly begin on two ten-inch breech-loading steel rifles. These last will be twenty-seven feet long and forty-two inches wide, weighing each 24 tons. The tubes and jackets are to be imported from England. All of the above-mentioned guns are for use on the new steel cruisers. The ten-inch guns will be very powerful, being able to throw projectiles weighing 500 pounds. The government has never before made any steel guns, but it has a six-inch steel rifled gun, made at the South Boston Steel-Works.

Keel Ridge furnace, at Sharon, Pa., has been blown in.

The new puddling department of Lindsay, McCutcheon & Co.'s mill, at Allegheny, has been shut down.

The puddlers of the Keystone Iron-Works, at Soho, have been put on double turn, to fill an order of 1000 tons of muck-iron for the American Iron-Works.

The Frances Manufacturing Company, of New Britain, Conn., will build another foundry 130 by 40 feet.

The Vesuvius Iron-Works, which have been closed since June 1st, will start in the puddling department to-day and in the nail factory on the 15th.

The Pennsylvania Lead Company, at Mansfield, O., refiner of base bullion, is now using natural gas.

The rolling-mill of the Lake Superior Copper Works Company is running full-time, and finds a ready market for its product, which consists of sheet-copper, copper bottoms, etc. The company has a furnace in connection with its mill, in which it smelts most of the mineral from the Wolverine mine, using the product of other mines only to fill special orders. Two of the furnaces at the smelting-works, Hancock, are rebuilding.

The New London, Conn., Scythe Company has just closed its business for the year past, during which time it manufactured 11,500 dozen scythes, 4000 dozen axes, and 500 dozen hay-knives. The company has been in business since 1835, and did the largest amount of business last year it ever did in one year. On the 21st ult., the company organized as a corporation under the laws of New Hampshire.

Hewes & Phillips's Iron-Works, Newark, N. J., have several very heavy specimens of the machines they build under construction. An immense slotting-machine, weighing over 40 tons, is about completed for the Miller Forge and Iron Company, Pittsburg, Pa. There is a planer of 45 tons weight well under way for the Oregon Iron and Steel Company, Oregon. Several of their standard Allen engines are in various degrees toward completion, one for the Eden Paper Mills being almost ready for shipment. A great deal of care and labor are devoted in these works to giving bearing surfaces accuracy. Ground journals and hardened pins are a regular feature. But all other than bearing surfaces are painted, no polished finish being made for ornament alone.

The Pennsylvania Bolt and Nut Company is fairly started in its new works at Lebanon, Pa. The wareroom is 150 by 50, three stories in hight, with a car-track for the first and second stories. The machine-shop and finishing-room is 120 by 80, the burring-room 60 by 20, and the factory, which contains a 10-inch train of rolls, is 80 by 120. The most improved machinery has been introduced.

The Babcock & Wilcox Company, of New York City, has just issued a circular announcing that Mr. William F. Zimmerman has been appointed manager of its Pittsburg office for the sale of its water-tube boilers. Mr. William Kent, who has had charge of the Pittsburg office during the past year, has been transferred to the general office in New York, as superintendent of the sales department.

The Western Nail Association met August 8th, and decided to order a general resumption of mills for a period of four weeks from next Monday. Trade is light, but the outlook for the fall is encouraging.

Robert Wetherell & Co., of Chester, are now building one of their Corliss engines for the Philadelphia water-works, which will have a horse-power of 1000 and a pumping capacity of four million gallons. This firm is also building an engine for the cotton mills of Matthews & Co., of Selma, Ala. The cylinders of this engine are to be 24 by 48 inches. An engine which it is building for Pope, Cole & Co., of Baltimore, is to have cylinders of 24 by 60 inches dimensions. Messrs. Wetherell & Co. employ 350 men, and turn out an average of six engines per month.

The Cuyahoga Steam-Furnace Company, of Cleveland, has recently built a pair of its blowing-engines for the Franklin, N. Y., Iron-Works, and also a pair for a furnace at Hanging Rock, Ohio.

Malleable iron-works are to be started in Keokuk, Iowa, at an early day. Ground has been purchased and preparations are going forward toward the erection of a foundry, 25 by 30 feet, and finishing-shop, 25 by 40 feet.

The Newburg, Ohio, blast-furnace, which has been idle for several months, has been bought by the Union Rolling-Mill Company. It will be started up some time next week.

The Excelsior Iron-Works, of Chicago, are building a complete copper plant of 20 tons capacity, including engines, boiler, blower, crusher, etc., for the Rocky Mountain Mine-Developing Company. The plant is to be erected at Cañon City, Colorado.

There are three incorporated companies in Warren County, Pa., for the purpose of supplying natural gas for light and heat. Each company has a capital stock of $100,000. These are about to be consolidated into the Warren Light and Heat Company, having a capital stock of $300,000, with Frederick P. Hays, formerly of Pittsburg, as president.

GENERAL MINING NEWS.

ARIZONA.

GILA COUNTY.

OLD DOMINION.—The vapor fuel furnace is now finished. As soon as the petroleum arrives, smelting by that process will begin.

CALIFORNIA.

FRESNO COUNTY.

The prospects of the quartz mining industry are cheering, and quite a fever for prospecting has recently sprung up. Shrewd mining operators are coming in daily, and properties are changing hand.

MONO COUNTY—BODIE DISTRICT.

SPAULDING.—According to the *Free Press*, the personal property of this company, at Bodie, consisting of steam-pumps, pans, shoes, pipe, etc., has been sold by the sheriff to satisfy a Superior Court judgment in favor of A. F. Bryant for about $1800 and costs. Mr. Bryant bought the property for $592.50.

PLUMAS COUNTY.

TAYLOR-PLUMAS.—During many weeks past, the only work done at the mine has been putting down a shaft to reach the ledge near the mill. This end has now been accomplished; the ledge is reached. A good deal of water has been encountered; but still the work is pushed on with vigor.

SAN BERNARDINO COUNTY—CALICO DISTRICT.

GARFIELD.—Work progresses with good results. The lower tunnel is in about seventy feet. The main shaft will be sunk seventy feet farther, to connect with the tunnel. The south winze connects with the lower tunnel. The bullion returns from this mine are very satisfactory.

GOBBLER.—The ore taken out is hauled daily to the Albambra mill. The mine is improving in appearance, and is working in an extension of a rich body of ore.

GOLCONDA.—The claim is carefully prospected and ore has been found in at least a half-dozen places. In about the center of the claim, a shaft has been sunk fifteen feet, from which some good ore has been taken. About seventy-five tons of low-grade ore that will average $60 to the ton are on the dump.

PLUTARCH.—The lessees are working the east end of the claim. Work has been suspended in the shaft, which is down forty feet. The ore in this claim lies in deposits and also in seams.

CANADA.

BELLIVEAU ALBERTITE MINES.—In view of the beginning of boring operations at these mines, the St. John *Telegraph* gives a short sketch of the history of the project. The company owning the mines was organized in 1875 with a capital of $500,000. It owns about four and a half square miles of land in Westmoreland County, extending from the Petitcodiac to the Dorchester River. A shaft 52 feet deep was sunk in 1877 and extended to 267 feet in 1879, and two tunnels afterward were run, one being 326 feet and the other 330 feet long. Small deposits of albertite were found and much inflammable gas. In May, 1879, a discovery of albertite, near the surface, in one of the veins at Taylor Village, induced the manager to prosecute its further development. Shales were struck at a depth of 40 feet from the surface—the vein passing into them. With the view of testing this and the other veins in this locality, a diamond borer was purchased from the government and put into operation in the month of November. At the depth of 100 feet, the borer, at an easterly angle, passed through seventeen inches of albertite, and was continued down through the shale a depth of 335 feet without again striking the vein. A second bore-hole was started a few feet southwesterly from the first. At a perpendicular depth of 170 feet, the drill passed through 49 inches of albertite, the vein being apparently a continuation of that struck at a depth of 160 feet in the first bore-hole—the horizontal distance between the two points being about 15 feet. The second hole again passed through 14 inches of albertite at a depth of 210 feet from the surface, or 80 feet below the 49 inches of albertite; and again, at a depth of 302 feet, passed through two inches, and was continued to a total depth of 325 feet. In view of these interesting developments, and from the fact that the vein extends horizontally along or near the surface a distance of 400 or 500 yards, the manager was instructed to sink a pit near the vein a depth of 200 feet. A shaft was then begun about 20 feet westerly from the 170-foot hole, and sunk to the depth of 165 feet, when a tunnel was projected easterly, to strike, as it was supposed, the

vein of 49 inches. This they did not do; but about the distance from the mouth of the tunnel, and where it was supposed this vein would be, gas made its appearance in such quantities as to make artificial ventilation necessary to render the tunnel fit to work in. This issue of gas was so great that the work was delayed for several weeks, and on three several occasions took fire, and the tunnel had to be flooded to extinguish it. It is now asserted that a mistake was made in the measurement of this shaft, and that it was not as deep down by about 20 feet as the 49-inch vein which they were in search of. The escape of gas from the mouth of the bore-hole, when lighted, burned so brilliantly that it was plainly visible at night for a long distance in the surrounding country, and was found to be so great that, by inserting a pipe securely at the surface, it was brought into the engine-house, not far from the shaft, and utilized, burning night and day, and giving them ample light at all times for five or six months, until their work ceased at that place, and has been ever since escaping through this shaft, now filled with water, as also through the bore-hole, until filled up by some mischievous person, as it now is. Mr. George Botsford, of Fredericton, holds the exclusive right of prospecting over the lands of this company, and it is by him that the diamond borer has been brought to the mines.

ONTARIO.

A number of American mining companies are working mines in Ottawa County. The American Phosphate Mining and Land Company has carried on active operations in the township of Templeton since September, 1882. Preparations are making to begin work on the property of the International Mining and Land Company. The company owns 1700 acres of phosphate lands. The Dominion Phosphate and Union Phosphate Mining and Land companies are carrying on successful operations on their respective properties.

COLORADO.

ARAPAHOE COUNTY.

The consolidation of the Grant Smelting Company and the Omaha Smelting and Refining Company was consummated a month ago; but was not made known to the public until recently. The capital stock is fixed at $2,500,000, and the company is incorporated for one hundred years, dating from the 5th of last month. There will be no changes in the location of the works or the administration of affairs, as the new order of things has been in existence for a month, and the action there announced is taken merely to perfect the record. The ore smelted by the Grant smelter has been refined at the Omaha Company's works for the past three years, and the two have been co-operating that length of time. They are now placed under one management. Sidney Dillon, President of the Union Pacific Railroad, is one of the parties brought into direct interest in Denver's welfare by this transaction, he being one of the stockholders of the Omaha Company. The following gentlemen have been elected directors by the stockholders of the new company: Guy C. Barton, Edward W. Nash, James B. Grant, Edward Eddy, William H. James, Charles Babcock, and J. H. Millard.

CHAFFEE COUNTY.

FREE GOLD.—Negotiations have been pending for the leasing of this company's property, which, if completed, would have put in operation the 25-stamp mill belonging to the company.

WEBER.—This mine, which has lain idle since last season, is to be started up vigorously. Machinery will be erected and shipments of ore will soon begin.

CLEAR CREEK COUNTY.

BARD CREEK.—This company has been organized to develop the Blue Grass lode on Democrat Mountain. The level now running on the vein from the Bard Creek side of Democrat is in over eighty feet, and shows two feet of quartz which assays forty ounces silver.

NEW YORK & COLORADO.—Work at grading for the new fifty-ton stamp-mill of this company, above Empire, is going forward. Twelve men are running three shifts daily on the Big and Little Chief drifts. The former is in 110 feet, the latter 50 feet. The Big Chief crevice at the creek is 100 feet wide, and prospects well in gold. In the breast is good quartz. Twenty thousand dollars have already been paid down toward the mill, and monthly dues thus far have been promptly met.

PAY ROCK.—The concentrator has now been running about six weeks, double *shift, treating forty tons per day, or 1000 tons a month.* Its success mechanically and financially has been demonstrated beyond a doubt. The exact financial results attained are not at this date available; but as part of the ore shipped has gone to the Georgetown mills, and as the July product is at least $5000 above that of June, some notion can be formed of what is accomplishing.

SNOW DRIFT.—In this property, six parties of lessees are at work, and all in good ore, so that leases with thirty-five per cent royalty command a handsome bonus.

HINSDALE COUNTY.

LITTLE PRINCE.—*This mine has been sold to Mr. J. L. Shiek, of Denver, for* $20,000.

VERMONT.—A large body of gray copper with native and wire silver has been opened up in the 2d level. At present, they are stoping and taking out a very fine lot of ore. The tunnel is now in over 90 feet at a depth of 200 feet.

LAKE COUNTY.

The ore-production of the Leadville mines, during July, was only a trifle in excess of the previous month, amounting to probably 35,500 tons, against 31,800 during June.

Among the mines showing a decrease are the following: Silver Cord, 500 tons; Mike & Starr, 200 tons; Nellie S., 600 tons; Catalpa, 200 tons; and several others in smaller amounts, making a total of about 1500 tons.

Among the properties showing increased productions are the following, with their respective increases appended: Henriett, 700 tons; Clontarf, 500 tons; Little Johnny, 100 tons; St. Louis, 100 tons; Colonel Sellers, 300 tons; Adlaide, 500 tons; Crown Point, 200 tons; total, 2400.

EXCELSIOR GOLD AND SILVER MINING COMPANY.—A concentrator is to be erected upon the Susie May lode for the treatment of the heavy body of low-grade ore. The vein discovered recently is opening up well, and the prospects for the future are very encouraging. The property is regarded as one of the best in Mosquito Gulch, and the owners are pushing work. On the completion of the concentrator, the force of miners will be increased.

GONABROD.—An important strike has been made in the sub-lease on this property. The first discovery of ore that was made was in a pocket which was exhausted after 70 tons had been taken out of it. New prospecting was then commenced, and from the shaft, which had been sunk to a depth of 100 feet, a drift was run 95 feet. A 6-foot body of galena ore was opened, and the assays made returned an average of 137 ounces of silver and 50 per cent lead. In the No. 1 shaft, another body of galena ore was exposed that averages about $48 per ton. Shipments will be resumed, and will continue steadily from this time.

IRON SILVER.—The Stone mine, during the past month, shipped about six thousand tons of ore. The product of the Iron Silver group, including the Iron, Stone, and leased mines, for July, exceeds ten thousand tons, or the largest monthly product ever made.

The Lime, Seventy-Six, Rock & Dome, are all working under leases, while many of the dumps are sorted over, and concentrated by hand-jigs.

At the Stone mine, the company is hoisting through No. 2, No. 7, and No. 6, or cage shaft. At the latter, a test was made the other day to ascertain its capacity, and a record of twenty-eight cars an hour for the day secured. This, too, in addition to lowering timbers and performing other work with the engines. The cars hoisted contained on an average about three fourths of a ton of ore each.

The Moyer shaft, situated several hundred feet east of the Stone mine, and started about five months ago, has attained a depth of about 250 feet. The shaft is calculated to encounter the contact in its eastern dip at a depth of three hundred feet.

SILVER CORD.—The work of adjusting the losses sustained by the company at the recent fire has been completed, and preparations are making for replacing and repairing the plant. Examination showed that the large hoisting-engines and rigs were not irreparably damaged, and a force of mechanics will be set to work immediately, making good all injuries. A good deal of the other machinery contained in the building at the time of the fire can also be repaired, and it is expected that a comparatively short time only will elapse before the mine will be properly equipped and in full running order again.

TWIN LAKES HYDRAULIC GOLD MINING SYNDICATE (LIMITED).—This company, which is an English corporation, has purchased for $300,000 the placer ground situated between Granite and Twin lakes. The property embraces the well-known claims in Cash Creek, Young America, and other gulches. The Cash Creek property, formerly owned by the Gaff Mining Company, is the best developed of the group. Just before making the transfer of this property to the newly-organized company, a clean-up was made, yielding eight thousand dollars. The auriferous pay gravel on these claims has a thickness of from twelve to three hundred feet, and has yielded largely in the past. They were first discovered in 1859, and many of them have been worked steadily ever since. All told, there are about nine miles of ditches and flumes, which, together with natural water channels, afford an available water supply equal to twenty thousand miner's inches. The company will take hold of the property immediately, and push its development with all possible haste. Among other work to be commenced at once is the construction of a large water-ditch, five miles in length. The construction of a telephone line from Leadville to the placer-fields, a distance of about twenty miles, is in progress, and also the erection of office and other buildings.

OURAY COUNTY.

AMES.—The smelter is no longer an experiment, but an assured success. In a run of less than four weeks, with ore-furnace, ten car-loads of bullion were produced.

MADISON.—Eight feet of brittle and ruby silver and gray and yellow copper have been uncovered on this claim. Two hundred and fifty sacks have been taken out.

ROSE.—A recent discovery of rich gold and crystal-bearing quartz is reported. The strike is in the main tunnel of the group.

PUEBLO COUNTY.

PUEBLO SMELTING AND REFINING COMPANY.—Two thirds of the employés are out on a strike for increased wages. The prices demanded are as follows: Furnace-men and feeders, $3 per day each; weighers, wheelers, pot-pullers, and calcimer men, $2.50 per day each; roustabouts, $2 per day each. The prices heretofore paid by the company, and which have been in force for the past three years, are: Furnace men and feeders, $2.50 per day each; weighers, wheelers, pot-pullers, and calcimer men, $2 per day each; and roustabouts, $1.75 per day each.

DAKOTA.

CALEDONIA.—For the week ended July 29th, the superintendent reports: Ore produced, 1050 tons. The header on the 400 level is in sixteen feet. The last four feet improved very much in appearance and also in quality of ore. All other parts of the mine are looking the same as usual.

ETTA.—San Francisco parties have purchased this mine for about $50,000. The work of development continues for the present; and as soon as the company has secured control of the property, the mining and reduction of the ore on a large scale will be commenced.

FATHER DE SMET.—The superintendent reports, July 19th: Herewith express company's receipt for bar No. 163, containing 908·9 ounces of gold, the result of run of mill for first half of July. On the 16th inst., I drew for $20,300, which amount was for all expenses incurred during the month of June. The engine in mill is doing better work than at any time for the last five years, and a new one will not be required, as we supposed a year ago. Nearly all the ore-faces are showing a decided improvement in both quantity and quality. We are at present ordering supplies for the coming year from Chicago, among the lot being 600 stamp-shoes, iron, candles, oils, etc. For the week ended August 1st, the report shows: Ore extracted from first, second, and third levels, 3000 tons. Ore milled, 3000 tons. Tramway level rise for month, 25 feet; total, 105 feet finished. Golden Gate east cross-cut advanced 7 feet; for month, 19 feet.

KING SOLOMON.—The Black Hills *Journal* states that the affairs of this company do not seem to be in the best possible condition. The men who have worked on the mine have not been paid, though wages for several months are long past due. Recently a large number of claims were filed against the company.

GEORGIA.

CHICAGO & GEORGIA.—This property, after lying comparatively idle for some time, has passed into the hands of energetic parties, who have added to it, by purchase of adjoining lots, a large amount of valuable mining ground. They have also erected an entire new plant. A new cut has been commenced, which will give access to the veins at a point considerably below the bottom of the old one. The twenty-stamp mill has been started up on ore from the new cut.

IDAHO.

BULLION CONSOLIDATED.—The company is loading on teams for its mines in Little Smoky Mining District a very complete outfit of machinery and supplies, consisting of a steam saw-mill of improved make, with ample power for extra saws, planer, etc. A concentrating-mill of 50 tons capacity, the machinery for which has already arrived and is now loading on teams to be taken from the railroad depot to the company's mine, will be erected at once.

WOOD RIVER REGION.

The Mayflower, Bullion, Jay Gould, and Idahoan have each had concentrating-works placed upon the properties to concentrate the second-class ores which would not pay for shipping. All of these use jiggers with good results, producing concentrates as rich as if not richer than first-class ores. Each of the mines named looks well, as does also the Eureka mine.

At Ketchum, the Philadelphia Company has a fine smelting-plant, two stacks in operation, and two new ones ready to start.

The new twenty-stamp silver mill at the Vienna mine has been in operation some three or four weeks, and is doing fine work. This mill is owned by a company owing and operating the Vienna, Mountain King, and some other mines. The former is turning out very rich ore, but the body is not so large as that of the Mountain King, which is classed as a mammoth mine. The company is working about the mill and mines 125 men. The Solace mine is lying idle from want of water, but expects to start up in a few days, and will be pushed with a good force of men.

Sawtooth is reported dull, with but little life in the camp because some of the properties are tied up, or in the hands of companies not disposed to operate at present.

YANKEE FORK REGION.

A correspondent of the Salt Lake *Tribune* says that Bonanza is the center of the Yankee Fork mining country, where once there was much activity in place mining, and, later, in prospecting for quartz leads and opening them up. With the discoveries and consequent excitement in the Wood River country, this locality became much neglected for a time, and Bonanza and the country around has had but little life the past three years.

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The Charles Dickens is the best mine in the district. There are 2300 feet of tunneling. The main tunnel is in 950 feet, and a shaft 120 feet connecting the upper with the lower tunnel. The ore is free-milling gold and silver, the vein averaging from 1½ to 6 feet, and runs from the top of the ledge down; 500 tons of first-class ore will be milled the coming month at the Custer mill. Over 300 tons are sacked and ready for shipment, which will average $200 a ton. About $4800 in gold bullion has been shipped this season, the work of the arrastra from low-grade ore. The arrastra works two tons daily. There are 8000 tons of second-class ore on the dump, averaging $50 a ton. Last season, thirty tons of first-class ore were shipped to Salt Lake, averaging $860 per ton. The mine never looked better, some of the ore assaying $4000, some going as high as $25,000 per ton. The only thing needed is a good stamp-mill to work the ores.

The Juliette is the eastern extension of the Charles Dickens, has just started work. The shaft is down twenty feet and the vein five feet wide, the ore averaging from 100 to 400 ounces silver and a percentage of gold.

DAN O'CONNELL.—This mine is situated on Dickens Hill, parallel with the Charles Dickens claim. Several tunnels are run on the vein. The vein is three to five feet. Considerable ore is on the dump.

PILOT.—This is at the west end of Dickens Hill. The vein is from four to five feet; the tunnel is in 46 feet, with the same class of ore as the Dickens.

PARADISE GROUP.—This comprises the following mines: Paradise, Washington, Fair Play, and Passover, owned by John G. Morrison. This group is situated west of the Pilot and is an extension of the Dickens ledge. There is a tunnel in 75 feet on the Washington. The main tunnel in the Paradise is 200 feet, having some very rich ore.

Mr. Morrison is working his placer claim on Jordan Creek, and is getting out some coarse nuggets. He is ground-sluicing and hydraulicking, uncovering the ledge of the Paradise group, where he will be apt to find some rich ore adjacent to the ground where the largest nuggets were found. The placer claim is very rich and paying well.

MONTANA.—This is situated in Yankee Fork Mining District, and is at the head of Jordan Creek, six miles from Bonanza City. It has a shaft down 350 feet; tunnel run in on level 185 feet. The vein in the shaft is eight feet wide. The ore, averaging $150, is free-milling gold and silver, gold predominating. The mine is shipping 350 tons of ore to the General Custer mill, which will be worked by the first of August. Forty tons worked this spring at the mill averaged over $600.

WHALES.—This is situated one mile west of the Montana. The ore croppings are traced for over 800 feet. The vein is from 8 to 15 inches, going from $300 to $2000 per ton. It is looking well and will prove to be a good property.

Two miles north from Bonanza City is a thirty-stamp mill, run by 118 horse-power Harris-Corliss engine; three 54-inch boilers, 16 feet long, 8 pans, and 4 settlers. The General Custer mine and the Unknown are owned by the General Custer Company. The mill was built in 1880, and has been working on General Custer ore continually up to the present, but is now clearing up, and will start working ore from the Unknown. The bullion has averaged over $60,000 monthly; 35 tons of ore were worked every twenty-four hours. The mill employs 32 and the mines 36 men. The mill this season has worked custom ores from the Montana, Charles Dickens, and Badger, and will work ten stamps on Montana and Charles Dickens ore the coming month.

KANSAS.

According to reports, persons engaged in digging a well recently on Governor Dale's farm, five miles northwest of Yates Center, at the depth of twenty feet struck a large vein of silver ore, specimens of which were assayed and found to be very rich. Several shafts are sinking.

MEXICO.

Correspondents of the Mexican *Financier* show that matters are not of a lively nature at Pachuca. The board of directors of the Encino mine, it seems, are having a new survey made of the workings. No doubt before long, this mine will be in full blast once more. The New Progreso hacienda is to start up in a few weeks. It seems so strange, in this enlightened age of improved machinery of all kinds, that a large and powerful company, like the owners of this hacienda, should, instead of putting in all the latest improvements, go back to the ways of the time of the Conde de Regla.

Nothing is doing with the Magdalena mine, owing to some misunderstanding among the stockholders; but work at the next mine to it, the San Nicolás, is pushed. The mine is now down 140 varas. At 10 varas deeper, a cross-cut of from 15 to 20 varas is to be made on to the principal lode. The Corpus Christi mine, which is quite close to the above, goes into the hands of a New York company of which Capt. George Brown, of the New York Board of Marine Underwriters, is president. The San Diego mine is down some 64 varas. There are some very good indications of paying ore.

The Pachuca River Concentrating Company's works are going up as fast as can be expected. The heavy rains that have prevailed here during the past month have been very much against them; but still the early part of August will see them hard at work. Owing to the unusual amount of water in the river of late, they have been unable to extract any quantity of tailings.

The new lode at the Guadalupe mine is turning out much better than was at first thought. Stock of the Anglo-Saxon Copper-Works Company is going up. There was a sale here last week of 20 *bonos* at the rate of between $50 and $60 each. This stock was bought, we believe, for parties in England.

The Real del Monte Company's new hacienda of San Antonio is pushing ahead night and day. The news from Chihuahua indicates a flourishing state of things. The mill, buildings, etc., of the Santa Eulalia Mining Company are nearly completed, and the first shipment of bullion is expected by the end of next month.

A big find of copper is reported east of Santa Rosalia; also a very rich deposit of quicksilver near Huajuquilla. Americans are prospecting both.

Judge Shaw is fitting out in Chihuahua to begin work this rainy season on his Santo Domingo placer. This placer is supposed to be the largest and richest on the continent, containing over 2000 acres.

Final settlements in the sale of the Refugio mine are making in the United States. The ore now runs high, and from 100 to 500 ounces to the ton are worked out.

The Jesus María District is looming up, work being pushed as rapidly as possible. The Tabor-Weston men expect to ship bullion shortly. Mr. Stanton, of the Santa Edowigis Mining Company, has on the way a smelter, concentrator, 25-stamp crusher, saw-mill, etc, and hopes to be running by the end of August. The ore runs from 40 to 1000 ounces. The Knotts Silver Mining Company, of Parral, has abandoned the idea of pumping out the old Prieta mine and is sinking a new shaft. The mill is turning out silver regularly every week.

The Aguilarania mine is down 278 feet, and the men have already cross-cut some 40 feet, and expect to have to go 40 feet more before striking the vein. They are sinking as fast as possible.

The Dry Mountain Company's work is still shut down, awaiting the settlement of the company's financial troubles. Formal work has been stopped on the Veta Grande, awaiting hoisting machinery. The Philadelphia Syndicate has started work on its Gigas mine. The ore is low-grade, but in large bodies.

Mr. V. A. Cowdery, of New York, has begun sinking a new shaft on the Southern extension of the Jesus María mine. The Jesus María seems to improve every day. A rich body of ore 12 feet wide has been opened up lately.

The Stirling Company has its pans in place, and expects to begin running immediately. It is turning out large bodies of ore from its Pedrasania mine. The Ward Mining and Milling Company, of Parral, has begun work on the foundations of its Stetefeldt furnace. The engine and pans are already in place, and there was a trial run on some old tailings, which worked well. The old mill still continues to turn out bullion.

The Tecolotio mine has been sold, and the new company is clearing the ground and getting in the foundation of its mill to smelt 100 tons of ore a day. The mine can produce twice that amount of ore. Every thing is in readiness to put in the new pumping and hoisting machinery at the San Francisco del Oro.

The Providencia Mining Company, of Philadelphia, has nearly completed the smelting hacienda on the river Listin; but before the end of the rainy season they do not expect to do any more than make a trial run.

Charles H. Ward, in the Carmen District, has nearly all his machinery for a forty-stamp mill on the ground, but, until after the rains, will continue to use the old patio process. The mine is looking well, showing very good ore, but inclined to be streaky.

Gen. H. P. Bee has resigned from the Washington Jude Mining Company and Mr. Frank B. Hein, of Silver Cliff, Colorado, is now in charge. The mill is not running, and the company is only working its San Antonio mine, which looks very fair, having an 18-inch streak of good galena ore, averaging about 90 ounces to the ton. The Jude Mining Company, of Washington, has also begun to open up its mines in a small way. Good reports come from Guanacevi, though as yet but little work has been done, and from Mapimi, where the smelters are a success.

The Sierra Mojada District is not doing as well as it should, on account of the cost of the reduction, no stone in the country standing more than one week in the furnaces. The district is, however, shipping three car-loads a week of base bullion to England.

MICHIGAN.

NONESUCH.—This copper mine has been closed to await further developments in the way of additional funds, the company refusing to advance further amounts. About $400,000 have been expended on this property the past year in machinery, buildings, etc, and it has one of the finest plants in the country. Twelve thousand cords of wood, 1800 barrels of salt, and several hundred barrels of copperas are in stock.

MONTANA.

SUMMIT VALLEY DISTRICT.

ANACONDA.—Eexcavating for the new smelter building began July 23d.

CLARK'S FRACTION.—Recent developments show favorable prospects. The sill-floor of the 80-foot level is now 40 feet wide, showing a breast of ore the entire width which assays 50 and 60 ounces. On this level, the workmen are putting in square sets forty feet wide. The Fraction is on the Rainbow lode, between the Alice and the Magna Charta. The peculiarity of the lode is that, wherever it has been developed, it has been found to be from 50 to 60 feet wide, having a well-defined north, south, and center vein of pay, separated from each other by porphyry and barren vein-matter. The Fraction is situated upon lower ground than the Alice, Moulton, or Magna Charta, and just west of a gulch which seems to have changed, at that point, the formation of the great lode, so that it bears ore of a high grade clear across the lode, in place of the porphyry and barren vein-matter which characterize the lode elsewhere.

MAGNA CHARTA.—At this mine, the principal work just now is the sinking of the 3-compartment shaft to the 600. Sinking will be vigorously prosecuted, and the north, south, and center veins of the Rainbow lode, which carry the same characteristics in this mine as in the Alice and Moulton, will be thoroughly developed by cross-cuts, drifts, and levels. The stopes of the upper levels are looking well and producing their usual output of ore.

MOULTON.—The winze from the 300 southwest drift is looking well; but extraction from this valuable ore-body has been temporarily suspended pending the running of a connection with the surface, which has become necessary for purposes of ventilation. Ore is stoped from the 200 west drift, where the ledge of high-grade is looming up bigger than ever, having widened to 6 and 7 feet of solid pay-ore of high grade, clear across the face.

POLLACK.—The Clark Brothers, of Walkerville, have leased this mine, situated northeast of the Alice. They will put a force of men at work, and thoroughly develop the property.

NEVADA.

The custom of working mines on tribute, says the *Sentinel*, is growing more and more general in the Eureka District. Chances that were formerly taken by mining companies are now largely taken by individual miners who try their fortunes in "pitches." At present, the tributers in the Alexandria, Hamburg, Phœnix, and other mines that we could mention are making more than $4 a day. In the first-named mine, the tributers for July made only a little less than $200 each.

It will be learned with pleasure, particularly to Gold Hill, says a local paper, that, by turning the water from the ranches up toward the head of the Carson River, sufficient water will be obtained to run the mills to their full capacity. Thus all the miners may resume work and all go on as usual in the Yellow Jacket, Kentuck, Crown Point, Belcher, and all the other mines.

ALTA.—At the mine, they are getting things in shape for pumping out the lower levels. This will require three or four months. The water now stands at the 1100 level, and between that and the 2150—the lowest level—there are at points some very long drifts; besides, the ground is about as thoroughly saturated with water as when the mine was first opened. The short distance that it is required to pump the water will, however, greatly expedite the work. Also, the strain on the apparatus will be greatly reduced, as all the pumps from the 1080 level to the surface will be taken out. This will make the lower pumps run light.

MARTIN WHITE.—An official letter says that there is but little change to note in the condition of the mine or the quality of the ore. The cave drift is looking well; the drift to the south is in about 15 feet, and the ore is about as wide as the drift and extending above and below. Much of this ore is of good quality, 50 or 60 ounces. A drift to the north has been started, showing good ore on that side also. The stope opened on the M. P. level is looking fairly, but it will take several days yet to prove it. The rock is rather hard at present for good ore, still it looks well and generally assays well. Stope No. 2 is in good ore; No. 1 is not at present.

MEXICAN.—The work of repairing the Central tunnel and the old Mexican shaft will now soon be completed, when a great amount of low-grade ore may be cheaply extracted from the old upper works.

SILVER STATE CONSOLIDATED.—The contractors in this mine are making good progress. The company is drifting toward the croppings from the end of the tunnel. Some low-grade ore has been struck, and the indications are better now than they have been heretofore. In working toward the croppings, many changes in the ground are taking place.

NEW HAMPSHIRE.

CRANE.—Work has been resumed at this mine.

MASCOT.—The company has received from the Cunningham Iron-Works a seventy horse-power engine and boiler for its new concentrating-works.

NEW MEXICO.

OLD MAN.—At a meeting of the stockholders held recently, the following officers were elected: President, J. W. Fleming; Vice-President, C. P. Crawford; Treasurer, R. B. Higbee; Secretary, John A Moses. The Board of Directors consists of J. W. Fleming, C. P. Crawford, R. B. Higbee, P. June, and C. Osborne.

NEW YORK.

A large deposit of mica has been found on the farm of Wilson Brown, at Chester, Warren County. About one thousand pounds have already been taken out, and tests prove the mica to equal in quality that of North Carolina.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Aug. 10.

There is nothing of special interest to note in the mining market. A large business has been done in the fancies, but the high-priced stocks remain very quiet. Prices have been a little better, as a rule, but have not gained materially. Horn-Silver has been the exception, for some reason selling quite weak to-day. The Comstocks have been fairly dealt in, but have been very irregular in price, owing to several assessments being levied. We give a summary of the market below. The total number of sales aggregates 193,655 shares, as against 190,513 last week.

The Comstock shares have been moderately dealt in at irregular prices. California was quiet and irregular, selling from 37@44@40c. Consolidated Virginia records a small business, and has been weak, selling from 67@59c., assessment paid, and from 33@43c., assessment unpaid. Sierra Nevada has just levied an assessment of one dollar per share. It has been weak in consequence, and has sold from $5.75@$4.90. Union Consolidated has been quiet and irregular, selling at $6.50@$6.25, assessment paid, and from $4.90@$5.75@$5, assessment unpaid. Ophir was quiet and steady, selling from $4.25@$4. Consolidated Imperial, with a small business, was steady at 8@7c. Best & Belcher sold at $4.50. Sutro Tunnel was quiet and steady, selling from 23@20c.

The Leadville stocks were also moderately dealt in and were steady. Amie was quiet and steady, selling from 15@18@17c. Chrysolite developed a little weakness, under a small business, and sold from $1.25 @$1.10. Dunkin was quiet and steady at 24@20c. Iron Silver was strong, selling from $3.05@$3.15, the sales amounting to 650 shares. Leadville declined from 45@30c.; the dealings were small. Little Chief was a little weak at 43@39c., and Little Pittsburg was quiet and steady at 65c. Climax had a small business and was strong, selling from 6@10c.

The Bodie stocks were very quiet and were weak. Bodie, under a fresh assessment of fifty cents a share, was weak, selling from 50@35c. Standard showed a little weakness, with a small business, declining from $6.63@$6. Bulwer was quiet at 75c.

The Tuscarora stocks have been almost neglected. Argenta sold at 25c. Belle Isle was quiet and steady at 35@31c. Navajo sold at $3.10, with a business of 200 shares. North Belle Isle sold at 35c. Elko Consolidated records a small business at steady prices, selling from 16@15c.

In the miscellaneous list, Alice has been quiet and steady, selling from $2.30@$2.40. Bassick sold at $9.50. Eureka Consolidated was quiet and steady at $5.50. Gold Stripe sold at 7c., and Green Mountain was steady at 74c. Horn-Silver records a small business and has been weak, it sold from $7.75@$6.63. Robinson has been quiet and steady, selling from 66@76@74c. Sierra Grande was moderately dealt in at stronger prices; it sold from 88c.@$1. Stormont was quiet and steady at 35@34c.

Alta-Montana sold at 5c. with a small business. Barcelona has turned up as a very active stock this week. The dealings foot up 32,500 shares, selling from 46@44c. Caledonia was very quiet at $1. Central Arizona was quiet and steady at 15@17c. Decatur records a small business at steady prices, selling at 3@4c. Eastern Oregon has been actively dealt in, and has been strong; it sold from 85@ 87c. Harlem has been quiet and steady at $1.30@$1.35. Oriental & Miller had a small business at steady prices, selling from 13@15c. Rappahannock was quiet at 6c. Red Elephant records a fair business and was steady, selling from 7c@6c. Sonora Consolidated has been very active and hasgained a little strength; it sold from 24@30@29c. South Hite was quiet and steady at 4c.

MEETINGS.

South Silver King Mining Company, No. 154 Nassau street, New York City. A special meeting of stockholders, for the purpose of considering and taking action upon the subjects of bonding the mine, collecting installments in arrears, and such other necessary business connected therewith as shall secure the financial success of the company, together with the entire affairs of the company. August 17th, at one o'clock P.M.

DIVIDENDS.

The Castle Creek Mining Company, of Idaho, announces its regular monthly dividend of three per cent, payable on the 16th inst.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 11) of two per cent on the capital stock, payable August 18th.

The Jocuistita Mining Company, of Mexico, has declared a quarterly dividend of fifty thousand dollars—fifty cents per share—payable August 31st.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows on the petroleum market:

There was on Saturday last a strong market, the price being sharply advanced to $1.09 from $1.07. On Monday morning, while the fever was on, the opening was at $1.10, which was one cent above Saturday's closing; and during the day, the market was bid up to $1.13. This sharp advance appeared to be chiefly due to the organized action of the Standard or some bull clique to force the shorts to cover and induce public buying. The market broke back to-day and sold as low as $1.08⅛, closing, however, at $1.09⅛.

A very important well is expected on Saturday or Monday. It is Porcupine No. 9, situated in Balltown District, 400 feet north of the developed territory; and as it proves good or poor, the market is liable to be influenced. A new well near old territory on the Brady tract tapped the sand yesterday, and is showing for a good well, but is not yet fully opened. It is said that it opens some new territory. During the past week, Grandin No. 3, an old well that had almost ceased flowing, was torpedoed, and yielded 525 barrels during the first twenty-four hours.

The "runs" of oil to the Pipe Line Company from August 1st to 7th inclusive, are about 35,000 barrels ess than the deliveries; but the last seven days of July showed the reverse, consequently no reliance can be placed on statistics based on only a few days' figures. The demand for refined is light, but, simultaneously with the advance in crudeon Monday, it was marked up ⅛c. per gallon, and, in the absence of any demand, there seemed to be no good reason for it, unless it was designed to influence the price of crude. At this writing, refined oil is ⅛c. lower and crude oil is strong.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 4.....	$1.07¾	$1.09	$1.07⅛	$1.09	2,326,000
6.....	1.10¼	1.13	1.09⅞	1.11⅞	3,970,000
7.....	1.12½	1.12¾	1.09⅝	1.10⅝	4,582,000
8.....	1.10⅝	1.10¾	1.09⅜	1.10⅛	3,170,000
9.	1.10⅛	1.10⅞	1.09¼	1.09⅜	2,141,000
10.....	1.08⅜	1.11	1.08½	1.09⅛	3,386,000
Total sales.					19,575,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Aug. 3.	Aug. 4.	Aug. 6.	Aug. 7.	Aug. 8.	Aug. 9.
Albion	....	....	....	....	....	....
Alpha	....	.2	1¼	1¾	1¾	2¼
Alta	.65	.95	.05	1	1	1
Argenta	....	....	.15	....	....	....
Bechtel	....	....	....	....	....	....
Belcher	.90	1	.90	1	1	1⅛
Belle Isle	....	....	....	....	....	....
Best & Belcher	3⅞	4¼	4¾	4⅝	4⅝	4⅝
Bodie	....	....	.40	.35	.35	....
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.25	.40	.45	.35	.45	.45
Chollar	3⅛	3	3⅛	3⅛	3⅛	3¼
Con. Virginia	.30	.35	.40	.50	.50	.40
Crown Point	.85	1	1	1⅛	1⅛	1⅛
Elko Cons	....	....	....	....	....	....
Eureka Cons	6	6	5½	....	....	5½
Exchequer	....	....	....	....	....	....
Gould & Curry	2¾	3¼	3¾	3½	3½	3½
Grand Prize	....	....	....	....	....	....
Hale & Norcross	6⅝	6	6¼	6	6	6¼
Independence	....	....	....	....	....	....
Martin White	....	....	.25	.30	.30	....
Mexican	2⅞	3¼	2⅛	3¾	3¾	3⅝
Mono	....	....	....	....	....	....
Mount Diablo	....	....	5	5	5	....
Navajo	3¼	3⅛	....	....	3⅛	3¼
Northern Belle	7	6¾	6¾	....	....	6¾
North Belle Isle	....	....	....	....	....	....
Ophir	2⅝	3⅞	3⅞	4⅛	4⅛	4
Overman	....	....	....	....	....	....
Potosi	1⅛	1¼	1¼	1¼	1¼	1¼
Savage	2	2	2⅛	2⅛	2⅛	2⅛
Scorpion	....	....	7	8	8	7
Sierra Nevada	3⅞	4¼	4¾	5⅜	5⅜	5⅛
Silver King	....	....	....	....	....	....
Tip-Top	....	....	....	....	....	....
Union Cons	4¾	5	5¼	5⅞	5⅞	5⅛
Utah	2⅝	2⅛	2⅝	3⅛	3⅛	3
Wales Cons	....	....	....	....	....	....
Yellow Jacket	2⅞	3	3⅛	3⅛	3⅛	3⅜

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Aug. 9.

Since our last report, the market has been fairly active, and in the early dealings a good degree of firmness was manifested in the leading copper stocks, due mainly to the fact that ingot copper was a fraction higher, and the demand more active. Sales of Calumet & Hecla were made at $250, against $246 the week before, but, owing to disturbances in the general market, as well as lack of buying orders, the price was not maintained, and later sales were made at $245, with the stock now offered at that price. Quincy holds its own well, and sales were made at $46¼@$46, an advance of $½@$¾ over last week. The July product of this mine was 300 tons, a gain of 75 tons over last year; and as the expenses were reduced some $10,000, the result, notwithstanding the lower price of copper, will compare favorably with last year's work. The mine has shipped about 1450 tons of refined copper since the opening of navigation. Osceola was heavy, and, under pressure to sell, the stock was forced down from $21@$19½. Franklin was also inclined to be weak, and on small sale declined from $10@$9. There are no large amounts pressed for sale, and it is not offered at less than $10. Pewabic sold at $8. Huron, at $1⅝.

In silver stocks, with the exception of Catalpa, there has been but little doing. Catalpa was freely pressed on the market, and declined from 47½@35c., with sales of about 7000 shares at these figures. In the later dealings there was a slight reaction, and small lots were sold at 45@42½c., closing at 40c. bid. The reports from the mine are not of a very encouraging nature. Crescent sold at 20c., against 25c. (July 13th). Bonanza Development seems to have lost its old-time activity, and transactions are light. Sales at $1¾@ $1½, against $1⅞, July 26th. Harshaw sold at 50c. Sullivan, at 62½@56¼c. Silver Islet declined from $5@$4.

At the Mining Board, Bowman Silver and Massachusetts & New Mexico are the principal stocks dealt in. The former is steady at 16@17c., while the latter, under favorable advices from the mine, has advanced from 3@5c., and is in good demand. The bonds are selling at $11@$12, and would seem to be a good purchase at these figures.

3. P.M.—There was no change in the market this afternoon. Quincy sold at $46, and same price was bid for it. Catalpa, 37½c. bid, 42½c. asked.

BULLION MARKET.

NEW YORK, Friday Evening, Aug. 10.

The market abroad and here the past week has been without any indications worthy of notice.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Aug. 4	50 7-16	110¼	Aug. 8	50 7-16	110¼
6	50 7-16	110¼	9	50 7-16	110¼
7	50 7-16	110¼	10	50 7-16	110⅛

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended August 10th, as compiled from various sources, amounted to $250,000 as against $194,000, reported for the previous week. The receipts from January 1st, 1883, to date are $6,987,974.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended August 4th	$314,080
Corresponding week last year	1,589,025
Since January 1st, 1883	7,887,064
Corresponding period last year	42,160,213

Imports.

Week ended August 4th	$143,688
Corresponding week last year	133,095
Since January 1st, 1883	7,697,919
Corresponding period last year	2,228,872

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank lost £88,000 bullion; but the proportion of its reserve to its liabilities was raised from 44⅝ to 45⅜ per cent, against 36 5-16 per cent at this date last year. August 9th, the bank gained £40,000 bullion on balance. The weekly statement of the Bank

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of France shows losses of 20,000 francs gold and 250,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date, from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of July.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.		‡$471,323
*Alta-Montana, G. L. S.	"		§10,625
*Belmont.	"	——	12,604
Bodie, G. S.	Cal.		119,535
Bodie Tunnel, G.	"		54,642
*Bonanza King, G.	"		334,223
*Boston & Montana, G.	Mont.		72,318
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah.		145,671
*Chrysolite, S, L.	Colo.		246,676
Consolidated Bobtail	Colo.		18,723
*Contention, S.	Ariz.		557,428
Crescent, G.	Cal.		13,000
*Custer, G. S.	Idaho.		43,572
*Deadwood-Terra, G.	Dak.		172,277
*Derbec Blue Gravel, G. S.	Cal.		55,148
Evening Star, S. L.	Colo.		47,061
*Father de Smet, G.	Dak.		178,163
*Frisco M. and S. Co., G. S. L.	Utah.		$77,084
Gunnell, S.	Colo.		58,828
*Head Center Consolidated	Ariz.		26,502
*Head Center and Tranquillity	Ariz.		60,620
*Hecla Consolidated, G. S.	Mont.		293,922
*Homestake, G.	Dak.		419,148
*Hope, S.	Mont.		41,963
Horn-Silver, S. L.	Utah.	300,000	1,847,000
*Howell S. and R. Co., G. S. L.		$41,361	41,361
Idaho, G.	Cal.		88,642
*Independence, G. S.	Nev.	——	32,991
Iron Silver, S. L.	Colo.		503,831
*Jocalstita, S.	Mex.		‡228,022
*Kentuck, G. S.	Nev.		12,876
*Lexington, S.	Mont.	106,068	744,556
*Little Pittsburg, S. L.	Colo.		35,645
*Marguerite, G.	Cal.		45,745
*Martin White, G. S.	Nev.	——	136,317
Morning Star, S. D.	Colo.		84,428
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev.		187,823
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S.	"		395,906
*Ontario, S. L.	Utah.		1,038,687
*Oxford, G.	N. S.	5,276	40,531
*Phœnix, G.	S. C.		7,700
*Pinal Consolidated, S. L.	Ariz.		181,485
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		101,241
Standard, G.	Cal.		575,822
Star, S.	Nev.		27,095
*Stormont, S.	Utah.		114,308
Syndicate, G.	Cal.		29,116
Tintic M. and M. Co.	Utah.	10,595	25,196
*Tip Top, S.	Ariz.		‡27,858
*Tombstone, G. S.	"		414,230
Wyoming Consolidated.	Cal.		31,541
Yellow Jacket, S.	Nev.		193,658
Total amount of shipments to date			$11,300,095

* Official. † Net value. ‡ Assay value. §Not including alue of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, Aug. 10.

Copper.—The situation has not materially changed, though the number of those who predict a good future for the metal is growing. We print elsewhere a letter from a correspondent, who has exceptional facilities for gathering reliable data, which will be accepted on the whole as encouraging evidence. Little has been done during the week. It is stated by some manufacturers that they have no difficulty in getting Lake copper at 15c. We can not hear of any available lower than 15½c., while the bulk is not procurable at less than 15¼c. We understand that 15c. has been offered for round lots for export, without, however, bringing out any sellers. Other brands are quoted 14¼@14½c., and bids have been made for 500,000 pounds at 14c. Refiners on this side are getting much less material than formerly, and the quantities of outside copper on the market are much smaller.

In England, Chili Bars are still well supported, being cabled £63 10s.; but Best Selected, which is free from speculative influences, is quoted lower, £67 10s., a sign which, it can not be denied, is not encouraging.

Tin.—Considerable business has been done during the week, 300 tons changing hands at lower prices, precipitated by the arrival this week by steamers of about 325 tons of Straits and 50 tons of Banca tin. Quotations for spot cash large lines Straits are now 21@21⅛c., while in jobbing lots the metal brings for Straits 21¼@21⅜c.; Lamb & Flag, 21⅝c.; Malaca, 21¼c.; and Banca, 22¼c. London cables to-day £93 10s.

Lead.—The market has been very dull, and there have been only a few sales of Common lead at 4·30@4·25c. As yet, the latter figure is not the one generally ruling; but the weakness displayed, notably in St. Louis, where lead has been offered at 3·90c., will probably carry our market to the lower level at an early date. There is very little confidence in the future of the market in metal circles, and the opinion is frequently expressed that, unless a strong demand comes to the rescue of the market, it will fall off to 4c. gradually. Buyers are very cautious, while production is going on at a steady pace.

Messrs. Everett & Post, of Chicago, wire us as follows to-day:

There have been no changes whatever in our market. Little business is doing, as the demand is only from hand to mouth. On the other hand, offerings are very moderate. Prices are nominally 4·05c. for Common and Refined.

Spelter.—The market is dull and lifeless at the range of 4⅝@4⅝c. for ordinary Western. Silesian has sold at 5c. during the week, less than the cost of importation.

Antimony.—There is no change to note.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Aug. 10.

Mr. Edward J. Shriver, Secretary of the New York Metal Exchange, publishes the following returns from 126 furnaces:

STOCKS AND PRODUCTION.	No. 1.	No. 2.	Forge and lower grades.	Grade not specified.	Total.
Stocks July 1st..	13,217	21,929	46,066	17,846	99,058
" August 1st	12,178	17,342	43,970	18,250	91,740
Product'n in July	17,953	6,769	23,149	13,834	61,705

American Pig.—The dullness which we had occasion to note in our last issue has continued, and the outlook is at present certainly not as bright as many would have the public believe. The pig-iron trade is not one to adapt itself rapidly to any changes, and while the known measures taken during the first part of the year have done much toward preventing a very serious overproduction, and have brought about a healthier state of affairs, they have not effected a cure. While No. 1 is certainly not in over-supply and is firmly held, other grades are available in full quantity, and in some cases can only be moved by making concessions. We continue to quote $22@$23.50 for standard to choice No. 1, ordinary brands being obtainable at a concession of 50c.; $19.50@$20.50 for ordinary to choice No. 2; and $18@$20 for inferior to choice Gray Forge. Bessemer Pig is dull at $20.50@$21 at tidewater. Spiegeleisen has sold in considerable quantities, the higher grades at $30.50, and the lower at $25.75@$26.

The week has been an exceedingly quiet one at the Exchange, the only transaction being the sale of 200 tons of No. 1, December delivery, at $22.

Scotch Pig.—Business during the week has been fair at about our quotations. Arrivals are heavier this week, aggregating 2700 tons, and freights are cabled easier, 6s. from Glasgow.

We quote ex ship: Coltness, $23.75@24; Langloan, $23.75@24; Summerlee, $23; Dalmellington, $21@$21.50; and Eglinton, $20.50@$21.

At the Exchange, the following higher cable quotations were received: Coltness, 61s.; Langloan, 60s. Summerlee, 57s.; Gartsherrie, 57s.; Glengarnock, at Ardrossan, 55s. 6d.; and Eglinton, at Ardrossan, 49s. Warrants to-day were 47s. 3d.

Rails.—Business is restricted to small parcels for early delivery, which can not be placed at much lower figures than $38.25@$38.50. There is very little doing in winter delivery, chiefly because makers insist on $38 at mill, which buyers consider too high. There are many inquiries for such delivery, but makers, from being full of work for some time to come, are still indifferent.

Old Rails.—A firmer tone prevails and there have been sales during the week aggregating from 4000 to 5000 tons, all Ts, which are now quoted $21.75@$22.50.

Scrap.—Scrap is dull at $22.50@23 ex ship.

Philadelphia. Aug. 9.

Small transactions have characterized the Eastern Pennsylvania iron trade during the past week, with an improving inquiry for heavy fall deliveries. The users of standard and special brands are in the market this week, to ascertain prices for September and October, and in some cases have submitted orders for ninety days' requirements. Opinions differ as to the probable course of trade between now and the end of the year. Should a large consumptive demand arise, prices will certainly improve for all kinds of iron of good brands. The furnaces out of blast will, for the most part, remain out, for the double reason of low prices and uncertain future demand. Stocks of good grades are low in buyers' hands, and $23.50 was paid this week for a few hundred tons of special for early delivery. Standards are selling in small lots all the way from $22 to $23, with offers in hand at $21.50 and $21.75. Some inferior No. 1 sold at $21, but it was no better than No. 2. Standard No. 2 commands $20.50 in some cases, but sales have been made down as low as $19. Inquiries for Forge are more active than for Foundry, because of the probable resumption of the rolling-mills in September. Prices range from $17@$19.50 at furnace; the latter being for two or three special and very scarce brands. Average prices are $18, though more or less iron has been sold this week below that price; but nothing of a desirable character can be secured below $17.50. The representatives of companies hold to their confident belief in regard to the future of the market; but with the downward tendency in finished iron, consumers will have no margin to pay more than current prices. It was thought that Bessemer iron in large quantities would be sold this week; but up to present writing, sales have not been closed, though, in all probability, large transactions will be concluded before Saturday night. Prices are $21@$21.50 asked, with $20@$20.50 offered, according to size of lot. A number of small transactions in Scotch iron were closed this week.

Muck Bars are selling at $33.50@$34.50, according to quality.

Merchant Iron is weakening, and quotations run from 2·10@2·20c. The intimations thrown out as to Western competition are realized, and agents from Western mills are flying up and down the country, offering iron at prices with which Eastern men will find it hard to compete. Sales have been made below 2c. here. Common iron, 1·75@1·90c. The mills are not working full-time, and will not for three or four weeks. Meanwhile, manufacturers are endeavoring to secure orders for fall delivery.

An active demand, in a small way, has been maintained for Plate and Tank, all the week, with prices as heretofore quoted. Nothing has been closed in large lots, although negotiations are pending. The requirements will be large, as is indicated by inquiries, and the known needs of several large consumers in this locality.

A very satisfactory condition of things is to be reported in the structural iron establishments, and orders for large lots are of very frequent occurrence for early delivery. Angles are 2·40c.; Tees, 3·20c; Beams and Channels, 3·50c. Some of the sales recently made were at concessions from these prices.

Steel Rails.—The companies continue to do a very satisfactory business, but it is mainly in small orders; 5000 and 10,000-ton lots are heard of, and prices range from $38@$39.

Spiegeleisen is selling in 1000-ton lots at $30.50.

Skelp Iron is 2·10c., in 1000-ton lots.

Sheet-Iron is active for light and galvanized at card rates.

Old Rails can scarcely be quoted, as there are no stocks, and buyers decline to pay asking prices; $24 would be paid for Double-Head rails.

Scrap continues rather quiet, and railroad scrap

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 4. H.	Aug. 4. L.	Aug. 6. H.	Aug. 6. L.	Aug. 7. H.	Aug. 7. L.	Aug. 8. H.	Aug. 8. L.	Aug. 9. H.	Aug. 9. L.	Aug. 10. H.	Aug. 10. L.	SALES.
Alice, Mon.			2.30								2.40		200
Amie Con., Co.	.17	.15	.17		.18		.17						7,300
Argenta, Ne.					.25								100
Bar. & Walker, Ut.													
Bassick, Co.					9.50								25
Belle Isle, Ne.					.35		.35		.31				300
Bodie Cons., Ca.					.50				.39		.35		1,400
Breece, Co.													
Bulwer, Ca.									.75				100
California, Ne.	.39		.41	.37	.41		.43		.44		.40		8,390
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Chrysolite, Co.	1.25	1.15			1.25		1.15		1.10		1.10		2,475
Cons. Va., Ne.	.39	.38	.34		.38		.43		.67		.60	.59	6,590
Crown Point													
Deadwood-Terra, Dk.													100
Dunkin, Co.			.24				.24	.20					1,500
Eureka Cons., Ne.	5.50												100
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.									.07				500
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.					.01				.01				4,300
Green Mountain, Ca.			.74										100
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.													
Horn-Silver, Ut.	7.75	7.68	7.63		7.50		7.50				6.63		700
Hukill, Co.													
Independence, Ne.													
Iron Silver, Co.			3.05		3.10		3.10				3.15		650
La Plata, Co.													
Leadville C., Co.	.45				.35				.30				400
Little Chief, Co.					.43						.40	.39	800
Little Pittsburg, Co.											.65		100
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.					3.10		3.10						200
Northern Belle, Ne.	6.75												100
North Belle Isle, Ne.					.35		.35						200
Ontario, Ut.													
Ophir, Ne.									4.25	4.00			200
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.					7.00		7.50						150
Rising Sun, Ca.													
Robinson Cons., Co.	.67	.66	.76	.68	.75	.70	.75	.71	.73		.75	.74	8,700
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	.90		.88				.90		.93		1.00	.94	4,200
Sierra Nevada, Ne.			4.10				5.75		5.50	5.38	4.90		1,275
Silver King, Ar.	6.50												150
Spring Valley, Ca.													
Standard, Ca.							6.63		6.63	6.00			345
Stormont, Ut.	.35				.34								520
Tip Top, Ar.					.75								100
Tombstone, Ar.													
Vizina, Ar.	.75												100
Yellow Jacket													
.....													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 4. H.	Aug. 4. L.	Aug. 6. H.	Aug. 6. L.	Aug. 7. H.	Aug. 7. L.	Aug. 8. H.	Aug. 8. L.	Aug. 9. H.	Aug. 9. L.	Aug. 10. H.	Aug. 10. L.	SALES.
Alta													
Alta-Montana, G.								.05		.05		.05	2,300
Am. Flag, s.													
Barcelona, G.							.45	.44	.45	.44	.45	.44	32,500
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'licher, G. s.										4.50		4.35	150
Big Pittsburg, s. L.													
Bradshaw, s.													
Buckeye													
" pref.													
Bull-Domingo, s. L.													
Bye and Bye													
Calaveras, G.													
O'lav'r'a W. & M. Co.													
Cal., B. H., G.				1.06									100
Central Ariz'na, s.										.15		.17	300
Cherokee, G.													
Climax, Co.				.06		.08				.09		.10	1,700
Cons. Imp'ri'l, G. s.								.08		.07			1,000
Crowell, G.													
Dahlonega, G.						.02							1,000
Decatur				.03				.03		.03		.04	3,300
Dunderberg													
Durango, G.												.05	1,200
Eastern Oregon	.85		.86	.85	.86			.86		.86		.87	86 12,900
Elko Cons.	.16	.15	.15		.15					.15			1,800
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.35		1.35					1.30				1.35	1,100
Hortense, s.										.07			300
Imperial													
Lacrosse, G.													
Lucerne													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. s.													
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, s. L.													
Ori'nt'l & Miller, s.	.13		.14		.13					.15			1,800
Parnell										.11			160
Quartz Creek													
Rappahannock, G.						.06							500
Red Elephant, s.	.07							.07		.07		.06	6,000
Ruby, of Arizona													
Silver Cliff, s.													
Sonora Con.	.25	.24	.27	.24	.30	.25	.29	.27	.27	.26	.30	.27	81,200
South Bodie, G.													
South Bulwer, G.													
South Hite								.04		.04		.04	5,200
South Pacific													
State Line, 1 & 4, s.													
" Nos. 2 & 3, s.													
Sutro Tunnel	.20							.22	.20	.22		.23	.20 10,175
Taylor-Plumas													
Tioga													
Unadilla, s.													
Union Cons., G. s.			4.90					6.50		6.25		5.00	700

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 48,270. Non-dividend shares sold, 145,385.

BOSTON MINING STOCKS.

	Aug. 3. H.	Aug. 3. L.	Aug. 4. H.	Aug. 4. L.	Aug. 6. H.	Aug. 6. L.	Aug. 7. H.	Aug. 7. L.	Aug. 8. H.	Aug. 8. L.	Aug. 9. H.	Aug. 9. L.	Sales.
Allouez											1.50		100
Amie													
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.					1.87½	1.50	1.75				1.50		400
Bowman Sil.	.17	.16	.17		.17		.16						3,700
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	250				250	249½	245						87
Catalpa	.47½	.45			.47½	.45	.45	.35	.42½		.45	.42½	3,150
Central Ariz.					.15								200
Climax													
Co. Virginia													
Copper F'lls													
Copperop.													
Crescent					.20								500
"Cusi"							1.57						100
Decatur													
Deer Isle													
Denver City													
Douglas	.50		.50										300
Duncan													
Dunkin	.23		.28				.25	.23					1,200
Empire													
Eureka Con.					5.75								20
Franklin	10.25				10.00	9.00							115
Hancock G.													
Harshaw	.50												560
Huron			1.50								1.75		200
Independ'ce													
Indian Q'n.											.75		300
Little Pitts.													
Mammoth	.03												1,000
Mass. & N.M.	.03		.03		.03		.05	.04					23,200
Milton													
Napa													
National													
North. Belle													
Ontario													
Osceola					20.50	20.00	20.00	19.50					213
Penn-Breck.													
Pewabic			3.00				3.25						115
Pine Tree													
Plymouth													
Quicks., com													
Quincy	46.00		46.25		46.50	46.38	46.25		46.00		46.00		202
Robinson													
San Pedro					.30		.30						300
S'ra Nevada													
S'ra Grande													
Silver Islet											4.00		50
Silver King							6.63						25
Simpson Gd													
So. Pacific													
Standard													
Sullivan	.65	.55	1.00	.95	.87½	.62½	.87½				.56¼		1,250
Sutro Tun.					.20								200
Sycamore													
Twin Lead													
Vizina													
.....													

PHILADELPHIA MINING STOCKS.

	Aug. 3. H.	Aug. 3. L.	Aug. 4. H.	Aug. 4. L.	Aug. 6. H.	Aug. 6. L.	Aug. 7. H.	Aug. 7. L.	Aug. 8. H.	Aug. 8. L.	Aug. 9. H.	Aug. 9. L.	Sales.
Amer. Cons.													
Argent	.18	.16	.17		.17	.16	.17		.16		.16	.15	24,400
Aztec													
Battle Mt.	.03						.03						7,500
Buena					.01								4,000
California													
Calista													
Chrysolite													
Cincinnati	.10								.11		.10		1,800
Comprom'e.	.20	.19	.19						.18	.16	.16		11,900
Contention													
Con. Virg.													
Dauntless			.02										2,800
Del Monte	.04		.04		.04		.05	.04	.05	.04	.04		17,200
Denver City			.13						.18				7,000
Eureka													
Girard	.03		.03		.03		.03	.01					8,500
Governor							.05						100
Grand Uni'n	.16		.15		.16	.15			.16		.17	.16	15,300
Green Mt.													
Gunnison	.25				.25				.30	.27½	.30	.27½	9,900
Homestake													
Horn Silver													
Iowa Gulch			.08	.06	.07		.07	.06	.06		.06		32,000
Iron Silver									3.00				
King Bul'on													
Ledger Con.													
Little Dia'd			.07										2,100
Little Mam'd					.03								3,000
Little Pitts.													
L'g & D'y H.													
Montana													
Mt. Sheridan													
National													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.	.06				.08	.06	.08	.07			.07	.06	12,300
Permanent	.02		.02										6,000
Pizarro													
Pizarro Ex.					.03								1,000
Potosi													
Rara Avis											.20		500
Rara Avis E.	.08		.09				.09				.09		5,500
Record													
Rice Pion'r.													
Sierra Apac.			.20		.22								1,500
Sierra Bel'e.			.52½								.52½		600
Sierra G'nde	.92½	.87½	.90		.90				.92½	.90	.90	.92½	9,550
Sierra Nev.													
Silver Cord.					1.50						1.42½		800
Silver King.													
Silv'r Plume					.02		.02						7,000
Sonora Con.													
Standard													
Sultana									.02		.02		9,500
Sutro Tun'l.													
Tombstone	1.00		1.00		1.00		1.00				1.02½	1.00	9,400
Victor									.02				12,000
Yale Mt.									.03				11,000

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and selected yard are not in sufficient abundance to induce holders to shade prices to meet buyers' views.

Pittsburg. Aug. 9.

Manufacturers, brokers, and representatives of furnace companies in this county and outside of it are unanimous in reporting an improving feeling and demand for both crude and finished iron; but they are not asking higher prices for any of their products. Order-books are lean, buyers are comparatively short of material, and, as a rule, can not be induced to purchase as freely as stiff prices demand. Manufacturers, however, are confident that, in a very short time, the requirements will drive buyers into market, and in view of this, are not making large concessions. Prices have reached their lowest limits. A few large sales of neutral mill iron were made at $17; best sales, $18. Red-Short iron in 500-ton lots is moving at $18@$18.50. Native Ore Foundry, $19.50. Lake Ore Foundry, $21.50@$22. Car-Wheel Charcoal iron, $30@$33. Bessemer iron sells in small lots at $21.50, but large buyers refuse to pay more than $20.50. Cash offers secure concessions from asking prices. A few thousand tons of Muck Bars have sold during the week at $34@$35. Manufactured iron is in better demand at 1·90c.; small lots, 2c. Several shipments have been made Eastward. Three more mills will start up. Some few have started from single to double turn. Nails are strong and steady at $2.90 in lots of 250 kegs and upward. Inquiries are in hand for 1000-keg lots, and offers are 15 cents less. Factories will start up next week. Stocks are sufficiently large to meet requirements. Makers think they can hold prices where they are. Large building operations are coming to light. Discounts on wrought pipes are 75 per cent; tubes, 60. Oil-well Casing, 45c. per foot; Tubing, 14@15c. The demand is active. All kinds of merchant steel are in moderate request. Prices are unchanged. Manufacturers could meet a much heavier demand. Sales of Steel Rails in small lots have been made at $38.50. Buyers of large lots will hold back. Steel Billets are quoted at $38. Spikes, 2·60c. Nuts and Bolts, 3·20c. Old Rails are quoted at $23.50; $23 offered. Old Car-Wheels, $19.50@$20. Railroad Scrap, $23 per net ton.

A general strike is threatened in the Connellsville coke region. The miners have just been organized. The McKeesport & Youghiogheny Company is putting on sixty-ton mogul engines.

A railroad eighty-five miles long will be built to the Cheat River, to bring ore into Western Pennsylvania.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Aug. 10.

Anthracite.

There are no symptoms whatever of an improvement in the anthracite coal trade; on the contrary, in several quarters we hear complaints of greater dullness, and reports of low prices are growing more numerous, because there are many who must force sales to take care of the larger amount of coal coming to them. Shippers are still engaged in placing coal bought at June prices; but soon the majority of them will have caught up. There has been some talk of putting up prices the middle of the present month; but to all appearances, the scare is now reserved for the first of next month, when probably all interests may be united to create higher nominal figures, so that those announced a month ago may be actually approximately realized. It is likely that there will be a good deal of buying then. From other quarters, the reports are fairly encouraging.

Bituminous.

Rumors of low prices continue numerous, Clearfield coal having sold to steamers as low as $3.50, a figure which, under special circumstances, may be closely approached by other buyers.

STATISTICS OF COAL PRODUCTION.

The Transportation of Coke over the Pennsylvania Railroad for the week ended August 4th, and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	770	52,753
West Penn. RR.	1,347	62,113
Southwest Penn. RR	45,828	1,222,248
Penn. & Westmoreland Region, Pa. RR	4,620	132,823
Pittsburg, Penn. RR.	....	501
Snow Shoe (Clearfield Region)	185	11,849
Total	52,750	1,482,087

Comparative statement of the production of anthracite coal for the week ended August 4th, and year from January 1st:

Tons of 2240 lbs.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	102,642	2,147,425	80,590	1,934,829
D. L. & W. RR. Co.	131,461	2,708,390	110,637	2,523,947
Penna. Coal Co.	37,069	772,296	37,712	758,379
L. V. RR. Co.	27,414	785,621	15,560	616,673
P. & N. Y. RR. Co.	4,669	119,005	3,761	114,771
C. RR. of N. J.	*	1,202,078	32,105	1,341,426
Penna. Canal Co.	15,607	222,083	12,888	243,606
North & West Br. RR.	5,963	266,931	.....	.....
	324,825	8,223,829	293,253	7,533,631
Lehigh Region.				
L. V. RR. Co.	116,903	2,759,619	113,048	2,696,526
C. RR. of N. J.	*	1,126,889	32,197	1,244,799
S. H. & W. B. RR.	1,095	32,317	581	40,370
	117,998	3,918,825	145,826	3,981,695
Schuylkill Region.				
P. & R. RR. Co.	185,089	3,968,078	159,661	3,734,305
Shamokin & Lykens Val.	†	776,324	30,473	695,318
	185,089	4,744,402	190,134	4,429,623
Sullivan Region.				
St Line&Sul.RR.Co.	851	36,035	946	32,931
Total	628,763	16,923,091	630,159	15,977,880
Increase	....	945,211	.....	.....
Decrease	....	....	.....	.....

* Included in tonnage of Philadelphia & Reading Railroad.
† Reports not received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878..... 9,199,031 tons.
" " " " 1879..... 14,843,245 "
" " " " 1880..... 12,347,573 "
" " " " 1881..... 15,566,158 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 523,263 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended August 4th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	4,904	61,569	50,701
Coal for shipment at South Amboy	17,967	461,447	493,464
Coal for distribution	18,476	457,591	415,372
Coal for company's use	5,204	90,504	75,681
Total	46,551	1,671,111	1,035,218
Increase	.....	35,893	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended August 4th was as follows:

Tons of 2000 lbs., unless otherwise designated

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs	63,323	1,379,686
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	5,731	182,752
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,321	109,984
East Broad Top	675	25,724
Clearfield Region, Pa.		
Snow Shoe	4,101	138,608
Tyrone and Clearfield	57,586	1,657,089
Alleghany Region, Pa.		
Pennsylvania RR.	8,145	257,274
Pittsburg Region, Pa.		
West Penn RR.	4,290	250,934
Southwest Penn. RR.	1,630	62,760
Penn & Westmoreland gas-coal, Pa. RR	22,047	796,919
Pennsylvania RR	15,574	320,689
Total	188,423	5,182,419

Wholesale Prices of Bituminous Coal.

Clearfield, at Philadelphia	$3.00@$3.25
" " South Amboy	3.55@ 3.80
" " New York, alongside	3.75@ 4.00
Cumberland, at Baltimore	3.15@ 3.25
" " Georgetown	2.90@ 3.10
" " South Amboy	4.00@ 4.20
" " New York, alongside	4.20@ 4.40

Horsford's Acid Phosphate
As a Refrigerant Drink in Fevers.

DR. C. H. S. DAVIS, Meriden, Conn., says: "I have used it as a pleasant and cooling drink in fevers, and have been very much pleased with it."

DIVIDENDS.

HORN-SILVER MINING COMPANY, Office, 44 Wall Street,
NEW YORK, July 31, 1883.
DIVIDEND NO. 10.
QUARTERLY DIVIDEND of $300,000 has been this day declared, being three per cent on the capital stock, payable to stockholders of record on the 15th day of August next, at the office of the company. Transfer-books will close on August 8th, and reopen August 16th.
W. S. HOYT, Secretary.

SAN FRANCISCO, Aug. 4, 1883.
THE BODIE CONSOLIDATED MINING CO. this day levied assessment No. 3 of 50 cents per share, delinquent September 10th. Sale day, October 10th. Same may be paid at the office of Laidlaw & Co., 14 Wall Street. GEO. W. SESSIONS, Secretary.

OFFICE OF THE JOCUISTITA MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, Aug. 8, 1883.
DIVIDEND NO. 9.
The Jocuistita Company has this day declared a quarterly dividend of FIFTY THOUSAND DOLLARS, being fifty cents (50c.) per share, payable at the office of Lounsbery & Haggin, Mills Building, No. 15 Broad street, on the 31st inst.
Transfer-books close on the 25th inst.
R. P. LOUNSBERY, President.

SPECIAL NOTICES.

AGENT WANTED.—IN AMERICA FOR the introduction of a new patented Cupola Furnace, in which a brilliant, soft, and tenacious cast-iron can be produced out of crude iron of inferior quality by adding shavings of malleable iron or steel. Address offers to DIRKS & COMP.,
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WANTED.—A POSITION AS MINING Engineer or Metallurgist, by a graduate of Lehigh University, with several years' practical experience. Can furnish good references from former employers, as to ability and character. Address,
B. F. HALDEMAN, Bethlehem, Pa.

G. E. RANDOLPH & CO.,
CENTRAL CITY, COLORADO,
GENERAL AGENTS FOR NON-RESIDENT OWNERS OF ACTIVE OR IDLE MINES.
Correspondence Solicited.

STEAM PUMPS.
FOR SALE.—A large number of Steam-Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy service machines.
While the stock lasts, good bargains are open for Miners, Water-Works, Rolling-Mills, Furnaces, or any one needing to move fluids by steam. Call upon or address
JOHN A. HINCKLEY, Purchasing Agent of
THE UNITED PIPE LINES, OIL CITY, PA.

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The smelting-works, with a capacity of from 60 to 80 tons per day, situated at Socorro, New Mexico, upon a switch of the A. T. & S. F. Railroad.
These works are entirely new, and are equipped with all the most modern improvements. For sale for lack of capital to run them. For further information address
WILLIAM H. RENAUD,
Care John J. Adams & Co., New Orleans, La.
Or WM. VANSLOOTEN, 683 Broadway, New York.

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But a small edition of this Map was printed, and the plates were then destroyed.
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On bond paper, for mounting..... 25
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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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VIRGINIA iron ores have appeared in Ohio as competitors of the products of Michigan and Missouri, and the result of the tests now making at Trenton are looked forward to with much interest.

MESSRS. POOR have, in their introduction to the forthcoming *Manual of the Railroads of the United States*, which they publish annually, given the weight of figures to the generally acknowledged statement that the newly-built railroads have been heavily loaded with securities. They show that, in the three years ended December 31st, 1882 the increase in share capital and indebtedness for old and new roads was $2,023,646,842, the increase in the funded debt being $864,929,029, and of the floating debt, $98,289,910. A little more than half of this, they estimate, is the actual cash expenditure made, the new roads costing only, on an average, $30,000 per mile, or $900,000,000 in all, while the cost of improvements of old roads was not more than $150,000,000. This leaves about $974,000,000 for "water," and sufficiently accounts for the loss of confidence on the part of the general public in the diluted railroad securities, and the men who have kept the printing-presses busy. Messrs. POOR take consolation from the fact that we have been taught a lesson, and that for the present we are not likely to fall into the same errors. They argue that it is a proof of the enormous wealth of the country, that its people have been able, almost unaided by foreign capitalists, to spend more than a million of dollars a day for three years in railroad enterprises, without feeling the strain more rapidly, and it might be added that, during the same period, they have contributed enormous amounts toward the same class of enterprises in Mexico, have been paying off the nation's indebtedness at a rate unprecedented, have indulged in a lavish expenditure of public funds of every description, and have invested uncounted millions in creating new industrial establishments. In miner's parlance, we have overdone the dead-work, and it will take some time to make it productive. It is encouraging, and that is a point which Messrs. POOR justly insist upon, that, in spite of much waste and wild inflation, the greater share of the work done has been of a permanent character. It has opened out wide stretches of new country; it has largely added to the means of developing our resources and rendering existing industries more independent. We have prepared the way for larger and more advantageous production, and are only temporarily suffering from the strain of over-exertion. We have been brought face to face with the problem how to solve the question of coping with the fact that we have no home market for a large share of our crude and finished products, and the sooner we intelligently attack the questions at issue the better. We can not afford to pay interest and dividends on double the actual outlay on our railroads; we can not hope to make returns of ten per cent annually on agricultural and manufacturing property run up in nominal value by frequent speculative turns; we can not expect to keep rickety or antiquated plants earning big profits, and expect every body else but ourselves to pay for it.

COMPUTING THE HEATING SURFACE OF HOT-BLAST STOVES.

Furnace-men in France and Germany have been for some time quite eagerly discussing hot-blast stoves, their advantages, their drawbacks, and the best method of overcoming the latter. The leading journals of the continent, *Stahl und Eisen*, *Le Génie Civil*, *Zeitschrift des Vereins Deutscher Ingenieure*, and others, have printed exhaustive articles in rapid succession, and a good many suggestions of value have been brought out. Among the most interesting contributions is an attempt by Herr STEFFEN to compute the heating surface required. We may briefly run over his figures, as reviewed by Herr FRITZ W. LUERMANN, a metallurgist whose name is thoroughly known in this country. Assuming that it is desired to ascertain the heating surface for two blast-furnaces, using each 75 tons of coke, or 150 tons together, deducting 15 per cent for ash and moisture, it will be necessary to consume 92·89 kilograms of carbon during every minute of the twenty-three hours actual blowing time. STEFFEN assumes that it will require only 4·3 cubic meters of gas per kilogram of carbon, a quantity which LUERMANN considers too low, as it would only convert the carbon into carbonic oxide. It should not, however, be confounded with the estimates made in computing the blowing-engine capacity, usually placed by German engineers at from 5·2 to 6·33 cubic meters. Taking the charge to be 1000 kilograms of coke, containing 850 kilograms of carbon, 2000 kilograms of ore, and 250 kilograms of fluxes, yielding 1097·46 kilograms of pig, STEFFEN estimates that 4266·15 kilograms of blast would yield 6054·12 kilograms of gas per 1000 kilograms of coke, or 3890 and 5516 kilograms respectively per 1000 kilograms of pig. If this quantity of blast were heated to 800 degrees Celsius, it would carry into the furnace 744 calories per kilogram of pig-iron. In this theoretical case, STEFFEN calculates the heat required per kilogram of iron at 3953 calories, of which 3209 must be furnished by the combustion of carbon. In reality, the 850 kilograms of carbon consumed per 1097·45 kilograms of pig-iron produce 6254 calories per kilogram of pig, so that only 51 per cent of the heat produced in the blast-furnace is actually used in the manufacture of pig; and deducting losses, 5·097 kilograms of gas per kilogram of pig-iron produced are available for other purposes, or, at the rate of production assumed, 607·56 kilograms of gas, containing by calculation 22·5 per cent of carbonic oxide and 0·5 per cent of hydrogen, capable of yielding per kilogram 715 calories, or 434,405 calories per minute. LUERMANN assumes that the 360 horse-power blowing-engine would require 1·5 kilograms of coal per hour per horse-power, or 12,420 kilograms per run of twenty-three hours; and that the hoists, pumps, etc., would want 2376 kilograms more—a total of 14,796 kilograms, or 10·65 kilograms per minute. Taking the value of one kilogram of boiler coal at 7500 calories, one kilogram would be equal to 10·49 kilograms of gas, so that the quantity of gas necessary for the boilers would be per minute 111·72 kilograms, leaving 495·84 kilograms of gas for the hot-blast stoves,

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or 354,525 calories per minute. STEFFEN estimates the loss of heat in the stoves by radiation and by the temperature of the escaping gas at 40 per cent, so that 212,714 calories would be available per minute. He states that practical experience has shown that it is not advisable to go in cooling beyond one degree Celsius per minute. Assuming the quantity W of blast delivered into the furnace at a temperature of 12 degrees Celsius, the temperature to which it is to be heated T, the surface to be heated by the gas at 1·26 square meters per cubic meter of blast, the specific heat at 0·239, we have the formula:

$$1{\cdot}26 \times 0{\cdot}239 \times W \times (T - 12) = X \text{ cal.}$$

The product X calories must be equivalent to the cooling of the mass of fire-brick in the stove, and we have therefore the formula:

$$G \times 0{\cdot}25 \times t = X,$$

in which G is the weight of the masonry 0·25 its specific heat, and t the rate of cooling per minute in degrees, in this case 1 degree. From this the weight G can be calculated, and by calling the weight of a cubic meter of brick-work 1900 kilograms, its cubical contents may be ascertained. If the stoves work on gas twice as long as on blast, the thickness of brick which will cool may be assumed at 0·10 meter, so that the surface will be twenty times approximately of the cubical contents. Thus the needed heating surface, given consumption of fuel and production of pig per diem, may be roughly ascertained.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Boss Continuous System at the Total Wreck Mill, Arizona.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: As it is a matter that interests the general mining public, I wish to report our experience with the "continuous" system of pan amalgamation, at the Total Wreck Mill, Pima County, Arizona. The mill has a rock-breaker, twenty stamps, fourteen pans, and seven settlers. It was started on February 14th; one half of the mill on the Boss "continuous" system, and the other half on the old-fashioned or tank system. A rigid and exhaustive trial was made, extending over a period of forty-four days, with the object of determining positively which was the more profitable way for us to work our ores. The percentage yield from average assays was 84·12 per cent for the tanks, and 86·35 per cent for the "continuous" plant. The test was conducted with the utmost fairness. I do not know why the "continuous" system should have done better than the tank system, unless it is the stronger attrition of pulp against the quicksilver in the sharp current of thin pulp, or the constant meeting of the pulp with fresh quicksilver. Possibly it might have been both. Certainly there is opportunity for a more varied treatment and manipulation in the several pans of the "continuous" system than is practicable in one pan, by the old style of amalgamation.

The mill worked seventy tons per twenty-four hours, consuming in the same time 4½ cords of cedar wood. The loss of quicksilver from the starting of the mill averaged 1·10 pounds per ton. The loss per ton for the last two months has been but 0·90 of a pound per ton.

The large saving in labor and in fuel, the cleanliness, the reduced wear and tear, because of the steadiness of the load, together with a great many other favorable points, should make the "continuous" system of pan amalgamation a favorite one for the millman and mill-owner.

Respectfully, W. H. ARMSTRONG.

SAN FRANCISCO, CAL., Aug. 7.

The Drifton School.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: It may be of interest to some of the readers of the JOURNAL to obtain some items of the progress of the Industrial School for Miners and Mechanics, of Drifton, Pa., which has just closed its fourth annual session with its usual public examination on the 6th of August. The school opened with 34 scholars, and admitted four more during the session. During the session, eight scholars left of their own accord, and four were discharged for neglect of studies. The school closed, therefore, with 26 scholars. Their average standing in regard to attendance and progress in their studies has been:

Per cent in attendance.		Per cent in progress.	
Six from	90-99	Seven from	90-95
Eleven from	70-86	Eleven "	70-85
Six "	57-68	Seven "	50-65
Three below	50	One below	50

The Preparatory Class was examined in the English branches, geometry, and algebra, to simple equation of one unknown quantity.

The Junior Class was examined in algebra as far as quadratic equations and logarithms; geometry of solids, including volumetrical computations of solids of any shape; geometrical projection of solids, including conical sections and other cross-sections; mechanics, on friction, strength of materials, and dynamics.

The Senior Class was examined in practical geometry, applied to leveling and underground surveying; geology—the geological formations constituting our globe; constituents of rocks and determination of simple rocks during examination; mining—occurrence of useful minerals; description of mineral deposits; searching for mineral deposits; application of the drill for deep boring; excavation of useful minerals and rocks, including tools and appliances; power drills for driving and sinking; mechanics—hydrostatics and aërostatics.

Previous to the public examination, lasting over four hours, in the presence of Hon. E. B. Coxe, who selected the subjects for examination, and even examined some of the senior class, a four weeks' searching review took place, by constant questioning in the class. None of the subjects in which the scholars were examined was known to them during all this period. Examples of the work in drawing, free hand and mechanical, many graphically executed problems from surveying, and a map made by the senior class from its own field-work, as also a number of written problems in mathematics, mechanics, book-keeping, and compositions were open to inspection.

Generally, the scholars passed very creditably, and in various instances even very well. Seven prizes, consisting of useful professional books and instruments, were given to the best scholars. It is not more than right to say here that the interest the scholars take in their studies should rouse other individuals and companies to follow the noble example of the proprietors of Cross Creek colliery, and make this secondary education what it very usefully would be—the primitive education of our mechanics and miners. What a world of difference would this produce in our coal regions! Yours truly, OLD FREIBERG.

DRIFTON, LUCERNE CO., PA., Aug. 9.

MINING IN BOULDER COUNTY, COLORADO.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: During the last year and a half, mining has received a new impetus in Boulder County, mainly through the efforts of miners who were dependent upon prospecting for a living and a few private companies which still retained faith in the telluride veins. For years, the uncertainty of the existence of tellurium ores in paying bodies, at any great depth, deterred capitalists from going down upon their mines. This question has been solved by the American Consolidated Gold and Silver Mining Company, on the Slide vein in the Gold Hill District, where, at a depth of 600 feet, pay ore is found in a large body; also in the Melvina mine, where, at a depth of 500 feet, pay ore is found.

A great deal of attention has been given to concentration in all parts of the county, about as many processes having been used as have been invented; but, with the exception of the Frue vanners, of which there are thirty-seven machines in the county, and one set of Rouse tables—the latter a Colorado invention—all others are either in disuse or have been removed. The main difficulty in concentrating telluride ore is, that the specific gravity of tellurium ores is so small that it passes off in the sluices. The Frue vanners, however, when handled with skill, effect a large saving, and enable a quality of ore to be worked at a profit which was valueless a few years ago.

The Neikerk & Butch mill at Crisman, has recently purchased 1000 tons of the Grand View dump, which samples $21 per ton. The price paid was $1 per ton. The Century Company's mill, at Salina, will be ready for work in ten days, drawing its ore supplies from the Atchison, Fortune, and Melvina mines. This last-named property has recently passed into the hands of practical miners; and as the facilities for handling the water and rock have been doubled by a new plant of machinery, we have no doubt its almost unexampled record of a monthly expenditure of $2000, with an ore-production of $17,000, will not be lowered.

The American and Grand View mines, at Sunshine, are again at work, the former under lease; while the Inter-Ocean and Emancipation properties of the same place are steadily producing at a profit to their owners. With the Ella McKay, Winona, Little Pittsburg, Prussian, Horsfall, and Slide steadily at work, Gold Hill is making her regular shipments. Owing to delay in settling the estate of the former owner of the Cold Spring, which has been a steady producer for the last eleven years, the mine is closed down temporarily. Work has been resumed upon the Washington Avenue, and strong hopes are entertained that success will follow. This is one of those properties where thousands of dollars were spent in a mill before the ore-bodies were opened, only to find the ore of such a nature that the mill could not treat it; and after spending thousands to establish this fact, the works and mine were of course closed; mining in Boulder County thus receiving another blow on account of incompetent managers.

Mining matters are very quiet at Caribou. The Caribou mine is again passing through one of its periodical financial manipulations at the hands of a few of the principal owners, while the condition of the mine, as far as can be learned, is good. With the exception of Caribou, every camp in the county is more active than for years past, with good reports from all. Our millmen estimate that the output for this year will amount to at least $450,000. As no heavy sums of money are spent anywhere in the county, the above sum will pay handsomely for the labor expended.

Of course, our people realize that the Jamestown excitement was an injury to the county, in that it was simply a grab game originated by a few parties for the purpose of plucking Eastern capital. The camp has about settled down upon the old basis, which is the supply from five or six paying properties in the vicinity. JOHN R. WOOD.

BOULDER, COLO., Aug. 6.

A NEW SMOKE-CONSUMER.—Mr. John S. Barwell, engineer of William Glenn & Sons, of Cincinnati, has the latest and most simple smoke-consumer. On the bridge-wall, he constructs a section of tubes of fire-clay, the tubes two feet in length, with a diameter of two inches. He starts the fire with coke, and the tubes soon get red-hot, and then, no matter what fuel is used, the smoke disappears in passing the fire-clay tubes, and beyond them is pure white flame. The cost of the reconstruction of a furnace is about $15. The new smoke inspector has seen this "device," and is surprised at the efficacy of so cheap and plain a method of smoke prevention.

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LAKE SUPERIOR NOTES.

Special Correspondence of the Engineering and Mining Journal.

The correction of my last iron letter by a Cleveland correspondent, whose name, if I mistake not the person behind the initial, is itself a pillar of strength, is an astonishing surprise to the mining superintendents of Lake Superior. The "Specular" article was based on a careful study of all the data at hand in this district, and reflected the positive assurances "from the inside" of the leading mines, and the best-posted correspondents of Eastern managers. If, as "P." says, nine tenths of the down ore have been sold, no one will be more surprised, and of course, none more gratified than the anxious superintendents of our peninsular properties, from whom this information appears to have been sequestered. It will even yet seem a little strange to them that their mines should refuse orders, as "P." asserts, because they are sold up, when none of the larger mines except the Barnum, which has sent down only 25,000 tons, is working strong, and many of them are doing little or no stoping at all. Some of the little fish, like the Boston, Winthrop, and McComber, may have sold up, and several of these doubtless are working somewhat strong. Only this week, the Republic was involved in a strike, on the ground that the mine had contracted for the delivery of from 150,000 to 175,000 tons; but the president, Mr. David Morgan, met the report with the public assertion that the mine had sold only 50,000 tons, of which only 30,000 tons were ore of the first class. Were it not a breach of confidence, other mines could be named whose unsold products at the time my former letter was mailed would reduce the proportion of the product of 1883 to so small a figure as to be a mere phantom—that is to say, of course, if the Western agents know any thing about what they are talking of. If, for reasons, however, the Western agents have been wrongly instructed on sales, it would illustrate the ancient proverb that some others than the Chinamen are peculiar for ways that are dark and tricks that are vain. Be this as it may, your correspondent has no debate with "P.," who is *in situ* at Cleveland, to avail himself, if he will take the trouble, of data which seem to be beyond the reach of the magnates of irondom; and if nine tenths of the down ore are sold (?), your correspondent is glad to modify his figures; and, having no axes to grind, no jobs to smooth over, no bribes to cater for, and no malice to execute, but existing solely to lay before the readers of the ENGINEERING AND MINING JOURNAL an account of the iron and copper industries of Lake Superior, which shall be wholly without bias, and as reliable as a patient study of all the facts can produce, he will be glad to have the "Specular" articles corrected in even the smallest details, at any point and at any time. This is said once for all.

Word has come up during the past few days of the sale of several blocks of ore, from 25,000 to 50,000 tons each, at Cleveland, and of a hardening in Bessemer prices as well. There is also a revival in demand for ores in Pennsylvania, the Scranton purchases discharging cargoes mainly at Buffalo. There is still considerable unsold ore at Erie—or was on the first instant. The outlook for future operations, however, is much better than even one month ago. Trade reports show a revival in demand for railroad construction and equipment, particularly in the building of locomotives—a fact which ought to exercise a marked influence on the price of copper ingot. The locomotive shops, says Mr. Swank's paper, have employed about the same number of men, up to the first ult., as last year; but reports from other sources show a visible increase during the past few weeks. The Bessemer mills report an increasing business. A director informs me that the Union Iron and Steel Mills, of Chicago, are about to go into blast. Thus far, moreover, we have not been very much troubled with the importation of steel and iron rails; the imports of steel up to July being less than thirty thousand tons, as against 101,000 tons for the same time last year, and the imports of iron only a trifle over 2000 tons as against 20,000 for last year. This shows that the market, such as it is, is pretty well held by American mills and American mines. The railroad mileage constructed during the same period of six months was 2032 miles, as contrasted with 4181 for the like period in 1882, and 1917 in 1881. If, however, the rate of increase during the remaining six months should equal that of 1882, the total mileage constructed in 1883 will not fall short of 5500 miles; and if it equals any thing like that of 1881, it will exceed by round figures 6000 miles. This is a crumb of comfort, and finds something of a basis for rational hope in a Wall street report which states that 9000 miles of track ought to be laid this year, and that over 15,000 miles are provided for. If, therefore, our home mills continue to hold the market, there ought to be a lively demand for ores, and the statement of your Cleveland correspondent, that the mines are sold up and are turning away orders, ought to be, if it is not already, literally true.

On the other hand, there is a disturbing factor in the figures of Mr. Swank, which show that, while our production of rails must have fallen off by perhaps one third, our production of pig has increased, being 2,311,662 gross tons for half of 1882 and 2,352,019 gross tons for the first half of 1883; and of this increase in production there were 528,590 gross tons unsold on the first of July, as against 383,655 gross tons at the beginning of the year. And yet it is to be remembered that the mills have been buying only in hand-to-mouth quantities, so that the amount of pig in the country may, in reality, be much less than the memory of the amounts in first hands in 1882 might lead us, at first blush, to infer. And in addition to this, Mr. Swank tells us that not over 5000 tons of foreign pig were in bond at all ports on the first of July, showing that its influence can scarcely reach beyond tide-water markets. We infer from these considerations that the future of our mines must, in the nature of things, be a large improvement on the past six months. The grip of the bears on railroad securities must be slackened in the event of a prosperous autumn, and the breathing of a new energy into railroad construction which must result as a consequence will start up our pig furnaces (nearly one half of which are out of blast), and this will mean a return of good times to our mines.

There are but few items of moment to be recorded in this letter. The Republic strike came to an end on Monday afternoon, the men carrying their point in the restoration of wages to the prices current through the Marquette District. The Champion has closed down for brief repairs to its hoisting-plant, but will be at work soon. Immense bodies of rich ore lie in the areas of the company's property; and although but little comparatively is doing, a general revival will see the Champion again at the front. Considerable exploring is going on in the vicinity of Michigamme, and a few rich finds are reported. The Michigamme mine itself is looking very well, and could, if required, make a decided advance over its record of the past. I notice in the Menominee papers that the Chapin intends sending down at least as much as last year; if so, it will be likely to be the banner producer of this calendar year—a distinction long held by the Lake Superior. It is reported that the Florence has shut down for good, and is allowing its pits and galleries to fill with water, although a letter from that place informs me that operations will begin again next spring. The mine sent down 160,000 tons last year, and was thought to be one of the most prosperous mines of the Menominee range. This will be a heavy blow to the handsome and thriving village to which it has given its name; but other industries will keep the blow from being fatal. A report comes up that Captain Goodrich is to begin operations at his mine in the Saginaw range, although operations for the present will be confined to forcing up a body of hematite which was found near the base of the bluff late last fall. A new find is also reported at the Jackson. The Iron Cliffs furnace is running both stacks, and is developing its mine some five miles from Negaunee, though hardly at high pressure.

The Menominee mines are pushing along, some being a little hard up for ore. Several of the mines are working somewhat strong, since they are owned by Pennsylvania and Ohio furnaces, which devour all their product. The Norway had rather a formidable cave some time since, a superficial area of not less than 115 by 150 feet going down about fifty feet. The upper levels are filling with poor ground, to prevent a spread of the fall, which would endanger the shaft and otherwise interfere with hoisting operations. Exploring is going on at a lively gait in "the range," and a party under Mr. C. E. Wright, a well-known engineer and mining expert, are thrusting their picks and geologists' hammers against the ledges of the vast Agogebic District, the results of which will be made familiar to you in the near future.

SPECULAR.

THE MANUFACTURE OF ZINC IN BELGIUM.*

By M. St. Paul de Sincay, Chenee.

At the epoch of the Roman invasion, the Belgians were already distinguished for their skill in the working of metals. Under the reign of Charlemagne, they understood their artistic treatment; and by the tenth century, they had acquired great skill in the casting and chasing of goldsmith's work, as is shown by the numerous and remarkable specimens preserved to this day. There is therefore nothing astonishing in their having been the first nation of Western Europe to understand and practice the manufacture of zinc. The continual communication which, from a very remote epoch, they kept up with the East by way of Germany, introduced into their country a new metal of a fine yellow color, and having the qualities of copper. This metal the Greeks distinguished by the name of *oreichalkos:* it had been produced from a remote period in Asia Minor and in the Isles of the Archipelago. The Belgians soon learned that it was made by alloying copper with a mysterious substance contained in calamine rock. This rock was probably known throughout a large part of Belgium, because both in the strata of the Devonian formation and in those of the Carboniferous era it formed numerous superficial deposits near the banks of the Meuse between Givet and Liége. Again, in a corner of the duchy of Limburg, not far from the Liége District and from the frontiers of Germany, there existed a bed of this mineral having an exceptional richness and extent. This great bed was subsequently named from the territory containing it, the Moresnet bed. It is generally admitted that here was the seat of the first working of calamine (carbonate of zinc); it is at least certain that at a very distant epoch this mineral was mined there, but the actual date when the working was begun has not hitherto been exactly determined. Ancient documents relate that calamine was raised in the neighborhood of Moresnet at the beginning of the seventh century. Under the date of July 5th, 1435, mention is made of the concession of a zinc mine accorded by the Duke of Limburg. In a record of 1439, a notice occurs of the calamine mountain "which the men of Aix were accustomed to work." This working, at that time abandoned, must have dated from a very distant period. From this circumstance the calamine-bed where it existed received afterward the name of Vieille-Montagne or Altenberg. In 1454, the working of this mine was recommenced according to a concession made by Philippe le Bon to the Sieur Arnold Van Zevel. This mine, which must have been so long in existence, was at that time the most esteemed for the abundance and the quality of its products. These were calcined, or burnt, as it was then called, on the spot; for which purpose wood-charcoal was employed, made in the Forest of Hertogenwald. Thus prepared, the ores were sold, and transported to different localities where copper was beaten. Such works existed at Aix, at Stolberg, and at Cornelius-Munster; but the brass-works of Dinant, Bouviegnas, Oignies, and other localities, near Namur, bought a greater quantity of the make, and transported it to their works on carts as far as Visé, whence they made use of the two great rivers, the Meuse and the Sambre.

It is known that they prepared the yellow metal by mixing in crucibles red copper from the Tyrol, and calamine, after an addition of charcoal; they then transformed the brass, whether cast or hammered, into articles of all kinds, which were known under the name of Dinanderies. Specimens of these are still existing, and bear testimony to the remarkable skill of their artists. Thus there is reason to believe that the working of calamine in Belgium began at about the same time as the making of brass, and was already practiced in the twelfth century. For a long time, under the dukes of Limburg and of Burgundy, and even the Spanish princes, the mines of the Moresnet District were let to mining companies under temporary concessions, not extending beyond twelve years. At certain periods, the government, from motives of policy or otherwise, preferred its own management to the system of leases, and worked mines by its own officers and to its own profit. This was especially the case under the Archdukes Albert and Isabelle, and later in the time of Philippe IV. of Spain. The Austrian government, like the Span-

* A paper read at the Liége Meeting of the Institute of Mechanical Engineers.

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ish sovereigns, used sometimes the practice of leasing and sometimes of working on its own account. The raising of calamine was considered from the first as an important branch of national industry, as is best proved by the numerous regulations to which it is subjected. In order the better to insure its development, the public authorities went so far as to interdict the importation of foreign calamine. After the annexation of the Belgian provinces by France in 1795, the government of the republic itself worked the Vieille-Montagne mine for the profit of the nation; but this attempt at government working soon produced a great diminution in the returns. Hence it was speedily renounced, and in 1806 the mine was let to Daniel Dony, of Liége.

Up to this period, Belgian calamine had only served for the making of brass; but for some time the question had been agitated of abstracting from it the metal which it contained, and which laboratory experiments performed at Liége about 1769 (especially by Professor Villette on the instructions of Magraff) had shown to be of excellent quality. The object was to replace by a national product the zinc made in the foundries of Germany, and also the "tutenag," an impure zinc brought by the ships of England and Holland from the farthest East. The progress which chemistry had made, thanks to the labors of Lavoisier and other scientific men, had spread widely the taste for research and experiment. From different quarters, attempts were made to discover a new method of working zinc, appropriate to the nature of the Belgian ores; and under this impulse, the government imposed on its lessee, Dony, an obligation to make "such experiments as might be judged useful, in order, by the aid of suitable furnaces, to reduce the calamine to a metallic state." Dony accepted these conditions, and set resolutely to work. The task was a difficult one. It required long effort, great expense, and numerous attempts; but the original and persevering genius of Dony overcame all difficulties, and on December 7th, 1809, he applied for a patent for fifteen years, "for the construction of a furnace suitable to extract zinc from calamine, and for the processes employed in this operation." This patent was accorded to him by imperial decree on January 19th, 1810. The Liége method of reducing zinc ores was now discovered, and Dony had given his country a new industry, which was destined to have a vast development.

The small establishment which he had founded at Liége, in the Faubourg St. Léonard, in order to carry out his researches, became the first zinc-works of Belgium. The second furnace was started on January 28th, 1810. The position of this foundry was excellently chosen, placed between two populous suburbs and in the neighborhood of the collieries. It was also able to make use of two main roads and of the Meuse, to receive its raw materials and to deliver its products. This establishment played an important part in the history of Liége. After numerous vicissitudes, it was closed in 1880. A square and several streets have been built on its site, the names of which will still preserve the recollection of the principal authors of the zinc industry and of the main site of calamine working in the district. The discovery of Dony had cost the inventor considerable sums for his experiments. He was recompensed by the protection of the authorities and by the praises of scientific men; but this was not sufficient to restore his broken fortunes. Metallic zinc was at that time applied to very few purposes. Dony hoped to find a market for his metal with the brass-founders; but these, influenced by routine, preferred to treat their copper by means of calamine, as their fathers had done before them. This failure imposed upon Dony further efforts, and a second task still more arduous than the first. After having discovered the method of producing zinc on an industrial scale, it was now become necessary to find applications for it, and to promote its use. In one word, the newly-obtained metal had to find its place in the ranks of ordinary and necessary materials. Indefatigable as ever, Dony set resolutely to work, but the effort was beyond his power. He associated with himself for some time the Sieur Chaulet; but in 1818, completely ruined and worn out by his labors, he definitely resigned in favor of Dominique Mosselman. The latter gave a strong impulse to the zinc trade; but despite his great powers and rare energy, he did not succeed any more than Dony in bringing to completion the work which he had undertaken. In 1837, his sons took up the task, and formed with their father the Société de la Vieille-Montagne. The resources of the new company were considerable; in the first place, it possessed the great calamine concession whose name it bore, and comprehending the whole Moresnet District. Next, it possessed two foundries in actual work—that of St. Léonard, which was now considerably enlarged, and another recently erected near the mines in neutral territory. A third zinc-works, then in course of construction at Angleur, on the left bank of the Ourthe, also belonged to them. In 1837, the first two of these foundries produced together 1833 tons of zinc; the next year, the Angleur works contributed to the production, which rose to 2540 tons. Thanks to the creation of new markets, the make of zinc then received a large development; new furnaces were built, and the production of the three works of Vieille-Montagne advanced rapidly from year to year; as is shown by the following table, which gives the production of the zinc-works at Moresnet, Angleur, and St. Léonard, from 1839 to 1852:

Year.	Tons of zinc.	Year.	Tons of zinc.
1839	3,336	1846	6,720
1840	3,631	1847	6,156
1841	3,891	1848	6,060
1842	4,508	1849	7,844
1843	5,105	1850	9,180
1844	5,665	1851	9,755
1845	5,941	1852	10,372

By the annexation of several competing works, the Vieille-Montagne Company has seen its production increase from year to year, until in 1882 it reached a total of 39,000 tons of raw zinc, 36,000 tons of which were made in Belgium.

During the same period, several new establishments for zinc-working were founded in Belgium. Among the first of these should be mentioned the Nouvelle-Montagne Company, founded in October, 1845. The two works of this company, situated one at Prayon, near the Vesdre, and the other at Engis, on the Meuse, produced in 1846 about 1357 tons of raw zinc. They were supplied with calamine from the royalties of the Nouvelle-Montagne, which was situated between Verviers and Stembert, and from the beds at La Mallieue and Les Fagnes, near Engis. The first of these mines was leased on May 7th, 1829, and the second on May 17th, 1830. The working of calamine at La Mallieue has existed for a long time; the brass-makers of the Namur District took their supplies thence at the beginning of the seventeenth century. It was in exploring along a bed of carboniferous limestone, with the object of working alum slate, that calamine had been met with: it was associated with ores of lead. The annual yield of these Nouvelle-Montagne zinc-works rose gradually; in 1865, it attained 3749 tons; it then sank below 3000 tons; but rose rapidly from 1874, and has now reached the figure of 6650 tons.

In 1882, the Prayon works were separated from the Nouvelle-Montagne, and restarted by a new company, bearing the name of Société Anonyme Métallurgique de Prayon.

In 1841, metallurgical works were erected in the commune of Antheit, near Huy, for treating the ores of zinc and lead derived from the Corphalie mines, which had been conceded in June, 1829. A company was formed July, 1849, under the name of the Société de la Corphalie, to continue the working of these mines. The company also possessed the right of exploration in the calamine-beds of Sielles and of Landesme-sur-Meuse, especially at the place called Hayes-Monets; this concession was obtained in February, 1848. The production of raw zinc at the Corphalie works was below 1000 tons up to 1847; it then rose from year to year, and in 1869 reached 6112 tons. After a period of reverses, it took a new departure in recent years, and is now above 8000 tons. In 1863, the Corphalie Company, being amalgamated with a zinc mining company situated in Croatia, changed its name to that of the Société Métallurgique Austro-Belge.

At the same date, the firm of Laminne, of Liége, founded at Ampsin, a zinc foundry on the banks of the Meuse, and also works for calcining zinc ores at Bende, on the plateau which overlooks the Meuse on the side of La Hesbaye. The foundry turned out 1181 tons of metal in 1856; but owing to the development of its capacity, it is now able to supply more than 6000 tons per annum.

The Grande Montagne Company was formed in 1846, to work the zinc-bearing beds of Flône, and built in this district works which were started in the succeeding year, and which, after some vicissitudes, were taken over by the Vieille-Montagne Company in 1853. It was then supplied by ores from different mines, like the other foundries of the same company. In 1854, its production was not more than 1510 tons; since that date, it has quadrupled itself.

The Société Anonyme des Houillères et Fonderies de Zinc de Valentin Cocq was founded like the last in 1846, and was merged at the same time in that of the Vieille-Montagne. Its works are situated at Hollogne aux-Pierres, and at that time already produced 2391 tons per annum. The production has since developed rapidly, and now reaches nearly 18,000 tons. The Valentin Cocq foundry is certainly the largest zinc-works in Europe.

The Société Anonyme de Zinc, Blanc de Zinc, et Charbonnage, de Colladios was founded in 1855, and built at Mons, near the Valentin Cocq foundry, zinc-works, the make of which was always below 500 tons. This foundry was bought by the Vieille-Montagne Company in 1865, and joined to the great works of Valentin Cocq.

The Société de Bleyberg-ès-Montzen added, in 1855, a zinc foundry to its lead-works, in order to treat the calamine of Schimper, as well as blende extracted from its great vein of lead, and found associated with galena. This foundry, whose annual make has for a long time been only about 1500 tons, has recently received great enlargement, and its capacity is now about 5000 tons.

The zinc-works at Ougrée, now belonging to Messrs. Escher, Ghesquière et Compagnie, dates from 1859. Its annual make, which was for several years small, is now above 4000 tons of raw zinc.

The most recent works in Belgium are those of Messrs. Dumont Frères, of Liége, erected in 1875, at Sclaigneaux, near their lead-works. It has developed rapidly, and its annual capacity is already as much as 6000 tons of zinc.

On the whole, it appears that Belgium now possesses eleven works for reducing zinc ores, and all in a state of high activity. Their capacity was developed gradually, and in 1882 they were able to turn out 71,565 tons of raw zinc. The following table gives the distribution of this total make:

Works.	Tons.
Vieille-Montagne	35,940
Austro-Belge	8,099
De Laminne	6,255
G. Dumont et Frères	5,500
Nouvelle-Montagne	5,480
Bleyberg	4,647
Ougrée	4,144
Prayon	1,500
	71,565

This total figure represents about one third of the whole production of Europe, but will probably be considerably surpassed in 1883. In so active a state of trade, it is not to be wondered at that the annual amount of ore consumed is considerable; it is, in fact, about 200,000 tons, only a part of which is furnished by the mines of the country. Belgium, as we have said, is rich in zinc-bearing strata; some of them consist of calamine, others of the blende, mixed with sulphates of iron and of lead. The greater part of these are under concession, and are worked to a greater or less extent. The principal concessions have already been mentioned; the others would form a long list which it is not worth while to give. For several years, calamine (carbonate of zinc) has been the only ore treated in the Belgian zinc-works. The preference thus given to it is easily explained by the facility with which it lends itself to metallurgical operations. For a long time, it was believed impossible to utilize the blende (sulphide of zinc); but thirty years ago, the making of zinc began to be largely extended, and it was necessary to have recourse to new supplies of mineral. Attempts were then made to make use of blende; special workshops were constructed for the desulphurizing of the new ore, and before long a considerable proportion of this ore was supplied to the foundries. In Belgium, the chief works for roasting blende are those of Bleyberg, Engis, Flône, Ampsine, Corphalie, and Sclaigneaux.

It would be difficult to estimate the quantity of zinc ores, carbonates and sulphides together, which have been extracted from the Belgium mines. It must be very great, since from 1837 to 1882 the mine of Moresnet Neutre alone, belonging to the Vieille-Montagne Company, produced

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1,295,290 tons of calamine. The calamine earths, which are found with the ore-bearing rock, are generally very poor in zinc, but are made more serviceable by washing. The same is the case with the blende, which must be separated from the other sulphides with which it is almost always associated; but on account of this separation, the mechanical preparation of blende gives rise to operations which are usually of a very complicated character. Belgium possesses several large works for the mechanical preparation of zinc, such as those of Moresnet, Welkenraedt, Bleyberg, Engis, Flône, Bende, Corphalie, and Sclaigneaux. These have a high reputation for the excellence of their manufacture. In several of these, appliances which are now known and appreciated throughout the world have had their origin. Except the Morsenet works, which only treat calamine from the neutral territory, all the Belgian foundries receive a part of their supplies of ore from abroad. It was the mines of Spain which first came in to aid in their supply; to these were subsequently joined those of Sardinia, Greece, Algeria, Sweden, France, Germany, and England.

Foreign calamine is generally calcined before being shipped; blende, on the contrary, is usually shipped in its raw state, and has to be submitted in Belgium to the preparatory treatment which its nature requires. Almost all these ores are brought by sea to Antwerp, where several agencies exist to receive them and to direct them toward the zinc-works, whether by railroads, with which all the works are connected, by canals, or by the Meuse; most of the works being equally accessible by the latter channels.

The Belgian foundries require from abroad nothing more than a supply of ore; for every thing else, they find in their own country and neighborhood all the resources necessary. Situated in more or less close vicinity to numerous collieries, they can choose the bituminous coal best suited to the system of furnace they have adopted. They receive from different sides, both from the basin of the Charleroi and that of Liége, non-bituminous coal and small coal, which they employ for reducing purposes. It is well known that, for the manufacture of zinc, as for many others, the question of refractory materials is of very high importance. The Belgian works obtain from large beds near Ardenne a refractory clay, with which they manufacture articles of an excellent quality and of long-established reputation.

But the special strength of these works lies in the fact of their possessing a class of workmen, strong, intelligent, experienced, active, well-disciplined, fond of their trade, and deeply penetrated with feelings of duty. Among this industrial population, which, without counting laborers, numbers some 7000 workmen, there are many who have saved enough to buy the houses which they inhabit, and the gardens which, after the rough labors of the shop, they find time to cultivate. The workmen at the Valentin Cocq works belonging to the Vieille-Montagne Company are distinguished in this respect, since at least half of them are proprietors. This love of property and care for the future is nothing surprising. For a long time past, the company has done its best to inspire this feeling by creating institutions of thrift intended to insure the material, moral, and intellectual good of the working-classes.

The first care of the company was to give all its workmen a share in the wealth which they procured proportional to their efforts and their success. The arrangements as to wages and allowances were made in this spirit. Subsequently, the work was completed by establishing the following institutions, all intended to ameliorate the condition of the workmen, namely: A sick fund, a provident fund, a savings-bank, and a life insurance fund. The first two are workmen's institutions in the full sense of the word; the sick fund is formed entirely by a sum deducted from the workmen's wages, and is used to supply their present needs in case of sickness or injury. The provident fund, which is supplied by payments from the company, is intended to provide for the future need of the workman when age or infirmity renders him incapable of labor. This solicitude for the working-classes on the part of the Vieille-Montagne Company has been imitated under different forms by the other Belgian works; and these measures have received a practical sanction which is worth noting—namely, that, so far as the writer knows, this industry has been wholly free from those strikes which have so often brought disaster into the trades of the miner and the iron-worker.

THE METALLURGY OF ZINC.

The different processes for the reduction of zinc ores are well known. The *per descensum* process has scarcely ever been practiced except in England. On the continent, the methods in general use are the Liége method and the Silesian method. Neither of these since its commencement has undergone any essential change, and they may be employed at present side by side with each other. The Liége furnace is generally higher than its width, and contains six, seven, or even eight ranges of crucibles. These furnaces occupy little space, and also consume less fuel than the Silesian furnaces. The latter, on the other hand, are cheaper as regards labor and the durability of the distilling apparatus. To complete the essential distinctions between the two, it may be said that the Silesian furnaces are specially adapted for treating poor ores; and this should be so, since they were invented to reduce the calamines, low in proportion of metal, which are worked in Silesia.

Belgium, as might be expected, has remained faithful to the Liége or direct-heating process, inaugurated by Dony. The works of Valentin Cocq and Flône are the only ones which possess furnaces agreeing with the Silesian system in their mode of heating; but being provided as they are with crucibles in three ranges, they share equally the advantages of the Liége method. Great efforts have been made to perfect the metallurgy of zinc. These have opened the way to progress in many respects. In all the operations required—in the preparation of the refractory materials concerned, in the crushing of the ores, in the composition of the charges, in the construction of the hearths, in the arrangements and dimensions of the heating chambers—important improvements have been realized: in all, new and improved appliances have come into use, which, for the most part, are due to eminent manufacturers in the district. Above all, changes have been made tending to render more easy and less dangerous the labor of the workman. Thanks to other improvements, the results of the process have been sensibly improved. It has especially been sought to augment the production of the furnace, to reduce the "écart" or loss of metal during treatment, and lastly to diminish the consumption of fuel. In all these ways, notable progress has been realized. The zinc vapors formed in the crucibles are condensed in receivers, made of refractory earths and called tubes or bottles. From these, the liquid metal is withdrawn, either several times during the operation, or once for all at its termination, and it is immediately run into ingots or rectangular plates, of a thickness from 20 to 25 mm. (0·8 inch to 1 inch) and weighing about 20 kilograms (45 pounds).

The first products of the distillation are collected in the form of dust, more or less oxidized, in wrought-iron pipes which form a prolongation of the tubes. This dust, to which has been given the name of gray oxide, must be submitted to a fresh treatment, unless it can be utilized directly for painting, or for the making of hydro-sulphite of soda. The second treatment is sometimes carried out in a furnace with vertical retorts, which bears the name of its inventor, M. Montefiore, and which is worked particularly at the Corphalie manufactory. The ingots of raw zinc are, some of them, taken to a rolling-mill and rolled into sheets. Others are reserved for making oxide of zinc, and others, lastly, destined for different industries, such as the making of brass, are sold in the condition in which they leave the foundry.

ROLLED ZINC.

The uses of rolled or sheet-zinc are numerous and varied. New uses are created every day. The consumption of rolled zinc, which has long been large, increases continually, and the greatest part of the zinc produced in Europe is not used until it has been passed through the rolls. The rolling of this metal at first encountered very great difficulties. These arose from the fact that its malleability is confined between very narrow limits of temperature. For this reason, the rolling of zinc will always remain a delicate operation, which can only be intrusted to experienced hands. The most suitable temperature is about 100° C. = 212° Fahr., and this must be maintained through the whole of the process. Below this point, the metal opposes too great a resistance to the squeezing action of the rolls, and it must be re-heated, which is a matter of much inconvenience. Above this point, it becomes brittle; at 200° C. = 390° Fahr., it can be brayed in a mortar. Whatever its method of manufacture, zinc ought to be re-melted before being rolled into sheets. The heat of fusion varies between 400° and 500° C. or 750° and 930° Fahr. Re-melting is generally accomplished in a reverberatory furnace. Its first advantage is, that it rids the zinc of the impurities, especially lead, which almost always accompany it. Again, the thickness of the ingots must vary with the final dimensions required; this is another consideration which renders re-melting indispensable. The re-melting plates are first roughed down or rolled between heavy rolls; then, after being cut down to a fixed weight, they are conducted to the finishing train, where the rolling is completed. There are, therefore, two distinct operations—the roughing down and the finishing. Between the two, the sheets should be re-heated in annealing-boxes placed upon the melting-furnace, so as to utilize the waste heat. Each of these operations gives rise to a production of scrap, which is more or less large according to the quality of the metal and the tenacity of the sheet. This scrap and any defective sheets are re-melted with the ingots coming from the foundry. On leaving the finished rolls, the sheets are cut by shears to a rectangular shape and to the dimensions required by commerce. There are several systems of shears; those most used in Belgium are the lever shears and the guillotine shears. The later, which at present have the preference in the rolling-mills of the Vieille-Montagne Company, cut the metal perfectly clean and exact.

After being squared, the sheets of zinc are sorted with great care. Those which are found to answer all the conditions are impressed with the stamp of the works. The thickness is specially gauged, and is expressed by a number on a fixed scale. It varies between 0·05 millimeter and 4 centimeters (0·002 inch to 1·575 inches). Zinc sheets are delivered sometimes loose, generally in barrels or boxes; hence a cooperage is an indispensable adjunct to a store for rolled zinc. This accessory is mentioned on account of its real importance. Belgium manufactures annually nearly 40,000 tons of sheet-zinc. The rolling-mills which contribute to this production are, in the first place, those of the Vieille-Montagne Company at Angleur and Tilff, which together furnish nearly 20,000 tons per annum. The remainder of the make is divided between the works of the Nouvelle Montagne Company, at Engis; those of the Société de Prayon, at Prayon; those of MM. Francotte-Pirlot & Co., at Chênée and Liége; those of M. E. Nagelmackers, at Chaudfontaine; those of M. Charles Heptia-Hauzeur, of Fraipont; those of Madame Veuve Bonhomme, at Nessonvaux; those of MM. Lejeune Frères, at Stère; those of M. L. Dacier, at Liége; those of M. J. Brasseur, at Huy; and those of M. G. Schmidt, at Brussels.

As already stated, the applications of rolled zinc are numerous and varied. We confine ourselves to a few. The making of roofing sheets certainly occupies the first rank. The systems vary according to the character of the buildings to be covered. For dwelling-houses, choice may be made between plates having the shape of a heart, a lozenge, a fish-scale, a rectangle, etc. All are recommended by many advantages; among which should be specially noted their complete impenetrability to water. Roofs for industrial buildings are generally constructed of fluted or corrugated zinc. Among other applications, some of the chief are the sheathing of vessels; the making of domestic utensils and articles for various trades, for many of which the zinc must be previously pierced with holes; the glazing of paper; the making of taps and of wire. In thick plates, zinc is chiefly employed by engravers for zincography, in arsenals for coating bullets, and in steam-boilers to prevent incrustation.

OXIDE OF ZINC.

Zinc heated to a red heat is evaporated, and the vapor coming in contact with air is oxidized and produces a white impalpable substance, which alchemists named *lana philosophica*, and which in modern times bears the name of "zinc-white." This oxide has long been employed for decorative painting. Its brilliant whiteness, combined with the fact that it does not change by the action of the air, and has no ill effects on the workmen who use it, are the principal qualities which have made it the most formidable rival to white lead. In making oxide of zinc, there are two processes, equally simple. The sublimation process is the most ancient. To sublime or volatilize ingot zinc, it is placed in a series of retorts within a common furnace; the oxide is formed in an exhaust-

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chimney, and then passes through a long series of passages and condensing-chambers. It is deposited in large tanks of sheet-iron or cloth, which are ranged all along the path pursued by the vapors. At certain hours in the day, the oxide is collected into casks, and then, after the quality has been tested, it is compressed into barrels carefully made, ready for delivery. According to the purity of the metal subjected to the process, the zinc-white is obtained varying in color and brilliancy. "Blanc de neige" is a product of the most superior quality, and can only be made with zinc from the ores of the Moresnet beds. "Blanc No. 1" is the most common variety. It requires for its manufacture zinc coming from selected ores, and generally purified by re-melting. Lastly "Blanc No. 2" is the common variety, distinguished from the others by its shade of whiteness, though still identical in composition.

In the making of zinc-white, as in all other manufactures, residues are produced: drops of metal imperfectly oxidized, deposit in the retorts, and waste from the workshops, and all classed separately; then after being ground, washed, and dried by being led through winding passages, they form the "gris-pierre," which is employed in painting to replace minim. The second process for making the zinc-white is known as the American method. It uses the ore directly, and is necessarily therefore cheaper than the former; but its products are of inferior quality to those produced by sublimation. There are in Belgium only two works for making zinc-white. The Vieille-Montagne Company produces annually at the Valentin Cocq works 3000 tons of zinc-white by sublimation. The other work is at Ougrée, and belongs to Messrs. Eschger, Ghesquière & Co. There the American method is employed; but at present, the works are standing idle.

DIRECT USE OF INGOT ZINC.

As we have said, zinc was employed in the arts long before it was known in the metallic state. As of old, the making of brass continues to absorb the largest quantities in Belgium, and above all in England. Melted zinc is also used to cast ornaments and objects of arts, such as statuettes, groups, etc., which are afterward covered with copper by means of the galvanoplastic method, and imitate bronze with a perfection which defies the most skillful eye. The Vieille-Montagne Company makes from the ores of Moresnet, under the name of *fonte d'art*, a variety of zinc which is specially reserved for this purpose. Lastly, the galvanizing of iron, telegraph wires, etc., is a large source of employment for ingot zinc.

If the zinc-works of Belgium receive a part of their supplies of ore from abroad, in return their products are exported into all the countries of the world. France and England are those which receive the most; Germany, Italy, America, Scandinavia, and Holland also take their share.

In conclusion, the manufacture of zinc, the origin of which in Belgium dates back to so remote a period, has received from the beginning of this century a very large development. By the number of establishments devoted to it, by the quantity and value of the production, by the multitude of workmen it employs, by the importance of the capital which it absorbs, it holds one of the foremost places in the great industrial life of the country. In spite of the depreciation in value of all metals, the production of zinc increases from year to year, and the financial results of the operation are, in general, satisfactory. The working of zinc has a brilliant past, and it may be hoped that it will still enjoy in Belgium a long era of prosperity.

MAKE OF CRUDE ZINC IN EUROPE SINCE THE YEAR 1860.

DISTRICT.	1860.	1865.	1870.	1875.	1880.	1882.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Upper Silesia	40,354	35,430	36,518	43,123	65,437	69,846
Rheinprovinz and Westphalia	8,592	16,647	18,006	25,396	27,107	35,546
Vieille-Montagne	28,925	30,592	48,112	41,618	44,690	48,861
Other Belgian makers	9,144	13,485	14,476	18,836	26,700	35,625
Asturias } Spain	1,777	1,325	3,048	3,000	4,000	5,047
Company } France	.....	.....	.....	5,311	8,591	11,423
Other French makers	.....	500	500	1,500	3,000	.....
England	6,104	6,523	16,000	15,903	22,000	25,581
Poland	1,500	3,000	3,625	3,000	4,463	4,454
Austria	1,500	1,000	1,000	1,000	3,199	3,199
Total	97,896	108,502	135,285	158,687	209,187	239,672

The discussion on the paper was opened by M. Rocour, who pointed out some of the difficulties in connection with the zinc manufacture, and said he could not assent to the conclusion of M. Sinçay, that the financial results of the operation were, on the whole, satisfactory. He was, he said, of a contrary opinion, and if he could establish that view of the case, he should be doing the best he could for his own country, and for others that might be thinking of introducing the industry. They were largely dependent upon foreign ores. In 1882, the production in Belgium was about 83,000 tons, while the foreign imports amounted to double that quantity. The price of the ore was continually increasing, and the competition of the different works was so sharp that the margin of profit was very small. During the last three years, it would appear from the value of the shares at the present time that the result of the total working had been a loss. It might seem at first sight that the metallurgy of zinc was very simple, and might be carried on in any country; in reality, it was of a very difficult character, requiring men of special intelligence and training, and also of great industry. He thought that the industry was certainly not adapted to England, as the work had to be continued without intermission; indeed, he knew of works where the men were occupied three hundred and sixty days in the year.

Prof. Chandler Roberts, of the Royal Mint, said that whatever view might be taken as to the immediate prospects of the zinc industry in Belgium, there could be no question that the Belgian method had entirely displaced the English, and had found a home in Swansea. He had recently visited some large works there, in which the Belgian system had been entirely adopted. A large staff of Belgian workmen had been employed by the proprietors, and he fully indorsed the views that had been expressed as to their skill, industry, intelligence, and discipline. There had been a great difficulty in the use of regenerative furnaces as applied to the metallurgy of zinc, and he believed it had arisen from the fracture of the retorts, giving rise to the escape of zinc, which rapidly became oxidized and choked the regenerator. He should be glad to know if that difficulty still existed, and whether any of the hitherto abortive experiments for the extraction of zinc in the blast-furnace had succeeded.

Mr. B. Sharpe said that great difficulty had been experienced in working up certain sorts of zinc. They had generally flakes of lead underneath, and there was nothing that made brass more rotten than lead: it gave it a white fracture; in certain forms, sheathing for example, it would not wear as well; and it was bad in every way. But by taking the zinc and lead mixed, getting it to a temperature above the melting-point of lead, but below the temperature at which zinc volatilized, casting it in a vertical mold slightly rounded at the bottom, so that it would not crack, and letting it cool slowly, the ingot could be dropped, and the two pieces would come separate. He had often adopted that method when he had a quantity of bad spelter. With regard to the catching of the oxide, he had brought out a plan about ten years ago in Birmingham, by which he used a jet of steam, and injected the entire contents of the furnace into water: it was a modification of Giffard's injector. There was a large vat, and about four inches below the surface of the water a plate perforated with sixteen holes. With an 18-inch pipe, the products of the water were injected down the shaft; they went under the plate and came up through the holes. It was then found that what went away, instead of being thick with fumes of oxide of zinc (representing in one works that he knew a loss of £5000 a year), was an almost colorless gas, and at the bottom there was a sort of gray mixture deposited, consisting of unconsumed gas and oxide of zinc. Of course, it was valuable, and it could be recovered by depositing; but he gave up the plan for the simple reason that, although he was able to catch 90 per cent of it, apparently saving £5000 a year, it cost £5000 or £6000 a year to catch it. Scientifically, it was a great success, and if he had had the means of utilizing waste steam, it would have been a success financially; but where the steam had to be made separately, it was otherwise. In open-air furnaces, the products of combustion could not be run through a boiler for many reasons, the chief one being that it interfered with the draught of the furnace, and the mixture was not as regular as was desired. In certain qualities of brass, a difference of half of one per cent in spelter would make the difference between a good and a bad result. With regard to the shape of the ingot, there were various reasons why it should be preferable to cast in a circular form—he would suggest a size of three or four inches; the only objection was, that that was an awkward size to break into small parts. With circular casting, there was a smaller loss than putting into pots. In the case of air-furnaces, they were put in on a rabble: one of the great advantages was, that very little zinc was lost. The cost of the workman's wages might be saved several times over. If there were a lot of flakes three quarters of an inch thick thrown in on the top, there was a great loss. If made in a circular form and dropped in vertically by a pair of claws, there would be an immense saving to the makers. At one time, he thought it was worth while to adopt that circular form, and he thought that any one who took up the plan would get some orders to start with.

M. Rocour said with reference to the breaking of the retorts, that it has been generally found that the clay retort resisted much better with the gas regenerator than with the old fire-clays. The system of blast-furnace working for spelter has been tried in Belgium several times, but not during the last twenty-five or thirty years. Several trials had been made, but they had not been successful. The reason was, that when the current of spelter and carbonic acid came together, the spelter reduced the carbonic acid, so that they could only have in the mixture pure oxide of carbon and spelter. He did not know any kind of industrial furnace that could solve the question. They had never seen a furnace producing only oxide of carbon and nitrogen. In the present state of technical science, he believed the problem was insoluble. There was also another reason arising from the difficulty of condensation of a rather small quantity of spelter vapor, with a large amount of other gas. That was another drawback; but the first one was quite enough to discredit any other method of producing spelter than in a retort.

A MINE ON PAPER.

Judge Brown, of the United States District Court, sitting as Circuit Judge, has rendered an important decision on a motion to remand to the State Courts the action of Sylvester H. Langdon and others *against* Francis A. Fogg and others, originally brought in the Supreme Court of this city by plaintiff, as stockholder in the Silver Era Mining Company, in behalf of himself and all the stockholders. The company was organized under the laws of the State in February, 1880, to have a capital stock of $10,000,000, divided into 100,000 shares of $100 each. The defendants are the corporation and five individual defendants, alleged to have been the trustees of the body at the time of its formation and during the first year afterward. Upon the petition of Mr. Fisk, one of the defendants, a resident of New Jersey, action was removed to the Federal court. The complainant alleges that the defendants agreed with Henry S. Sanders to issue to him the whole of the capital stock in consideration of his conveying to the corporation certain mining claims and property in Arizona. It is further alleged that shortly afterward all of said stock was turned over to the individual defendants upon payment of $45,666.67. It is also alleged that the defendants, assuming to act for the corporation, issued certificates of stock, representing them to the public to be full-paid stock. Some of this stock on such representations was purchased by the plaintiff, who subsequently learned that the corporation had no means of developing or improving the property, and failing to work it, it had become forfeited and passed beyond the control of the corporation. It is also alleged that the individual defendants have not accounted for the difference between the ten million dollars represented by the capital stock and the actual cost of the property conveyed to it by Sanders. Judge Brown says it does not appear that the corporation ever had any property or capital whatever except the mining property which the defendants individually procured from Sanders, and any profits on sale of stock were individual and not joint transactions. The court denies the motion to remand.

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THE SCHWARTZKOPFF SAFETY APPARATUS FOR STEAM-BOILERS.

By C. A. Stetefeldt.

Read at the Roanoke Meeting of the American Institute of Mining Engineers.

If we inquire into the causes of explosions of normally constructed steam-boilers, we may classify them under the following heads:

1st. Low water-level.
2d. Undue pressure.
3d. Firing empty, and injecting water after the sheets have reached a high temperature.
4th. Those still unexplained phenomena, known as "Siedeverzug" or retarded boiling, that is, the condition in which the water has reached a higher temperature than the pressure indicated.

Mr. Richard Schwartzkopff, of Berlin, Germany, has invented an apparatus which indicates every one of these dangerous conditions. The principle upon which its construction is based is this: An alloy, fusing at a certain temperature, closes, when fusion takes place, an electric current, having one or more alarm-bells in the circuit. Let us examine the ingenious manner in which Mr. Schwartzkopff has utilized this principle.

The apparatus consists of two parts, of which one is stationary and the other movable. The former serves as a receptacle for the latter. Fig. 2 represents a vertical section of the stationary part, fastened to the boiler, as shown in the drawing. The tube i, i is closed at the bottom, and reaches nearly to the flue or flues. A second tube a, a, concentric with the first, and sufficiently large to form an annular space, is open at the bottom, and ends at low water-level. A short distance above the crown-sheet, the second tube terminates, and the annular space is closed. It reappears again, however, on the top of the apparatus at A, where it is connected with the lower one by a spiral pipe o, o. A is provided with a cock h. If h is opened, the air escapes, and both annular spaces and the pipe o, o are filled with hot water. As soon as h is closed, the water in A sinks to a moderate temperature. The movable part of the apparatus is shown in Figs. 3, 4, and 5. It consists of two heavy copper wires d, d', terminating in a soapstone crucible k, k', which forms the bottom of a copper cylinder c', c'. The fusible alloy, in the form of a ring l', l', is inverted at the top of this cylinder, its temperature of fusion being so graded as to correspond with a certain pressure. A plug of soapstone v' covers the top of the cylinder c'. The upper ends of the wires perforate an apparatus exactly like the one just described (see Fig. 3), only that the point of fusion of the alloy is 100° C. The soapstone disks m, m' serve to insulate and strengthen the wires, which are made parts of an electric circuit. (See Fig. 1.) If we insert the apparatus, Fig. 5, in the tube i, i, so that the cylinder c', c' touches bottom, we find that the upper cylinder c, c is surrounded by the chamber A. Now, let the water-level sink below $L\,W$. Immediately the water column in the annular spaces drops out, and the chamber A is filled with steam of a temperature above 100° C. The ring l, l fuses, the alloy accumulates in the crucible k, k, closes the current, and all the alarm-bells in the circuit are sounded.

In case one of the dangerous conditions, given as the second, third, and fourth causes of explosions, exists, the alloy ring l', l', at the bottom of the tube i, i, is brought to fusion, and the result is the same as indicated before. Whenever an alarm sounds, the wires are taken out, examination made as to which crucible the alloy has fused, the latter poured out, and a new ring inserted. As soon as the boiler has been brought back to a normal condition, the wires are replaced. If several boilers are in operation, an annunciator with numbers is used.

Mr. Schwartzkopff recommends the Leclanché battery. As a matter of precaution, the efficiency of the battery and circuit is frequently tested by touching the two wires with a conductor. It is also well to open occasionally, for a few seconds, the cock h, to see if the spiral water-pipe is clear. The apparatus acts so quickly that the alarm

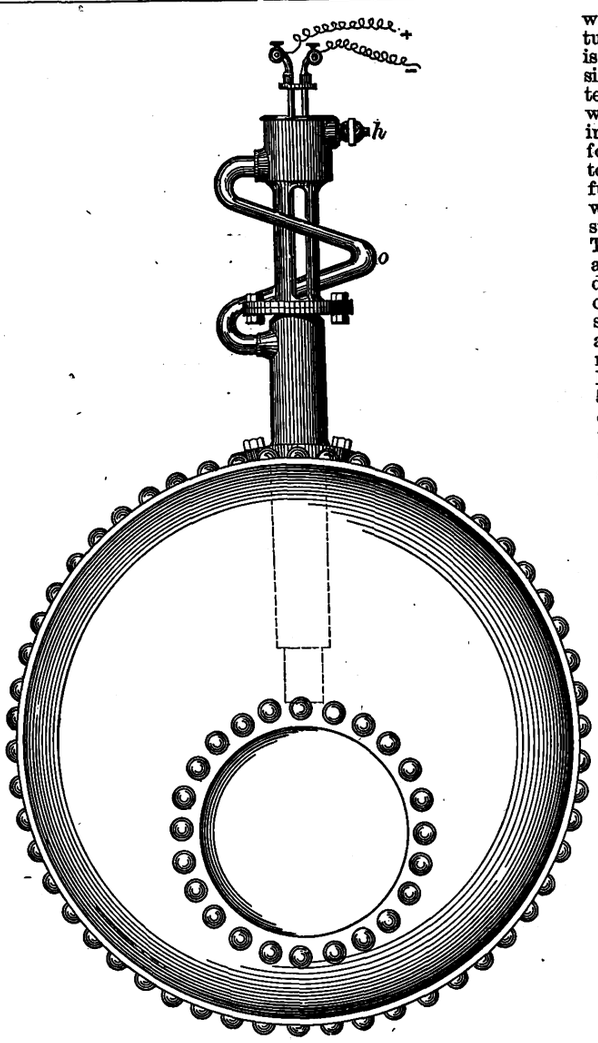


Fig. 1.—Outside View.

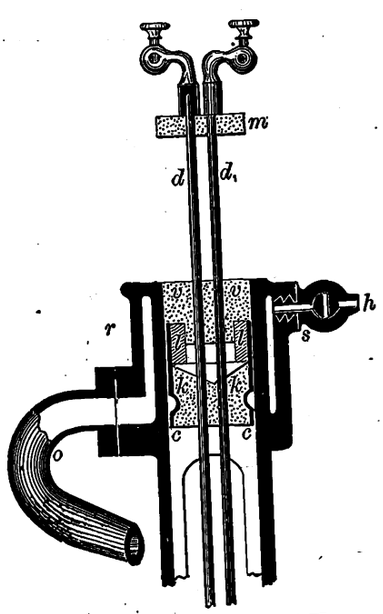
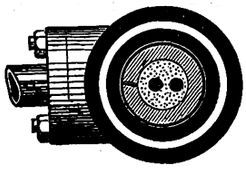


Fig. 3.—Vertical Section of Upper Part A.



Section r, s.

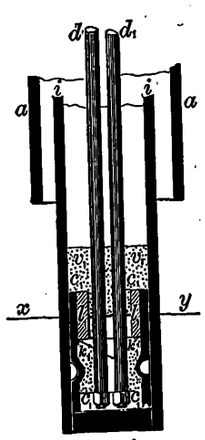


Fig. 4.



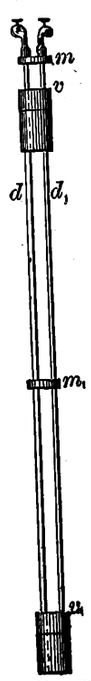


Fig. 5

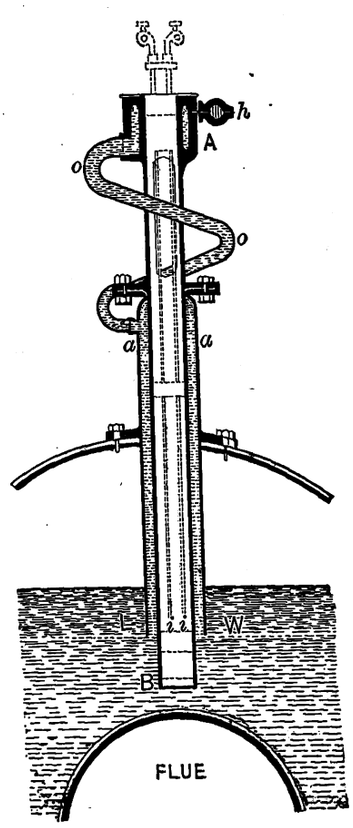


Fig 2.—Vertical Section.

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is given within a minute after one of the dangerous stages has been reached.

I will now give the results of investigations concerning several points of the apparatus. No difficulty is found in manufacturing the alloy rings with an accuracy of the desired fusion-point of ± 1° C. Those for the upper crucible are plainly marked with a W (water), and those for the lower one with the pressure corresponding to their fusing-point. It will be argued that, if the rings have been for a very long time in the apparatus, and have been heated so near their fusing-point, a degeneration of the metals might take place and their fusing-point become materially changed. This case was thoroughly tested at the Royal Artillery Works at Spandau, near Berlin. Rings which had been in the apparatus for eight months were taken out, and tested for their fusing-point in a paraffine bath. It was found that they fused at exactly the same temperature for which they were originally made. The question may be asked, whether the annular space of the apparatus does not get stopped up, in course of time, by boiler scales. This was also fully tested. An apparatus had been left uncleaned for eight months upon a boiler which was supplied with very hard water, requiring thorough cleaning every two months. An almost imperceptible coating only was found to have been formed. This is explained by the water stagnating in the annular space. Often repeated experiments have shown that a momentary freeing of the annular space—for instance, when by the boiling a wave depression is formed underneath it—does not empty it of all its water; in fact, the average lowest water-level must be reached before the steam reacts upon the upper alloy ring.

Finally, I will state, that in firing a boiler dry, rings for five atmospheres pressure, or 164° C. fusing-point, were fused when the lower sheets had reached a temperature of from 250° to 270°. Since a dark-red heat began at 500° C., the warning was given long before there was any danger of injuring the sheets by over-heating. Permit me to conclude this paper with Professor Reuleaux's opinion of this valuable invention, which he expressed in a meeting of the Gewerbeverein at Berlin. Professor Reuleaux said:

"I have been much interested to see Mr. Schwartzkopff's apparatus exhibited here. At his machine-shop, I have seen three boilers supplied with it, and convinced myself that it acts with precision. This apparatus has the great merit that it marks four dangerous conditions, namely, excessive pressure, low water, retarded boiling, and firing the boiler empty. That all this is possible, I consider of great importance, since the engineer has to keep in order only this one apparatus, which is very easy. The wires can be taken out at any time and examined. Besides, the whole apparatus is so simple, and can, as I suppose, be procured at such a moderate price, that it seems to me, we have to welcome in this invention a real progress in steam engineering.

THE TOTAL OUTPUT OF GOLD AND SILVER IN THE UNITED STATES.*

By Albert Williams, Jr.

It may seem strange to say that one of the most perplexing statistical questions is to state the total gold and silver production of the United States from the beginning of mining operations to the present. The difficulty lies not so much in the dearth of material as in the embarrassing abundance of statistics, actual and estimated, made by different persons at different times; covering overlapping periods and occasionally showing gaps; including and omitting the product of the Southern States; sometimes including the partial output of the west coast of North America beyond the limits of the United States; estimated on the basis of the calendar year or of the fiscal year; revised, changed, and corrected, until the whole subject seems lost in confusion. And yet there is sufficient reliable evidence upon which to reconstruct an estimate believed to have a probable error not exceeding five per cent.

First, we have Prof. J. D. Whitney's study of the gold output of the Southern States from 1804 to 1850, inclusive, showing the following results:

PROFESSOR WHITNEY'S ESTIMATE OF THE GOLD PRODUCTION OF THE SOUTHERN STATES FROM 1804 TO 1850, INCLUSIVE, BY PERIODS OF CALENDAR YEARS.

1804-23	$47,000
1824-30	715,000
1831-40	6,695,000
1841-50	7,715,300
Total	$15,172,300

PROFESSOR WHITNEY'S ESTIMATE OF THE PRODUCTION, BY STATES, DURING THE SAME TIME.

Georgia	$6,048,900
North Carolina	6,842,900
South Carolina	818,100
Tennessee and Alabama	263,800
Virginia	1,198,600
Total	15,172,300

This carries the history of production up to, and two and a half years later than, the discovery of gold in California. In the subsequent summary, a deduction has been made from Professor Whitney's total, in order to adjust these statistics to that most important date. From the $7,715,300 estimated for the decade 1841 to 1850, one quarter has been subtracted; thus reducing the estimate for the total production of the Southern States up to the turning-point in the output of the United States to $13,243,475. After the year 1850, the small production from this region has been usually disregarded altogether, until quite recently, when it again appears as an item in mining statistics. It is highly probable that during this intermediate period the total production of the country has been overestimated to an extent at least equal to the amount produced in the South.

Prof. W. P. Blake has carried the figures through the second natural time division (that is, the period during which California and Oregon may be considered to have been practically the sole producers) and up to the close of 1863, or somewhat beyond the proper limits of this epoch. The Comstock lode was discovered in 1859, began production in 1860, and by 1863 had made its influence largely felt. In 1863, prospectors were scouring Nevada, Idaho, and Washington Territory; and a considerable production began to come from other sources than California-Oregon, and the Comstock lode. Professor Blake's estimate of the actual gold exports from San Francisco, which has formed the basis for the figures now accepted, is as follows:

DECLARED EXPORTS OF GOLD FROM SAN FRANCISCO FROM 1848 TO 1863, INCLUSIVE, WITH ESTIMATES OF THE ACTUAL MOVEMENT, BY PROF. W. P. BLAKE.

YEAR.	Declared gold export.	Estimated actual gold export.	YEAR.	Declared gold export.	Estimated actual gold export.
1848	$66,000,000	$10,000,000	1857	$48,976,692	$55,000,000
1849		40,000,000	1858	47,548,026	50,000,000
1850		50,000,000	1859	47,640,462	50,000,000
1851 to May 1	11,497,000	55,000,000	1860	42,325,916	42,325,916
1851	34,960,895		1861	40,676,758	39,176,758
1852	45,779,000	60,000,000	1862	42,561,761	36,061,761
1853	54,965,000	65,000,000	1863	46,071,920	33,071,920
1854	52,045,633	60,000,000			
1855	45,161,731	55,000,000	Total	$676,908,228	$755,636,355
1856	50,697,434	55,000,000			

These figures do not show any silver production; in fact, silver mining in the United States may be said to have only begun in 1860. The value of the silver contents of gold, however, has been added in the compilations which are now generally accepted; and though the computation has been made in a very rough way, the value of the silver was so small as compared with that of the gold, that a revision seems hardly necessary.

Various authorities have been quoted for the period up to the time when a United States mining commissioner was appointed, and when Mr. Valentine began the publication of his estimates based upon the express returns. Mr. J. Ross Browne, in his reports as commissioner (1866 and 1867), gave the then accepted figures, which, however, were undoubtedly over-estimated, and they have since been materially reduced. Dr. R. W. Raymond, mining commissioner from 1868 to 1875 inclusive, made a very careful study of the subject, and his results, as published in his series of admirable reports, are generally accepted, though in a few cases over-estimates, which there was then no means of checking, could not be eliminated. The following table gives Dr. Raymond's estimates:

DR. R. W. RAYMOND'S ESTIMATE OF THE GOLD AND SILVER PRODUCT FROM 1868 TO 1875 INCLUSIVE (CALENDAR YEARS).

STATES AND TERRITORIES.	1868.	1869.	1870.	1871.
California	$22,000,000	$22,500,000	$25,000,000	$20,000,000
Nevada	14,000,000	14,000,000	16,000,000	22,500,000
Montana	15,000,000	9,000,000	9,100,000	8,050,000
Idaho	7,000,000	7,000,000	6,000,000	5,000,000
Oregon and Washington	4,000,000	3,000,000	3,000,000	2,500,000
Arizona	500,000	1,000,000	800,000	800,000
New Mexico	250,000	500,000	500,000	500,000
Colorado and Wyoming	3,250,000	4,000,000	3,775,000	4,763,000
Utah			1,300,000	2,300,000
From other parts	1,000,000	500,000	525,000	250,000
Total	$67,000,000	$61,500,000	66,000,000	$66,663,000

STATES AND TERRITORIES.	1872.	1873.	1874.	1875.
California	$19,049,098	$18,025,722	$20,300,531	$17,753,151
Nevada	25,548,801	35,254,507	35,452,233	40,478,369
Montana	6,068,339	5,187,047	3,844,702	3,573,600
Idaho	2,695,870	2,500,000	1,880,004	1,760,000
Oregon and Washington	2,000,000	1,585,784	763,605	1,246,978
Arizona	625,000	500,000	487,000	750,000
New Mexico	500,000	500,000	500,000	325,000
Colorado and Wyoming	4,761,465	4,070,263	5,188,510	5,302,810
Utah	2,445,284	3,778,200	3,911,601	3,137,688
From other parts	250,000	250,000	100,000	500,000
Total	63,943,857	71,651,523	72,428,206	74,817,596

Dr. Adolf Soetbeer (in Petermann's *Mittheilungen*, Ergänzungsheft No. 57) published conclusions reached by him as to the bullion product of the United States up to the close of 1875, based upon a study and comparison of the literature of the subject. In the following table, Dr. Soetbeer's results are shown, kilograms being converted into troy ounces and German marks into United States money. The production is given by periods of years:

DR. SOETBEER'S ESTIMATE OF THE PRODUCTION OF PRECIOUS METALS IN THE UNITED STATES TO THE CLOSE OF 1875.

PERIODS.	Number of years.	GOLD PRODUCT. Total.	Yearly average.	Value.	SILVER PRODUCT. Total.	Yearly average.	Value.
		Ounces.	Ounces.		Ounces.	Ounces.	
1804-20	17	1,929	113	$39,876			
1821-30	10	35,368	3,537	731,121			
1831-40	10	273,295	27,329	5,649,509			
1841-50	10	5,658,825	565,882	116,978,291			
1851-55	5	14,275,673	2,855,135	295,104,343	1,334,325	266,865	$1,725,149
1856-60	5	12,394,757	2,478,951	256,222,359	996,725	199,345	1,288,666
1861-65	5	10,722,862	2,144,566	221,660,603	27,972,602	5,594,520	36,165,777
1866-70	5	12,217,918	2,443,564	252,566,773	48,389,387	9,677,877	62,562,638
1871-75	5	9,565,344	1,913,069	197,733,203	90,798,425	18,159,685	117,383,284
Total	72	65,145,941	12,432,167	1,346,678,078	169,491,464	33,898,292	219,135,514

The figures which, partly by repeated official publication, are now most generally credited, are shown in the following table, which includes

* From advance-sheets of *The Mineral Resources of the United States*. Compiled by the United States Geological Survey Department of Industrial Statistics.

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the estimates for the fiscal years from 1848 to 1880 inclusive. This table is made the basis of the second and most important item in the recapitulation, with the exception of the year 1880, for which the census figures are substituted:

ESTIMATE OF THE PRODUCTION OF GOLD AND SILVER FROM 1848 TO 1880 INCLUSIVE, BY FISCAL YEARS, AS GENERALLY ACCEPTED IN OFFICIAL REPORTS.

YEARS.	Gold.	Silver.	Total gold and silver.
1848	$10,000,000	.....	$10,000,000
1849	40,000,000	$50,000	40,050,000
1850	50,000,000	50,000	50,050,000
1851	55,000,000	50,000	55,050,000
1852	60,000,000	50,000	60,050,000
1853	65,000,000	50,000	65,050,000
1854	60,000,000	50,000	60,050,000
1855	55,000,000	50,000	55,050,000
1856	55,000,000	50,000	55,050,000
1857	55,000,000	50,000	55,050,000
1858	50,000,000	50,000	50,050,000
1859	50,000,000	100,000	50,100,000
1860	46,000,000	150,000	46,150,000
1861	43,000,000	2,000,000	45,000,000
1862	39,200,000	4,500,000	43,700,000
1863	40,000,000	8,500,000	48,500,000
1864	46,000,000	11,000,000	57,000,000
1865	53,225,000	11,250,000	64,475,000
1866	53,500,000	10,000,000	63,500,000
1867	51,725,000	13,500,000	65,225,000
1868	48,000,000	12,000,000	60,000,000
1869	49,500,000	12,000,000	61,500,000
1870	50,000,000	16,000,000	66,000,000
1871	43,000,000	23,000,000	66,000,000
1872	36,000,000	28,750,000	64,750,000
1873	36,000,000	35,750,000	71,750,000
1874	33,490,902	37,324,594	70,815,496
1875	33,467,856	31,727,560	65,195,416
1876	39,929,166	38,783,016	78,712,182
1877	46,897,390	39,793,573	86,690,963
1878	51,206,360	45,281,385	96,487,745
1879	38,899,858	40,812,132	79,711,990
1880	36,000,000	37,700,000	73,700,000
Total	$1,520,041,532	$460,422,260	$1,980,463,792

Statistics of the production are now, as they formerly were and always should have been, prepared for calendar years. For the six months from July 1st, 1880, to December 31st, 1880, half of the product of the fiscal year ended June 30th, 1881, as reported by the Director of the Mint, has been assumed. For the calendar years 1881 and 1882, the mint figures are again quoted. For the first six months of 1883, the estimate is made by assuming, on the authority of Mr. Preston, the rate of production in 1882 to have been maintained during the first half of 1883. It is not probable that the complete statistics for 1883 will show this estimate to be very seriously in error.

Summing up the material thus briefly sketched, the following results are reached:

PRODUCTION OF GOLD AND SILVER IN THE UNITED STATES TO JUNE 30TH, 1883.

PERIODS.	Gold.	Silver.	Total.
Output of the Southern States up to the discovery of gold in California in 1848 (based on estimates of Prof. J. D. Whitney)	$13,243,475	.....	$13,243,475
Product from 1848 to 1879 inclusive, by fiscal years (as published by the Directors of the Mint)	1,484,041,532	$422,722,260	1,906,763,792
Fiscal year ended June 30th, 1880 (census figures, covering a period one month earlier assumed	33,379,663	41,110,957	74,490,620
July 1st, 1880, to December 31st, 1880 (estimated on the basis of half the product of the fiscal year 1881, as reported by Hon. Horatio C. Burchard, Director of the Mint)	18,250,000	21,050,000	39,300,000
Calendar years 1881 and 1882 (as reported by Hon. Horatio C. Burchard, Director of the Mint)	67,200,000	89,800,000	157,000,000
Total product of the United States to close of 1882	1,616,114,670	574,683,217	2,190,797,887
Estimated product in the first six months of 1883	16,250,000	23,400,000	39,650,000
Total product of the United States to June 30th, 1883	1,632,364,670	598,083,218	2,230,447,887

Up to June 30th, 1883, the aggregate production of gold in the United States may be stated at $1,632,364,670, and of silver $598,083,217, making a grand total of $2,230,447,887. Reduced to the equivalent weights, the total gold output has been 78,965,572 troy ounces, or 2707·4 avoirdupois net tons. The total for silver represents 462,590,469 troy ounces, or 15,860 tons. It will perhaps convey little meaning to say that the grand total is in excess of the national debt; but a better conception of the vastness of the amount may be had by considering that all the gold produced in the country to the present time, if brought together, would suffice to load 271 ordinary freight-cars; the silver, supposed in the same way to be collected together as fine bullion, would require 1586 cars for its transportation. The gold would tax the carrying capacity of a large ocean steamship; while the silver would suffice to form cargoes for a small fleet.

Present Status of the Industry.—From the foregoing figures, the general deduction may be drawn that the annual precious metal output of the United States during recent years may be stated at between $70,000,000 and $80,000,000, coining value, and that the fluctuations in the proportional amounts of gold and silver are greater than those of the total product. It is also safe to assume that this rate of production will be maintained for some time to come, and that the probability of a slight increase is greater than that of a decline. Experience has shown that, as old districts become exhausted, or fall off in their rate of production, new localities are developed which fully take their place, and that the general result is therefore nearly uniform as compared year by year. By the time the country has been thoroughly explored for gold and silver deposits, a time which may be considered as indefinitely remote, the facilities for mining and working the ores will undoubtedly be such as to enable systematic and permanent development to be maintained in places and with ores which at present could not be profitable. The production of the precious metals appears to be the sole industry which is at all independent of changes in the relation between supply and demand, unless, indeed, the influence exerted by fluctuations in the market value of silver may be held to affect the production of that metal. With all other natural products, the amount produced is necessarily limited by the amount consumed, whether in this or in foreign countries; notable examples of which effect may be seen in the case of quicksilver, which, at a certain demand and consequent market value, may be mined profitably, while, if the price declines only a few cents per pound, a number of mines are at once thrown out of operation, and the production falls off until an equilibrium is reached at which resumption of work is profitable. In the case of the great iron industry, in which, as is so often seen, over-production brings its own remedy, and as is found to be true in other almost innumerable instances which might be cited, it would require very violent changes in the purchasing power of the precious metals to materially affect the rate of their production. It might even be said that the latter is apt to increase in cumulative ratio; for unusual success in any locality at once attracts attention and stimulates prospecting for new deposits and their exploitation, the ultimate result being a sympathetic increase throughout the mining region. But while natural causes are thus seen to influence the rate of production only slightly, artificial restraints, such as the crusade against hydraulic mining in California or the adoption of unwise laws, certainly make their influence felt, although for the country at large the effect is relatively small. In like manner, the reaction from undue speculation has a slight depressing result, which shows itself in apparently returning cycles. Sudden changes in the normal supply of either of the precious metals bring about from time to time corresponding changes in the coinage laws of nations; the reflex action upon production, however, is hardly more than perceptible.

The production of gold and silver, like that of other commodities, is of course not one of clear profit. Indeed, a saying that it costs one dollar in coin to produce one dollar in bullion has gained more or less credit; and though this opinion has been abundantly shown to be unfounded, and while also any attempt to estimate the profit gained to the country by the mining of the precious metals is mere guess-work, it is still quite probable that $500,000,000 of the gross total has been net profit.

One third of all the gold and one half of all the silver annually produced in the world are supplied by the mines of the United States.

THE SMALLEST LOCOMOTIVE.—The *Railway World* says that the smallest locomotive engine ever built in the United States for regular work was turned out by M. M. Duck & Co., of St. Louis, recently, and shipped to the Edmee plantation, St. Charles Parish, La. This little engine was designed by and built under the supervision of Mr. Jay Noble, and is as perfect a piece of mechanism as one would wish to see. Its diminutiveness may be understood from the following facts respecting it: Twenty-one and one half inch gauge; diameter of cylinder, 6½ inches; stroke, 10 inches; four wheels, diameter of driving-wheels, 24 inches; height of engine to top of boiler, 4 feet 7 inches; weight without water, 5250 pounds. The engine has link motion, and is made of the best materials throughout. The boiler is made of ¼-inch iron, and is 30 inches in diameter in the barrel. It is provided with an Orm patent pop-valve, has a steel fire-box, and is fed by two inspirators. The tank is made of No. 10 iron, has four wheels of a diameter of 16 inches, a capacity of 380 gallons, and weighs, without water, 1400 pounds. In experimenting with the engine before it was shipped, it was found to act very obediently under the hand of the engineer.

FURNACE, MILL, AND FACTORY.

The Gates Iron-Works, Chicago, are about starting a crusher at Haythorne station on the Chicago, Burlington & Quincy Railroad. It is one of their largest sizes, will take rock 16 by 24 inches, and has a capacity of six hundred tons per day of ten hours. They have also just started one of their No. 6 machines at South Bethlehem, N. Y. The latter machine is crushing rock for railroad ballast.

The Chicago Smelting and Refining Company, at Chicago, has rebuilt its works, which were burnt last winter, and is now treating about fifteen tons of bullion a day. It expects to have the whole plant in thorough running order in about one month, and its capacity will then be eighty tons daily.

The Topton Furnace, Berks County, Pa., which had been idle for some time, will go into blast at an early day, in consequence of the recent explosion at Kutztown furnace. William M. Kaufman & Co., of Reading, are the lessees of both furnaces.

It is stated that the material of the Princess furnace, at Ashland, Ky., exclusive of ore, has been sold for $10,000 to parties who will remove it to a few miles beyond Lowmoor, Va., where it will be set up again for the manufacture of iron.

The Steelton *Reporter* says of the work of the Pennsylvania Steel Company: The product of the Bessemer mill for the month of July was 1895 blows, producing 13,913 tons of steel ingots. The product in turns is as follows:

A turn	628 blows	4596 tons.
B turn	641 blows	4704 tons.
C turn	626 blows	4617 tons.

The rail-mill for the month of July produced 40,158 rails or 9609 tons of steel rails. During the month, six changes of rolls were made, and a loss in running time of four and a half days, occasioned by shutting down the works for the usual Fourth of July holiday. The blast-furnaces have made a good showing for the year ended July 30th. No. 1 furnace produced in eleven months 14,246 tons of pig-iron. This furnace went out of blast a month ago, and is undergoing extensive repairs and improvements, which will increase its capacity. No. 2 furnace produced 42,785 tons during the year, and is in successful operation. No. 2 shows an increase of 5500 tons over the preceding year. The product of No. 2 furnace for July was 4052 tons, and that of No. 5 furnace 450 tons. No. 5 was not in blast during the full month. The first smoke from the big stack of No. 3 issued forth on Wednesday, occasioned by fires being kindled for the purpose of drying out the stoves.

The Tyrone Iron Manufacturing Company, Tyrone, Pa., has decided to erect furnaces, rolling-mills, and machine-shops there.

The Nashville Merrill Pump Company has been duly chartered. The company

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organized by electing T. A. Atchison, A. S. Colyar, A. J. Grigsby, J. N. Brooks, Baxter Smith, and W. M. Duncan, directors. They elected A. S. Colyar, President; J. N. Brooks, Vice-President; A. J. Grigsby, Secretary and Treasurer; and M. Merrill, Superintendent. They have already commenced building a manufactory near the city limits, on the Northwestern Railroad, and will be fully at work this fall.

The new iron-works in course of erection at Thirty-fourth and Wyncoop streets, Denver, Colo., are nearly completed. The building will be ready to receive the roof in a few days, and the work is prosecuted with great industry. It is hoped to have the works completed and in running order by the early days in September. The works when completed, will give employment to about seventy-five men.

Annin & Co., Water street, Brooklyn, N. Y., are fitting out a complete equipment of machinery for the manufacture of iron wheel-barrows and steel hand-trucks.

Wilson, Snyder & Co. have just sold to Jones & Laughlins one of their large plunger pumps, with 24-inch steam cylinder, 20-inch plunger, and 48-inch stroke. It is to be used in supplying the American Iron-Works with water.

The Watt Mining Car-Wheel Company, Barnesville, Ohio, is driving things along at a lively rate. Its machinery—trip-hammer, furnace, boring-machines, drill-presses, etc.—is all specially adapted to the manufacture of its specialty, Watt's patent self-oiling mine car-wheel. It works from twenty-five to thirty men at all times, and is always crowded with orders. Its trade extends to nearly every mining region in the United States.

Palmer, Mass., expects to have a wire-cloth manufactory located there, by Worcester parties, provided the citizens subscribe $1500 toward the enterprise.

The Gulf Shot and Lead Company's tower, at New Orleans, La., is now up to the hight of ninety feet, and will be, when completed, 200 feet high. It is composed of wrought-iron legs tied together with braces and built in with brick.

The Pennsylvania Combustion Attachment Company has been incorporated in Philadelphia, to make and apply the Orvis combustion attachment and smoke-consumer to steam-boiler furnaces. R. B. Swain is President; John S. Stevens, Treasurer; Charles Perkes, Secretary; and L. B. Eaton, General Agent. Capital stock, $100,000.

The South Tredegar Iron-Works, of Chattanooga, Tenn., have decided to introduce Swedish labor altogether in certain departments of their mill. Seven of these Swedes have arrived, and several more will arrive shortly.

Joseph Radcliffe writes the American *Machinist* from Glen Rock, Pa., that an effort is now making to organize a stock company in that town, with a capital of $40,000, to manufacture steam-engines, boilers, and agricultural machinery. Of the amount, $35,000 are subscribed. It is proposed to transfer to the new company the car and machine-shops of Fry, Herbst & Co., for $18,000, this amount to be taken in stock.

The Marshall Foundry and Machine Company, Marshall, Tex., is preparing to erect a new wheel foundry and other buildings. The wheel foundry will be 75 feet wide and 115 feet long. The walls will be 20 feet high, with a lantern roof 40 feet above grade. The new foundry will enable the company to increase its present capacity of 10,000 per annum to over 40,000. The company is far behind its orders, but hopes to have its new buildings in working condition very soon, when it will be in shape for any reasonable amount of new work. The company has just finished a liberal order for stock and coal-cars for the International & Great Northern Railroad, and is now working on an order for coal-cars or gondolas for the Texas & Pacific Company,

C. H. Parmalee, of Dadeville, Ala., is putting a Westinghouse engine into his stamp-mill.

The Kelly Smelting Company, of Socorro, New Mexico, will run its fans and crushers by two Westinghouse engines of 30 horse-power each.

The Tucson Electric Light Company, of Tucson, Arizona, has recently started its new lighting station. Its plant consists of a 40 and a 16-light Brush machine, driven by a 60 horse-power Westinghouse automatic engine.

The Council Bluffs Water-Works will pump the muddy water of the river into their settling-basins by two 15-inch Andrews centrifugal pumps. Each pump is coupled directly to a Westinghouse engine of 100 horse-power, making 300 revolutions a minute, and fitted with an adjustable cut-off, in order that the speed may be varied to meet the varying hights of lift.

The New York, West Shore & Buffalo Railroad is driving the power in its new shops in a novel and effective manner. Instead of belting from the engine to the line-shaft in the usual manner, each shaft is driven by an independent engine, coupled directly to it. To effect this, the arched door-way in the central brick partition is strengthened by piers, and a second arched opening left over it similar to a transom. The floor of this opening forms the foundation for a Westinghouse engine, which is set with its centers exactly in line with the shafting, to which it is coupled on each end. No regular engineer is employed; but the engine is considered a part of the shafting and is in charge of the wiper. The Westinghouse Machine Company has so far fitted up the shops at New Durham, N. J., with a 12 by 12; at Kingston and Syracuse, N. Y., each with a 9 by 9; and at Schenectady with a 7 by 7 engine.

The Omaha Smelting and Refining Company, of Omaha, and the Grant Smelting Company, of Denver, have been consolidated, and hereafter will be known as the Omaha & Grant Smelting and Refining Company, and will have offices at Omaha, Denver, and Leadville. The refining-works at Omaha are running on full-time, day and night, employing about 300 men, and are capable of treating 130 tons of bullion a day. Their total product for 1882 was: Silver, $5,339,236.67; gold, $805,440; lead, 43,711,921 pounds; bluestone, 1,152,041 pounds. The total value of their product for the first three months of this year show a very satisfactory increase, amounting to $1,167,269.61 more than the same period in 1882.

GENERAL MINING NEWS.

ARIZONA.

PINAL COUNTY.

AUSTRALIA.—Work has been resumed.

EUREKA.—Work continues and the mill is abundantly supplied with ore from that mine. Fifteen men are employed in the mine.

MONARCH OF THE SEA.—The working-force has been greatly enlarged. A double-compartment shaft is sinking, and several feeders of rich ore from the main vein have been cut. Several drifts are worked, and good ore is taken out.

SILVER KING.—Owing to the lack of water, the mill has stopped running. The Pinal *Drill*, provoked at the San Francisco's *Bulletin's* statement that, from the further decline of the stock, it was evident that dividends were to be suspended, says: The Silver King may be weak on the stock board, and who cares? The Silver King is stronger than ever in the earth, and the company employs more men than ever, and has more rich ore than it can handle. It pays its men who work at the mill and mine. The company will have to build a 100-stamp mill at once or be choked with ore, and it is probably saving its dividends for that purpose.

SURPRISER.—Four drifts have been opened, and gold quartz has been found.

YAVAPAI COUNTY.

UNITED VERDE COPPER COMPANY.—The smelter made its first run August 2d, turning out a bar of fine copper bullion. It was the intention to keep the smelter running, but the present impassable condition of the roads will delay the transportation of coke, etc., and necessitate a suspension, which will be of short duration, however.

CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED.—The Amador, Pacific, Empire, and Plymouth mines at Plymouth, Amador County, have recently been consolidated under a single corporation, known by the above name, with a capital of $10,000,000, in 10,000 shares. The company owns two mills, 40 and 80 stamps respectively, and is well equipped with Frue concentrators. The mines are thoroughly opened with three shafts, the last one constructed being vertical, 1400 feet in depth, in three compartments, and thoroughly timbered. The rock is a ribbon quartz, varying from $12 to $16 per ton.

MONO COUNTY—BODIE DISTRICT.

There is nothing of interest to report from the mines of this district. Work goes on as usual.

CANADA.

PROVINCE OF MANITOBA.

ARGYLE.—In point of organization, this company was the first on the Lake of the Woods, and was begun in August last. The machinery which has been erected is only temporary, and consists of stamps and Frue vanners of Fraser & Chalmers's manufacture.

LAKE OF THE WOODS.—Work will begin shortly on this company's property.

MAIDEN.—This mine has a four-foot vein carrying a heavy mineralized quartz, in which free gold shows itself.

MANITOBA CONSOLIDATED.—Alongside of the Argyle, this company is sinking upon what it believes to be the Argyle lead; but whether it is so or not, it can strike either lead by a cross-cut under the lake.

MINNESABIC.—Two shafts are sinking on this property. The ore is said to be of the same character as that of the Maiden.

RED STAR.—According to the Chicago *Mining Review*, this mine has a vein measuring over 40 feet on the face, as now uncovered, and swelling at points to 80 feet, in its course across the island. The quartz is white, and is richly impregnated with copper pyrites. Assays made show the pyrites to contain 23⅞ per cent of copper and $118.93 in gold. The George Heenan Company is reported to have acquired some kind of ownership.

WINNIPEG CONSOLIDATED.—After a series of experiments that will likely be supplemented by kiln-roasting, the permanent character of the machinery will be decided upon. The shaft is down 114 feet, and the vein, which began with only four inches on the surface, has widened out to over six feet. The pay-streak is decomposed and over two feet wide. It shows fine gold, and is streaked with carbonates of copper. The gangue is worth about $10 a ton. There are seven or eight veins, all of them showing fine mineral.

NOVA SCOTIA.

The Sherbrooke *Gazette*, speaking of the progress of the construction of the Sherbrooke & Magog Railroad says: This road, when completed, will furnish an important auxiliary to our mining industries, which should not be overlooked in estimating the advantages it will confer upon this section of the Eastern Townships. It is the intention to construct a branch line to the mining properties already developed, known as the Suffield copper and silver mines, and the Hepburn copper and sulphur mine, which branch will also run close by Mr. Clark's rich iron mountain. The ore from these mines can thus be taken by rail to the smelting-works on the main line, or find a direct outlet to New York down the Hudson River Valley.

COXHEATH.—Operations are said to be proceeding with most efficient regularity and system, and, though a new enterprise, the results are already exceedingly gratifying, and are apparently certain to become still more so in the immediate future.

ONTARIO.

Several New York gentlemen are reported to be exploring the mineral districts of the Gatineau just across the Ottawa River from Ottawa. Their ostensible object is the phosphate mining lands, but it is said a search for gold and silver also occupies their attention to a great extent. Work is still pushed forward vigorously in phosphate mining, notwithstanding the somewhat dull state of the market.

COLORADO.

ARAPAHOE COUNTY.

HARRIS MANUFACTURING AND MILLING COMPANY.—This new amalgamating concern will be in working order shortly.

GRANT SMELTER.—To the north of the smelter, and in the rear of the office, a three-muffle assay-office has been erected. It is similar to that now in use at the Argo works. The furnace has been completed, and will be worked at once. In addition to the furnace, a large sampling-works, 100 by 40 feet, is in course of construction. Heretofore, the Grant smelter has done no sampling of ore. All the work of this kind has been done at Leadville, at the Denver sampling-works, and at the Colorado ore sampling-works. The new sampling-works will do away with this, and hereafter the Grant smelter will do its own smelting. The crushers have not arrived as yet. An important improvement will be the new furnace for roasting matte, which is now going up.

CLEAR CREEK COUNTY.

SEVEN-THIRTY.—Five levels are pushed ahead, three of which are mineral. A winze 200 feet east of the main shaft is sinking on a fine streak of smelting ore, which runs from 500 to 400 ounces per ton. The 310-foot level east continues in a large streak of smelting ore, heavy in lead but comparatively low in silver. The 375-foot level west is driven in barren ground; but on the west side of the main shaft at this point, there is a fair streak of smelting ore. Somewhat over $6000 worth of ore was shipped last month.

DOLORES COUNTY.

CROSS.—A strike has been made, showing eight inches of mineral in a vein uncovered for 250 feet, running 900 ounces of silver and 30 per cent lead. This property adjoins the Grand View group.

FREMONT COUNTY.

ROCKY MOUNTAIN MINE DEVELOPMENT COMPANY.—One car-load of machinery for the copper smelter has been shipped from Chicago. The plant will be situated a few rods east of the Royal Gorge smelter.

GUNNISON COUNTY.

A dispatch from Gunnison City says that Mr. John Crooke, of the Lake City smelter, and B. W. Lewis, of St. Louis, have been in close consultation for two or three days, and have privately decided to locate a smelter in Gunnison.

GUNNISON ORE-SAMPLING COMPANY.—This company has just been organized. The establishing of these works will be of great importance not only to the steady

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producers of the country, but also to the proprietors, as it will enable the latter to dispose of their small lots of ore and give them the means whereby to develop their properties. The exact site of the mill is not yet fully determined on, but will be either in the town of Pitkin or at Quartz, three miles from Pitkin. Quartz is the present shipping-point of the Tin Cup and Pitkin.

HINSDALE COUNTY.

The success attending the Crooke concentrator, says the Lake City *Silver World*, has added new interest to this industry. Plants have been started all around the country; more are coming, and another year will see them at every mine of ordinary development.

The new Pittsburg concentrator, at Mineral Point, will be started up shortly. The work has been pushed with great energy.

The machinery for the Henson Creek Reduction Company's concentrator has arrived. The active work of putting it in position will be commenced at once.

LAKE COUNTY.

The *Herald's* description of the mines on Rock Hill shows that the western portion, from the Stone and Dome mines to the Columbia property, is showing up very well, and gives indication of a large production in the near future. Even at the present time, this section is producing over one hundred tons of fine smelting ore a week, derived largely in prosecuting the exploration of the territory and the development of the mines.

The Vining is one of the most regular producers of the section, having averaged for a year past about thirty tons a week.

Just below the Vining, is the Oro City mine, a comparatively new property, having begun regular shipments but about a month ago. This week, the product of the Oro City will aggregate at least forty tons, with a large prospective increase in a very few weeks. The yield of the mine is a fine carbonate ore, carrying from thirty to fifty per cent in lead and from twelve to twenty-five ounces in silver to the ton.

Just below and west of the Oro City, is the O'Sullivan shaft. During the present week, exploration-work from this shaft has encountered indications which leave little doubt but that it will soon possess the same ore-body that is now supplying the Ben Burb mine with its large production. The O'Sullivan has been working for a year past without a day's intermission, and among its underground workings contains a drift four hundred feet in length.

The Ben Burb mine, of the Robert Emmet Consolidation, is also meeting all expectations, and is doing fully as well as any of the adjoining mines. The ore, like that of the neighboring properties, is a fine carbonate of lead mineral. The contact so productive in the Oro City and Ben Burb loads is regular, showing a good lime floor and even cap of porphyry. It continues without interruption to the Columbia tunnel, where a fault produces a displacement, and depresses it to the westward to a depth that has not yet been attained by any of the shafts sunk on that portion of the hill. Between the Ben Burb and Columbia is the Robert Emmet, the most western property working and producing. It is the principal property of the Robert Emmet Mining Company, and has produced in limited quantities quite steadily for several years past. With the settlement of the pending litigation over these properties, it is reasonable to expect the development of very extensive resources and quite a large ore production.

The County Commissioners have granted J. S. Delan the privilege of constructing a railroad or tramway along the county road through California Gulch to Oro. The new enterprise is intended to expedite the production of the carbonate mines on the Iron and other hills sloping into the gulch. The road, which promises to reduce charges for ore hauling, will be constructed at an early day.

ADLAIDE.—A large body of ore was struck in the 360-foot level. Tests made show eighty ounces of silver and one ounce of gold to the ton. The ore also carries from ten to thirty per cent in lead. Considerable exploration-work had been done from this shaft two or three years ago, on the 167-foot level, but failed to show any extended or high-grade ore-bodies.

HAMBURG CONSOLIDATED.—This company's properties, situated on Breece Hill and adjoining the Highland Chief mine, have been leased. The developments of the property consist of a shaft down 365 feet. At about one hundred feet from the surface, the shaft passed through the contact, and the parties now working, being cognizant of this fact, started a drift at ninety feet and soon encountered the vein, which had all along escaped detection.

HIGHLAND CHIEF.—This property, which has been worked under a lease for a year or more past, is reported as falling off in the tonnage of its production as well as the grade of the ore. For some months past, the company has not realized any royalty from its lessee, and the prospects now are, that at the expiration of the present lease, which will be August 31st, it will be impossible to renew the lease on present terms.

MCCLELLAN.—The mill has been closed down.

ROBERT E. LEE.—It is stated, on what authority is not known, that an analysis made of the water pumped from the Robert E. Lee shaft shows a large amount of silver carried in solution.

ROSEVILLE-ALTA.—The new shaft, while encountering considerable water, has by no means the strong flow to contend with that was met in the old shaft, the latter now being filled to within fifty feet of the surface. The absence of the ore at the present depth is accounted for on the theory that there is a fault or displacement of the formation between the two shafts. The formation passed through in the new shaft is as follows: Boulder wash, 122 feet; porphyry, 12 feet; lime, quartzites, and shales, 72 feet; porphyry, 4 feet; total depth, 210 feet.

SMUGGLER.—This property, situated on the southwest side of Iron Hill, hemmed in by the Iron Silver, Silver Cord, and Iron Hill Consolidated mines, is a small piece of territory which for some months past has produced regularly. The company has now about twenty thousand dollars on hand.

YANKEE & BREECE HILL CONSOLIDATED.—The Loveland lode has been leased. The shaft was sunk some years ago, and passed within eighteen inches of a fair streak of ore. This has been followed by the present lessees until, at a distance of thirteen feet from the shaft, it opened out into quite a body of thirteen-dollar ore. In connection with it is a streak four inches in thickness, running nineteen dollars to the ton.

SUMMIT COUNTY.

GOLD PLACER.—The Leadville *Democrat* reports the sale of this company's placer property, in order to satisfy promissory notes given by the company to Mr. C. G. Hathaway in September last. The property was bid in by Mr. Hathaway for $8971, being the amount of the notes running to him and the accrued costs. A want of concert of action on the part of stockholders in the company was the cause of the failure to raise the money. The property is situated near the confluence of the Blue and Swan rivers. There are 800 acres of placer lands, to which good title is held, the greater part of that amount being patented, and an immense acreage on all sides is valuable only to this company, as it controls the water, and in an emergency can empty all the water of both the rivers mentioned into its flumes. Something over $70,000 have been spent in opening the placer, and only a small sum is now required to place it on a basis of large production.

ROBINSON.—The terms of the new lease secured by Mr. Greer for eight months are as follows: The lessee agrees to pay the company the following royalties: On ore under 35 ounces to the ton, three dollars per ton; ore of 35 ounces and not exceeding 40, four dollars per ton; ore of 40 ounces and not exceeding 45, six dollars per ton; ore of 45 ounces and not exceeding 50, nine dollars per ton; ore of 50 ounces and not exceeding 55, twelve dollars per ton; ore of 55 ounces and not exceeding 60, eighteen dollars per ton; on all ores over sixty ounces, in the proportion of eighteen dollars per ton per sixty ounces. Settlements are to be made with the company on the first of every month. The lessee agrees to employ not less than sixty-five men, and extract at least fifteen hundred tons a month, provided the ore is contained in the mine and available. He also agrees to diligently prosecute development-work on the line of the ore-chutes below the thirteenth level, and keep development-work at least fifty feet ahead of the extraction of the ore. He moreover agrees not to mix the ores to deteriorate the grade of the mineral shipped, nor to permit any indebtedness or encumbrance to accrue for which the property may become liable. The lease is accompanied by a bond signed by Messrs. W. B. Scott and William H. McCraig, insuring the company against any possible damage. During the past four months, under Mr. Greer's administration, the mine produced and shipped 3350 tons of ore. The output of the mine was shipped principally to Argo, except some of the oxidized ores, for which a better market is offered in Leadville, and which were in consequence sent to the Arkansas Valley smelter. The ore is reported to average from thirty-eight to forty-two ounces to the ton.

WHITE QUAIL.—Late last week, the sheriff again levied on this property, says the Ten Mile *News*, for a debt of some $300 due to Dan Recen. The sheriff attached the hoister at the mine and some machinery at the old smelter. This claim will have to be adjusted before the mine can resume work under the lease.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended August 5th: Ore produced, from 300-foot level, 966 tons; 400-foot level, 84 tons. Shipped, 553 ounces gold; value about $9500. The 400-foot level header has advanced four feet, making a total of twenty feet. The ore in this header is looking very well.

DEADWOOD.—This hydraulic company has shut down, owing to the scarcity of water, and is now engaged cleaning up. Although many drawbacks have been experienced, the result of the short season's work is satisfactory.

FATHER DE SMET.—The superintendent's report, from July 31st to August 8th, shows ore extracted from first, second, and third levels, 2025 tons. Ore milled, 2025 tons. Golden Gate cross-cut 3d level advanced 6 feet. Total, 25 feet. Work stopped. Golden Gate south header advanced 7 feet.

GOLDEN SUMMIT.—The mill is running constantly.

PORTLAND.—A number of men were discharged by this company recently, and the probabilities are, that the mill soon be idle, all owing to lack of water. No extensive operations can be inaugurated by the Portland until new works are erected on Spearfish, or a water supply secured from some source.

RICHMOND *vs.* SITTING BULL.—Action has been commenced by the Richmond company against Colonel Davey, to enjoin the latter from working the Sitting Bull, on the ground of trespass. It is stated that the Richmond sank to a depth of 138 feet without striking any thing of value, whereupon a drift was run tapping the ore-body of the Sitting Bull, on the dip.

WELCOME.—Seventeen miners in the employ of this company struck recently for an increase of pay to $3.50 per day. Their demands were not complied with, and they packed up and went to Deadwood. Not over one half of the machinery for the new works has arrived; carpenters have not begun work on the mill building; and it will be at least two months before the reduction-works will be ready for operation.

FLORIDA.

We are informed that deposits of magnitude of hematite, running 0·22 per cent of phosphorus and 51 per cent of iron, have been discovered by Mr. Albert Hill, C.E., in Northern Florida.

Extensive phosphate-beds, similar to those of South Carolina, have been discovered in Florida, and a scientific examination has been so favorable that the Ashley Phosphate Company, of Charleston, S. C., has already purchased 3000 acres of land covering these beds, with the view of erecting extensive works at Charlotte harbor.

GEORGIA.

The news from the mines this week, says the Dahlonega *Signal*, is not of the most cheerful nature. The drought still continues, and mining operations, except in a few favored localities, are consequently almost suspended. Many individual operators who have been working small placers now find themselves nearly or quite deprived of that absolute necessity, water. The mining companies operating here are as a rule running their works at about one half capacity. Notwithstanding this condition of things, those mines now worked are yielding fair returns, and but few, if any, find the proceeds from sale of bullion more than counterbalanced by mining and expense account.

IDAHO.

PHILADELPHIA MINING AND SMELTING COMPANY.—According to the Wood River *Times*, a contract has been made with the Union Pacific and Oregon Short Line companies, according to the terms of which the smelting company agrees to import from Rawlins, Wyoming, or Tintic, Utah, all the iron ore which the smelting company will require for flux. As the capacity of the company's works is 180 tons of ore per day, the company is liable to require as much as 5400 tons of iron per month, or five hundred and forty car-loads. The company has felt compelled to go outside for flux, because of an attempt, on the part of local owners of iron mines, to "corner" the smelting company and make it pay more than it considered the East Fork iron ore worth. The company has, from the start, been buying iron ore from three mines on the East Fork of Wood River; but recently a Mr. Burton, who claims to be operating here for a company in which Senator Tabor, the Colorado millionaire, is a stockholder, secured the control of two of the mines, and E. S. Chase secured the other by exchanging his interest in the Star group for it; and they at once raised the price of the ore on the Philadelphia Company, with the result above stated.

SILVER KING.—The mine has been sold for $125,000. The purchasers propose to work the property vigorously. They will at once begin shipping ore to the Sawtooth and Vienna mills. The mine is located on the head of Beaver Creek, and receives the water-shed of both sides of Beaver Cañon. The workings are filled with water up to within 35 feet of the surface. Above that level, careful estimates show 200 tons of ore in sight, averaging $200 per ton.

MAINE.

DOUGLASS.—Since the first of June, the company is reported to have shipped and sold in the Boston market 59,000 pounds of refined copper, for which the average price realized was 14⅝ cents per pound. The July product of the works aggregates about 75,000 pounds.

TRENTON FLINT AND SPAR COMPANY.—This company is operating a feldspar mine, located on the farm of Mr. Austin, at Topsham. It has a mill on the Cathance River, about a third of a mile from the railroad, where the spar is crushed. The mine is distant about a mile and a half from the mill, to which the mineral is transported in coarse lumps, by teams. Arriving at the mill, the spar passes through crushers and comes out a powder finer than the finest flour. Three car-loads of the crushed spar, amounting to 36 tons, are shipped each week, and it is used almost exclusively for the manufacture of the finest crockery and porcelain ware. The Maine Central has built a spur track for the accommodation of the company, thereby greatly lessening the distance between the mill and the cars.

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MEXICO.

The Governor of Chihuahua, in a recent interview with a correspondent of the New York *Tribune*, said: It is a mistake to suppose that the laws of this country are illiberal to mining. A few years ago, there was a tax of 42¼ cents on every half-ounce of silver metal; now that tax is repealed. Every $100,000 invested in a mine, or by one company in several mines, is exempt from tax for six years.

ANGLO-MEXICAN.—The copper mines recently denounced by this company in the district of Zimapan are turning out to be very rich. A tract of 90,000 square meters has lately been denounced by the company for the establishment of reduction-works.

MICHIGAN.

The following statements show the yield (in mineral) of each of the reporting mines of Portage Lake and Keweenaw districts for the month ended July 31st, 1883, and the total product for six months:

	July.		Total.	
	Tons.	Lbs.	Tons.	Lbs.
Calumet & Hecla	1,657	1,770	11,783	285
Quincy	300	495	1,657	785
Atlantic	158	660	1,116	654
Franklin	179	975	1,141	1,190
Allouez	111	710	687	920
Pewabic	64	500	476	1175
Peninsula	42	845	340	445
Grand Portage	38	...	255	1,024
Hancock	58	....	275	1,317
Wolverine	....	....	205	1,295
Phœnix	....	....	200	1,700
Copper Falls	....	....	297	885
Grand total			18,437	1655

CABIRA.—Considerable exploring is done by the management on its track in section 16, 42-32. A churn-drill is now at work 35 feet east of the main shaft, and is down 30 feet. The object of this work is to ascertain if the ore-body widens going in that direction, the dip in the bottom of the shaft being to the east, and at an angle leading to the belief that the drill-hole will strike it at a depth of about 40 feet. A shaft will also be put down shortly some 40 feet west and a little north of the present working, where it is confidently expected that a workable deposit will be found.

EMMETT.—It is stated that the exploration of the company's property, adjoining the Ludington, has been abandoned.

FRANKLIN.—The arrangement for delivering coal from the lake front at the chief point for consumption at this mine on top of the hill is a very complete one. Cars filled at the lake are run up over the incline by automatic power, on to the main track, and landed by the locomotive at the entrance of the fuel-chamber, and unloaded on trestle-work in front of the boilers by a self-acting dump.

GREEN MINING AND EXPLORING COMPANY.—This company has been formed at l'Anse for the developing of lands in the vicinity of Michigamme. Operations will be commenced on section 31, town 48, range 30. Good indications have been found on this property by former explorations, and much is expected as the result of work about to be prosecuted.

HURON.—The new stamp-mill of this mine has been in operation several days, and is giving satisfaction.

HYDRAULIC POWER COMPANY.—Most of the pipe for conveying the compressed air from its plant of air-compressing machinery at the Little Quinnisec Falls to the Chapin and Ludington mines, near Iron Mountain, is on the ground. They will shortly begin setting the pipe line in position. The air-compressors are now getting into place.

OSCEOLA.—The annex to be placed on the west side of the dressing-works for the new head of stamps is now in course of construction, and will be ready in a short time for the machinery.

REPUBLIC.—The result of the recent strike is the restoration of the scale of wages in effect prior to the first of June last.

MISSOURI.

Reports from Rich Hill state that the oil excitement continues. Lands are bought at fabulous prices. Thousands of acres are leased, and options taken for thousands of acres more, and many large and small tracts have been purchased at from $50 to $100 that a month ago could have been bought for $20 to $40. Several gas-wells have been found, and more oil-wells. Oil-rock abounds over a considerable territory, and the extent is unknown. The number of wells under contract continues increasing, and machinery is shipped from Chicago and Pennsylvania.

MONTANA.

AMAZON.—A shaft, 176 feet deep, has been sunk on this property, with two levels running east and west. The width of the vein is 16 feet. The lower east level is 75 feet in length, and the west level 80 feet. The width of the vein at this point is 26 feet. The assays from the lower level will average 80 ounces in silver. Steam hoisting-works have been put in position, and a large amount of ore is taken out daily. About two miles from the mine, the company is putting up concentration-works. The smelter will have a capacity of 30 tons. The stamp-mill has two batteries of 10 stamps each, with a capacity of 40 tons daily. The length of the flue from the smelter to the stack is 250 feet, the hight of the stack is 40 feet. The works will be in good running order by the first of October.

BOULDER.—During the past three months, this mine has been worked under a lease, and has paid well. Some of the ore worked ran as high as $40 per ton in gold saved in the mill, and still the principal value of the mine product is in silver. The lease expired on the 1st inst., and the corporation now contemplates changing its present mill so as to enable it to save the silver. At present, it only saves gold, and the excess of silver renders it difficult to save more than a small percentage of that.

DRUM LUMMON.—The London purchasing syndicate has ordered a mill from Messrs. Prescott, Scott & Co., of San Francisco.

MISSOULA COUNTY.

PLEASANT VIEW.—The Bitter Root quartz, about which the people have been hearing for the past two years, says a correspondent of the Butte *Miner*, is still in such a condition that it is not now known that more than one mine exists in the region where the rich quartz has been found. Hon. H. E. Bass bought and leased interests until he obtained control of a location called the Pleasant View. A shaft has been sunk to a depth of 125 feet on the vein. Levels were run out at fifty and one hundred feet, to ascertain the character and extent of the ore. The ledge has a uniform width of four or five feet. There are about 200 tons of ore that came out of the shaft and levels on the dump. The expenditure for purchase and working so far has been between $7000 and $8000. The production of ore continues.

SILVER BOW COUNTY—SUMMIT VALLEY DISTRICT.

Activity has prevailed at all the principal mines since last report, and all the mills and smelters are running. The shipments of matte and silver-copper ore at the Utah & Northern Railroad office were unusually large, aggregating 380 tons of matte and 650 tons of ore. Nearly all of the latter were shipped to European ports.

NEVADA.

NORTHERN BELLE.—The superintendent writes: As the heat is not so great in the southwest drift of the 5th shaft level, we are able to report better progress, having extended the same 10 feet during the week; total distance, 182 feet; the face having passed into moderately soft quartzite. Work has also been resumed in the south cross-cut, same level, where the formation is quite favorable. The main drift to the west on the 4th shows no change of note, but continues entirely in sulphurets, given low assays. There is a decided improvement in the width of the stope on this level, and the ore is of excellent quality. In the uprise above the 1st, the stopes are producing as usual, the ore being of moderate grade. We are thoroughly prospecting other shaft-levels, but there are no changes of importance to report. Above the adit-level, work is progressing as usual. The 7th and 9th do not present as promising an appearance as last week, but we hope for an improvement. Every thing is running smoothly in and about the mine, and the daily production of ore has been about 43 tons. Both mills are running steadily and doing the usual good work.

COMSTOCK LODE.

A contract with the Risdon Iron-Works, San Francisco, says the *Enterprise*, has been signed for another big hydraulic pump for the combination shaft. The pump is to be completed within one hundred days. It will be of the same capacity as that now in operation, and will be placed at a point from ten to twelve feet below the 2620 level. At this place will be constructed a station 25 feet wide, 14 feet high, and from 90 to 100 feet long. The pump will have upon it over 200 feet more pressure than that at the 2400 level. Once it is in and ready to run, it will release the Cornish pumps now in operation below the 2400, and they will be used below the 2600 level to pump up to the lower hydraulic pump. The cost, which will be a great deal less than the first, will be divided up among the several companies interested in the shaft, will be less than 20 cents per share, and it will be so divided that never so much as seven cents per share will be required at any one time. The putting in of the new pump and the sinking of the shaft to the 3000 level will be of great advantage to all the middle mines.

HALE & NORCROSS.—An official letter says: In consequence of repairs to the air-compressor at the combination shaft, the overhauling of hydraulic pumps and the reopening of the Chollar and Potosi south drift, on the 2600 level, progress in sinking the 2600 winze has been impeded during the whole of this week. This winze is now down 80 feet, and the ore in the bottom looks about the same.

KEYES & WHEELER.—In this claim, north of Monte Cristo, at Seven Mile Cañon, at a depth of 225 feet, a rich black sulphuret ore has been struck. As yet no large body of the ore has been found. In sinking four feet, the deposit has widened from one inch to three feet of ribbon ore and porphyry.

SUTRO TUNNEL.—The report for the week ended August 1st shows that the following temperatures were observed: Tunnel entrance, air 90 degrees, water 120 degrees; shaft No. 1 east, 92; No. 1 west, 96; No. 2 east, 70; No. 2 west, 61; No. 3, 91; No. 4, 90; Combination Shaft connection, 82; Osbiston, 100; C. & C., 88; Julia, 99; Yellow Jacket, 87; Forman, 86. Flow of water in standard gallons per day, 8,032,700.

NEW MEXICO.

MANZANITA CONSOLIDATED.—Assessment-work is doing on the company's claims.

OLD MAN.—Another strike is reported. Glowing reports, with the usual assertion that the ore "runs away up in the thousands," accompany this news.

SOLID FIND PLACER MINING CLAIM.—Gold has been found in a placer four miles north of West Albuquerque. The claim was immediatly located, and will be known by the above name. Work will be commenced at once.

UTAH.

Twenty-five miles east of Black Rock station on the Utah Central, on Cove Creek, there are deposits of sulphur in almost a pure state. Experiments have been made in digging down, and also in boring, to a depth of thirty feet, all the way through sulphur. C. W. Scofield has purchased the property, and already has his machinery at Ogden for refining the sulphur. The machinery is to be shipped to the mines, and will be capable of turning out 150 tons of pure sulphur per day. The process of refining is that of retorts, in which the crude material will be placed, there to be treated by steam under a pressure of eighty pounds per square inch, which will melt the sulphur and separate it from the foreign substances. This pure sulphur will be run into cylindrical blocks weighing 200 pounds each, ready for shipping.

EMMA.—Twenty tons of ore were shipped recently, taken from below the old workings, which sold for $268 per ton. This property is looking very finely, and work is progressing favorably. On the 135-foot level in the new shaft, at the inner end of the Bay City tunnel, a cross-cut, now in 205 feet, has tapped the vein, and from this drifting is going on, and they are also cross-cutting to find the foot-wall. The vein at this point is supposed to be over 100 feet wide. The machinery handles the water very easily, and there is a prospect that the mine will soon begin shipping ore again.

GREAT BASIN CONCENTRATING MILL.—George O. Dickinson and L. Osgood, associated with B. B. Van Deusen, have leased this mill at Stockton, and having entirely reconstructed the old works, are now able to treat the tailings from the former workings of the mill with profit. It is the intention of these men to purchase ores about Stockton, and treat them at the Great Basin concentrator. Samples of concentrates have been brought to this city which show fine results.

ONTARIO.—The tunnel, which was begun in the summer of 1881, and has been in progress ever since, has been finished; it is over 5500 feet long. The Salt Lake *Herald* says that one of the heavy expenses of operating this great mine has been the handling of water, which as greater depth was attained, has been a source of increased labor, anxiety, and expense. It was found difficult not only to handle the water by lifting it from the 600, 700, and 800-foot levels of the mine, but the same labor was attached to lifting the ore from the mine, though, of course, there was no such danger from the ore as there was from fresh outbreaks of water, or from a failure to work of machinery employed to handle the water. The tunnel in question was projected for the purpose of carrying off the water, and thus saving a lift of 600 feet, and also causing a saving in handling the ore. Men are now at work laying in the flumes, and shortly the water, which now finds an outlet at the top of the mine, will be run out from the 600-foot level. The same saving, however, will be made in the handling of ore; indeed, the saving will be greater; for the water is turned loose after it gets to the top, but the ore has to be hauled in wagons from the mine to the mill. By means of the tunnel, however, ore can be sent from the 600-foot level down to the mill on cars, thus saving the expense of hoisting 600 feet and then of loading and hauling to the mill and unloading again. The tunnel cost the Ontario over $20 per foot, and there are over 5500 feet, or something over $110,000.

WYOMING.

The Silver Crown District is making rapid strides toward a permanent and paying mining camp. The mines are owned principally by Omaha, Chicago, and Cheyenne parties. This district is situated near Granite Cañon, and southeast from Laramie. At the principal mine, fully $50,000 worth of copper ore is on the dump. A town-site has been located near the mines, and twenty-six men are now at work. The country is staked out for miles and miles thereabouts, and new arrivals are reported daily. A portion of the country lying between the new mines and Laramie is also undergoing thorough prospecting.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Aug. 17.

The mining market this week has been very dull, and there is but little of interest to note. Prices generally have ruled weak, with the exception of one or two low-priced stocks. The Comstocks were quite weak, although but moderately dealt in. To-day, Navajo sold very weak, with a small business. Below will be found a complete summary of the market. The total number of sales aggregates 137,900 shares, as against 193,655 last week.

The Comstock shares have been quiet and weak. California, under a small business, was quite weak, declining from 42 30c. Consolidated Virginia was moderately dealt in at irregular prices; it sold from 62@55@58c. Sierra Nevada has been quiet and weak, selling from $5.13@$4.40. Union Consolidated was dealt in to the extent of 400 shares, at $5.38@$5. Ophir sold at $3.50. Hale & Norcross was quiet and steady, selling from $6@$5.75. Savage sold from $2.20@$2.10, assessment unpaid. Yellow Jacket, with one small transaction, sold at $3.05. Sutro Tunnel was quiet and steady, selling from 19@20c.

The Leadville stocks were very quiet and very steady. Amie was quiet and weak, selling from 17@14c. Chrysolite was moderately dealt in at steady prices; it sold from $1@$1.10. Dunkin records small transactions at steady prices, selling from 23@20c. Leadville sold at 35c. Little Chief has been moderately dealt in and was steady, selling from 42@41c. Little Pittsburg was quiet and steady at 66c. Climax records a small business at steady prices, selling from 10@9c.

The Bodie stocks were very quiet. Bodie Consolidated was weak at 39@35c. Standard was steady, under small transactions, selling from $5.50@$6. Bulwer records one transaction at 70c.

The Tuscarora stocks record but a small business, and were steady. Grand Prize sold from 27@30c., with a business of 400 shares. Argenta was quiet and steady, selling from 15@20c. Belle Isle sold at 35c. Navajo had a small business and was quite weak; it sold from $3@$2.25. Elko Consolidated has been active and steady, selling from 17@15c.

In the miscellaneous list, Alice has declined during the week, but rallied to-day, and was stronger; it sold from $2.40@$2.20@$2.40. Eureka Consolidated was quiet and steady, selling at $6.50, assessment paid, and from $5.75@$6, assessment unpaid. Horn-Silver has been quiet and a little weak; it sold from $6.50@$6.25. Northern Belle has suffered a slight decline, under a small business, selling from $6.50@$6.25. Robinson records an active business at weak prices; it sold from 75@62c. Sierra Grande has been moderately dealt in, and has been steady; it sold from $1@1.15.

Alta-Montana has been quiet and steady, selling from 5@6c. Barcelona continues to be very actively dealt in, but has suffered a slight decline; it sold from 45@37@39c. Bradshaw was quiet and irregular at 26@24@25c. Caledonia has been quite weak under a small business, declining from 81@70c. Decatur records small transactions at 3c. Eastern Oregon has been actively dealt in, and has been strong; it sold from 87@93c. Harlem declined from $1.40@$1.25, with a business of 1300 shares. Oriental & Miller was quiet and steady at 14c. Rappahannock sold from 5@7c. Sonora Consolidated has been actively dealt in, and has been a little weak; it declined from 29@25c. South Hite records a small business at weak prices, selling from 5@3c.

The property of the Alta-Montana Company has passed into the hands of the Helena Mining and Production Company, with a capital of $3,000,000 divided into 600,000 $5 shares. The new company gives one share for every ten shares of the old company, provided the exchange is made on or before the 15th of September. The new company has a bonded indebtedness of $600,000, given in part payment for the property, having ten years to run, 6 per cent interest, payable semi-annually, beginning in eighteen months. Parties interested in the new company have, we understand, induced the Northern Pacific Railroad to build an extension to Wickes.

At the meeting of the stockholders of the Green Mountain Company this week, we understand it was reported that the mine was paying for all but the dead-work, leaving a deficiency of from two to three thousand dollars per month. An effort has been made to raise $30,000 toward meeting the past expenditures for this purpose, and the sum which it will probably require monthly to the end of this year, when it is expected the Blake chute will be struck. It is reported that $20,000 have been raised.

The tunnel of the Ontario Silver Mining Company has been completed, so that the strain on the pumps will be relieved.

DIVIDENDS.

The Homestake Mining Company, of Dakota, announces its July dividend of $50,000, payable at the office of Lounsbury & Haggin, Mills Building, No. 15 Broad street, on the 25th. Transfers close on the 20th. Total of dividends to date $2,162,500.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

On last Friday, the market was sluggish and uninteresting at about $1.08⅛@$1.09, but late in the day a spirited buying rapidly advanced the price to $1.11 on the report that Porcupine No. 9 well was in and showing very poorly. Before the close, however, the price reacted to $1.09, when it was learned that the well promised to be good. The next day, Saturday, the well was proved to be a large one, and it was evident that this extended the area of productive territory in Balltown; but, strange to say, the market did not respond to this bearish news. On Tuesday, prices actually advanced to $1.10¼, at which they closed, and Wednesday they sold still higher at $1.11⅛. Meanwhile, two other large wells had come in, Balltown No. 6 and McCalmont No. 5. During all this time, the stock market was exceedingly weak and almost on the verge of a panic; and had the petroleum market been left to its fate, it must have declined.

Further to show the tactics of the Standard Oil Company, it deliberately advanced the price of refined from 7⅝ cents per gallon to 8⅛ cents between Wednesday and to-day, though there is a very light export demand, and the domestic trade not yet due. This doubtless is intended to help bull oil, and the clique now in control of the market is probably both able and disposed to advance prices. Porcupine No. 9 was drilled deeper on Wednesday evening, increasing its flow to about 2000 barrels the first twenty-four hours. This is on the extreme northern line of Balltown, and opens up to great possibilities the territory between Balltown and Cherry Grove. If oil goes up to near $1.15 during the next few days, it ought to be a good sale for those who will remain short. Russia is coming every day into more active competition with American petroleum on the continent. California and Missouri give promise of opening some new producing wells, and the present stock of crude is the largest in the history of the trade.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 11.....	$1.08¾	$1.10½	$1.08¼	$1.08½	1,923,000
13.....	1.08⅛	1.08¾	1.07¾	1.08⅛	1,853,000
14.....	1.08	1.10⅝	1.08	1.10⅝	3,044,000
15.....	1.09⅝	1.11⅝	1.09⅛	1.09¾	3,545,000
16.	1.08¾	1.09⅞	1.08¾	1.09⅝	3,163,000
17.....	1.10⅝	1.11⅝	1.09⅞	1.10⅛	5,575,000
Total sales.					19,103,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Aug. 16.

There has been but little doing the past week in mining stocks, the interest in the general market having absorbed all the attention of operators. The copper stocks are held mostly by investors, very few being bought on margins, and consequently, in a period of depression such as we have had the past week, there is no selling out "under the rule" or forcing stocks for sale because margins are exhausted. Calumet & Hecla declined on small sales to $241, but quickly rallied again to $245, the closing price of last week. It is worthy of notice that so little of this stock out of the 100,000 shares of the company is put upon the market, showing the confidence of the holders in its permanent character as an investment security. Quincy, which is more of a speculative character, is much more largely dealt in, but has fairly maintained its price against an adverse market, having declined only $1 per share, with sales of 200 or 300 shares, mostly in small lots, at $46@$45, closing $45 bid. Osceola also declined $1 per share; sales at $18½. Pewabic sold at $3¼@$3. Allouez, at $1½. Altantic, 25 shares, at $10; last sale $12, July 20th.

In silver stocks, dullness reigns. The transactions for the week, all told, are not equal to one good day's work in ordinary times of activity. The commission brokers complain of the absence of orders, and what little is done is principally room trading. Bonanza declined from $1⅛@$1¼, but later advanced to $1⅝, sales. Catalpa declined from 42½@37½c., but closed a little firmer, with sales at 42½c., and 40c. bid. Harshaw sold at 50c. Silver Islet, at $3⅛. Bowman Silver seems to have got into a rut at 16c. bid, 17c. asked, with now and then a sale at both figures. Massachusetts & New Mexico, dull at 4c. bid for small lots, and 3c. for 5000-share lots, and but little offering under 5c. The bonds are steady at 11@13 per cent.

3 P.M.—At the afternoon Board, Catalpa sold at 40c. Quincy, offered at $45. Huron, $1⅝ bid. Silver Islet, $3 bid. Bonanza, $1½ bid. Crescent, 12½@15c. The rest of the market unchanged.

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Aug. 10.	Aug. 11.	Aug. 13.	Aug. 14.	Aug. 15.	Aug. 16.
Albion						
Alpha	2¼	2¾		2¼	2⅛	2⅛
Alta	1	1		1⅛	.85	.55
Argenta						
Bechtel						
Belcher	1¼	1¼		1⅛		1
Belle Isle	.40			.40		
Best & Belcher	4½	4⅝		4¼	4¼	4⅛
Bodie	.40	.40		.40	.35	.30
Bullion						
Bulwer						
California	.45	.45		.40	.40	.30
Challar	3⅝	3⅝		3¼	3⅛	3⅛
Con. Virginia	.40	.70		.60	.55	.60
Crown Point	1¼	1¼			1⅛	1⅛
Elko Cons						
Eureka Cons		5½		6	6½	6
Exchequer						
Gould & Curry	3⅝	3⅝		3¼	3	2¾
Grand Prize						
Hale & Norcross	6⅝	6¼		6⅛	6⅛	5⅞
Independence					.50	
Martin White	.25			.25		.25
Mexican	3¾	3¾		3¼	3⅛	3
Mono						
Mount Diablo					4⅞	4¾
Navajo		3⅛		2⅞	2½	2½
Northern Belle				6⅛	6¼	6¼
North Belle Isle						
Ophir	4⅛	4⅛		3⅝	3½	3¼
Overman						
Potosi	1⅝	1⅝		1⅝	1¼	1¼
Savage	2¼	2⅝		2	2	1⅞
Scorpion	.75	.70		.60	.60	.55
Sierra Nevada	5½	5½		4½	4½	4½
Silver King						
Tip-Top						
Union Cons	5⅝	5½		5	5	4⅝
Utah	3	3		2⅝	2½	2
Wales Cons						
Yellow Jacket	3⅝	3½		3¾	3¼	3

The following are the financial balances of the various mining companies on August 1st:

CASH ON HAND.

Alta	$13,073.05	Gould & Curry	$35,512.37
Andes	9,262.80	§Hale & Norcross	26,326.53
Alpha Con	4,350.26	Jackson	2,367.60
Bodie Con	25,674.34	Martin White	41.58
Best & Belcher	13,022.73	Mono	3,139 85
Bulwer	4,275.49	‖Northern Belle	16,863.70
Benton Con	10,036.36	Ophir	2,017.87
*Belcher	25,824.48	Occidental	5,945.71
Challenge Con	5,405.78	Potosi	8,108.44
†Con. Virginia	8,211.26	Silver Hill	2,181.90
Con. Imperial	5,759.19	Sierra Nevada	15,608.45
Chollar	3,510.41	Summit	1,248.15
Crown Point	23,542.13	Standard	157,899.09
Double Standard	47.70	Tioga Con	884.82
‡ Day	4,732.65		

INDEBTEDNESS.

Grand Prize	$11,576.62	Mexican, to Nevada B'k, J'ly 31st.	13,156.06
Lady Washingt'n	3,938,88	Savage	2,110.27

Albion, exact amount not yet known; approximates $260,000.
* Due Sutro Tunnel Company, $10,920.
† Expenses of mine, amount unknown.
‡ Bills payable, $91,151.81.
§ Amount due on assessment No. 77, $5918.10.
‖ Bullion unsold, $101,951.93.

BULLION MARKET.

NEW YORK, Friday Evening, Aug. 17.

The market has been higher abroad; but the decline in sterling exchange here has kept the rates of silver in our market practically unchanged since our previous postings.

DATE.	London. Pence.	N. Y. Cents.	DATE	London. Pence.	N. Y. Cents.
Aug. 11	50 7-16	110⅛	Aug. 15	50 7-16	109⅞@110
13	50 7-16	110⅛	16	50⅛@50⅝	110⅛
14	50 7-16	110	17	*	110⅛

* 50 9-16@50⅝.

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BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of July.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.		‡$471,323
*Alta-Montana, G. L. S.	"		$10,625
*Belmont.	"		12,604
Bodie, G. S.	Cal.	12,447	131,982
Bodie Tunnel, G.	"		54,642
*Bonanza King, G.	"		334,223
*Boston & Montana, G.	Mont.		72,318
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah.		145,671
*Chrysolite, S. L.	Colo.		246,676
Consolidated Bobtail	Colo.		18,723
*Contention, S.	Ariz.	77,985	635,413
Crescent, G.	Cal.		13,000
*Custer, G. S.	Idaho.		43,572
*Deadwood-Terra, G.	Dak.		172,277
*Derbec Blue Gravel, G. S.	Cal.		55,148
Evening Star, S. L.	Colo.		47,061
*Father de Smet, G.	Dak.	30,688	208,851
*Frisco M. and S. Co., G. S. L.	Utah.		§77,084
Gunnell, S.	Colo.		58,828
*Head Center Consolidated	Ariz.		26,502
*Head Center and Tranquillity	Ariz.		60,620
*Hecla Consolidated, G. S.	Mont.		293,922
*Homestake, G.	Dak.		419,148
*Hope, S.	Mont.		41,963
Horn-Silver, S. L.	Utah.	300,000	1,847,000
*Howell S. and Mg. Co., G. S. L.		§41,361	41,361
Idaho, G.	Cal.		88,642
*Independence, G. S.	Nev.		32,991
Iron Silver, S. L.	Colo.		503,831
*Jocuistita, S.	Mex.		‡228,022
*Kentuck, G. S.	Nev.		12,876
*Lexington, S.	Mont.	106,068	744,556
*Little Pittsburg, S. L.	Colo.		35,645
*Marguerite, G.	Cal.		45,745
*Martin White, G. S.	Nev.		136,317
Morning Star, S. D.	Colo.		84,428
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev.	74,277	262,100
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S.	"	51,134	447,040
*Ontario, S. L.	Utah.		1,038,687
*Oxford, G.	N. S.	5,276	40,531
*Phœnix, G.	S. C.		7,700
*Pinal Consolidated, S. L.	Ariz.		181,485
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		101,241
Standard, G.	Cal.	95,208	671,030
Star, S.	Nev.		27,095
*Stormont, S.	Utah.	18,020	132,330
Syndicate, G.	Cal.		29,116
Tintic M. and M. Co.	Utah.	10,595	25,196
*Tip Top, S.	Ariz.	10,009	37,868
*Tombstone, G. S. L.	"	82,960	497,199
Wyoming Consolidated.	Cal.		31,541
Yellow Jacket, S.	Nev.	72,227	265,885
Total amount of shipments to date			$11,825,050

* Official. † Net value. ‡ Assay value. § Not including alue of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended August 17th, as compiled from various sources, amounted to $210,000, as against $250,000, reported for the previous week. The receipts from January 1st, 1883, to date are $7,177,974.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended August 11th	$249,460
Corresponding week last year	290,000
Since January 1st, 1883	8,136,524
Corresponding period last year	42,450,213

Imports.

Week ended August 11th	$153,746
Corresponding week last year	32,929
Since January 1st, 1883	7,851,665
Corresponding period last year	2,261,801

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £396,000 bullion—principally from domestic sources—and the proportion of its reserve to its liabilities was raised from 45⅝ to 46 9-16 per cent, against 37⅞ per cent at this date a year ago. The weekly statement of the Bank of France shows losses of 1,725,000 francs gold and 1,325,000 francs silver.

METALS.

NEW YORK, Friday Evening, Aug. 17.

Copper.—So far as Lake copper is concerned, the situation is practically unchanged. It is occasionally procured at 15c., and we note an export sale of 100,000 pounds at that figure. We quote nominally, 15@15¼c. In other grades, the range continues at 14@14½c., according to quality, 600,000 pounds of Baltimore in lots having been sold, some of it at 14¼@14⅝c. The export of refined ingot copper for the first six months of the year was 11,483,172 pounds of Lake and 1,219,200 pounds of Baltimore, Orford and other brands. The engagements are understood to cover considerable additional quantities. Messrs. Thomas J. Pope & Co., of this city, have printed the following estimate of the output for 1883:

	Pounds.
Arizon and New Mexico	20,000,000
Montana	21,000,000
All other places, except Lake	7,000,000
	48,000,000
Lake Superior	56,000,000
Total	104,000,000
Exports already shipped and contracted to be shipped	35,000,000
Namely: Copper, outside of Lake	Pounds. 15,000,000
Lake copper	20,000,000
Leaving for home consumption for the year 1883	69,000,000

We have reason to believe that the product of the mines outside of Lake will be much closer to 54,000,000 pounds, and that the Lake producers will not fall short of 58,000,000 pounds, which would make the total 112,000,000 pounds.

The engagements of Lake copper for export and of metal for cartridges are probably not more than 14,000,000 pounds. On the other hand, the engagements of copper in various forms from other sources are heavier, probably not less than 20,000,000 pounds, so that there would be left for home consumption 78,000,000, which leaves us with a fair margin for further exports of Montana mattes and ores, assuming our consumption to be at the rate of 72,000,000 per annum.

With such figures as those given by us, which are conservative, there is every reason for a hopeful view for the future.

In England, Chili Bars were quoted to-day £64 f. o. b., which is the usual level of the past month. Best Selected, however, has improved to £69 f. o. b., which is encouraging, because it was here that the principal weakness has been shown of late.

The statistical reports published in England are bewildering in number, and are treated in a widely varying manner. We choose the two following, knowing them to be as reliable as they can be procured. The statistics of Messrs. James & Shakspeare below estimate the supply and demand:

STATISTICS OF COPPER—ENGLAND AND FRANCE.

	Jan. 1 to June 30. 1883. Tons.	1882. Tons.
Imports copper into England per Customs	48,573	42,878
Of which passed through public warehouses	33,916	29,669
Giving direct supply to smelters	14,657	13,209
Deliveries from public stocks, England	32,633	31,835
To which add direct supplies, as above	14,657	13,20.)
Making total delivery of	47,290	45,044
Of this were exported (reduced to pure copper)	29,588	26,139
Leaving for home use	17,702	18,905
English imports, as per Customs returns	48,573	42,878
French imports of foreign (direct)	8,048	7,299
Total supply, England and France	56,621	50,177
English consumption, as above	17,702	18,905
English exports (in fine copper)	29,588	26,139
Deliveries from French warehouses	8,304	6,550
Total consumption, England and France	55,594	51,594

Those of Messrs. Henry R. Merton & Co., of London, give details of the stocks, and the quantities afloat and chartered.

	July 31. 1883. Tons.	1882. Tons.	
Stocks in England and France:			
Chili bars	23,997	20,711	Liverpool and Swansea.
" ingots	436	1,105	
" ores and regulus (fine)	1,812	1,977	
" other stuff (fine)	4,014	2,375	
Foreign copper (chiefly Australian) and landing	4,531	7,545	London.
Chilian and other bars	2,094	3,244	Havre and Bordeaux.
Other copper	575	370	
	37,459	37,327	
Afloat and chartered from Chili to England and France:			
Ores and regulus (fine)	359	2,228	Advised by mail.
Bars and ingots	6,964	2,209	
Ores and regulus (fine)	700	1,600	Advised by cable.
Bars and ingots	2,800	3,600	
	48,282	46,964	
Afloat from Australia to London:			
Fine copper	257	650	Advised by mail.
Fine copper	783	1,250	Advised by cable.
Totals	49,322	48,864	

Tin.—There is a firmer feeling. The large arrivals of the past week have been absorbed and for the time being the stocks are again firmly under control. In large lines, Straits and Australian are quoted 21@21⅛c., while Malacca, the spot stock of which is reduced to 50 tons, is held at 21¼c. Straits for August shipment is offered at 20⅝c. London cables to-day £93.

Lead.—The market has been dull and has exhibited further signs of weakness. There have been jobbing sales only at 4·25c. with rumors of 4·20c. for Common, and 4·25 for Refined. Offers at 4·20c. can hardly be obtained. It is stated that some of the refiners, who find it hard to get the raw material, are indifferent, in fact, would not object to seeing prices fall off further still. London is as low as it ever has been, and soft Spanish can be laid down at 4·80c., duty paid. A small quantity, about 2000 tons, is annually brought in to be exported under the drawback clause.

From St. Louis, Messrs. John Wahl & Co. wire us as follows:

Our market is unchanged, being quiet, with prices the same. Sales will not aggregate 250 tons of Refined at 4c., and 30 tons of Common at 3·95c.

From Chicago, Messrs. Everett & Post send us the following dispatch:

The market remains in the same condition, showing, if any, a shade of weakness. Offerings, however, are moderate only. There is a general disposition to buy at 4c., but there is none offering at that. Prices are nominally 4·03@4·07½c.

Spelter.—It is reported that some of the Western producers are showing a disposition to hold back at present prices, and only the brands of works recently started, being comparatively unknown, are available at 4⅜c., the others being held at 4½@4¾c.

Antimony.—There is little doing, quotations remaining 10¼c. for Cookson's and 9¼@9⅜c. for Hallett's, for jobbing lots.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Aug. 17.

Mr. Edward J. Shriver, Secretary of the New York Metal Exchange, publishes the following returns for 136 furnaces:

1883.	No. 1.	No. 2.	Forge and lower grades.	Grade not specified.	Total.
Stocks July 1st	14,538	24,192	50,058	21,226	110,014
" August 1st	14,817	20,127	30,365	21,250	106,459
Prod'ct'n in July	19,327	7,708	25,704	14,354	67,093

"Forge and lower grades" includes some charcoal and Bessemer pig.

American Pig.—If any thing, the condition of the market has grown a shade more unsatisfactory. While No. 1 is certainly not in over-supply and is firmly held, other grades are available in full quantity, and in some cases can only be moved by making round concessions. We continue to quote $22@$23.50 for standard to choice No. 1, the Crane Company claiming to $23, ordinary brands being obtainable at a concession of 50c.; $19.50@20.50 for ordinary to choice No. 2; and $18@$20 for inferior to choice Gray Forge. Bessemer Pig has sold to the extent of 5000 tons at $21 at tide. Spiegeleisen has been dull, the higher grades at $30.50, and the lower at $25.50@$26.

The week has been an exceedingly quiet one at the Exchange, no transactions being recorded.

Scotch Pig.—Business during the week has been dull at about our quotations. Arrivals are moderate this week, aggregating 1400 tons, and freights are cabled better, 8s. from Glasgow.

We quote ex ship: Coltness, $23.75@24; Langloan, $23.75@24; Summerlee, $23; Dallmellington, $21@$21.50; and Eglinton, $20.50@$21.

At the Exchange, the following slightly lower cable quotations were received: Coltness, 60s. 3d.; Langloan, 61s. 3d.; Summerlee, 57s.; Gartsherrie, 56s. 9d.; Glengarnock, at Ardrossan, 55s.; and Eglinton, at Ardrossan, 49s.

Rails.—For early delivery there is little doing, the mills being fairly full; beyond that, the quotations of of agents, $37.50@38, are not tempting buyers, who look forward to lower figures.

Old Rails.—The firm tone still prevails, though transactions are limited. We quote $22.50@$23.

Scrap.—Small sales are made. We quote, ex ship, $22.50@23.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Aug. 11.		Aug. 13.		Aug. 14.		Aug. 15.		Aug. 16.		Aug. 17.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.40	.....	.....	.....	.....	.....	2.35	2.25	2.25	2.20	2.40	.....	800
Amie Con., Co.	.....	.....	.17	.16	.....	.....	.....	.....	.....	.....	.14	.....	2,500
Argenta, Ne.	.....	.....	.....	.....	.....	.....	.20	.15	.20	.....	.20	.....	800
Bar. & Walker, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belle Isle, Ne.	.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Bodie Cons., Ca.	.....	.....	.39	.35	.....	.....	.....	.....	.....	.....	.....	.....	1,750
Breece, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.70	.....	200
California, Ne.	.....	.....	.42	.....	.42	.40	.....	.....	.....	.....	.30	.....	2,800
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribou Con., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Co.	1.05	.....	1.05	1.00	1.00	.....	1.00	.....	1.00	.....	1.10	1.05	3,760
Cons. Va., Ne.	.61	.60	.62	.....	.62	.60	.35	.....	.55	.81	.58	.....	4,450
Crown Point	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deadwood-Terra, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.23	.20	.....	.....	800
Eureka Cons., Ne.	.....	.....	.....	.....	.....	.....	6.50	5.75	6.00	.....	.....	.....	180
Excelsior, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fatner de Smet, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	100
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.....	.....	.....	.....	.....	.....	.27	.....	.30	.27	.....	.....	400
Great Eastern, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	.....	.....	1,000
Green Mountain, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.72	100
Hale & Norcross, Ne.	.....	.....	6.00	.....	.....	.....	.....	.....	5.75	.....	.....	.....	150
Hall-Anderson, N. S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hibernia, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	17.00	.....	17.75	.....	850
Horn-Silver, Ut.	.....	.....	6.50	.....	6.50	.....	6.25	6.13	.....	.....	6.38	6.25	1,120
Hukill, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independence, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iron Silver, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
La Plata, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co.	.....	.....	.....	.....	.....	.....	.35	.....	.....	.....	.35	.....	700
Little Chief, Co.	.....	.....	.42	.41	.....	.....	.....	.....	.....	.....	.....	.....	1,100
Little Pittsburg, Co.	.66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	800
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moose, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	.....	.....	3.00	.....	.....	.....	.....	.....	.....	.....	2.25	.....	900
Northern Belle, Ne.	6.50	.....	.....	.....	.....	.....	6.50	.....	6.38	6.25	.....	.....	450
North Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	30.00	.....	.....	.....	50
Ophir, Ne.	.....	.....	.....	.....	.....	.....	3.50	.....	.....	.....	.....	.....	100
Plumas, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rising Sun, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson Cons., Co.	.75	.....	.75	.....	.73	.....	.69	.62	.65	.62	.....	.....	11,900
Saint Joseph's Lead.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	2.20	2.10	.....	.....	.....	.....	.....	.....	.....	.....	600
Sierra Grande, N. M.	1.00	.....	1.05	1.00	1.05	.....	1.15	1.10	1.05	1.00	1.15	1.00	7,450
Sierra Nevada, Ne.	5.13	5.00	5.13	.....	4.85	.....	4.50	4.40	.....	.....	.....	.....	1,725
Silver King, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	.....	.....	.....	.....	5.75	5.50	5.88	5.75	6.00	5.75	.....	.....	415
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.70	.....	.....	.....	100
Yellow Jacket	.....	.....	3.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Aug. 11.		Aug. 13.		Aug. 14.		Aug. 15.		Aug. 16.		Aug. 17.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion.	.....	.....	.05	.....	.....	.....	.....	.....	.55	.....	.....	.....	500
Alta-Montana, G.	.....	.....	.06	.....	.....	.....	.06	.05	.06	.....	.06	.....	5,300
Am. Flag, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barcelona, G.	.45	.44	.41	.....	.....	.....	.39	.37	.40	.39	.40	.39	13,100
Bear Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'lcher, G. s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Big Pittsburg, s. l.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradshaw, s.	.25	.....	.....	.....	.....	.....	.....	.....	.....	.26	.....	.26	.24	5,200
Buckeye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, s.l.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bye and Bye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calaveras, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clav'r's W. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., S. H., G.	.....	.....	.....	.....	.....	.....	.....	.....	.81	.70	.70	.....	800
Central Ariz'na, s.	.18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Cherokee, G.	.....	.....	.....	.....	.....	.....	.....	.....	.01	.....	.....	.....	1,000
Climax, Co.	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.09	.....	800
Cons. Imp'r'l, G. s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crowell, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dahlonega, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.03	.....	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	700
Dunderberg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, G.	.05	.....	.06	.03	.....	.....	.....	.....	.....	.....	.....	.....	2,400
Eastern Oregon	.90	.87	.93	.90	.92	.91	.93	.92	.93	.91	.93	.92	13,400
Elko Cons.	.17	.16	.17	.16	.17	.16	.17	.15	.15	.....	.15	.....	11,600
Enterprise	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fannie Barret	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Globe Copper	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Placer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granville, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	1.40	.....	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,900
Hortense, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Imperial.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G.	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Lucerne	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miner Boy	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, s.l.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, s.	.14	.....	.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Parnell	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quartz Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, G.	.06	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	.07	.....	1,600
Red Elephant, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ruby, of Arizona.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con.	.29	.28	.29	.28	.25	.....	.27	.25	25	.....	.25	.....	17,500
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Elite.	.05	.....	.05	.....	.04	.....	.04	.....	.04	.03	.....	.....	6,300
South Pacific.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel	.....	.....	.20	.....	.20	.....	.19	.....	.....	.....	.20	.19	6,400
Taylor Plumas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cons., G. s.	.....	.....	.....	.....	.....	.....	5.38	.....	.....	.....	5.00	.....	400

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 46,690. Non-dividend shares sold, 91,300.

BOSTON MINING STOCKS.

	Aug. 10.		Aug. 11.		Aug. 13.		Aug. 14.		Aug. 15.		Aug. 16.		Sales.
	H.	L.	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.	.....	.....	.....	.....	.....	.....	1.50	.....	1.50	.....	.....	.....	250
Amie.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic.	10.25	.....	.....	.....	.....	.....	.....	.....	10.00	.....	10.0	.....	140
Aztec.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza D.	.....	.....	1.50	.....	1.25	.....	1.25	.....	1.38	.....	1.63	.....	550
Bowman Sil	.17	.....	.17	.....	.17	.16	.17	.16	.16	.15	.17	.16	9,800
Bruns. Ant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer.	.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
California.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hec.	.....	.....	.....	.....	242	.....	241	.....	245	242	.....	.....	28
Catalpa.	.42½	.40	.40	.37½	.40	.37½	.42½	.40	.42½	.....	.42½	.40	2,900
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Climax	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Co. Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.68	.....	.....	.....	200
Copper F'lls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copperop.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent.	.12	.....	.....	.....	.....	.....	.13	.....	.....	.....	.15	.....	700
"Cusi"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deer Isle.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Duncan.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin.	.....	.....	.....	.....	.....	.....	.24	.....	.....	.....	.25	.....	600
Empire	.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.16	.15	2,800
Eureka Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.63	.....	50
Franklin.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hancock G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harshaw.	.....	.....	.....	.....	.....	.....	.50	.....	.50	.....	.....	.....	350
Huron.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independ'ce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Q'n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth.	.03	.....	.....	.....	.....	.....	.03	.....	.....	.....	.....	.....	4,500
Mass. & N.M.	.05	.....	.05	.....	.05	.04	.04	.....	.05	.....	.....	.....	11,800
Milton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North. Belle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola.	.....	.....	18.50	.....	18.00	.....	18.50	.....	18.50	.....	.....	.....	60
Penn-Breck.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewabic.	3.25	3.00	.....	.....	.....	.....	.....	.....	.....	.....	3.25	.....	140
Pine Tree.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicks.,com	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy.	46.00	.....	46.00	.....	46.00	45.00	46.00	45.75	45.75	45.00	45.00	.....	294
Robinson.	.....	.....	.....	.....	.75	.....	.75	.....	.....	.....	.....	.....	200
San Pedro.	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
S'ra Nevada	.....	.....	.....	.....	5.25	.....	.....	.....	.....	.....	.....	.....	50
S'ra Grande	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Islet.	3.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35
Silver King.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simpson Gd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
So. Pacific.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan.	.80	.....	.80	.....	.75	.....	.....	.....	.....	.....	.80	.....	600
Sutro Tun.	.....	.....	.....	.....	.....	.....	.20	.....	.20	.....	.....	.....	300
Sycamore.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	Aug. 10.		Aug. 11.		Aug. 13.		Aug. 14.		Aug. 15.		Aug. 16.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Argent.	.16	.....	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,200
Aztec.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Battle Mt.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buena.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calista.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati.	.....	.....	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	400
Comprom'e.	.17	.19	.18	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,300
Contention.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virg.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dauntless.	.02	.....	.02	.....	.02	.....	.....	.....	.....	.....	.....	.....	8,500
Del Monte.	.03	.....	.03	.....	.03	.....	.....	.....	.....	.....	.....	.....	8,500
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Girard.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Governor.	.....	.....	.14	.....	.05	.....	.....	.....	.....	.....	.....	.....	1,600
Grand Uni'n	.16	.....	.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000
Green Mt.	.....	.....	.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,600
Gunnison.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horn Silver.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch.	.06	.....	.06	.05	.06	.....	.....	.....	.....	.....	.....	.....	8,800
Iron Silver.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd.	.06	.....	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,500
Little Maud	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L'g & D'y H	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Sheridan	.04	.....	.04	.....	.04	.....	.....	.....	.....	.....	.....	.....	7,500
National.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North'n B'l.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion Pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palmetto E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn-Breck.	.07	.....	.07	.....	.06	.....	.....	.....	.....	.....	.....	.....	4,500
Permanent.	.....	.....	.12	.....	.02	.....	.....	.....	.....	.....	.....	.....	8,000
Pizarro.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro Ex.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potosi.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rara

Philadelphia. August 17.

Pig-Iron.—The improvement which a great many brokers and makers predicted in July to take place in August has not shown itself as yet, although the expectation is still strong of an active demand before the opening of September. It is based upon the fact that stocks of desirable irons of special and standard brands are in light supply. Apparently, there is a need for much more activity on the part of consumers than has been exhibited. But the tendency is to lower prices, and hence the delay indulged in by every one who can postpone the placing of large orders. Part of this inactivity is due to the knowledge that some companies have large stocks.

No. 1 Foundry is quoted at $22@$23, tide-water; Common, $21@$21½. Best No. 2, $20.50. Poorer grades are $19. Mill irons command $20 for most of the iron selling. The poorer grades are neglected. The furnace quotation is $17.50, and this is pretty generally adhered to on all sides. Makers show considerable determination, and are justified in so doing by the fact that that quotation represents the minimum price at which iron can be sold to cover cost. There are inquiries in the market for large lots, but the weakening tendency has induced buyers to withdraw some of their offers. For a number of well-known brands, $18 is adhered to. Scotch iron is selling in a quiet retail way. One lot of 5000 tons of Bessemer iron has been sold for shipment at $21 and other offers are in hand at $20.50. Spiegeleisen is selling at $31.25, with offers at 50@75c. less for large lots.

Blooms.—Charcoal Blooms sell in small lots at $57.50. Anthracite Blooms are quiet. Muck Bars are quoted as usual, $34@$35, with some business at the inside figure.

Merchant Iron.—The demand for merchant iron is irregular, and prices fluctuating, because of the continuance of the competition heretofore reported. Card rates are 2·30c. Selling prices, 2@2·20c. Several orders have been sent to country mills at 2c., and there are negotiations in hand to-day for several hundred tons at that price, although the iron is not strictly first-class. The off-setting advantage of the low prices is a large prospective demand, which imparts a steady tone to the market, although complaints are frequent as to the cutting of prices without cause. A good deal of iron is going in small lots at 2·15@2.20c. from mill and store.

Nails.—The nail trade has been active for the past week, and some few inquiries have just been received from jobbers who are willing to lay in a few hundred-keg lots, for retail requirements, at a little less than asking prices. Makers are not very anxious to book business of this kind; but dealers have declined this week to buy, unless concessions were allowed.

Plate and Tank Iron.—A fair amount of business, both in large and small lots, has been transacted, and mills are all in good shape, as prices are 2·40@2·50c. for Tank, and 3@3¼c. for Shell.

In *Structural Iron*, some additional business has been placed, and inquiries are coming along to fill large specifications at last week's prices. Sheet-iron continues to improve in demand, and some concessions have been allowed on a few large lots placed this week. Small lots are firm at card rates.

A fair amount of inquiry is coming along for wrought pipes and tubes, which are moving in small lots at from 70 to 75 per cent off for gas and steam pipe and 60 for tubes. Makers report a fair inquiry, and see a large demand in the near future.

Steel Rails.—Steel rails are strong and steady at $38@$38.50, with the average business. A number of offers have been made at prices away below these figures, but without any result, as mills have as much business as they care for, excepting on their own terms.

Old Rails are not to be had excepting on shipments, and agents are asking $23.50 in some cases; $23 offered, but no business is heard of.

Scrap-Iron is unchanged, and several buyers are in the market for hundred-ton lots and over, but selling prices are too high. Railroad Scrap is held at $25, and cargo lots $22.50. Crop-Ends, $23.

Pittsburg. August 16.

To-day's quotations are $17@$18 for Neutral Mill; $18@$18 50 for Red Short; $19.50@$20 for Native Ore Foundry; $22 for Lake Ore Foundry. The only peculiarity of the market this week is the fact of an increasing number of inquiries for Bessemer, Forge and Foundry. The improvement has induced the holders of desirable makes of iron to hold to higher selling prices. The resumption of mills in September will lead to a larger demand, and manufacturers have endeavored this week to cover September requirements, but failed to do so, and will risk buying random lots when needed. Bessemer is held at $21. Several offers are in hand at $20. Muck Bar is quiet at $34.50. A good many consumers of merchant iron have placed orders for 50-ton lots at 1·90c. Small lots are 2c. Offers are in hand at 1·75@1·80c. for larger lots, and there is a disposition to meet that demand. Nails are strong and steady at $2.90. Sheet and galvanized iron is in good request, and mills are filling up. Steam pipes are 75 per cent off. Steel is moving quietly in small lots; Crop-Ends are quoted at $25@$26; Steel Rails, $38. Business is restricted to small lots. Large lots will not be placed for a few weeks to come, unless makers should decide to take less than they now ask. Rail fastenings are $2.60 for Spikes.

COAL TRADE REVIEW.

NEW YORK, Friday, Aug. 17.

Anthracite.

The anthracite coal trade here is still very dull, and there is no improvement whatever to report. June purchases have been filled and appear to have pretty thoroughly loaded up retailers, many of whom could not take any more coal even if they would. The result is, that there is considerable pressure to sell coal, especially as the production is large, and the manufacturing interests are very dull. The Pennsylvania Coal Company has advanced its circular prices 10c. on egg, 20c. on stove, and 15c. on chestnut, and as the managers of it are known to be conservative, considerable stress is laid on the fact as an indication of an improvement in the trade. The company, we presume, is warranted in taking this step, which brings its nominal prices nearer those of the others; but we have certainly not been able to trace any symptoms of a better general feeling, and attribute their action to special reasons. The trade is looking forward to September with some interest, and the opinion is general that an advance will be announced. There are rumors, however, that the councils of the magnates of the trade are not entirely unanimous on this subject.

John H. Jones, official accountant, has published the following statement of the anthracite tonnage for the month of July:

	July, 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	1,026,481	4,671,736	3,560,173	I. 1,111,563
Central RR. of N. J.	*.....	1,745,399	2,304,445	D. 559,046
Lehigh Valley RR.	†497,741	3,346,470	3,168,435	I. 178,035
Del., Lack. & W. RR.	427,646	2,644,714	2,460,393	I. 184,321
Del. & Hud. Canal Co.	‡279,262	1,810.423	1,662,303	I. 148,120
Penna. RR.	240,609	1,449,578	1,275,289	I. 174,289
Pa. Coal Co.	121,597	774,780	756,383	I. 18,397
N. Y., L. E. & W. RR.	22,349	183,353	137,680	I. 45,673
Total.	2,615,686	16,626,454	15,325,100	I. 1,301,353

* Included in tonnage of Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 6029 tons.

‡ In addition, there were 42,748 tons transported from the mines by the Delaware & Hudson Canal Company, during June, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, July 31st, 1883, was 502,159 tons; on June 30th, 1883, 592,309 tons; decrease, 90,150 tons.

Bituminous.

Bituminous coal does not appear to have reached bottom yet, and we hear of sales of Clearfield at $3.45. The competition is exceedingly sharp. Cumberland is nominally $4@$4.40 alongside, according to quality.

STATISTICS OF COAL PRODUCTION.

The Transportation of Coke over the Pennsylvania Railroad for the week ended August 11th, and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	954	53,707
West Penn. RR.	2,414	64.527
Southwest Penn. RR	40,551	1,262,799
Penn. & Westmoreland Region, Pa. RR	4,023	136,649
Pittsburg, Penn. RR.	...	501
Snow Shoe (Clearfield Region)	165	12,014
Total	48,107	1,530,194

Belvidere-Delaware Railroad Report for the week ended August 11th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	3,278	64,847	52,678
Coal for shipment at South Amboy	13,640	475,087	512,025
Coal for distribution	16,204	473,796	427.733
Coal for company's use	5,132	95,636	77,891
Total	38,254	1,109,364	1,070,327
Increase		39,037	
Decrease			

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DIVIDENDS.

HOMESTAKE MINING COMPANY, MILLS BUILDING,

NEW YORK, Aug. 13, 1883.

DIVIDEND NO. 60.

The regular monthly dividend of FORTY CENTS per share has been declared for July, payable at the office of the Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad street, on the 25th inst.

Transfer-books close on the 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

SAN FRANCISCO, Aug. 4, 1883.

THE BODIE CONSOLIDATED MINING CO. this day levied assessment No. 3 of 50 cents per share, delinquent September 10th. Sale day, October 16th. Same may be paid at the office of Laidlaw & Co., 14 Wall Street. GEO. W. SESSIONS, Secretary.

OFFICE OF THE JOCUISTITA MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, Aug. 8, 1883.

DIVIDEND NO. 9.

The Jocuistita Company has this day declared a quarterly dividend of FIFTY THOUSAND DOLLARS, being fifty cents (50c.) per share, payable at the office of Lounsbery & Haggin, Mills Building, No. 15 Broad street, on the 31st inst.

Transfer-books close on the 25th inst.

R. P. LOUNSBERY, President.

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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MESSRS. WELLS, FARGO & CO., on the first of August, opened for business with Mexico to all points on the Mexican Central, Mexican National, and Isola & Pachuca railroads.

M. ALEXANDRE POURCEL, the eminent metallurgist, who has contributed so much toward making Terre Noire one of the most famous steel-works of Europe, has resigned and has accepted the charge of the large steel-works which are now building at Bilbao, Spain.

WE regret to announce the death, at Real del Monte, Mexico, of WILLIAM SULLIVAN SCHLEY, M.E., a graduate of the Clausthal School of Mines. By industry and perseverance, after many years of faithful work under adverse circumstances, he had reached the point where he was just beginning to see a brighter future open out before him.

GASES IN IRON AND STEEL.

The most lively and sustained controversy during the past few years in metallurgical circles has been that relating to the gases occluded and inclosed in iron and steel. Aside from the fact that iron-masters and steel-makers have learned to take a much deeper interest in researches formerly scorned as merely "theoretical," the direct bearing of the question at issue upon important practical points has contributed to make the controversy one which has been closely watched. We have repeatedly referred to the subject in giving an outline of the work of MÜLLER, PARRY, and others, and the more polemical writings of M. ALEXANDRE POURCEL, Dr. WEDDING, and a group of metallurgists who took a part in the discussion. Of late, few facts based upon experimental work have been brought forward, and the more recent contributions have not been remarkably profitable. Particular interest attaches, therefore, to the latest data gathered by that indefatigable worker in this field, Dr. FRIEDRICH C. G. MÜLLER, of Brandenburg, Germany. Following his example in the first installment of his paper, printed in *Stahl und Eisen*, we shall, for the present, confine ourselves to the presentation of a summary of his array of new data, leaving their discussion to a future period.

Iron and steel, like many other metals, possess the property of being able to absorb gases, their capacity to absorb hydrogen being greatest, while it is less for carbonic oxide, carbonic acid, and nitrogen. In chilling, a part of the gas escapes, giving rise to phenomena which destroy the continuity of the solid metal, and unfavorably affect its mechanical properties. Metallurgists are less interested in the cause than in the effect, and the porosity of steel, being a serious flaw at times, attracted study at an early date. The first efforts directed toward the remedying of the evil in this country, where Mr. W. R. JONES took the lead, were to prevent the escape of the gases by applying pressure during the process of solidification, a purely mechanical method, therefore. At Terre Noire, it was discovered that the addition of an alloy of silicon, manganese, and iron had a quieting effect upon steel, and the theory was advanced that this was due to the decomposition of carbonic oxide by silicon, it being accepted as a fact that blow-holes were caused by the entanglement of bubbles of that gas during the chilling of the steel. This theory was rudely shaken by the discovery that the gas in steel was chiefly hydrogen.

Mechanically, the form of the blow-holes was carefully investigated. A common form is that of porous tops, which is most easily dealt with. A more dangerous form is a core consisting of a series of cavities extending along the central portion of the ingot. A third kind of blow-holes is a large number of elongated fine horizontal cavities extending from the sides of the ingot toward its center.

There are two distinct phenomena producing unsound ingots. The first, which may be termed the "scintillating" of the steel, is due to an escape of gas from the metal at the moment of its solidification. This phenomenon does not necessarily cause unsoundness except in the top of the ingots, unless the escape of the gas in the central portion, chilling last, is cut off by the solidification of the upper part of the ingot. In that case, the ingot will show a core of blow-holes. The main point in casting such steel would therefore be to keep the top open for the escape of gas. The second, that of "rising" steel, is not accompanied by the expulsion of many particles of molten metal, but is characterized by the more or less rapid rising of the metal in the mold. The steel may appear to be completely quiet and dead in casting, and yet in solidifying will show the phenomenon noted, which causes the formation of the horizontal elongated blow-holes radiating from the sides to the center, honey-combing the entire ingot in extreme cases; while in less pronounced instances the blow-holes are nearer the center, there being a thick solid shell around them. While steel may scintillate and at the same time show a tendency to rise, as basic steel sometimes does, the phenomena are apparently due to two entirely distinct causes. The rising is, according to MÜLLER, due entirely to the presence of occluded hydrogen, while the "scintillating" seems to be caused rather by the escape of carbonic oxide.

Dr. MÜLLER has added only a few analyses to those already published of the character of the gas in the blow-holes in ingot steel. But as these are of interest, referring to basic steel, we give them below:

ANALYSES OF GAS IN BASIC STEEL.

	Quantity of gas. Per cent.	Carbonic oxide.	Hydrogen.	Nitrogen.
I. Soft, made with 2½ per cent 35 per cent ferro. Scintillating. Rising a little.	36	0·6	85·4	14·3
II. No final additions. Quiet. Scintillating little. Rising slowly.	20	0·0	64·5	35·4
III. Made with 5 per cent 14 per cent silicide and 2½ per cent 70 per cent ferro. Rising quietly. Ingot pretty sound.	22	0·4	86·4	12·7
IV. Made with 5 per cent 14 per cent silicide. Rising quietly. Ingot solid.	6	0·0	54·7	45·3

It is worthy of mention that, in spite of the large additions of silicon and manganese in Nos. III. and IV., the steel had only traces of silicon and 0·4 per cent of manganese, while at least 0·3 per cent of phosphorus

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was reduced. In another case, the percentage of phosphorus in the steel rose, after an addition of 5 per cent of silicide, from 0·106 to 0·515 per cent, while the silicon ran only 0·011 per cent.

Dr. MÜLLER'S principal labors were, however, directed to the analysis of the gas escaping from the steel during the process of solidifying; the only attempt previously made in this direction being that of Mr. J. STEAD, of Middlesborough. Dr. MÜLLER at first collected the gas by using bottom casting and conducting the displaced and accumulating gas through a pipe in the closed top. This method yielded results that were not strictly correct, even after deducting the oxygen found and a four-fold quantity of nitrogen, as representing the air in the mold, because a part of the gas was probably consumed by combustion, so that the nitrogen is too high. In order to overcome this defect and get rid more thoroughly of the air, a second method was used. The ingots were cast from the top in the usual way, and then the remaining space in the mold was quickly filled with pure white quartz sand, thus displacing the air and preventing ignition of the escaping gases before they were collected. A clay cover was luted on top of the ingot and the gas collected through a pipe. The letter *b* affixed to the analysis will, in the following, denote that the gas was collected by the earlier; and the letter *t*, by the later and better method.

The gases escaping from chilling pig-iron were found to have the following composition:

ANALYSES OF GASES ESCAPING FROM PIG-IRON.

	Carbonic oxide.	Hydrogen.	Nitrogen.	Carbonic acid.
Gray Bessemer pig	37·3	58·3	0·5	3·9
Spiegeleisen	48·7	49·5	0 5	1·3
Basic Bessemer pig	39·6	46·8	10·0	3·6

The analyses of these grades of pig were as follows:

Pig:	Carbon.	Silicon.	Manganese.	Phosphorus.
Gray Bessemer	3·688	1·680	1·930	.....
Spiegeleisen	4·180	0·253	7·370	.....
Basic Bessemer	3·099	0·203	0·736	3·025

The fact that the gas gathered in pig-iron by drilling is high in hydrogen and nitrogen, but low in carbonic oxide, while the latter gas, as is shown, is found in a large percentage in the escaping gas, proves that pig-iron when chilling is incapable of retaining the carbonic oxide previously absorbed.

Bessemer steel made at Bochum, which in casting shows few signs of scintillating and rising, yielded gas of the following composition, the rail steel ranging between 0·23 and 0·28 in carbon, 0·15 and 0·25 in silicon, 0·5 and 0·6 in manganese, and 0·06 and 0·08 in phosphorus, while the spring steel carried from 0·48 to 0·53 of carbon, 0·15 to 0·25 silicon, 0·8 to 0·9 manganese, and 0·06 to 0·08 phosphorus.

ANALYSES OF GAS ESCAPING FROM INGOT STEEL.

	Carbonic oxide.	Hydrogen.	Nitrogen.	Carbonic acid.
1. Rail steel (*t*)	37·3	47.3	7·9	7·5
2. Spring steel (*t*)	34·0	49·5	8·6	7·9
3. Spring steel (*b*)	45·9	41·4	9·9	2·8
4. Rail steel, first ingot	38·7	51·3	7·2	2·8
5. Rail steel, last ingot	43·4	46·9	6·6	3·1
6. Solid spring steel, first ingot	48·2	44·5	2·5	4·8
7. Solid spring steel, last ingot	42·5	36·5	17·1	3·7

Analyses 4 and 5 and 6 and 7 were made to ascertain whether there was any change in the composition of the gas issuing from the steel, after remaining in the ladle for a time; and therefore the first and last ingots of a heat were examined, the result being a slight relative decline in the hydrogen and an increase in the carbonic oxide. In all cases, the metal examined made solid castings. In order to ascertain whether the gas was different in composition in porous steel, the following analyses were made: No. 1 rose slightly, it being possible to keep in the ingot by pouring water on it. No. 2 had to be divided. No. 3 rose very much. Dr. MÜLLER examined also Bessemer steel completely decarbonized before the final addition of spiegeleisen, which rose considerably and developed much gas, the two samples 4 and 5 being taken one after the other from the same ingot.

A parallel experiment was made with open-hearth steel, the sample being cast before recarbonization.

ANALYSES OF GAS ESCAPING FROM INGOT STEEL.

	Carbonic oxide.	Hydrogen.	Nitrogen.	Carbonic acid.
1. B. Rail steel, rising slightly (*t*)	38·4	51·0	2·2	8·4
2. B. Rail steel, rising strongly (*t*)	31·5	39·2	21·6	7·7
3. B. Rail steel, " " (*t*)	70·7	20·7	6·5	2·1
4. B. Steel, not recarbonized, rising, first sample (*t*)	18·6	54·2	24·9	2·3
5. B. Steel, not recarbonized, rising, second sample	18·1	52·9	26·8	2·2
6. O. H. Steel, not recarbonized, rising, first sample	48·0	35·1	15·4	1·5
7. O. H. Steel, not recarbonized rising, second sample.	46·1	43·6	6·9	3·4

With the exception of No. 3, the gas of which approaches in composition that from basic steel, there does not appear to be any strongly-marked difference in the gas issuing from solid or from rising steel. It seems to be more a question of quantity, a point which Dr. MÜLLER promises to investigate. The analyses of steel cast previous to recarbonization naturally show a lower percentage of carbonic oxide, which, in open-hearth metal, is much higher, probably because the slow process of combustion of the carbon gives the steel a better opportunity to saturate with that gas; while, on the other hand, the cover of cinder on the bath prevents it from absorbing any great quantity of nitrogen and hydrogen.

Dr. MÜLLER'S most interesting results are those obtained with basic steel, where the gaseous products play a peculiar part. While the steel is comparatively quiet in the converter after the addition of spiegel, and ferro-manganese causes the formation of but little carbonic oxide, the escape of gas in the ladle is very violent. After it has been completely quieted in the ladle, it begins to agitate and scintillate in the ingot, and large quantities of gas escape from it until it is chilled. In spite of these phenomena, the tendency to rise is slight, and the most violently agitated steel generally yields pretty solid ingots. Mild basic steel, carrying from 0·05 to 0·10 carbon, 0·05 to 0·10 phosphorus, 0·45 to 0·55 manganese, and a trace of silicon, made by deoxidizing and recarbonizing with two per cent of 95 per cent ferro-manganese, yielded steel from which gas analyzed under Nos. 1 to 5 was obtained. Harder steel, 0·25 carbon, made with 8 per cent of spiegel, yielded No. 6, and a rail steel made with 10 per cent of spiegel gave two samples of gas taken from the fourth and the last ingot, nine minutes later.

ANALYSES OF GAS FROM BASIC STEEL.

	Carbonic oxide.	Hydrogen.	Nitrogen.	Carbonic acid.
1. Mild basic steel	61·3	2·3	36·4	0·0
2. " " "	57·5	4·7	38·0	0·0
3. " " "	76·6	6·1	17·3	0·0
4. " " "	50·9	5·1	43·3	0·3
5. " " "	77·3	6·4	16·0	0·4
6. Rail steel, 0·25 carbon	68·0	16·2	11·0	4·8
7. Rail steel, first sample	56·5	33·0	8·6	1·9
8. " " second sample.	62·0	34·2	1·0	2·8
9. Mild steel, first sample	77·9	5·7	14·7	1·7
10. " " last sample	62·6	12·6	23·2	1·6
11. Rail steel, first sample	81·7	8·2	9·5	0·6
12. " " last sample	54·1	38·6	3·5	3·8

As the escape of gas is particularly violent so long as the steel in the ingot is fluid, and decreases as it solidifies, Dr. MÜLLER took a sample after casting and when the ingot was setting, the results being given in Nos. 9 and 10 and 11 and 12. These analyses show that the frothing of the basic steel at first is due almost entirely to carbonic oxide, and that during the actual process of solidification the same gases escape as are taken from an ordinary Bessemer ingot. Particular interest, therefore, attaches to the examination of metal not recarbonized, whose contents of gas seem to vary considerably. The metal is often quiet and yields pretty solid ingots, and at other times it scintillates and rises considerably. Dr. MÜLLER believes that, if it is not too much over-blown, and if there is still 0·15 phosphorus in the bath, the metal without final additions yields a quiet ingot. No. 1 in the following table is a quiet steel, Nos. 2 and 3 two successive samples of a metal richer in gas:

GAS FROM BASIC METAL NOT RECARBONIZED.

	Carbonic oxide.	Hydrogen.	Nitrogen.	Carbonic acid.
1. Basic steel, quiet	8·8	71·9	18·1	2·0
2. Basic steel, rising, first sample	27·3	43·5	26·2	3·0
3. Basic steel, rising, second sample	35·0	38·4	22·5	4·1

It would appear, therefore, that, previous to the final addition, the gas in the metal does not differ materially from that in the unfinished steel of the acid converter.

In view of the importance of the Terre Noire method of making solid castings, which has been introduced in this country, the action of additions of silicide upon basic steel are of special interest. Two cases have already been referred to. An addition of five per cent of melted silicide and two and a half per cent of melted ferro-manganese produced steel that was quiet, but showed a tendency to rise. It was unfit for use, being cold-short. Analysis showed that the percentage of phosphorus had risen from 0·106 to 0·515, while silicon was only 0·011. The addition, it is true, quieted the steel, but the reduction of phosphorus was too great. In order to limit the latter, another charge was worked by adding 5 per cent of silicide and 2 per cent of 70 per cent ferro-manganese, simply preheated to a red heat, to the metal when in the ladle. Analysis showed the following:

	Carbon.	Silicon.	Manganese.	Phosphorus.
Before addition	0·002	0·002	0·083	0·078
After addition	0·115	0·162	0·944	0·097
Computed composition	0·140	0·530	1·250	....

The reduction of phosphorus was small only and the steel was quiet, but it rose and yielded unsound ingots. The gas escaping from the ingots in the two experiments had the following composition:

GAS FROM BASIC STEEL TREATED WITH SILICIDE.

	Carbonic oxide.	Hydrogen.	Nitrogen.	Carbonic acid.
1. Silicide added in converter, first sample	64·6	18·9	14·4	2·1
2. Silicide added in converter, second sample.	44·1	41·6	10·6	3·7
3. Silicide added in ladle, first sample	34·7	58·0	4·1	3·2
4. Silicide added in ladle, second sample	30·8	65·8	1·9	1·5

The experiments with silicide, while they certainly show the quieting effect of additions of silicon, do not prove that it leads to the making of solid metal.

Dr. MÜLLER concludes, from his analyses of the gas escaping from chilling steel of various grades and in different stages of manufacture, that the rising of steel is due to the escape of alloyed hydrogen, while the frothing and scintillating are the result of the escape of absorbed carbonic oxide gas chiefly. Basic metal previous to deoxidation and recarbonization contains chiefly hydrogen and nitrogen and little carbonic oxide, so tha

the metal when cast is quiet. As soon as spiegeleisen or ferro-manganese is added, carbonic oxide is formed in great quantity, the steel is saturated with the gas, which escapes partially in the ladle and partially while the steel is solidifying in the ingot. Other kinds of steel show a much larger proportion of hydrogen; but it might be thought, because the gas mixture escaping during solidification holds on an average about 30 per cent of carbonic oxide, that after solidification the contents of the blow-holes should show a similarly heavy percentage. Now, Dr. MÜLLER'S drillings have shown that, on the contrary, the gas in the blow-holes contains but little carbonic oxide, being a mixture of hydrogen and nitrogen. There is much force, therefore, in his conclusion that alloyed hydrogen escaping in the very act of solidification, in a manner similar to the crystallization of graphite in pig-iron, is the principal cause of the most dangerous form of porosity in steel, while carbonic oxide, which is expelled much more readily, is to be dreaded much less.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Black Hills of Dakota.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: It is not a light undertaking to reach this land of gold and now of tin as well as other metals. The traveler must accept the discomforts of a stage ride of two days and two nights; for there is no railroad on the east nearer than Pierre, on the Missouri River, and on the south than Sidney, on the Union Pacific road. The first is 160 miles distant, and the second 250 miles; yet the residents of the Hills generally prefer the longer route by Sidney, as there is less discomfort from freight inside as well as outside the stages.

From Sidney, the route is directly north, crossing in succession the east and west valleys of the North or main Platte, the Niobrara, the White River, and the South Fork of the Cheyenne. The "Plains" between these valleys have a gently rolling surface, stretching away on all sides as far as the eye can reach, an unbroken field of green grass, waving in the wind, and tempting the scythe of the mower. The gama-grass is unusually green and fresh this season; for the rains have been frequent, and it has not been eaten down. There are no herds of buffalo as formerly, nor even of stock cattle; for at this time of the year, the cattle are chiefly along the bottom or valley lands. Now and then, a few frightened antelope may be seen fleeing across the hills, as the stage rolls along.

EROSION OF PLATTE VALLEY.

When the road reaches the margin of the Platte Valley, there is a sudden change of scene. The broad stretches of prairie are broken by ravines leading into the valley, which is here clearly seen to be cut out of the general level or slope of the plains. It is well marked by the line of bluffs on each side; the edges of the horizontal beds of rock projecting in white cliffs among the growth of stunted pines. Standing on the edge of this bluff formation, the valley lies some six hundred feet below, and is nearly twenty miles wide. The opposite side is seen to be similarly walled in by bluffs, and when in the valley it seems to be bordered by mountains. The river flows here in a broad gravelly bed, and though fordable by stock cattle when not swollen by floods, it is crossed by a bridge a mile in length, the approach to which on the north end is guarded by a block-house fort on an island.

The geologist can not cross this broad valley cut out of the plain without being impressed by the enormous amount of material which has been removed from the general slope of the plains by this river, and similarly by the other streams flowing from the Rocky Mountains. The miner, accustomed to make calculations of tons of ore in a given length of vein, is tempted here to calculate the weight of material moved into the Missouri and onward to the gulf; but here he must deal with cubic miles instead of feet or tons. The transfer of such an enormous amount of material is a factor not to be lost sight of in terrestrial dynamics.

The road crosses also the upper portion of the Bad Lands, where the phenomena of erosion are well shown, and where the beds of clay have yielded up some of the most interesting fossils known.

The first view of the Hills is not particularly impressive as respects hight. The ridges are long, low, and dark, owing to the pine forests which cover them; but the central ridge has an irregular, serrated outline, and portions of it are quite bare and gray. This is the Harney range, the backbone of the Hills. It is essentially granite, and it is flanked on each side by mica schists, which are in turn overlain by stratified formations, from the Potsdam sandstone up. All these have been well described in the report by Messrs. Newton and Jenney. The crystalline rocks now, however, become more than ever before interesting and important, inasmuch as

TIN ORE

has recently been found in them, and in such quantities as to justify mining it. About the first of June last, Capt. A. J. Simmons, of Rapid City, received from some miners who were prospecting for mica masses of very heavy brown ore. Samples were sent to Mr. Gashwiler, in San Francisco, and submitted to Prof. W. P. Blake, who determined the ore to be cassiterite or tin oxide of good quality. A ton or two of specimens have been taken out. Assays by Price and by Mollitor and others show a percentage of from 35 to 60 of metallic tin. The locality has been examined recently by Mr. Blake, who finds the ore not only in massive bunches in a coarse granite vein, but disseminated in grains through a peculiar micaceous rock, and in a condition to be easily separated from the rock by crushing and washing. Considerable stream-tin has also been found, and the prospect is, that a very considerable amount of tin will soon be produced in this region. The Hills have several advantages for tin mining. There is an abundance of water for concentrating-works and a profusion of wood for charcoal to use in smelting. As soon as the right of way is obtained from the Indians, two or more railroads will connect the Hills with the railroad system of the Missouri Valley, and thus give cheap transportation and other advantages.

GLÜCK AUF.

DEADWOOD, DAKOTA, July 30.

LAKE COPPER INTERESTS.

Special Correspondence of the Engineering and Mining Journal.

To the copper country your correspondent turned his steps a few days since, for a brief but pleasant pilgrimage. He found that the Huron had stopped hauling its rock across Portage Lake to the Pewabic stamps, and was now using its own mills, the economical but substantial construction of which reflects great credit on the mining superintendent, Mr. Johnson Vivian, who is now able to stamp rock as cheaply as any of his neighbors. In common with the Peninsula and Allouez, the Huron has now a bountiful supply of water for milling purposes, and, with its very complete equipment, has at last got a fair chance to demonstrate what it can do. The mine has not, in time past, made much headway in its cupriferous returns. It has worked nearly as many men as the Pewabic, while its mineral product has frequently been only about one third as great as that of its quondam benefactor. Its output for July was not far from twenty tons. Now that the Pewabic is free from its contracts to stamp the Huron ground, it will put in both shifts (two of its Ball heads instead of three, however) on rock hoisted from its own shaft. And this is quite opportune; for, while it must be acknowledged that the monthly average for the first half of 1883 is below the last half of 1882, yet it now looks as if the famous lean stretch is being left behind the present bottom levels, and that the mill will yet be needed at full capacity to deal with the profitable rock of the future. The Pewabic lowers its June record by about four tons in July, making an exhibit for the latter month of 64¼ tons. The Pewabic has also been retarded by the necessity of using its skip for unwatering the mine; but adequate pumping facilities are now put in, and the skip will henceforth be devoted to its legitimate business. The bears may take another bite at this property when the next assessment is called in; but if the present outlook of the mine is not deceiving, and if copper hardens any under the pressure of London speculation, an ultimate and satisfactory rise in Pewabic may safely be taken as a foregone conclusion.

This leads to the remark that the future of copper is still problematical, despite the very satisfactory movement of mineral across the water, and is likely to remain so for some little time. The two or three London gentlemen who have heretofore manipulated the market in tin, and autocratically determined its price in both hemispheres, will find it dangerous to attempt a corner in copper, particularly when our Western mines are sending their products out with so much energy to foreign markets. I notice that the London *Iron Monger*, in a recent and careful estimate concerning the total American supply for 1883, corroborates in all its details the figures arrived at in my independent calculation made in May, and published in the ENGINEERING AND MINING JOURNAL of June 2d. For the sake of accuracy, it ought to be said that both the *Iron Monger* and your correspondent were a little high on the amount left over from 1882, as I now know indirectly from the Eastern syndicate which holds the exact figures of the matter in hand, and which figures are secret. This simply gives lee-room for confidence in my estimate of 72,000,000 pounds as the consumption of 1883, but in no respect lessens the quality of the deductions of my ancient letter. It is not altogether ungratifying that the present outlook should fulfill, in such minute details, the position at which your correspondent arrived in the early months of the calendar year. After a careful study of the facts as they were presented in my letter of June 2d, the total American production for 1883 was placed at 147,000,000 pounds. From a very careful computation, "Refiner," in his letter of August 11th, states that the total product will be 145,000,000 pounds. But this is on a basis of 55,000,000 as the output of the lake mines. This, I am convinced, is wrong. "Refiner" bases his calculations on the reports of the leading mines for June only, while, for the first six months—more, the first seven months—the output of each one of the five largest reporting mines, together with the Osceola, which has not reported, has presented an increase which in the aggregate amounts to not less than 800,000 pounds, at which rate (and it will not fall below it, since the Calumet & Hecla is somewhat handicapped by changing its plant of stamps and Leavitt patterns), it will certainly not fall below 1,500,000 pounds increase for the twelve months of this year. The Pewabic, Grand Portage, and Conglomerate have fallen off a trifle (the last having suspended milling operations until the completion of the new stamps at Lac la Belle); but the Copper Falls, Huron, and Central have, as a whole, gained in higher ratio, while the Peninsula and Wolverine have already sent out 1,000,000 pounds, and in future operations will raise their own record by a very comforting trifle.

The figures already advanced will raise "Refiner's" figures to my own, and thenceforth our reasoning is parallel. Your correspondent now puts the output of Lake Superior at 59,500,000 pounds, though it may fall short by half a million—certainly not more. After all is told, it is safe to say that, after the home demand is supplied, there will be 75,000,000 pounds yet waiting, which your correspondent said must be carried over as the crushing incubus on the trade of 1884, or have the gates lifted which open into foreign seas. This latter has been done; 30,000,000 pounds have already found a market there, and, if prices stay up, 10,000,000 more, says "Refiner," must go. This is all your correspondent ever set out to prove; and in their essential points, at least, the figures of June 2d may, he modestly thinks, be taken as foregone conclusions. If, therefore, the London syndicate can corner the market, or is even able to dictate prices to any extent, the price of several lake mines will vault into higher planes, and the land of dividends, which now seemeth afar off, will suddenly draw nigh. The uncertainty lies in our exports, and a Damocles sword may cut that escape off, if the syndicate, failing to be sanguine of accomplishing its purposes (when the possibilities of the Montana and

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Arizona mines are taken into account, to say nothing of the Spanish mines, which have exhaustless reserves already opened), should once begin to unload on the market. This brings us back from our interpolated meandering to the Pewabic.

From what data are just now accessible, the price of stock in reputable iron mines has suffered little collapse on account of the glut in iron, and it is passing strange that such a calamity should overtake the Pewabic, which once sold for over fifty dollars, and which now has every appearance of sinking into rich areas. However, the small number of shares that have changed hands among Portage people shows that the stockholders here intend to stand by the mine, and the entire sentiment of the best miners, as far as your correspondent could get at it, is, that a revival warranted by the facts will set in in Pewabic in the not distant future. But this, of course, is provisional, and, like all other prophecies where bulls and bears gore and hug, must not be taken for more than it is worth. The Franklin is truly looking well underground, is increasingly regular in its productiveness, and is remarkably cheap at present rulings. The record for the first six months shows a marked advance over the splendid returns of 1882, and over 350,000 pounds over the first six months of 1881. The Grand Portage is not trying to do very much, and is succeeding very well in its undertaking. Another of the smaller mines is straining at a gnat hard enough to swallow a camel; but these efforts only facilitate the disease which threatens to carry off the patient, provided, of course, no stimulant in the way of an assessment is handed in by those interested in the survival of the concern. The Quincy is clearing the way for a new boiler-house at the mill. It lately completed a new dock, which forms an excellent bulkhead against the discharge of its sand into the lake, and which is a material advantage to the shipping facilities of the harbor.

Let me observe, *en passant*, that the sand deposited as "tailings" from the stamp-mills is a matter which may well receive attention from the next Congress, since Portage Lake is a national highway, and the encroachments of the tailings, particularly from the Franklin mills, have pushed their way nearly if not quite half-way across the lake. There is no immediate danger to navigation, and proper caution will obviate any danger for the next generation. The report of Messrs. Schermerhorn and Roberts, of the Engineer Corps of the United States, estimates the amount of sand discharged into Portage Lake as being in excess of 3,500,000 cubic yards. This report shows that the "tailings" are a formidable matter, and ought to be regulated by a power superior to and independent of the mining corporations. A spirit of petty jealousy threatened to make the discharge of the Franklin stamps the entering-wedge of a serious controversy; but a quietus was administered an officious official, and the location of this bank as the site of a draw railroad bridge will remove from the Franklin the possible incubus of a serious litigation and obstruction. Next week, we shall start overland for the mines of Keweenaw, and by water for those of Ontonagon.

SPECULAR.

THE FRISBIE CLUTCH AND ITS USE IN HOISTING-ENGINES.

Clutches of various forms are gaining in favor, as applied to hoisting-engines, for a large variety of purposes. Among those which have of late been introduced in connection with mine hoisting is the clutch designed by Messrs. D. Frisbie & Co., of Philadelphia. The leading features of its construction may, in a general way, be best described by references to the cut-off coupling shown in Fig. 1, the modifications used for hoisting-engines embracing only such minor changes as are called for by the exigencies of each special case. On the driving-shaft on the right in our figure, is mounted a sleeve, the motion of which is, by the compound levers shown, transmitted to the bevel-headed bolts, held in position by an arm keyed to the shaft. If, through the pressure exerted by the position of the compound lever, the sides of the bolt-head are forced against the V groove, the other shaft is carried along. As the length of each bolt is adjustable by means of the nut, each single one can be adjusted to suit the load, while the power of the clutch is illustrated by the fact that a twenty-eight inch clutch, said to be the largest in use in this country, has been used to move 90 tons on the Harlem River drawbridge.

The application of the Frisbie clutch to hoisting-engines is shown by the sketch, Fig. 2, which is a horizontal section through a drum driven by belt, though, of course for longer distances wire rope is substituted. One end face of the drum carries the V groove, against which the bevel-heads of the bolts are pressed through the action of the levers, the projecting ends of which slide along the inclined surface of the cone when the latter is moved toward the drum by means of the simple lever shown. The drum of course moves freely when the clutch is off, and may be held in any position desired, by a brake. An end view of the machine is shown in Fig. 3, in which only one arm and bolt are drawn, to prove that the friction surface is large and can be easily adjusted. The Frisbie clutch is now applied on drums at Lake Superior copper mines and in Leadville mines.

THE SMELTING OF ARGENTIFEROUS LEAD IN THE FAR WEST.*

By O. H. Hahn.

Early Attempts.—Twenty years ago, the smelting of argentiferous lead ores was an unknown thing in the far West, under which collective name the States and territories west of the Mississippi River are generally known; and although there were persons to be found in the mining districts who were familiar with the methods of smelting current in European countries, the first attempts in this branch of the metallurgical industry were failures, because the appliances used and the grade of the ores to be treated were not adapted to the requirements of the localities of that vast yet sparsely settled stretch of country, then entirely devoid of cheap transportation facilities. Who would ever think nowadays of building a Flintshire or a Carinthian furnace, or a Scotch hearth, or a Mexican "chacuaco" in the wilds of Nevada or in the Rocky Mountains, to smelt lead ores? Yet such was the apparatus first resorted to in the beginning of our smelting industry, evidences of which may still be found in the ruins of Galena (Washoe County) and Washington districts, Nevada; in the Patagonia Mountains of Arizona; in Little Cottonwood and Rush Valley, Utah; Cerro Gordo, California; and other localities. It seems that the early smelters did not calculate the cost of their product, or imagined that they were operating on the sea-coast, where fuel, labor, and every thing else are cheapest.

The first smelting-works with an appearance of success sprang up near Helena, Montana, and at Oreana, Nevada, a station on the line of the Central Pacific Railroad, in 1866 or 1867. In both places, the ore treated had a sufficiently high silver tenor to leave a margin over and above the cost of working it and the expense of transportation of the silver, which is no small matter, if we consider that not only had the ores to be smelted, but the resulting bullion had to be calcined and cupelled on the spot to obtain the silver in salable shape. For the lead, or litharge rather, there was no market in those days, all wants being supplied more cheaply by the Missouri and European producers. The year 1869, when the two great Pacific railroads were united to form an uninterrupted line of communication between San Francisco and New York, the great commercial centers of the East and West, gave the signal for the beginning of smelting operations on a more extensive scale than heretofore, and for the gradual expulsion of foreign lead from our markets. Till then, mines producing "cooking ores," as lead ores were scornfully termed at that time, did not find ready purchasers, especially as those ores generally occurred in limestone formations, which were then considered as very unreliable ore producers. But the success of the firm of Buel & Bateman, who had bonded the mines now known under the name of the Eureka Consolidated, and who turned a perfect stream of rich bullion from two small furnaces on to Balbach's refinery at Newark, New Jersey, wrought a sudden change. Lead mines, good, bad, or indifferent—but "true fissure-veins" they must of necessity be—were at a premium, and smelting-works sprang up like wild-fire everywhere. The nucleus of excitement, however, centered about Salt Lake City, whose neighboring mountains were known, from the explorations of the Mormons and the soldiers of General Conner, to teem with lead ores. The comparative poverty of the ores in silver, their siliceous and frequently refractory character, the close competition in their purchase, the bad quality of the fuel and furnace lining, and a good many other things, sharpened the intelligence of the Salt Lake Valley smelters, more so than that of others; and it is to them that we owe the introduction of improvements which led to a more economic handling of the ores. Iron ore and limestone were here used intelligently as fluxing material for the first time; Connellsville coke superseded, at least partially, the miserable charcoal which was made from the light woods of Utah; water-jackets replaced the out-walls as well as the costly fire-brick lining of the furnaces; dust-chambers were erected to save the escaping finest particles of ore; and a number of very complete sampling-works were erected, which opened a liberal market to the miner and afforded the smelter an opportunity to select for purchase such ores as suited his wants. It is true, Eureka, Nevada, has been, so to speak, the cradle of the art of smelting in the West; to Arents we owe the introduction of the siphon tap, the construction of the first large and successful furnaces, and the reintroduction of the boshes in lead furnaces; but beyond these, Eureka does not offer any innovations in the smelting process itself. The same routine is observed there as of old. The principal reasons for this conservatism are, first, the docile character of the predominant ore (of Ruby Hill), which requires little or no flux to give economically satisfactory results; and, secondly, the fact that mines and smelters of the leading companies are managed by the same person, generally a miner or a business man who is reluctant on general principles to adopt improvements of a scientific nature.

Recent Progress.—In localities where mines and reduction-works are not united under one head, and where, on the contrary, the miner sells his product to the smelter who pays him the most money, there is no room for nursing prejudices. Business, art, and science have to go peaceably together; and it is owing to the co-operation of these three factors that we are progressing day by day in search for the most profitable methods in the art of smelting.

Silica Percentage of Slags.—It is taught in the mining schools that in smelting lead ores the object is to make a singulo-silicate slag, or one between this and a bisilicate, of the earthy matter in the ore, which best enables us to effect its separation from the metallic matter; it is also taught that simple singulo-silicates are not as easily fusible as compounds of two or more singulo-silicates; for instance, a compound of the singulo-silicate of ferrous oxide with that of calcic oxide. It was further known in practice for a long time that if, in fluxing an ore, the proportion of lime to oxide of iron is kept as one part of the former to two parts of the latter, a good slag would be the result; that is, one which will form with the least amount of fuel, keep the furnace open, and be free from lead and silver. But, with all this knowledge, more bad slags than good ones were made, till several thinkers were led to the right track by giving their attention to crystallized slags, which presumably are real chemical compounds, and therefore have a constant composition, while amorphous slags might be considered as mere mixtures of different silicates or solutions of one silicate in another. It was observed that some crystallized slags behaved better than others in the furnace. If such a slag, then, could be made at will, a great problem was solved; any kind of ore could be smelted without the least trouble by giving it the lacking constituents in the same ratio as they are found in the analyzed slag. This necessitates, of course, an accurate knowledge of the slag-constituting ingredients of ore, fluxes, and ash of the fuel, which can only be arrived at by chemical analysis and an accurate weighing of all the material into the furnace. Taking all these precautions, a slag of the same crystallization as the typical one will almost invariably result, other things being equal. I say "almost invariably," because oxide of zinc seems to prevent crystallization; at least, such was my experience in Colorado. The slag-forming matter of an ore which has to be most frequently dealt with in lead smelting consists of the following substances:

1. Silica.
2. Alumina.
3. The oxides of iron and manganese.
4. Lime and magnesia.

Baryta and strontia are of rarer occurrence, and the oxides of the alka-

* From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey, Department of Industrial Statistics. Albert Williams, Jr., Chief of Department.

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line metals exist only in such subordinate quantities that they may be neglected.

All the above-named substances are hardly ever found present in the same gangue, and much less arranged in such a proportion as to yield at once a suitable slag in smelting. By supplying the ore with the deficient ingredient, we *flux* it and form a "smelting mixture." According to the amount of combined silica present in a slag, we distinguish three degrees of acidity:

1. Subsilicates, in which the oxygen of the bases is to the oxygen of the acid as 2:1—

$$4RO+SiO_2=R_4SiO_6 \text{ ; or } R_2O_3+SiO_2=R_2SiO_5.$$

2. Singulo-silicates, in which the oxygen of the bases is to the oxygen of the acid as 1:1—

$$2RO+SiO_2=R_2SiO_4 \text{ ; or } 2R_2O_3+3SiO_2=R_4Si_3O_{12}.$$

3. Bisilicates, in which the oxygen of the bases is to the oxygen of the acid as 1:2—

$$RO+SiO_2=RSiO_3 \text{ ; or } R_2O_3+3SiO_2=R_2Si_3O_9.$$

Subsilicate Slags.—The subsilicates are not made at present, at least not intentionally, on account of their evil behavior; but they are mentioned because they may be used as a flux on account of their capability to saturate themselves with silica. The subsilicates of alumina and those of the oxides of the alkaline earth metals are infusible; but the subsilicate of iron is very easily fusible, and at a lower temperature than singulo-silicates. It has a high specific gravity, runs very thin, solidifies very rapidly, and has a bluish metallic luster and fine-grained texture. It forms accretions in the furnace hearth, causes the furnace to blaze, and entangles metallic particles. It also has a highly corrosive action on the masonry of the furnace.

Bisilicate Slags.—Bisilicates are not made in this country, to my knowledge, except unintentionally, as there are no furnaces of sufficient hight to make them without evil results. Those highly siliciferous slags, which Mr. A. F. Schneider describes in Vol. XXXIV., page 283, of the ENGINEERING AND MINING JOURNAL, are still singulo-silicates, because the combined oxygen of all their bases is to that of the silicic acid as 1:1. Bisilicates have a glassy flow and generally a black color, and do not *often* crystallize, as we glean from the latest metallurgical publication (Balling's *Compendium der Metallurgischen Chemie*). It appears from analyses quoted in metallurgical books that they always carry considerable oxide of lead, which is probably due to their faulty composition. A typical one of the form $6FeO,3SiO_2+4CaO,2SiO_2$, in which the percentage proportion of oxide of calcium is to protoxide of iron as 1:2, has been the most interesting slag to the lead smelter is the *singulo-silicate.*

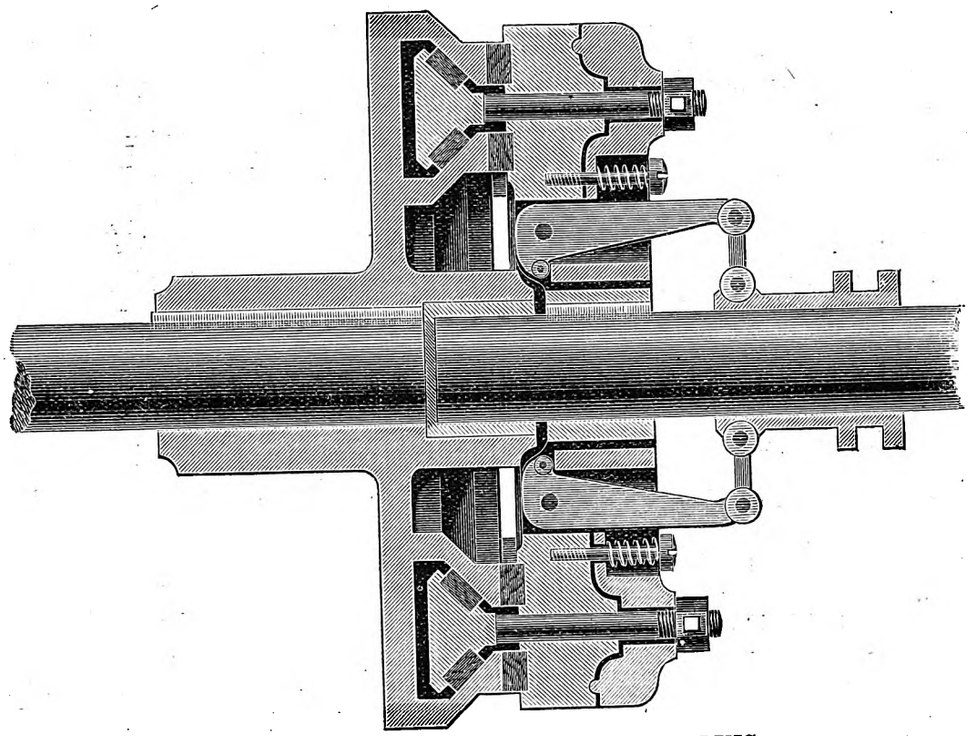
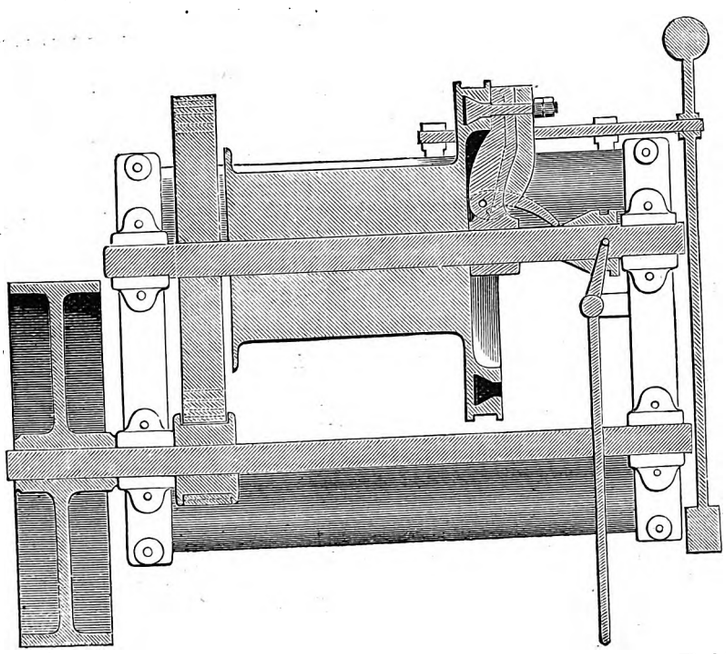
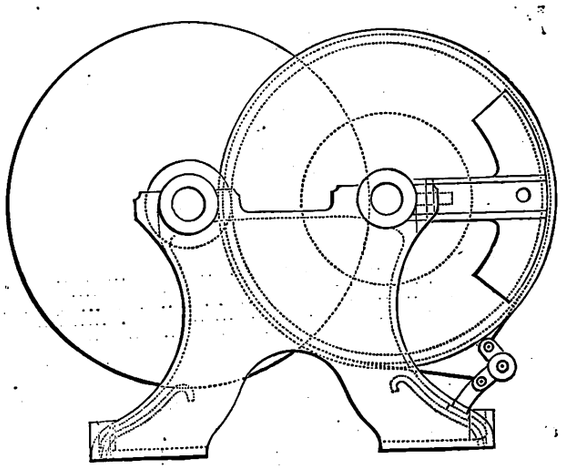


Fig. 1. THE FRISBIE CUT-OFF COUPLING.





Figs. 2 and 3. THE FRISBIE CLUTCH AS APPLIED TO A HOISTING-DRUM.

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long known, and has nevertheless not been often made, if we may judge by the analyses published in metallurgical papers, until Mr. A. Eilers, and probably a few other metallurgists, recognized its great virtues. This is a most magnificent slag; its physical appearance in the slag-pot is so marked that one who has once seen will never forget it. If the proper amount of fuel has been given to the charge, it will contain neither lead nor silver; and it is my opinion that if it ever is metalliferous it is through small globules of matte dissolved in it, which have not been separated on account of lack of heat in the furnace. Running on such a slag, a furnace can never get out of order except through gross carelessness. It is, however, the duty of the metallurgist to correct the slag if it shows imperfections; for instance, if it shows an excess of iron, a lack of silica, etc. An addition or a reduction of a few pounds of one flux or the other will show itself in the appearance of the new slag as soon as it gets down to the hearth. This explains why, in throwing the charge into the furnace by volume, and not by weight—the old "shovel system"—a typical slag (that is, one of a fixed composition) can not be obtained. Each pot of slag running out of the furnace will differ from the preceding one; and if the furnace becomes deranged, it may be impossible to perceive what caused the trouble. On breaking a cake or cone of slag as it comes out of the pot, after cooling, it will show cavities filled with large crystals. Unfortunately, they are never entirely developed, so that one can be able to determine to which crystallographic system they belong.

Various Slag Components.—Heretofore, we have assumed that a slag is only composed of silica, iron, and lime. An ore or a flux may, however, contain notable quantities of other substances which would play an important part in the formation of a slag, such as manganese, magnesia, etc. Experience has shown that manganese acts analogously to its related metal, iron; magnesia, baryta, and strontia to lime. In the case of alumina, we have to make the slag more acid by an amount of silica corresponding to the alumina, according to the formula of a singulo-silicate, namely, $2Al_2O_3.3SiO_2$; otherwise, we should obtain too basic a slag. It is obvious that a slag of the above composition, needing so much lime, would make the treatment of some kinds of ore, such as carry much ferruginous or manganous matter, very expensive, inasmuch as it reduces the percentage of ore in the smelting charge very considerably. This point occupied the attention of Mr. Eilers while treating the ferruginous ores of the Flagstaff mine in Utah; and after much labor and many sleepless nights, he succeeded in making a slag which very nearly corresponds to the formula,

$$6FeO,3SiO_2+2CaO,SiO_2,$$

and in which the proportion of calcic oxide is to ferrous oxide as 1 : 4. The physical appearance of this slag is still more striking than that of the first one; it is simply beautiful, and it crystallizes also, but in a different system. It has a black color, frequently with a rusty brown film, and a fibrous texture. It fills all the requirements of a good slag, metallurgically as well as commercially, but it is not quite as free from lead oxide and silver as the former. It keeps the furnace open (that is, free from hearth accretions), and is especially adapted for smelting ores containing a large percentage of zinc, this greatest enemy of the lead smelter. Oxide of zinc makes a slag difficult to fuse, and silicate of zinc is infusible; but both dissolve readily in an excess of the slag just described, while the more calcic slag becomes much less fluid. In other words, ferrous oxide increases the liquidity of zinciferous matter, while lime decreases it.

If the proportion of ferrous oxide is raised beyond the limits just given, but at the same time the degree of acidity corresponding to a singulo-silicate is maintained, the remarkable fact is observed that the slag becomes rich in lead oxide. In consequence of this, its physical appearance changes entirely. It shows a blueish hue and waxy luster in its fracture, runs like stearine, and forms hard accretions in the furnace-hearth. This slag was formerly made at some works in Leadville, at which the necessity of using lime in their smelting mixtures was decried, and thus a great waste in lead and silver resulted.

The lack of iron in the Utah ores, and the great cost of iron flux as compared with limestone, induced prominent Utah smelters to search for a type of slag in which the proportion between lime and protoxide of iron is greater than one of the former to two of the latter, and they seem to have succeeded very well. I have seen a sample from the Horn-Silver works which had a color like stove polish, a greasy luster, and well-formed crystals in its cavities. Schneider gives its percentage composition as follows:

SiO_2	35
FeO	25
CaO	26
Al_2O_3	10
Not determined	4
	100

This would respond to the formula,

$$6FeO,3SiO_2+8CaO,4SiO_2+2Al_2O_3,3SiO_2.$$

As will be observed, there is a large amount of alumina in this slag; and it might, therefore, be questioned whether such a slag could be made if alumina were lacking.

Estimation of Slags.—In the early stage of smelting at Leadville, great difficulties were encountered at most of the works in making a good slag, and the "muscular" method had to be frequently resorted to in freeing the furnaces from sows. This evil was in great part due to disregarding the alumina contained in the ore; and also to the manganese, which was not regularly determined on account of the tedious methods then in use. The result of this oversight was a very basic slag, which would naturally close up the furnaces. Mr. T. Macfarlane, in a paper read before the American Institute of Mining Engineers, suggested that, by determining the specific gravity of a slag, a clue might be obtained for improving it if not correct. If the specific gravity were higher than that of the typical slag, this would prove an excess of the bases of the heavy metals in the faulty one. But whether it required an addition of silica, or of lime, or of both, the determination of the specific gravity could not tell us. In the case of a slag which is far out of the way, correct chemical analysis alone, however tardy it may be, can give us information. Since the introduction of more rapid volumetric methods for the determination of manganese (for example, Guyard's), and the estimation of the alumina in slag computations, all troubles of this nature have ceased.

A fact to which Dr. Iles, of the Grant Smelting-Works, now at Denver, first called attention, and which it appears might be turned to account in correcting a slag, is the behavior of its powder under the magnet. Some slags are highly magnetic, while others are not. Would this not indicate that magnetic oxide is dissolved in the slag, which has escaped reduction to ferrous oxide, and thus causes a waste of precious flux?

Elimination of Sulphur, Arsenic, Antimony, etc.—The subject of slags has been dwelt upon at some length, because the metallurgical success of smelting depends in a great measure upon their composition, and it may be said *altogether* in the case of cerussite ores. But as soon as sulphur, arsenic, antimony, and other electro-negative elements enter into the composition of an ore, this alters the case; we have to eliminate them in some other manner before we can extract the pure lead without difficulty. There are two ways of doing this:

1. By precipitation by means of metallic iron.
2. By roasting the ore.

Precipitation by Iron.—The iron-precipitation process is only applicable to galena ores and lead ores contaminated with small quantities of the sulphides, arsenides, and antimonides of other metals, to which should be added all sulphates, arseniates, and antimoniates, as they are reduced in the furnace to sulphides, arsenides, etc.

This process is based upon the fact that iron has a greater affinity for the electro-negative elements than lead and silver. If, therefore, iron is brought in contact with molten sulphide of lead or silver, it will, as soon as it has acquired the proper temperature, combine with the sulphur, while lead and silver are set free as reguline metals. The affinity of silver to sulphur is, however, stronger than that of lead, which is the reason why some sulphide of silver is undecomposed, remaining with the sulphide of iron.

The compound of iron and sulphur is metallurgically called a *matte*, while that of iron and arsenic or antimony is termed *speiss*. The latter has a higher specific gravity than the former, which is the reason why, if both are produced during a smelting operation, the matte floats on top of the speiss. The mattes retain more silver than the speisses, while with gold the case is exactly the reverse. Lead enters the speiss only in the metallic state in the form of shots, while in matte it will be present as sulphide. Copper enters into either as sulphide and arsenide respectively, as it has a strong affinity for both sulphur and arsenic.

The iron may be present in a matte either as diferrous sulphide (Fe_2S) or as ferrous sulphide (FeS), but never as ferric disulphide (FeS_2), because the latter, on being exposed to a strong heat, is decomposed into magnetic sulphide and free sulphur. The former does not fuse well; it is mushy and liable to chill in the furnace, thus forming an accretion. It is therefore well to aim at making ferrous sulphide (FeS) in computing a charge. If copper be present in a lead ore, it will go into the matte as cuprous sulphide (Cu_2S). On the strong affinity of copper for sulphur is based its separation from lead. Iron and other heavy metals combine with arsenic in a great many proportions, according to the statements of metallurgical authors, who speak of

$$R_2As,R_3As,R_4As,R_5As, \ldots\ldots R_nAs.$$

Yet experience has taught the practical smelter that only crystalline speisses of a bloomy texture, similar to that of spiegeleisen, from R_5As toward R_nAs, will work well in the blast-furnace. Speisses from R_4As on toward R_2As run very thick, if at all, and form hard accretions (speiss sows) in the furnace. They are fine-grained, and always contain entangled metallic lead. An addition of metallic iron will therefore improve the liquidity of a speiss. How far we can go in augmenting the proportion of iron to arsenic, I am unable to state from my own experience; yet it may be surmised that an excess of iron in a speiss may be just as injurious to the operation of a furnace as an excess of arsenic.

Purely antimonial speisses have never come under my observation, so I can not say any thing about them.

Form in which Iron is used.—As it is not easy to obtain metallic iron in every locality, and as it is generally not in a proper shape for being weighed out and mixed accurately with ore and fluxes, it is preferable to supply the iron as a desulphurizer in its nascent state, in which it can be obtained by using a properly constructed furnace and making a slag of sufficient acidity, at the same time adding so much ferruginous matter to the smelting mixture as will correspond to the amount of metallic iron required for the saturation of sulphur, arsenic, etc. Furnaces with straight walls from top to bottom are poor reducers, while those provided with boshes operate very well indeed. Basic slags are not good reducers either, because they form at a temperature at which iron is not reduced; they will therefore merely mechanically dissolve the magnetic oxide which forms out of the additional ferruginous matter in the upper part of the furnace.

From the preceding remarks, it may be inferred that this process is not a perfect one, because it gives rise to the formation of intermediate or by-products which contain gold, silver, and lead. If thrown away, these metals will be lost entirely. If we wish to extract them, additional processes will have to be resorted to, and then the question arises, Will it pay? It is therefore advisable to subject only such ores to the iron-precipitation process as contain a minimum of sulphur, etc. What the maximum should be, can be determined by the local price of the iron flux compared with the cost of roasting.

The Roasting Process.—By roasting an ore, we wish to expel its sulphur, arsenic, or antimony, and convert the metals in it into oxides, in which form they are best adapted either to be carried into the slag or into the metallic state during the subsequent smelting. The roasting is carried out by exposing the ore to the action of heat and air, in consequence of which sulphur, arsenic, and antimony are volatilized as sulphurous, arsenious, and antimonious anhydrides, respectively, while the metals remain in the oxidized state. According to the apparatus in which the operation is performed, the result will be more or less complete. The roasting of arsenical and antimonial ores is rendered more difficult by the simultaneous formation of arsenic and antimonic acid, which combine with the metals to form arseniates and antimoniates. These compounds can only be decomposed by repeated additions of carbon and access of air, whereby the arsenic and antimonic acid are reduced to their arsenious and antimonious anhydrides and thus gradually volatilized.

Ores containing sulphide of zinc (zinc-blende, sphalerite) are also difficult to desulphurize by roasting, inasmuch as zincic sulphate is always

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forming, which is only completely decomposed in a white heat. Mr. Stetefeldt found that sulphate of zinc is the most constant compound in the fire next to sulphate of manganese. While during the first two hours of roasting nearly all the sulphate of iron had been decomposed, there was still a large percentage of zincic sulphate undecomposed at the ninth hour. This behavior of zinc makes zinciferous ores difficult to work. In the blast-furnace, any sulphate of zinc remaining undecomposed after roasting will be reduced again to sulphide. This substance goes partially into the matte, if any is forming, partially into the slag, which it makes thick and stiff; it also carries silver along, and thus gives rise to losses above and beyond those inherent in all metallurgical processes.

Roasting-Furnaces.—With regard to the apparatus used for roasting, preference is given in this country to reverberatories, ranging from 30 to 40 feet in length and from 10 to 12 feet span, divided into four or five hearths. This arrangement admits of keeping four or five charges in the furnace, in as many different stages of treatment. As soon as one charge is drawn, all the preceding ones are moved forward one by one, and a fresh charge is put in. The time of roasting varies with the amount of sulphur in the ore, the bulk of the charge, the quality of the fuel, and also with the altitude of the locality above the sea-level. The size of the ore has a great influence upon the completeness of the desulphurization, and the more zinc-blende there is in it the finer it should be. At Robinson, Colorado, for instance, the ores could not be crushed finer than walnut size; and although a charge of 1300 pounds remained in the furnace for thirty-six hours, there was still from 7 to 8 per cent of sulphur left in the ore. The ore being highly zinciferous (21 per cent ZnS), the slag resulting from smelting contained considerable silver. From Przibram, Bohemia, it is reported that blende ores have been roasted down to one per cent sulphur.

If copper is present in an ore, there should be sufficient sulphur left in the charge to get rid of it as matte; otherwise, it will deteriorate the quality of the lead or be lost in the slag. Galena ores almost free from other sulphides roast better in a short furnace than in a long one, especially if the fuel does not yield a long flame.

For subsequent smelting, it is more convenient to have the ore in lump shape than in powder. Wherever, therefore, it is practicable, as in the case of ores with a large percentage of lead, to slag the ore, in other words, to convert it into silicates, it should be done. This slag should be drawn, and after cooling broken up into lumps of suitable size. As zinciferous and ferruginous ores can not be slagged very easily, it will be sufficient to sinter or "agglomerate" them.

Wood is used as fuel in places where its abundance makes it cheaper than stone coal, and it is preferable when it is of a resinous character. Mineral coal is, however, preferable to oak, mahogany, mesquite, or the lighter woods.

Matte Roasting.—In the foregoing outline, it has been observed that, whenever there is any sulphur in a smelting mixture, it has to be saturated with the necessary quantity of iron to form a matte of the right composition. To extract the lead and silver which these mattes retain, it is necessary to roast or calcine, and afterward flux and smelt them exactly in the same manner as an ore. If they are so poor in lead that there is danger of its being kept entangled in the slag and thus lost, it is advisable to add plumbiferous ores or products in sufficient quantity to effect a complete separation of lead and slag in the furnace. A charge containing 10 per cent of lead will be safe to answer this purpose, yet it is possible to obtain the same result with as little as 6 per cent. The question now arises, Will it pay to roast matte in a reverberatory, as it costs something to reduce it to powder besides the roasting itself? If the matte is rich in silver, it does; if not, then it requires close figuring of all expenses. I have known localities where poor matte was roasted in heaps. The only preparations it needed were coarse crushing, a bedding of wood to pile it on, and setting it on fire. The crushing is easy enough after it has been exposed for a while to atmospheric influences, which cause it to crumble. But the calcination is extremely tedious, as it will burn for a month or more, and then the whole pile will have to be turned over to assort the well-calcined stuff from the half-calcined and crude matte, from which a new pile or heap has to be formed. These manipulations have to be repeated till no more crude matte is left, and it will take months before that result is achieved. However well this matte may be roasted in heaps, it will always contain from 7 to 8 per cent of sulphur, which in the following smelting operation will cause another matte to be formed. It appears to me that this mode of roasting is not worthy of imitation in a progressive country where time is an object, and I find that most smelters take the same view. They are simply laying aside the poor mattes for a time when these may be reduced more cheaply and quickly than at present.

Attempts to roast ore in this manner have been frequently made, but just as often discarded as tedious and imperfect. An ore which does not bear the expenses of roasting in a reverberatory furnace should be left alone.

During the past year, experiments have been made at the Germania works, near Salt Lake City, to calcine mattes in an Unterharz kiln, but with what result I am not informed.

(TO BE CONTINUED.)

PUBLIC LAND SALE.—The Commissioner of the General Land-Office has been informed that the Register of the Land-Office of the St. Cloud District, Minnesota, began, August 20th, the sale of 2,000,000 acres of public land at auction. The price realized was $3.35 per acre.

An exchange says: Twenty-one miles of new road are to be constructed on the Seattle & Tacoma, and the work is well under way. From Tacoma to Seattle by this route, the distance is forty-one miles. The Puyallup extension from Tacoma, commonly known as "the coal road," will be used for ten miles, and ten miles of the coal road from Seattle to Black River will also be utilized; so that the total length of new road (from track to track of old roads) will be as above stated. Much trestle-work is required on this line—four or five miles in all—besides bridges across Black, White, Stuck, and Puyallup rivers. The Black River bridge will be a single span of 160 feet; that over White River, a single span of 180 feet; and those over the Stuck and Puyallup, respectively 160 and 320 feet. It is confidently expected that the road will be finished before the first of September.

THE DIVINING-ROD.*

By Rossiter W. Raymond, Ph.D., New York City.

(*Concluded from page* 81.)

Numerous hydroscopes soon appeared in Italy, and a vigorous discussion of the subject followed. One of the latest celebrated experts of this class was Campetti, who was called to Munich in 1806 for scientific examination. One of the writers of this period, the Abbé Amoretti, himself a member of a family containing many hydroscopes, makes the significant assertion that the sensation experienced by the holder of the divining-rod is one of heat or cold. But the name of Amoretti recalls the fact that he was one of those who revived and continued the discussion of "the magic pendulum."

The earliest mention of this apparatus, according to M. Chevreul, is found in the work of Ammianus Marcellinus, the last of the Latin historians, who died A.D. 390. In an obscure passage (lib. xxix., cap. 1), giving the confession of one of the conspirators against the Emperor of the East, this author describes, in the words of the conspirator, the ceremonies adopted by the band to discover the name of the emperor's predestined successor. Among these was the use of a ring suspended by a fine thread over a disk, around the edge of which, at equal intervals, were the letters of the alphabet. The ring in its oscillations pointed out successively the letters T, H, E, O: whereupon, without further continuing the inquiry, all perceived that Theodorus was the one designated by destiny.

Father Schott mentions the pendulum in his *Physica Curiosa* (1662), already alluded to in this paper.

In the latter part of the eighteenth century, and at the beginning of the nineteenth, several scientific men were attracted to this phenomenon. Albert Fortis (*Mémoires pour servir à l'Histoire naturelle et principalement à l'Oryctographie de l'Italie et des Pays adjacents*, 1802), Prof. Gerboin of Strasburg (*Recherches experimentales sur un nouveau Mode de l'Action électrique*, 1808), and Prof. Ritter, of Munich (see his report in the Tübingen *Morgenblatt für gebildete Stände*, No. 26, January 30th, 1807), were among the number, as well as the Abbé Charles Amoretti, librarian at Milan, to whom I have already alluded. As this mention of the pendulum is in the nature of a digression, although (as will appear) not without pertinence to my main argument, I content myself with an abstract from Ritter's article. He says:

"Take a cube of pyrites, native sulphur or any metal. Size and form are indifferent. We may use, for instance, a gold ring. This body is attached to a piece of thread, a quarter to half an ell long. This is held pinched between two fingers and suspended vertically, all mechanical movement being hindered. It is best to wet the thread slightly. In this condition, the pendulum is held over or close to a vessel full of water, or over any metal, as a piece of money or a plaque of zinc or copper. The pendulum insensibly assumes elliptical oscillations, which form themselves into a circle, becoming more and more regular. On the north pole of the magnet, the movement is from left to right; over the south pole, from right to left; over copper or silver, as in the former instance; over zinc or water, as in the latter. . . . Over an orange or an apple, on the side of the stem, the move is the same as over a south pole; on the opposite side, as over the north pole. The same difference in polarity is shown by the two ends of a fresh egg. It shows itself still more strikingly in the different parts of the human body, the head acting upon the pendulum like zinc; the sole of the foot, like copper; forehead and eyes, north pole; nose and mouth, south pole; chin, like the forehead; and so on, with all parts. The palm and the back of the hand act in opposite senses. The pendulum will move over every point of the finger, and even over the fourth or ring-finger, but, in that case, in an opposite direction. The finger has also the faculty of arresting or diverting the movement of the pendulum. It needs merely to be placed alone upon the table used in the experiment."

So much for the outline of Ritter's statement. He was at this time occupied with Campetti, above mentioned, and naturally he brought together in his thoughts the divining-rod of Campetti with the pendulum of Fortis (Fortis had experimented with it, and it was often called by his name, in consequence; but his death in 1803 deprived Ritter of his advice and aid in further tests).

Campetti was a young peasant from the borders of the *Lago di Garda*, who had seen the performances of Pennet, Dr. Thouvenel's last *protégé*, and had found himself possessed of similar powers. Not only Ritter, but Schelling and Franz Baader examined him. The opinion expressed by Ritter was, that the divining-rod is simply a double pendulum, requiring, to set it in motion, a force greater than those which move the pendulum. Ritter wrote this after consultation with Amoretti and others; and after either he or Amoretti had visited and consulted, at Padua, the great Volta.

But Professor Gerboin carried his scientific study of the pendulum to a much greater extent. His book contains in 356 octavo pages the records of two hundred and fifty-three experiments, and a most elaborate theory of "organo-electric force," in its different qualities, expansive, compressive, passive perturbatory, and active perturbatory. The simplest actions of these qualities may be indicated thus—to condense from the professor's somewhat verbose description:

By virtue of the *expansive* quality, which resides most abundantly in the thumb and fore-finger, a pendulum held between these two is caused to describe with its center of gravity a circle. The *compressive* quality, belonging characteristically to the middle finger, will not permit this motion, or will stop it—as when a highly *compressive* man touches the hand of an *expansive* man, which is holding the swinging pendulum. Contact ceasing, the movement recommences. The *passive perturbatory* is a high degree of the expansive, and the *active perturbatory* is in like manner a powerful *compressive*. The possessor of the former, if, while holding a pendulum he is suitably touched by one of the first or second class, will find the pendulum, if at rest, to start backward; and if in motion already, to reverse its motion. The fourth class is, like the second, negative in its action. Persons exercising either the compressive or the active perturbatory qual-

* Read at the Boston Meeting of the American Institute of Mining Engineers.

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ity can not cause the pendulum to oscillate; they can only counteract or reverse its oscillations in the hands of others.

Considering that the author goes on to formulate the permutations and combinations of these qualities of force, their relations to the different fingers, and to a long list of organic and inorganic bodies, I may be excused from following further his intricate and obscure system. Elaborate as it is, the whole structure is absolutely baseless; and constitutes a capital example of what St. Paul denominated "science, falsely so-called." Its vast array of worthless experiments are merely so many ciphers in a row, with a decimal point instead of a unit at the head. When the distinguished chemist Michel Eugène Chevreul (long the chief of the Gobelin tapestry-works, and the author of a well-known book on Color, as well as other important works) took up the subject in 1812, he was not long in discovering that, when the eyes of the operator were blindfolded, so that neither his will nor his thought could consciously or unconsciously affect the movement of the pendulum, the data, arguments, and conclusions of Fortis, Amoretti, Ritter, and Gerboin, the organo-electric force, with its qualities *expansive*, *compressive*, and *perturbatory*; the south poles and north poles, the classification of the universe thereby; in short, the entire science, bag and baggage, disappeared!

Gerboin had pronounced the action of the divining-rod to be a case of *passive perturbatory*. Chevreul, as we shall see, put both the rod and the pendulum in a new category. But before proceeding to state his theory, I will devote a word or two to the evidence presented in our own country.

It is safe to say that most of it, like most of the evidence of the past, is open to the suspicion of at least an alloy of deception. Men who make money out of their reputed skill with the divining-rod and who could not make as much money or advertise themselves so widely if they claimed only a high degree of skill as prospectors, will almost inevitably ascribe to the rod what is due to other means of inquiry; will explain away failures, exaggerate successes, and not establish or execute or permit really thorough and sincere experiment. The most distinguished expert in this art on the Pacific coast has been repeatedly made ridiculous by the result of test experiments. On one occasion, as I learn from an eye-witness, who also reported the circumstances to the *Mining and Scientific Press* of San Francisco, this diviner was permitted to inspect a metallurgical laboratory, which always contained a large amount of gold, either in bullion or coin. After this inspection, he was brought (blindfold) again into the laboratory, and assured that no coin or bullion had been removed. Under these circumstances, he was requested to find the metal with his rod. The coin had all been put in its natural receptacle, the fire-proof safe; and the bullion had been fastened with wire to the under-side of a writing-table. The operator found neither of them, though the point of his rod was frequently within an inch of thousands of dollars. He probably suspected a trick, and he declared that the gold had been removed. When the bandage was again removed from his eyes, and the coin and bullion shown to him, he claimed that his rod had been diverted by the immense amount of treasure in a bank half a block distant! There have also been operators in California claiming to be natural magnets, and not using the rod; but they are not known to have accomplished any better success. One of these natural magnets was employed to trace a lost vein for a mining company at Grass Valley, the mine of which had been at one time the most productive in California. Under his direction, the company cut for many hundred feet, at an expense of from $30 to $40 per foot, through tough serpentine rock, and found nothing. Not only are these belts of serpentine at Grass Valley well known to be barren in general, but this particular belt was actually exposed in a cross-section, parallel to this expensive underground cross-cut, only one eighth of a mile away. The persons most familiar with the mining districts of the West declare that in Grass Valley, and elsewhere, the divining-rod has accomplished nothing of practical value. It is very recently announced by telegraph from Tombstone, Arizona, that a large body of ore has been found at a considerable depth, under a spot indicated by the "hooda-stick" (which, I suppose, is some sort of divining-rod) in the hands of a common workman. I need hardly say that such a discovery proves nothing. It would be of course presumptuous for me, in the absence of information as to persons and circumstances, to criticise this most recent case; but I can not forbear saying that nothing is more common in the experience of mining superintendents than the discovery of ore-bodies by workmen, who have carried for a long time the secret knowledge of their existence. Most frequently it occurs when a mine seems to to have been exhausted, or at least the superintendent does not know where to look for ore, and finally leases some portion of the ground to miners who, by a good luck that would be surprising if it were not so easily explained, go straightway into a bonanza. It is not always, however, the certain knowledge of the existence of an ore-body observed by workmen, and kept secret with a view to future profit, which guides these practical explorers. Often it is their great familiarity with the indications of the ground, and sometimes, let me add, the ignorance and pride of the manager himself co-operate with this result, by leading him to pursue some erroneous theory of exploration, and to refuse the advice of practical men. The so-called instinct of Mexican miners for finding ore, exhibited particularly in such irregular formations as those of the quicksilver mines of New Almaden, is, indeed, an unconscious practice of an unwritten science.

The scientific explanation of the movement of the divining-rod was given by M. Chevreul, in a letter to M. Ampère, published in 1833 in the *Revue des Deux Mondes*. This letter contained an account of the experiments made by the writer in 1812, more than twenty years before, with the pendulum. Finally, in 1853, M. Chevreul having been apointed by the Academy of Sciences upon a committee to examine a work on the divining-rod, wrote a report on the subject, including the "exploring pendulum" and the then novel wonders of "table-tipping."

This report was published in 1854 under the title *De la Baguette divinatoire, du Pendule dit Explorateur, et des Tables tournantes, au Point de Vue de l'Histoire, de la Critique et de la Méthode experimentale.* It is worthy of notice that this venerable *savant* is still active at the age of ninety-seven; only the other day, he spoke before the Academy, referring to a paper he had presented to that body, if I remember correctly, seventy years ago!

Chevreul ascribes the movement of the rod, apart from cases of deliberate deception, to minute, unconscious muscular movements; and these are caused, he thinks, by the imagination or intuitive or unconscious decision or expectation of the operator. An impression that the rod will dip at a certain point, or a wish that it would, or even, in some minds, a fear that it may do so, are all effective causes of the peculiar muscular movement. Stories describing motions of the rod so violent as to strip the bark from it, in spite of the resistance of the holder, do not disprove the above theory. The position of arms, hands, and fingers usually prescribed for the holding of the rod, as explained in the beginning of this essay, is one in which it is not easy (though not impossible) to produce by conscious effort the peculiar movement referred to. But it is also one in which skillful effort, if employed, may be easily disguised; and finally, it is one which invites muscular cramps, and produces muscular torsions and involuntary movements, not to be resisted successfully without a change of position. Under these circumstances, a man might easily twist the bark from a willow stick, and yet fancy he was trying not to do it.

In concluding this survey of the subject, I shall take a somewhat wider view than M. Chevreul, and my remarks, though based on his theory, should not be received as representing it.

From the mass of testimony, good, bad, and indifferent, the following propositions may be safely deduced:

1. The material, consecration, astrological relations, and ritual formalities of the rod are entirely irrelevant and indifferent to its efficacy. This disposes at a stroke of nine tenths of the science which the middle ages so laboriously accumulated on the subject.

2. The rod itself is entirely inert, unless in the hands of a human operator; and according to the declaration of the most famous experts, such as Aymar, Bleton, Amoretti, and many others, and a whole school of diviners who do not use the rod at all, it is merely an index, revealing and magnifying in visible results the peculiar inward sensations of the diviner.

3. The favorite and most convenient form of the rod (λ) is one which promotes involuntary movements and also permits deception.

4. The involuntary minute muscular movements may proceed either from the causes enumerated by Chevreul, or from a truly and purely physical sensation. To this I will presently recur.

5. The uses of the rod for discovering moral qualities, re-locating missing landmarks, tracing stolen property, prophesying the future, or even (as in the seventeenth century was the case) settling the orthodoxy of theological dogmas, will not now be seriously defended by any one. They belong to charlatanry and superstition.

6. The agency of demons we may also set aside, as a view outgrown if not disproved. The pious Jesuit Gaspard Schott (1662) who held this view, was, as we have seen, shaken in his faith, though not convinced, by testimony showing how often the rod failed to act, or gave unreliable indications. He half admits that, if Satan were at the bottom of it, it should work better. As an instrument of divination, it is unworthy of the devil! But, it might have been rejoined, that as a means of perplexing and misleading mankind, that distinguished expert could scarcely have improved upon it.

As old Albinus (*Das entlarvte Idol der Wünschelruthe*, 1700) quaintly says:

"Ich achte, dass kein verworrener Ding in der Welt zu finden, als das Wünschelruthen-Wesen, denn was Einem recht und tauglich ist, das ist vielen Anderen wieder unrecht und untauglich, dass aus solcher grossen confusion nicht viel Gutes zu präsumiren ist."

[I ween, that no confoundeder thing is to be found in the world than the divining-rod business; for whatsoever is right and fit according to one, the same is wrong and unfit according to others; until there is no good to be presumed, out of so great confusion.]

7. The application of the rod to the discovery of metals, coal, buried treasure, etc., is shown abundantly to be chimerical. The rules and methods, as well as the asserted performances, of its professors contradict each other; and innumerable failures and exposures have justly covered with ridicule their pretensions.

8. The transparent humbug of locating wells with the rod, to strike oil at depths of from a hundred to thousands of feet, needs no comment. In this case, there are positively no signs by which a given *spot* can be selected. The experience of neighbors may show a certain area to be probably productive; and within that area a certain line may be inferred, sometimes, to be the line of a productive channel. But if a keen observer, having gone so far, professes to select a point on that line, he is simply betting on his luck; and, as carried on in Pennsylvania, the bet is a safe one for the oil-smeller, who gets a handsome fee if he wins, and loses, in the opposite event, nothing but an hour or two of time.

9. The case is somewhat different with the discovery of springs, and (since ore-deposits always have been and often still are the channels of springs) of ore-deposits. Here we have much stronger and more abundant evidence in favor of the rod; and here, in my judgment, there is a residuum of scientific value, after making all necessary deductions for exaggeration, self-deception, and fraud. Keeping in mind that the rod is merely an index to the minute muscular movement, and that this movement may have a mental or a physical cause, let us consider (putting aside at once all cases of deliberate deception) the following facts:

There is undoubtedly a practical science of discovering mineral deposits and springs. The most skillful prospectors can scarcely explain how they decide upon the place where they dig; and yet, though they are by no means always successful, it is certain that they are more successful than the inexperienced. The books, from Agricola down, give rules and signs; but the practical explorer is unacquainted with the books. He has a science of his own, which affects his mind, without conscious reasoning, by the principles of association and memory. He recognizes in a new locality the tokens that he has become accustomed to associate elsewhere with a rich gulch, or an abundance of pay-quartz. Perhaps he never took conscious note of them; yet their recurrence affects his judgment. This practical skill is almost unerring within narrow limits. Under new conditions, it breaks down. Some of the most absurdly foolish gold-mining enterprises I have known have been set on foot by old California miners, who, returning to their former homes east of the mountains, have said at once of some ravine or hillside, that it was "just the place for gold." In like manner, certain

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omens and signs from Cornwall have been carried around the world by Cornish miners. But whatever the errors of practical prospectors, the noteworthy point is, that in localities with which they are familiar (or in other localities where the conditions are the same), they come swiftly, surely, and without conscious reasoning to impressions and decisions. A decision of this kind would probably, in a man of suitable nervous organization, affect the muscles already constrained by holding a divining-rod, and the minute muscular movement or inward sensation might be unconscious.

The case is still plainer with regard to the discovery of springs. Every body knows that Indians in our desert West can find water where most white men can not; and the experienced frontiersman has learned the art from the savages. The conformation of the surface, the track of animals, above all, the presence or absence of certain plants, are his guides. In regions where the finding of water within a few feet of the surface is a question of life or death, it becomes a science very rapidly. The location of artesian wells is a different matter. Science will do that in a general way; but science will not determine a difference between one spot and another, ten or twenty feet away, the geological and topographical conditions being alike in both; and the selection of one of two such points as better than the other for a deep well is purely a piece of imagination or deceit. It must be remembered, however, that the diviner has in such a case an easy task. If possessed of sufficient practical judgment to decide that a certain area or line would probably be suitable for boring, he is pretty sure to be safe in selecting any point of it. But this, it will be seen, is very different from the unconscious skill which points out in the dry *arroyo* the very spot where water will be found in half an hour's digging.

In abundantly watered regions like New England, it is perfectly well-known that the springs follow, under or through the soil and above the bed-rock, more or less defined channels. A well may be dug at one point without success, and a subsequent attempt a few yards away may be successful. The superficial signs of these water-courses are often subtle, and they are little studied by the inhabitants in general. It is not necessary that a farmer, who will want to locate a well once in his lifetime, should know the signs of water, as a ranchman or *vaquero* must know them. Hence, men who are keen observers (in many instances, finding profit in the business) get impressions, amounting to a local science, of the "lay" of the rocks, the general courses of the springs, the differences in surface vegetation, the earlier or later greenness of grass, the presence of particular grasses and shrubs, the ascent of local vapors at sunrise, the behavior of frosts; in short, a hundred minute tokens which betray the presence, even at considerable depth, of a water-channel, and the point at which it comes nearest to the surface. The unconscious judgment of such an expert may decide upon a given spot over which he walks; and while he could undoubtedly come to this conclusion without having a rod in his hand, I am willing to admit seriously that the rod may help him make up his mind by emphasizing for him his own slightest tendency to a decision. It should be remembered here that even Bleton, the greatest of all the hydroscopists, generally used to go (if permitted) many times over a piece of land before finally locating a well, and often disregarded the first intimation of the rod. In other words, unless he felt sure, every time he crossed a given spot, that it was a good place to dig, he did not rely upon his first sensation or impression. Moreover, neither he nor any other hydroscope has ever accurately divined, except on an occasional lucky guess, either the distance from the surface or the quantity of a subterranean spring. Yet a very large spring, or one very near the surface, appears to have had, usually, a relatively greater influence upon hydroscopes.

This brings me to the final inquiry, whether there may not be, apart from unconscious skill or judgment, a purely physical effect produced by a subterranean spring upon a person walking over it. Electrical theories on this point were only possible in the days when the laws of electricity were little understood. We know now that the earth is a vast conductor, and that the tension of its currents is consequently so low as to be reckoned as the zero of the electricians' scale; hence, that no perceptible electrical current can leave a particular bit of the earth to pass through a human body and return. For this purpose, analogies between rock-contacts or fissure-veins and the voltaic pile are inapplicable.

But the effects of moisture and temperature upon the nerves are often striking; and here, I think, is a matter which writers on the divining-rod have generally overlooked. The distance at which animals will "scent water" is very great. Their faculty is supposed to consist in great sensitiveness to temperature and moisture. The quickness with which some people "catch cold" on the slightest exposure to dampness—particularly of the soles of the feet—is also a familiar phenomenon. Now, it is curious that among the most puzzling of the well-authenticated accounts of the divining-rod are related instances in which women, unacquainted with its use and not expecting it to work in their hands, have found it to dip, without their conscious help, over spots previously or subsequently shown to contain springs.

Here I would recall the remark of Amoretti, that the sensation of the diviner is one of heat or cold. These two are not easily distinguishable when minute and transient. What we call a chill includes both. Is it not probable that a single unconscious chill may be the physical result, to certain sensitive persons, of walking over a spring of water or a belt of rock or soil kept by running water cooler than the adjacent rock or soil, or a spot of surface made by the same cause damper than the surrounding surface? That these causes exist, is beyond doubt. Thermometrical measurements have not been made; but the way in which grass grows and snow lies and frost settles and vapors rise over springs, is due to the temperature and moisture of the ground in such places. Goethe in one of his novels (*Die Wahlverwandtschaften*, I believe), describes a lady as seized with a sudden chill upon a spot where subsequently the outcrop of a coal-bed is discovered. The incident is introduced without attempt at scientific explanation, and apparently to convey to the readers a vivid conception of the lady's extreme delicacy of temperament. I infer from it that such cases were known to the great philosopher, and that he believed such supersensitiveness to be in some way connected with the performances of diviners.

To this, then, the rod of Moses, of Jacob, of Mercury, of Circe, of Valentine, of Beausoleil, of Vallemont, of Aymar, of Bleton, of Pennet, of Campetti—even of Mr. Latimer—has come at last. In itself it is nothing. Its claims to virtues derived from Deity, from Satan, from affinities and sympathies, from corpuscular effluvia, from electrical currents, from passive perturbatory qualities of organo-electric force, are hopelessly collapsed and discarded. A whole library of learned rubbish about it, which remains to us, furnishes jargon for charlatans, marvelous tales for fools, and amusement for antiquarians; otherwise it is only fit to constitute part of Mr. Caxton's *History of Human Error*. And the sphere of the divining-rod has shrunk with its authority. In one department after another, it has been found useless. Even in the one application left to it with any show of reason, it is nothing unless held in skillful hands, and whoever has the skill may dispense with the rod. It belongs with "the magic pendulum" and "Planchette," among the toys of children. Or if it be worthy the attention of scientific students, it is the students of psychology and biology, not of geology and hydroscopy and the science of ore-deposits, who can profitably consider it. For us miners and prospectors, the advice holds good which was given us three hundred years ago by the wise Agricola, the father of our profession, who says the believers in the rod find some veins with it by accident. "*Sed idem multo sæpius perdunt operam, et ut venas invenire possint, nihilominus in fossis agendis defatigantur, quam adversæ partis metallici*"—"but the same people much more frequently lose their pains, and in order to discover veins have to fatigue themselves with digging, not less than the miners of the opposite school."

As a piece of sorcery, he goes on to say, the virtuous and respectable miner will avoid it; as a piece of science, it is inferior to the study of nature, following the indications of which, the skillful and prudent miner selects a good place for exploration, and "*ibi metallicus agit fossas*"—"there the miner digs"—to which business, rod or no rod, he is bound to come at last.

THE BRITISH ACCIDENT STATISTICS FOR 1882.

We are indebted to Mr. R. J. Frecheville, of Truro, one of her majesty's inspectors, for an early report on the production of the mines of Great Britain and of the accidents which occurred. Turning first to the mines classified under the Coal Mines Regulation Act, we have the following series of figures for the number of persons employed above and below ground, and the quantity of mineral raised, for the period from 1873 to 1882, both inclusive:

PERSONS EMPLOYED AND PRODUCTION OF ENGLISH COAL MINES.

YEAR.	PERSONS EMPLOYED.		Coal.	Total, including coal, fire-clay, iron-stone, shale, etc.
	Under ground.	Above ground.		
1873	407,808	106,341	128,680,131	143,041,246
1874	428,611	110,218	126,590,108	140,713,832
1875	427,017	108,828	133,306,485	147,700,313
1876	409,229	105,303	134,125,166	148,980,385
1877	395,025	99,366	134,179,968	148,846,260
1878	382,979	92,350	132,612,063	145,798,133
1879	385,179	91,631	133,720,393	145,306,369
1880	391,381	93,552	146,969,409	161,466,703
1881	399,387	96,090	154,184,300	168,959,931
1882	406,192	97,795	156,499,977	171,334,032

The general figures for the total number of accidents and deaths for the same period are given below:

ACCIDENT STATISTICS IN ENGLISH MINES.

YEAR.	Separate fatal accidents.	Lives lost by the accidents.	PERSONS EMPLOYED.		Death-rate from accidents per 1000 persons employed.	TOTAL OF MINERAL MINED.		Number of mines.
			Per fatal accident.	Per life lost.		Per fatal accident.	Per life lost.	
1873	973	1,069	528	481	2·079	146,867	133,677	3,938
1874	895	1,056	602	510	1·959	157,222	133,251	4,332
1875	927	1,244	578	430	2·321	159,331	118,730	4,501
1876	839	933	613	551	1·813	177,580	159,688	4,385
1877	864	1,208	572	409	2·443	172,276	123,217	4,231
1878	811	1,413	586	336	2·972	179,777	103,183	3,968
1879	782	973	610	490	2·040	185,890	149,400	3,956
1880	815	1,318	595	368	2·718	198,119	122,509	3,904
1881	844	954	587	519	1·925	200,189	177,106	3,847
1882	876	1,126	575	447	2·234	195,586	152,161	3,814

These data, it will be seen, are remarkably complete; and it is a source of much regret that as yet it has been impossible to show any thing like it for this country, even for a single year. We can not help believing that, when the Department of Industrial Statistics of the United States Geological Survey has once fully mastered the work it has so auspiciously begun, it will be able to turn its attention to the gathering of accident statistics. We know that the industrious chief of the department, Mr. Albert Williams, Jr., has already contemplated taking up this work, and we trust that it may not be long before he will be able to enter upon it systematically. The figures given above prove again the point upon which we have repeatedly insisted, that single years do not furnish a good criterion for judging of the number of fatal accidents and the deaths. The fluctuations are great, and it is not possible to trace from them any direct evidence of a decrease in the danger of the miner's work

The causes of the accidents and deaths for the past two years are fully

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given in the following tables. For details over a series of years, we must refer to the data given in the issue of COAL of August 16th, 1882:

ACCIDENTS AND DEATHS IN ENGLISH COAL MINES.

	1882.		1881.	
	Fatal accidents.	Deaths.	Fatal accidents.	Deaths.
Explosions of fire-damp	35	250	31	116
Falls in mines:				
Falls of sides	127	129	114	114
Falls of roofs	332	339	325	336
Total falls	459	468	439	450
In shafts:				
Overwinding	3	3	5	5
Ropes and chains breaking	6	9	2	2
Ascending or descending by machinery	18	24	26	27
Falling into shaft from surface	6	6	5	5
Things falling from surface	7	8	6	6
Falling from part way down	23	26	30	30
Things falling from part way down	8	8	5	8
Miscellaneous	30	32	27	27
Total in shafts	101	116	106	110
Miscellaneous underground:				
Explosion of gunpowder, etc	11	11	17	17
Suffocation by gases	4	15	6	10
Irruptions of water	1	1	...	...
On inclined planes	54	55	43	45
By trams and tubs	99	98	83	86
By machinery underground	6	6	8	8
Sundries underground	22	22	24	24
Total miscellaneous underground	197	208	181	190
On surface:				
By machinery	9	9	18	18
Boiler bursting	2	2	1	2
Miscellaneous	73	73	68	68
Total on surface	84	84	87	88
Gross total	876	1,126	844	954

This shows a heavy increase in the mortality, due chiefly to the great number of lives lost in a few colliery explosions. A brief summary of the corresponding figures for the three preceding decades will aid in showing how the record of the last two years compares with that of the past:

RATIO OF PERSONS EMPLOYED TO EACH TOTAL ACCIDENT.

YEAR.	Explosions.	Roof and sides falling.	Shaft.	Miscellaneous underground.	Miscellaneous surface.	Total.
1851–60	3,000	681	1,339	2,453	5,257	318
1861–70	5,650	792	2,394	2,045	4,326	388
1871–80	11,372	1,104	3,991	2,747	5,529	559
1881	15,983	1,128	4,674	2,737	5,695	587
1882	14,399	1,098	4,989	2,558	5,999	575

RATIO OF PERSONS EMPLOYED TO EACH DEATH.

1851–60	1,008	653	1,161	2,074	4,872	215
1861–70	1,408	767	2,121	1,666	4,119	300
1871–80	1,795	1,069	3,557	2,535	5,369	425
1881	4,271	1,101	4,504	2,607	5,630	519
1882	2,015	1,076	4,344	2,423	5,990	447

TOTAL DEATHS.

1851–1882	7,760	13,356	5,205	5,402	2,350	34,073

In thirty-two years, 34,073 persons were killed in mining the coal and allied minerals in Great Britain, or at the rate of upward of one thousand people annually, one fifth of the deaths being due to the explosion of fire-damp.—*Coal.*

FURNACE, MILL, AND FACTORY.

Hendey & Meyer, of Denver, Colo., are running full-time, employing over one hundred hands. They are turning out at present two seven-foot hoisting-drums and two steel boilers of 70 horse-power each, for the Iron Silver Mining Company, Leadville; one double hoisting-engine of 100 horse-power, and an automatic cut-off steam-engine of the same capacity, to go with the hoisting-engine, for the American Smelting Company, Leadville, duplicating a former order. They recently made a 100 horse-power steam-engine for the Colorado Smelting Company, South Pueblo, and are now working on another machine of like capacity for the same company. They are also at work on a 70 horse-power steel boiler and an automatic cut-off engine of 60 horse-power, for a flouring-mill at Durango, Colo.; and have recently erected a 10-inch Cornish pump at the Evening Star mine, Leadville. They put in all the machinery at the Colorado Smelting-Works, South Pueblo, Colo., which expects to blow in before September first. Messrs. Hendey & Meyer erect every machine and give it a running trial before shipping.

The Foreign Exhibition Building at Boston has been recently supplied with a five-inch Curtis pressure regulator, in order to utilize the exhaust steam for heating purposes.

The Ashland Coal and Iron Company's machine-shops at Ashland, Ky., have just made and set up a new hydraulic press, christened Jumbo, weighing 6000 pounds, which will do duty principally in pressing wheels on or off axles, exerting a pressure of thirty tons and more if necessary. This company has contracted with Fairbanks, Morse & Co., for a tank and tower fifty feet high, the tank to hold 50,000 gallons of water, which will be held as a reservoir to draw water for the use of the works, and also as a protection and preventive in case of fire.

The foundry business of Mr. William Hamilton, Peterboro', Canada, is to be carried on by a limited liability company, known as the William Hamilton Manufacturing Company; capital, $200,000. The letters patent have issued to George A. Cox, William Hamilton, George Munro, Andrew Macfarlane, and Richard Hall, all of Peterboro'.

Iron and steel-works are to be erected at once at Gunnison, Colo., a company having been organized for that purpose with a capital of $5,000,000.

John Cover, superintendent of the Clare Furnace, New Castle, Pa., gives the following as the output of that furnace for one week's melting: 33⅓ cinder, 33⅓ lake ore, 33⅓ native ore.

1st day	101 tons.
2d day	106 "
3d day	105 "
4th day	107 "
5th day	110 "
6th day	116 "
7th day	110 "
Total	755 "

Size of furnace, 65 feet high; bosh, 16 feet.

The Philadelphia & Reading Coal and Iron Company will now manufacture rails sixty feet long, instead of thirty as before. The weight will also be increased about twenty pounds a yard. This step is taken on account of the increased weight of passenger cars.

The Phœnix Iron Company, at Phœnixville, Pa., has just built and put in operation one of the Taylor-Langdon patent gas ore-roasting furnaces. It is working very satisfactorily, giving a product of from forty to fifty tons per day of well-roasted ore. The Phœnix Iron Company will build several additional furnaces at Phœnixville.

Furnace No. 3 of the Phœnix Iron Company, at Phœnixville, Pa., of which Mr. Charles I. Rader is manager, produced, in the week ended August 16th, 478·26 gross tons of pig-iron on a fuel consumption of one ton and two cwt. per ton of iron. For the preceding week, the production was 442 tons. This furnace is sixty feet high and fourteen feet in diameter at the bosh, and uses a mixture of coke and anthracite for fuel.

An important contract has just been awarded to Messrs. Bellhouse, Dillon & Co., of Montreal, for the supply of the cast-iron water-pipes for the new Quebec Water-Works. The amount involved is between $250,000 and $300,000.

Three mills of the Acadia Powder Company, at Waverley, fifteen miles from Halifax, N. S., were blown to pieces on the 17th, by an explosion which was heard throughout a radius of seven miles. Three employés lost their lives and several others were hurt. The company has eight mills uninjured. The one next to those destroyed contained fifty tons of powder.

The appraisers of the property of the Manchester Iron and Steel Company, of Alleghany, Pa., Messrs. John W. Chalfant and David B. Oliver, have filed their report in Common Pleas No. 1. The assets are placed by the appraisers at $289,640.92. The rolling-mill and blast-furnace in Alleghany are estimated to be worth $425,000, subject, however, to a mortgage of $300,000. Henry Stauuton, for the assignees, filed a bond in the sum of $579,281.84 with George W. Cass, of New York, and J. M. Schoonmaker, Jesse H. Lippincot, J. N. O'Neill, and William N. O'Neill, of Alleghany County, as sureties.

Messrs. Sebastian Brown and Skipwith Wilmer, as counsel for William Keyser and John T. Mason, R., have filed a bill in the Circuit Court against Thomas H. Paul & Son and W. H. Whyte, trustee, asking for the appointment of a receiver and sale of the Paul Locomotive-Works, Baltimore. Mr. Whyte, as trustee, filed an answer consenting to the appointment of the receiver and to the sale of the works.

The Redstone Coal Company, it is said, will break ground within the next thirty days for a new rolling-mill on the Redstone branch of the Pennsylvania Railroad, either at Smock's station or at Hill's Bridge, one mile above.

The Colorado Coal and Iron Company has closed a contract with the Chicago Burlington & Quincy Railroad for the delivery to the latter of 5000 tons of steel rails.

H. K. Porter & Co., of Pittsburg, Pa., have under way another very small locomotive for hauling steel ingots at rail-mills. The cylinders are five inches in diameter by ten inches stroke, and the entire weight in working order, including water and fuel, is 6000 pounds. It has no cab, as it works inside of the mill; and no tender, as the water and fuel are carried on the foot-board. These locomotives are also used at sugar plantations for hauling cane on portable tracks, and are the smallest built in the United States for regular service.

The Edes, Mixter & Heald Zinc Company, of Plymouth, Mass., has recently opened valuable zinc mines in East Tennessee. The ore from these mines is found to be of very superior quality, being free from lead, arsenic, and other impurities. An analysis of the zinc made by Messrs. Ledoux & Ricketts, of New York, gave the following results: Iron, 0·017 per cent; zinc, 99·983 per cent. The spelter made by this company is soft and ductile and of unusual strength, making it especially desirable for such work as cartridge brass. The mines and furnaces of the company are near Knoxville, Tenn., the sales offices being at Plymouth, Mass.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

ATLANTA.—On this claim, the running of the tunnel at the east end continues with satisfactory results. As soon as the point settled upon has been reached, a large station is to be cut out and a main working-shaft sunk. This mode of working is caused by the configuration of Copper Mountain, in which this claim is situated.

CAVE.—The main shaft is now down forty-eight feet, in iron oxides and copper ore. The copper ore encountered consists of red oxide of copper and green carbonates, very similar to those met with in the 300-foot level of the Copper Queen. Another shaft, sunk 12 feet, is in red oxide of iron, and is situated 199 feet north from the natural cave.

HENDRICKS.—Work has been recommenced. The mine is the westerly extension of the Atlanta, and through both claims a ledge of lead carbonates is known to run, assaying in several instances from $60 to $95 per ton. Recently, some of the lead carbonate ore, carrying silver, from this mine, was reduced with the ore from the Tombstone camp.

TOMBSTONE DISTRICT.

The outlook presented by a visit to many of the properties which are at work, says the *Epitaph*, is encouraging in the extreme, and while there is nothing of startling importance to note, the steady work of the camp proceeds.

GILA COUNTY.

STONEWALL.—The mill is running night and day on tailings, with good results. The circulation of air in the drift on the 280-foot level is good.

GRAHAM COUNTY.

GREAT WESTERN CONSOLIDATED.—Three ingots of refined copper, aggregating fifty pounds, besides a small quantity of gold and silver, have been received in this city from Mr. L. B. Darling, of Providence, R. I. They are the result of a working test of 100 pounds of ore from the property of this company.

YAVAPAI COUNTY.

UNITED VERDE COPPER COMPANY.—Our notice of this enterprise last week was, without any intentional injustice, quite in error. We are now able to state from authority that the smelter was blown in at noon of August 1st, and up to noon of the 11th inst., or in ten days' uninterrupted run, the output of copper bullion was over seventy tons, or fully seven tons daily. The last weekly account was made up to August 11th, at which time shipments had been made of about thirty tons of copper, and teams were arriving to haul the remainder to Ash Fork on the Atlantic & Pacific road. The roads were not impassable, there has been no suspension, nor was there any deficiency of coke. The mountain road, built at great expense by this company, is said to be a remarka-

bly good piece of engineering. It is simple justice to the energetic superintendent, Mr. F. F. Thomas, to say that by his tireless efforts all the labor of opening the Verde property, erecting the furnace, building over ten miles of mountain road, introducing water in nearly a mile of pipe, etc., was accomplished in one hundred and four days from the day of his arrival (April 18th) on the property. The ores are carbonate and oxide, with enough iron to smelt them; and the slags run under one per cent from ores averaging over twenty per cent. The copper bullion is high grade, and portions of the ores carry a *ley* of the precious metals. The reserves of ore are said to be large and constantly increasing with the work of development.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

The Bodie *Free Press* gives the bullion shipments of the four operating companies of the district for the first half of 1883 as follows:

	Gold.	Silver.	Total.
Standard	$564,086	$79,107	$643,193
Bodie Consolidated	59,289	89,992	149,281
Syndicate	35,806	2,622	38,428
Bodie Tunnel			52,742
Total			$883,644

The Bodie Tunnel Company made only two shipments during June, the mill closing down before the end of the month. The shipments of the Standard mine during July amounted to $95,208.24. In the Syndicate statement, the shipment for July is included.

KENTUCK.—This Sweetwater property is turning out rich ore, and there is a great deal in sight. It is estimated that the bullion output will average at least $20,000 per month.

VIRGINIA CREEK HYDRAULIC COMPANY.—It is thought that the company has struck the old Mono channel, which proved so rich, having encountered a gravel bed running diagonally across the channel first started on.

PLACER COUNTY.

BLUE RIDGE.—This gold and silver mining claim with its extensions has been located. The ore is reported to run from $15 to $60 per ton; two shafts, one 17 and another 34 feet deep, have been sunk; also a tunnel run 193 feet to cross-cut the vein. The width of the vein is from 16 to 25 feet. It is about fourteen miles from Auburn. Wood and water are in abundance.

CANADA.

PROVINCE OF NEW BRUNSWICK.

A quantity of ore from the mines at Mineral Vale was recently shipped to Portland and Boston for treatment. This special shipment is made on account of newly discovered veins thought to be much richer than previous workings. It is expected that large quantities of this ore will be shipped to this country and England.

NOVA SCOTIA.

HALL-ANDERSON.—The work in mining and milling continues as heretofore.

OXFORD.—The superintendent reports every thing about the mine and mill in good condition. The late scarcity of miners, owing to the fishing season, seems now to be over, and he will now be able to open up all the different leads thoroughly. The ore in the mill lead continues of the same high grade. The face of the east bluff is now 25 feet high and shows enough ore for three months' work. He is sinking on the lake lead, and will let a contract for sinking the main shaft on mill lead as soon as he can get the tenders made. The mill is pronounced by mining visitors the finest in that country, or possibly in any country. The assay of tailings at the mine made from time show hardly more than a trace. A lot sent to this city this week, to be tested here, gave only 88 cents per ton. This from ore (though perfectly "free") is, to say the least, not a little remarkable when it is milling over $60 per ton.

RENFREW CONSOLIDATED.—At this mine, a sinking of 100 feet through barren rock has rewarded the management with a splendid strike, the ore looking fine and showing three feet in width.

COLORADO.

BOULDER COUNTY.

CELESTIAL.—A rumor states that this mine has been sold to English capitalists for $35,000.

CLEAR CREEK COUNTY.

PAY ROCK.—The mill is treating about 1000 tons of ore per month.

EAGLE COUNTY.

Considerable work is reported in the gulches tributary to Half Moon Gulch, in the southwestern corner of the county. Particularly is this true in Little and South Half Moon gulches. In the latter gulch are located the well-known Iron Duke and other mines. The Iron Duke is working under lease, and is shipping ore with considerable regularity. The ore is brought in on jacks; but as the ore ranges in value from one to two hundred dollars a ton, it readily bears this expensive method of transportation, and still leaves a fair profit.

GRAPHIC.—Included among the Little Half Moon properties is the group of claims controlled by this company, on which operations are to be resumed.

GILPIN COUNTY.

DELAWARE.—The lessees are drifting and backstoping at a depth of 300 feet. The ore contains considerable galena and nets from $6 to $50 per ton. The third quality is piling up, and will be sent to the concentration-works. The main shaft is 430 feet deep, but, owing to heavy flow of water, can not be worked to advantage below the 300-foot station.

EGYPTIAN.—Connection from the 400-foot west level with the 500-foot west level has been made through a winze. The body of ore at this point is continuous and of a fair average width. This affords the company quite an extensive body of stoping ground. The 700-foot east and west levels are showing up well, especially the west level, which is driven through a wide vein, the smelting ore being fully eighteen inches wide.

KING.—Development-work is confined to the sinking of the main shaft, now over 300 feet deep.

GUNNISON COUNTY.

A sale on a group of properties in the Elk Mountains is pending, which, if consummated, will cause $250,000 to change hands.

SYLVANITE.—Reports state that work will shortly be resumed. This property was discovered in the spring of 1879, and is noted for both the quality and quantity of ore it has already produced. But, like most other valuable properties, this has become involved in litigation and has been shut down for more than twelve months.

LAKE COUNTY.

The prospects are, that the California Gulch extension of the Rio Grande Railroad will not stop at Oro City, but make a turn at that point and run across portions of Breece and Iron hills, tapping all the leading mines on the latter hill.

The *Herald* states that a great deal of activity is at present displayed among the mining properties of Little Ellen Hill. Mere prospects, that have been permitted to lie idle for years past, are working again, and a number of claims have lately been added to the list of productive mines of the Leadville District. The ore secured from the Little Ellen Hill mines, in most instances, is only of medium grade; but as it usually occurs in large bodies, the expense of extraction reaches only a minimum of the average expense per ton of the mines of the district. In consequence, the profits are nearly if not quite as satisfactory as those resulting from the working of mines on Carbonate or Iron Hill. The ore generally is more siliceous than that of the mines in other portions of Lake County, and the expense of smelting a trifle heavier, but in return the mineral all contains an appreciable amount of gold.

ADLAIDE.—In pushing work on the ore-body recently opened in the vicinity of the Ward shaft, on the 160-foot level, the workmen ran into a streak of about fourteen inches of horn-silver. A test of a fair average piece of the ore made twenty-two and a half ounces of gold. Ores carrying chloride of silver in minute particles are frequently encountered in nearly all the mines of Iron Hill; but we believe this to be the first instance on record where large pieces of horn-silver ore were discovered in an Iron Hill mine.

AMERICAN SMELTER.—The new 110 horse-power engine, recently purchased, was set in motion recently. Another engine has been ordered, to take the place of the engine recently wrecked. Three of the large furnaces are in blast, and the fourth furnace, it is expected, will be started up. About twelve thousand tons of ore are on the company's premises.

ARKANSAS VALLEY WORKS.—These smelting-works have lately been provided with a new 125 horse-power Corliss engine. Five large furnaces are in blast at the works, and ore is reduced at the rate of about five thousand tons a month.

BREECE.—This iron mine is at work again, having recently received several large contracts for iron ore.

CHRYSOLITE.—Mr. Cuno, who is working a portion of the Chrysolite mine on a lease, is shipping from seventy to eighty tons of ore a day to Leadville smelters.

DUNKIN.—During the past five months, over one thousand feet of prospect-drifts were driven. The working expenses of the mine for July were about $1800, and the net earnings above all expenses $4500. No portion of the mine is now worked on the lease or tribute system. The company has now $22,000 in its treasury, exclusive of the earnings of this month.

IRON SILVER *vs.* A. W. GILL.—A suit has been instituted by the Iron Silver Mining Company against A. W. Gill and others, to recover $50,000, the alleged value of the ore extracted by the Smuggler lessees from the Iron Silver territory.

IRON SILVER.—The company is still engaged in making surface improvements, made necessary by the extension of its underground workings. At the Stone mine, a large new Worthington compound pump is being placed in position, having a capacity of 225 gallons a minute. A similar, but of smaller dimensions, is in use at the Moyer shaft, as well as two sinking-pumps. Two new winding-drums are also added to the plant at the Moyer shaft, and other improvements are in progress. On the Stone mine, where a number of hoisting and pumping-engines are employed, it has been decided to put in several large new boilers. The ground on this claim, owing to large stoping, has been sinking, and the old boilers are out of plumb. As new boilers will be required shortly, it was decided to put in a new battery, and place it in a secure position. The new boilers will possess at least one hundred and fifty horse-power, and are calculated to supply all the engines on the Stone mine with steam.

LITTLE ELLEN.—The concentrating mill attached to this mine, on Little Ellen Hill, belonging to the American Mining and Smelting Company, was burned August 16th. The mill cost about $100,000 originally, and was complete. It did not prove a success, and most of the machinery had been removed before the fire. It was insured for $20,000, and the insurance will probably cover the loss.

LITTLE PITTSBURG.—A lot of waste material placed in front of the Little Pittsburg office some four years ago, to fill a depression in the hillside and make a passable road, has been taken up within the past week, and replaced by surface soil. The material contained, according to the *Herald*, about thirty ounces in silver to the ton, and was shipped to the smelters. The work was done by tribute workers.

MOYAMENSING.—This lode, on Yankee Hill, has encountered a streak of ore, running high in silver. The material is a siliceous iron, carrying the silver in the form of chlorides.

WILLIAM WALLACE.—In the drift run at a depth of 528 feet, a twelve-inch streak of ore has been encountered, which shows a gray sand, slightly mixed with talc. The returns show from sixty-five to eighty-two ounces in silver to the ton, and from forty to sixty per cent of lead. The mineral bears a greater resemblance to the high-grade lead ores of the Carbonate mine than to the ores of the Big Chief and Clontarf. The owners have expended a large sum of money in prospecting this property for the last three or four years. The above is the first ore that has been found.

PARK COUNTY.

EVERLASTING.—This comparatively new property, situated on Mount Bross, is opening out into quite a bonanza. The mine shows a three-foot contact-vein of ore, from which fifteen tons have been shipped, averaging $209 to the ton.

KANSAS.—Work has been started again.

SOVEREIGN.—Regular ore-shipments are made to the Pioneer stamp-mill. The product of the mines is free-milling gold rock. Air-compressors, machine drills, and other approved appliances are used to facilitate work.

PITKIN COUNTY.

The parties who recently purchased the Aspen smelter have opened a bank in that town, and made other preparations for business. The smelter is enlarging, and the purchase of ores is in progress.

SAN JUAN COUNTY.

MINERAL CREEK CONCENTRATING COMPANY.—The superintendent writes that arrangements have been completed for the erection of a thirty-ton concentrating plant at the town of Chattanooga, Red Mountain Mining District. Contracts have been let and work will be prosecuted without delay, it being the intention to push the work so as to have the mill in running order by the first week in October.

PULASKI & WATERFALL.—Reports state that New York parties have purchased these mines, in Bridal Vein Basin, for $65,000. Several adjoining properties have been bonded by these same parties.

SUMMIT COUNTY.

Concentrating devices are being put in a number of the mines and metallurgical works of this county. The Keystone Bullion Company is putting in six Metcalf concentrators. A new concentrator of forty tons capacity a day is erecting at Governor, and rigs are at work at the Lincoln. The Elyria smelting-works have been leased by Messrs. Newcomb & Musgrove, who are engaged in placing concentrating machinery in the building. The mill is to be used in treating Gibson Hill ore, and also in doing general custom-work.

DONCASTER CONCENTRATING-WORKS.—It is stated that Leadville parties contemplate the purchase of these concentrating-works at Kokomo, and enlarging the establishment to fifty a day capacity.

PAYMASTER.—This property consists of the Paymaster, Silver Ball, and Seven Thirty lodes, or 4500 feet on a large vein of argentiferous galena, 6 feet in width. They are only down 75 feet, but produce from 30 to 50 tons of ore per day. Assays run from 10 to 160 ounces per ton. The plant erected to work the mines and ore consists of a concentrating-mill, in which is a 50 horse-power engine and boiler, Blake crusher, Cornish rolls, Hartz jigs, and Rittinger tables, designed to treat 40 tons of ore per day.

ROBINSON CONSOLIDATED.—The president, it is reported, has stated to the New York *Evening Stock Report*, on his return to the city that the mine never looked better since he was connected with it. Mr. Greer owes to the company a small amount of royalty, which is secured to the company. The company only owes $3100, and has on hand $17,000 cash assets. The reports about the company's having $10,000 debt and about being responsible for any claims besides the above $3100 are not true.

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DAKOTA.

CALEDONIA.—The superintendent reports for the week ended August 12th: Ore produced—from 300-foot level, 896 tons; 400-foot level, 154 tons. The 460-foot level header advanced five feet, making a total of twenty-five feet. There is no change to report in the appearance of the mine. The mill is running to its full capacity.

FATHER DE SMET.—The report for the week ended August 7th shows: Ore extracted from first level, 750 tons; second level, 750 tons; third level, 525 tons. Ore milled, 2025 tons. Golden Gate cross-cut, third level, advanced six feet; total, twenty-five feet. Work stopped. Golden Gate south header advanced seven feet.

GEORGIA.

The scarcity of water continues, and the consequence is, that but little work is done at the various mines in Lumpkin County.

IDAHO.

FISH CREEK COPPER MINES.—Arrangements are making to have a copper matting furnace constructed on Little Wood River, to operate upon the rich silver and copper ores of that section. The furnace is of the Rankin & Brayton make, and will run 20 tons of copper matte daily, of an average value of $160 per ton. The plant is expected to be in operation soon, and money will be on hand to purchase ores.

MAYFLOWER.—The vein is reported to be sixty feet wide at the end of the lower tunnel, 900 feet in from the mouth. Burleigh drills will be used to chamber out the ore and expedite the development of the mine. The Mayflower mine has twice the actual amount of pay-ore now in sight that was shown up at the time the mine was purchased, the price being $375,000.

PHILADELPHIA SMELTING COMPANY.—Work has begun on the Silver Star mine, the property of this company. The ore-body is strong, regular, and high-grade. The chances are very favorable for early shipments of ore from the mine to the smelter.

SILVER FORTUNE.—The mine has been bonded for $30,000. A shaft sunk 30 feet on the vein struck water, but exposed a solid body of high-grade galena ore, three feet wide. The bondholders are now developing it.

MAINE.

It is reported that the West Luber silver mines, in Washington County, are to be worked again, and that a new mill is to be erected.

MOUNT MICA.—Operations have been resumed on this property.

STEWART.—Developments at this copper mine are progressing favorably. Two drifts and a cross-cut are in progress from the bottom of No. 3 shaft, and an open cut at another point on the property is extending. All the openings are showing well.

MICHIGAN.

A new company, composed of prominent men in Marquette and Houghton counties, will be organized in Ishpeming shortly, to prosecute work on a quartz belt in the vicinity of the Ropes mine, which has been proved to carry well in gold and silver.

CALUMET & HECLA.—The old board of directors have been re-elected. Mr. Agassiz was re-elected president, and C. W. Seabury secretary and treasurer. The financial statement given out for publication shows that the surplus April 30th, 1883, was $1,980,824.53, dividends to the amount of $2,000,000 ($20 per share) having been paid during the year. The above surplus is about $1,400,000 less than on April 30th, 1882, the reduction having been caused in part by the drop in copper and by the expenditure of $1,250,000 for land.

CLEVELAND IRON MINING COMPANY.—At the meeting of stockholders, to be held in Cleveland, September 5th, a resolution will be offered authorizing the board of directors to sell and convey all the lands and real estate of the company in the city of Marquette, Marquette County, together with all its rights, privileges, and reservations in streets and other property appurtenant thereto, and all buildings, improvements, docks, tracks, water and riparian rights owned by it or in which it has any interest.

DETROIT.—Sinking is in active progress in the new shaft, which will, when completed, be the main hoisting-shaft. It is now down 108 feet in blue slate, somewhat mixed with jasper, and will be sunk 14 feet more, when drifting will be commenced eastward toward the present workings. The mine is now getting out about 120 tons of ore per day and is steadily shipping to Detroit by way of the Detroit, Mackinac & Marquette Railrord. Some exploring has been going on in the south part of this property, below the bluff of diorite; but this has been abandoned for the time being.

ROPES.—The stamp-mill was put in operation August 14th. The entire plant worked without a hitch of any kind. The Ishpeming *Agitator* says: Of course, nothing has as yet been learned of the milling qualities of the rock, nor will it be given out until a run of several weeks has been made.

MONTANA.

The Queen of the Hills and the Homestake mines, in Montana District, have been bonded for six months to I. G. Baker, of Fort Benton, for $60,000. Mr. Baker will organize a company to develop the mines and reduce their ores. These leads are already well developed.

LEWIS & CLARKE COUNTY.

The mining industry in the vicinity of Helena is having, according to the *Independent*, its boom, though not yet in any extravagant manner. The effect of the liberal policy inaugurated by the railroad magnates has been to stimulate development to such an extent as to render many properties—heretofore idle and considered of little value—quite promising, and the well-known paying mines are adding to their facilities, in some cases very extensively.

BOSTON & MONTANA.—A contract has been made with the Union Iron-Works to put in 24 pans and 12 settlers, besides 48 settling-tanks, at the sixty-stamp mill of the Gloster mine. Another boiler will be added, making four that will be used to furnish power, and a 200 horse-power engine will be added to the present plant, to run the new machinery, which will make an aggregate of 300 horse-power in the mill when completed. A new building, 60 by 190 feet, to accommodate this machinery, will be erected immediately, and the whole will be in working order within ninety days. At the Gloster, another contract will be let to sink the shaft 100 feet deeper for the fourth level, and at the same time start two winzes, one on each side of the shaft, and about 75 feet distant, so as to be able at once to run connecting levels and have plenty of ventilation as well as new ground opened for stoping.

GREGORY CONSOLIDATED.—The old concentrator is to be torn down and a new one erected having a capacity of 75 tons per day. It will be equipped with two of the largest crushers and four of the largest rolls made, and will have two compartments. The Ætna Iron Foundry, of San Francisco, has contracted to complete the concentrator and have it in running order within three months from date. At the mine, for a distance of 400 feet along the sixth, which is the lowest level, the galena is continuous, the ore-product very regular in value, and nearly all that is taken out carries sufficient silver to pay.

NEVADA.

The total amount of ore extracted in Eureka County for the three months ended June 30th amounted to 18,990 tons, according to the returns made by Assessor Wallace.

BAY STATE.—Ore has been shipped to the Eureka Consolidated furnaces. The mine is looking well. About eight tons per day are now shipped that work from $52 to $70 per ton. In addition to this, about 35 tons are shipped per month that will average $200 per ton.

ONONDAGA.—About 80 tons a week are shipped to Salt Lake. The bottom of the shaft, 110 feet from the surface, shows a body of ore five feet wide that assays high.

RUBY HILL.—The tunnel is in nearly 400 feet. The face is in very favorable-looking broken limestone. Prospecting will be carried on in this mine until ore is struck.

SILVER CONNOR.—A shipment of low-grade ore was recently made that assayed nearly $60 a ton.

COMSTOCK LODE.

The Cornish pump at the Combination shaft is fast lowering the water, which was up over the 2600 level, pending repairs to the broken rod and bob-pin. During the absence of Superintendent Patton, nothing has been done at the face of the north drift of the 3000 level in the Union. Two thirds of the face are still in ore. Sinking the joint winze is making good progress.

GOULD & CURRY.—Good headway is making in the new east drift on the 2500 level. It starts from the southwest drift, which was run out to the Savage line, at a point about 200 feet south of the shaft, and is now out about 100 feet. The face is in dry vein porphyry. There is, indeed, no water in any of the drifts on the 2500 level of the Gould & Curry; but north, in the Best & Belcher, the ground is very wet. The water in the Curry appears to lie out near the west wall. The new east drift will really have the effect of a cross-cut. Its course is east, 20 degrees south.

HALE & NORCROSS.—Pending repairs of the Cornish pump at the Chollar-Norcross-Savage shaft, the water rose above the 2000 level; but the pump is going on now as usual. The temperature on the 2600 level is now but 98 degrees, and it will doubtless go still lower when the water has been lowered to the old mark in the shaft.

UNION CONSOLIDATED.—No work has been done in the face of the north drift on the 3000 level recently. Meantime, the main west cross-drift has been timbered up at the point from which starts the north drift, and work has been pushed as usual in the joint Sierra Nevada winze below the 3000 level. As it now stands, about two thirds of the face of the north drift are in ore. As soon as the superintendent returns, work will doubtless be resumed in the face, and the drift pushed on the north to the Sierra Nevada line.

NEW MEXICO.

BILLINGS SMELTER.—The smelting-works, situated at Socorro, are now almost completed and will blow in shortly. There are more than a thousand tons of ore in the bins. There will be two furnaces, each with sixty tons capacity.

KINGSTON CONCENTRATION-WORKS.—The capacity of the works is small as yet, the present plant of machinery being erected as an experiment to demonstrate the feasibility of concentrating the low-grade ores of the vicinity of Kingston. The result of a run made upon bullion ore, average value $30 per ton, is given as follows: concentrates, as nine to one; value, $243, showing a loss of only ten per cent. The ore in this instance was difficult to treat.

NEW MEXICO & ILLINOIS.—The Eureka smelter, the property of this company, has closed down after a successful run of over a week. It was the first trial of the machinery, and it gives complete satisfaction. There is scarcity of iron ore for fluxing, and as soon as a supply is obtained, the smelter will start up and run permanently. It is expected that the other smelter will start up shortly. Iron ore of good quality and quantity has been found, and it is thought no further delays will be occasioned by the lack of that article for fluxing. The coke is supplied from Trinidad, and is taken in wagons from Bernalillo to Copper City at a great expense.

UTAH.

BOX ELDER COUNTY.

LAST CHANCE.—The Salt Lake *Tribune* says that when Mr. Cullins left this mine, years ago, it had about a foot and a half of ore, upon which they had run 65 feet, which was 20 per cent lead, 30 per cent sulphur, and carried 50 ounces in silver and a little gold. The sulphur was easily burned out by spreading the ores on cord-wood and setting fire to it. Afterward, there were quarreling and mismanagement and waste, and, of course, in time, complete abandonment. At present, Messrs. Bambergers have it. They are running a long, deep tunnel. It will, it is supposed, also furnish a live stream of water to reinforce the limited supply in Can Fork.

SILVER MOUNTAIN.—Good progress is made. About eighty tons of ore are on the dump, which averages about seventy-five ounces silver and forty-five per cent lead. A road is building to the mine, which will soon be completed, and then ore will be sent to the smelters.

PIUTE COUNTY.

BULLION CAÑON.—This company's ten-stamp mill at Marysvale was recently started on a test run of second-class Pluto ore. The assay of this ore gave about 34 ounces silver per ton, and was found easy to work. The capacity of the mill is from twenty-four to thirty tons per day. After making the tests, the mill was shut down for the purpose of putting in a Frue vanner. It will be started again as soon as this has been done. The property is now in the hands of the same men owning and managing the Pluto property. The first bar of bullion, weighing 515 ounces, was shipped to Salt Lake City. An assay showed it to be 927 fine in silver, and 18 fine in gold, the value of the bar being over $700.

SEVIER COUNTY.

The discovery of a ledge of copper ore is reported. A tunnel of about 35 feet has been run in to cross-cut it. The ore seems to consist of ruby, black, and red oxides, and ranges in assays from 15 to 45 per cent copper, with a perceptible amount of gold. A new district has been formed and is to be known as the Henry District, and the mine is located as the D. A. Giles copper mine. As usual, this deposit is stated to be an "immense and wonderful body of copper ore," and the immediate attention of capitalists is asked by the local papers.

SUMMIT COUNTY.

CRESCENT.—Shipments are regularly made. The ore is sampled at Mackintosh's Mill. About 1200 tons of ore are piled on the floor and in the bins, and the place is crowded with daily receipts.

WASHINGTON COUNTY.

This county is fortunate enough to have within its limits ore which runs as high as $130 in silver—so it is stated. A shaft 87 feet at an angle of 60 degrees has been sunk in this. At this depth the vein has pinched out to a mere line. A drift 20 feet deep has been run horizontally into the hanging-rock. This ends in the vicinity of a cave, exhibiting a high grade of carbonate ore.

SILVER REEF.

STORMONT.—The official report of August 13th is as follows: Our best stope now is in 23 winze ground, and the following are assays from a point about halfway between the 4th and 5th levels, where the stope is going down a moderate dip underhanded, and all solid ground below except as cut by the 5th level: 14 inches, $13.76 per ton; 14 inches, $35.14 per ton; 12 inches, $157.69 per ton; 12 inches, $7.17 per ton; 6 inches, $73.16 per ton; 18 inches, $36.08 per ton. A splendid stope of ore, and will go down, I hope, a good distance yet.

WYOMING.

SILVER CROWN DISTRICT.

COPPER KING.—At this mine, the principal one in the district, two shifts a day are at work, and a depth of sixty-five feet has been attained. They will soon begin two drifts, to test the width of the vein. New machinery will shortly be on hand, to facilitate the hoisting of ore. While the ore is varied in appearance and value, it all shows native copper in considerable quantities.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Aug. 24.

The mining market this week has been principally confined to four stocks, namely, Robinson, Sonora, Barcelona, and Alta-Montana. Robinson has suffered a sharp decline and closed weak to-day. Sonora has about held its own and has been steady. Barcelona sold a little weak to-day, and Alta-Montana has been steady throughout. Outside of these stocks, the dealings have been limited, and prices, generally, steady. A full summary of the market is given below. The total number of sales aggregates 142,010 shares, as against 137,900 last week.

The Comstock shares have been quiet and steady. California sold from 35@40c. with a small business. Consolidated Virginia was quiet and strong, selling from 57@66c. Sierra Nevada had a small business at irregular prices; it sold from $4@$4.20@$4.10. Mexican was quiet and steady at $3.35@$3.75. Ophir sold at $3. Consolidated Imperial records a small sale at 5c. Gould & Curry sold at $2.85. Savage sold, assessment unpaid, at $1.80. Best & Belcher, with one small transaction, sold at $3.90. Sutro Tunnel was moderately dealt in and was irregular; it sold at 19@21@20c.

The Leadville stocks were also quiet and steady. Amie sold at 15@14c., with moderate transactions. Chrysolite was quiet and a little weak, selling from $1.10@$1. Dunkin sold at 23c., with a small business. Breece developed a little strength, selling from 18@23c., with a business of 2600 shares. Iron Silver had a small business at strong prices; it sold at $3@$3.20. Little Chief was quiet and strong, selling from 35@45c. Little Pittsburg records a small business at weak prices; it sold from 70@60c. Climax was quiet and steady at 9@10c.

The Bodie stocks were very quiet and were steady. Bodie Consolidated was quiet and weak at 25c. Standard had a small business at steady prices, selling from $5.50@$6. Bulwer records a transaction of 100 shares at 70c.

The Tuscarora stocks were almost neglected and were weak. Argenta sold at 20c. Navajo was quiet and weak at $2.90. Elko Consolidated records small transactions at weak prices, selling from 15 10c.

In the miscellaneous list, Alice has been quiet and weak, selling from $2.40@$2. Bassick sold from $9.75@$9.50, with small transactions. Hall-Anderson was moderately dealt in at steady prices; it sold from $1@$1.05. Homestake was quiet and steady at $17.75@$17.63. Horn-Silver had a fair business at strong prices, selling from $6.25@$6.75. Northern Belle was quiet and steady, selling from $6.75@$6.50. Robinson has been very active and very weak; it sold from 64@49@51c., the business aggregating 39,700 shares. Sierra Grande was quiet and steady, selling from $1.15@$1.05. Stormont records a transaction of 500 shares at 20c.

Alta-Montana has been very active at steady prices, selling from 6@5c. Barcelona records a large business and was weak, selling from 39@34c. Caledonia sold at 62c. Central Arizona was moderately dealt in at steady prices, selling from 15@20c. Decatur records a very small business at 2c. Eastern Oregon has been fairly dealt in and has been strong; it sold from 92@98@96c. Rappahannock sold at 6c., and Red Elephant at 6c. The business in both stocks was small. Sonora Consolidated has been actively dealt in at steady prices; it sold from 24@26c.

The Tip Top Silver Mining Company, of Arizona, has levied an assessment of twenty-five cents a share, delinquent September 24th.

MEETINGS.

Baldwin Mining and Milling Company, No. 115 Worth street, New York City. Annual meeting of stockholders and election of trustees, September 11th, between three and four o'clock P.M.

Esmeralda Mining Company, No. 35 Broadway, Room 69, New York City. Annual meeting of stockholders and election of trustees, September 1st, from twelve M. until one o'clock P.M.

DIVIDENDS.

The Oxford Mining Company, of Nova Scotia, announces its regular monthly dividend (No. 6) of five per cent, payable August 25th.

The Smuggler Consolidated Mining Company, of Colorado, has declared a dividend of twenty-five cents per share, or $15,000.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway; report as follows for the week:

Friday of last week witnessed an upward movement in petroleum to $1.11⅝, though the news from the wells was bearish, and it appeared to be due principally to manipulation. The fluctuations through the week have not been very great, $1.11⅝ being the highest, and $1.07½ the lowest.

Porcupine well No. 9 has been a large producer, and being on the outer northern edge of Balltown, it is regarded as important in showing the possibilities of a farther extension of the fertile territory to the northeast, in which direction several important test-wells are now drilling. The result of this development-work ought to exercise an important influence on the future course of prices; but it will probably be two or three weeks before any thing conclusive will be known about these new undertakings.

One of the surprises of the week was the sharp advance in refined oil to 8c. on last Saturday, and an equally sharp decline Monday morning to 7⅝c. The Standard Oil Company has the control of the prices of refined oil. Rumors have been in circulation for some days about a consolidation of the Standard and tidewater companies, but the report is denied.

No great fluctuations are likely to occur during the coming week, and those who buy on a break of two or three cents, or sell on a sudden spurt, will have the best prospect for a profitable return.

The following dispatch from Titusville, Pa., has been received: The United Pipe Line Company has issued a circular to the oil exchanges of the country, proposing that they appoint gaugers to accompany the United Pipe Line gaugers on their annual inspection, in order to verify the figures given to the oil trade by the company, and to inspect its books. The net stocks held by the United Pipe Lines, according to the statement made on August 10th, were 33,995,765 barrels. The gauging of all oil-tanks will be accomplished on September 1st, and the oil exchanges will appoint ninety-one gaugers, sixteen inspectors, and a number of clerks to accompany the United Pipe Line officials. The gauge given to the trade to-day of the production of Forest County shows that the Cooper tract, with 103 wells, is yielding 3290 barrels, and Balltown, with thirty-six wells, 4790 barrels. Porcupine No. 9 is now flowing at the rate of twenty barrels an hour.

he following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 18.....	$1.10⅝	$1.11	$1.09⅝	$1.10	2,056,000
20.....	1.09¾	1.10⅜	1.09½	1.09¾	1,300,000
21.....	1.09¾	1.10	1.07¾	1.08⅛	2,743,000
22.....	1.07⅞	1.09¼	1.07⅛	1.09	2,460,000
23.	1.09⅜	1.09⅜	1.08⅜	1.08¼	1,869,000
24.....	1.08¼	1.08⅜	1.06⅞	1.07⅛	2,916,000
Total sales.					13,344,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Aug. 23.

The market for mining stocks, if the limited transactions of the past week at the regular brokers' board can be called a market, has lapsed into a state of chronic dullness, from which it will require a mighty effort to lift it. At the Boston Mining Exchange, there has been the usual trading in the two or three specialties dealt in; but there is no feature worthy of mention; in fact, a summer dullness pervades the whole atmosphere, and we can not look for much improvement, either in the volume of sales or in prices, until later in the season. In copper stocks, Calumet & Hecla sold in the early dealings at $245, but there being no orders to buy, a small lot was pressed for sale yesterday, and $241 was the result. To-day it sold at $240, and more offered at that price, with $235 as the best bid. Quincy steady at $45@$45½; but few sales were made, and the stock is not offered at less than $45½. Atlantic sold same as last week, at $10. Franklin, a small lot sold at $9½, but it is freely offered at $10, and no bids for round lots. Pewabic, firm at $3, which is bid, and none offered. The reports from this mine, as well as the Huron, continue of a favorable character. The rest of the list was neglected, and with no disposition to operate in any of the low-priced stocks.

In silver stocks, there is virtually nothing doing at the Board. Two hundred shares Catalpa at 40c., 200 Harshaw at 50c., 300 Sullivan at 87½c., and 1800 San Pedro at 25@17c. comprise all the recorded transactions for the week. At the Mining Exchange, Bowman Silver Company, at 16@18c.; Massachusetts & New Mexico, at 4@5c.; Catalpa, at 37½c., and Sullivan, at 80@92½c., are the principal stocks dealt in.

3 P.M.—There was no improvement in the market this afternoon. Closing prices: Calumet & Hecla, $245 asked. Allouez, $1¼ bid. Bonanza, $1½@$1¾. Franklin, $9½@$10. Osceola, $17 bid. Pewabic, $3 bid, $3½ asked. Quincy, $45 bid. Silver Islet, $3 bid. Sullivan, $⅛@$1. Bowman, 17c. bid. Massachusetts & New Mexico, 4@5c.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Aug. 17.	Aug. 18.	Aug. 20.	Aug. 21.	Aug. 22.	Aug. 23.
Albion	....	....	....	....	....	....
Alpha	2⅛	2	2	....	2	2¼
Alta	.55	.70	....	....	....	.80
Argenta	.25	....	....	....	....	....
Bechtel	....	....	....	....	....	....
Belcher	1	1	....	....	1	....
Belle Isle	.25	....	....	....	....	....
Best & Belcher	4⅛	4⅛	....	....	....	4¼
Bodie	.25	....	....	....	....	....
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.30	.35	....	....	....	.40
Chollar	3⅛	3⅛	....	....	....	3⅛
Con. Virginia	.60	.60	.60	....	.60	.65
Crown Point	1⅛	1⅛	....	....	....	1⅛
Elko Cons	....	....	....	....	....	....
Eureka Cons	6	6⅛	6⅛	....	6⅛	6⅛
Exchequer	....	....	....	....	....	....
Gould & Curry	2¾	3	3	....	3	3⅛
Grand Prize	.30	....	....	....	....	.25
Hale & Norcross	5⅞	6	....	....	....	6⅛
Independence	.55	....	....	....	....	....
Martin White	.25	.25	....	....	....	....
Mexican	3	3½	3½	....	3½	3¾
Mono	....	....	....	....	....	....
Mount Diablo	4¼	....	....	....	....	4¼
Navajo	2½	2¾	....	....	....	3
Northern Belle	6¼	6⅜	....	....	6⅛	....
North Belle Isle	....	....	....	....	....	....
Ophir	3¼	3¼	3⅛	....	3⅛	3
Overman	....	....	....	....	....	....
Potosi	1¼	1⅛	1¼	....	1¼	1⅛
Savage	1⅞	2	2½	....	2⅛	2¼
Scorpion	.55	.55	....	....	....	.65
Sierra Nevada	4½	4⅜	4¼	....	4¼	4¼
Silver King	....	....	....	....	....	....
Tip-Top	....	....	....	....	....	....
Union Cons	4⅝	5¼	5¼	....	5¼	5⅝
Utah	2	2	....	....	....	3
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3	3⅛	....	....	....	3¼

BULLION MARKET.

NEW YORK, Friday Evening, Aug. 24.

There is nothing new to note of the silver market. It continues tolerably firm abroad, but with sterling exchange weak and declining here.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Aug. 18	50⅛@50⅝	110⅛	Aug. 22	50⅝	110¼
20	50⅛@50⅝	110⅛	23	50⅝	110¼
21	50⅛@50⅝	110⅛	24	50⅝	110⅛@110¼

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended August 24th, as compiled from various sources, amounted to $214,000, as against $210,000, reported for the previous week. The receipts from January 1st, 1883, to date are $7,391,974.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended August 18th	$195,000
Corresponding week last year	298,435
Since January 1st, 1883	8,331,524
Corresponding period last year	42,748,698

Imports.

Week ended August 18th	$370,168
Corresponding week last year	108,161
Since January 1st, 1883	8,221,833
Corresponding period last year	2,369,962

Foreign Bank Statements.—The governors of the Bank of England have made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £243,000 bullion, and the proportion of its reserve to its liabilities was raised from 46 9-16 to 49 11-16 per cent, against 38⅝ per cent at this date a year ago. August 23d, the bank made a further gain of £59,000 bullion on balances. The weekly statement of the Bank of France shows a loss of 1,275,000 francs in gold and a gain of 1,900,000 francs in silver.

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BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of July.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	.....	‡$471,323
*Alta-Montana, G. L. S.	"	.....	§10,625
*Belmont.	"	—	12,604
Bodie, G. S.	Cal.	12,447	161,728
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	45,211	379,434
*Boston & Montana, G.	Mont.	.....	72,318
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah.	.....	145,671
*Chrysolite, S. L.	Colo.	.....	246,676
Consolidated Bobtail	Colo.	.....	18,723
*Contention, S.	Ariz.	77,985	635,413
Crescent, G.	Cal.	.....	13,000
*Custer, G. S.	Idaho.	.....	43,572
*Deadwood-Terra, G.	Dak.	.....	172,277
*Derbec Blue Gravel, G. S.	Cal.	17,122	72,270
Dunkin, S. L.	Colo.	.....	32,015
Evening Star, S. L.	Colo.	.....	47,061
*Father de Smet, G.	Dak.	30,688	208,851
*Frisco M. and S. Co., G. S. L.	Utah.	.....	$77,084
Gunnell, S.	Colo.	.....	58,828
*Head Center Consolidated	Ariz.	.....	26,502
*Head Center and Tranquillity	Ariz.	.....	60,620
*Hecla Consolidated, G. S.	Mont.	.....	293,922
*Homestake, G.	Dak.	.....	419,148
*Hope, S.	Mont.	20,484	62,447
Horn-Silver, S. L.	Utah.	300,000	1,847,000
*Howell S. and Mg. Co. G. S. L.	Ariz.	$41,361	41,361
Idaho, G.	Cal.	.....	88,642
*Independence, G. S.	Nev.	—	32,991
Iron Silver, S. L.	Colo.	.....	503,831
*Jocuistita, S.	Mex.	.....	‡228,022
*Kentuck, G. S.	Nev.	.....	12,876
*Lexington, S.	Mont.	106,068	744,556
*Little Pittsburg, S. L.	Colo.	6,446	42,091
*Marguerite, G.	Cal.	.....	45,745
*Martin White, G. S.	Nev.	—	136,317
Morning Star, S. D.	Colo.	.....	84,428
*Moulton, G. S.	Mont.	.....	123,288
Mount Diablo	Nev.	74,277	262,100
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	51,134	447,040
*Ontario, S. L.	Utah.	.....	1,038,687
*Oxford, G.	N. S.	5,276	40,531
*Phœnix, G.	S. C.	3,000	10,700
*Pinal Consolidated, S. L.	Ariz.	.....	181,485
*Satemo. G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	.....	101,241
Standard, G.	Cal.	95,209	738,401
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah.	18,020	132,330
Syndicate, G.	Cal.	9,300	38,428
Tintic M. and M. Co.	Utah.	10,595	25,196
*Tip Top, S.	Ariz.	10,009	37,868
*Tombstone, G. S. L.	"	82,960	497,199
Wyoming Consolidated.	Cal.	.....	31,541
Yellow Jacket, S.	Nev.	72,227	265,885
Total amount of shipments to date			$12,053,857

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, Aug. 24.

Copper.—There is not much change in the situation. Current demand and offerings are very moderate, and there is as yet no movement looking toward prices for the next contract sales, which are due some time next month, unless negotiations are protracted. England is unchanged.

The *American Architect* has the following on copper roofing, which is of great importance to the trade: The *Scientific American* mentions the decline in the price of copper as likely to lead to the increased use of that metal in building. At present, the material for a copper roof costs, at the outset, only about twice as much as tin, and as the latter must be repaired and painted about once in three years, and in fifteen or twenty years must be renewed altogether, the copper, which never needs painting, and is practically indestructible, is much the cheaper material in the end. There are in Boston many copper roofs, put on about forty years ago, which show no signs of deterioration; and the metal is still much employed in that city for cornices, gutters, and rain-water pipes, as well as for covering bay-windows, and in many other ways, in place of galvanized iron, which is much inferior in beauty and durability, and not very much cheaper. The copper has the additional advantage of needing no paint, so that the delicate lines o artistic work are in no danger of being filled up, and the metal increases rather than diminishes in beauty, by the slow formation of a bluish-green patina over it. For flashings, as well as other portions of roof-work, copper is much superior to zinc or tin, and with the aid of a certain amount of lead, the most difficult problems in roofing can be successfully and permanently solved.

The following are the British Board of Trade returns for the first seven months of the year:

	—Jan. 1 to July 31.— 1883. Tons.	1882. Tons.	1881. Tons.
Imports:			
Pure in pyrites	9,853	9,871	8,170
" precipitate	12,253	10,385	11,685
" ore	8,312	8,361	8,472
" regulus	5,770	4,779	3,053
Bars, cakes, etc.	20,247	16,088	18,335
	56,435	52,484	49,715
Exports:			
Raw (English)	9,736	6,870	10,989
Sheets	9,279	8,677	7,686
Yellow metal at 60 per cent.	6,646	6,475	5,192
Brass at 70 per cent	1,950	1,835	1,813
	27,611	23,857	25,680
Foreign	7,203	6,875	7,463
	34,814	30,732	33,143

Tin.—Sales during the week aggregate about 200 tons at 21@21⅛c. spot, which we quote for long lines while jobbing lots, 30 days, bring 21⅜c. London cables £93 15s. @£94.

Lead.—The deadlock in this metal continues. Offerings are light, though stocks are known to be heavy, a fact which encourages consumers in the belief that lower prices may be looked forward to. Common has been selling in jobbing lots at 4·20@4·25c.

Messrs John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is dull and quiet, and prices are unchanged. We quote: Refined lead, 4c.; and Common, 3·92½@3·95c.

Messrs. Everett & Post, of Chicago, send us the following dispatch:

In consequence of a considerable increase in the inquiry for both common and refined lead, a little more is asked by sellers. Business has, however, been only moderate in amount, transactions for the week footing up to 700 tons of common and refined. Our market is nominally 4·05@4·07½c.

Spelter.—Very little is doing. We quote 4⅝@4⅝c. nominally for good ordinary Western.

Antimony.—This metal is quiet, quotations remaining 10¼c. for Cookson's and 9¼c. for Hallett's, for jobbing lots.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Aug. 24.

The following are the quantities of iron and steel sent from Great Britain to this country for the first seven months of this year, ended July 31st:

	1881. Tons.	1882. Tons.	1883. Tons.
Pig-iron	217,641	274,171	168,801
Old iron for remanufacture	50,589	59,665	36,143
Steel unwrought	63,095	104,349	23,641
Tin plates	96,871	127,962	120,620
Hoops and sheets	16,724	18,816	19,153
Bar, angle, bolt, and rod	7,421	13,276	6,398
Railroad iron and steel	186,491	142,023	40,144

American Pig.—Business has been restricted to small lots, buyers pursuing strictly a hand-to-mouth policy. We hear of the sale of a lot of from 800 to 1000 tons, but are unable to learn the particulars. No. 1 Foundry continues firm at $21.50@$23 for standard and choice, while No. 2 is still in a less favorable position, showing occasional signs of weakness. We quote $19@$21, according to quality, while inferior to choice Gray Forge fetches from $18 @$20, all at tide-water. In Bessemer pig, another sale of 5000 tons of foreign is reported at a little less than $21 at tide-water, and $21 full is now quoted. In Spiegeleisen, sales of 2000 tons of lower grade are mentioned at $25.50@$25.75, while higher grades are quiet at $30.50.

Scotch Pig.—Business during the week has been dull at about our quotations. Arrivals are heavier this week, aggregating 2000 tons, and freights are cabled lower, 5@6s. from Glasgow.

We quote ex ship: Coltness, $23.75@$24; Langloan, $23.75@$24; Summerlee, $23; Dallmellington, $21@$21.50; Eglinton, $20.50@$21; and Glengarnock, $22.50@$23.

At the Exchange, the following slightly lower cable quotations were received: Coltness, 60s. 6d.; Langloan, 59s. 3d.; Summerlee, 57s.; Gartsherrie, 56s. 3d.; Glengarnock, at Ardrossan, 55s. 3d.; and Eglinton, at Ardrossan, 48s. 6d.

Rails.—Current business is small and unimportant. There are orders on the market for 50,000 tons of rails for delivery early in 1884; but as yet buyers and sellers have been unable to come to terms, buyers' views being in some cases as low as $36, which the mills show no eagerness to meet.

Old Rails.—Holders' views are still high, and business is limited, though inquiries are more numerous. We quote nominally $22.50@$23.

Scrap.—Spot stock and arrivals are light, and business is dull on the basis of $22.50@$23 ex ship for No. 1.

Philadelphia. August 23.

Pig-Iron.—Buyers still hold back, and sellers still refuse to make the concessions desired, to secure the placing of fall and winter orders. The situation has changed but little for the past week. Furnace-men are waiting for a demand which will at least prevent any further downward tendency, for which they say there is no room. Standard No 1 Foundry iron, tide-water quotation, $22@$23; Common, $21@$21.50; No. 2, $20@$21; ordinary makes, $19@$19.50. No large sales were closed this week. A number of negotiations are in hand, but buyers have no reason for purchasing largely, and sellers seem indifferent. Representatives of the stronger companies think buyers are making a mistake in failing to come forward when iron can be had at $17.50 at furnace, and fair No. 1 Foundry at $22. There are offers at $17 for Forge, and $21.75 for Foundry. Bessemer iron is quiet and firm at $21. Transactions for the week, 12,000 tons. Spiegeleisen, $25.50 and $31, according to per cent; sales, 4000 tons.

Blooms.—But few large buyers are around. Some sales took place at $56@$58 for Charcoal and $46@$48 for anthracite.

Merchant Iron.—Selling prices are unchanged; 2·10@2·15c. is offered; 2·15@2·20c. asked, according to size of order. The market is weak, and prices fluctuating. Manufacturers are not willing to sell good iron under 2·15c., and buyers think they can secure stocks later on at 2·10c. Small lots of Refined are firm at 2·20c.

Plate and Tank-Iron.—Plate-Iron is in fair demand for small lots, chiefly at 2·40c. for Angles, 3@3·25c. for Shell, and 4 4·25c. for Flange.

Sheet-Iron.—A fair number of small orders were placed at 4@4½c. for Common, and 6@6·50c. for Bloom Sheets. Galvanized is in good request, and large orders are in negotiation.

Structural Iron.—Makers report fair inquiry. Moderate business and firm prices at 3·50c. for Channels and Beams.

Steel Rails.—Prices are firm at $38@$38.50 for fall delivery, and negotiations are about closing for large lots for winter and spring deliveries somewhere from $36 up.

Old Rails.—Prices are quoted at $23 for Tees and $25.50 for Double Heads, with 50c.@$1 less offered. No sales heard of.

Scrap.—Scrap is dull and weak at $23@$25.

Pittsburg. August 22.

The Home furnaces are well sold up, but the outside furnaces are accumulating stocks, and the agents representing them are in town, making very attractive offers, but so far, without the desired success. There will be a steady consumption of iron during the fall; but thus far, consumers see no reason for buying more than a month or two ahead, notwithstanding some very tempting offers. Nearly all the business done is in from 100 to 200-ton lots. The highest sale of last week was for 1000 tons of Neutral Forge at $18. There were three or four sales of all-ore Forge at $19; Silvery, $18; Foundry Iron, $20@$21; Mottled Iron, $17. There are quite a number of inquiries for fall deliveries, and some fair offers, but transactions can not be closed excepting at concessions which Crop-makers are unable and unwilling to make. Crop-ends are without sale. Scrap is $13@$14 for cast bowings. Old Car-Wheels, $20. Selected Yard, $22@$23; No. 2, $21@$22. Spikes are 2·60c. Splice Bars, 1·90c. Track Bolts, 3@3·25c. Wrought Pipes are 70 and 10 to 75 off. Boiler Tubes are 57½ to 60 off. The demand for merchant steel is quite active, but for near-by requirements altogether. Prices are unchanged. Old Rails are quoted at $23. Stocks are absorbed. Muck Bars, $34. Merchant

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 18.		Aug. 20.		Aug. 21.		Aug. 22.		Aug. 23.		Aug. 24.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon..	2.40	.....	2.40	.....	2.40	.....	2.25	2.00	2.00	.....	.....	.....	1,500
Amie Con., Co.	.14	.....	.....	.....	.....	.....	.15	.14	.....	.....	.....	.....	3,000
Argenta, Ne.	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Bar. & Walker, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	9.75	.....	.....	.....	9.50	.....	.....	.....	300
Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Cons., Ca.	.....	.....	.25	.....	.....	.....	.....	.....	.25	.....	.....	.....	300
Breece, Co.	.....	.....	.....	.....	.18	.....	.21	.....	.....	.....	.23	.....	2,600
Bulwer, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.70	.....	.....	.....	100
California, Ne.	.35	.....	.....	.....	.....	.....	.....	.....	.39	.....	.40	.....	2,920
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribou Con., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.00	.....	500
Chrysolite, Co.	1.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Va., Ne.	.60	.....	.65	.57	.60	.....	.35	.33	.66	.63	.66	.65	6,650
Crown Point	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deadwood-Terra, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Dunkin, Co.	.28	.....	.....	.....	.23	.....	.....	.....	.....	.....	.....	.....	500
Eureka Cons., Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Excelsior, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Findley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gould & Curry, Ne.	.....	.....	2.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Grand Prize, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Great Eastern, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.01	.....	700
Green Mountain, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hall-Anderson, N. S	.....	.....	.....	.....	.....	.....	1.05	1.00	1.00	.....	1.05	.....	1,600
Hibernia, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	.....	.....	17.75	17.63	.....	.....	.....	.....	.....	.....	.....	.....	50
Horn-Silver, Ut.	6.50	6.25	6.63	.....	6.75	6.63	.....	.....	6.75	.....	6.75	.....	1,860
Hukill, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independence, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iron Silver, Co.	3.10	3.00	.....	.....	.....	.....	3.20	.....	.....	.....	.....	.....	1,320
La Plata, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Chief, Co.	.....	.....	.....	.....	.40	.....	.....	.....	.35	.....	.45	.40	1,700
Little Pittsburg, Co.	.70	.....	.....	.....	.....	.....	.65	.60	.60	.....	.....	.....	625
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	50
Moose, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	.....	.....	.....	.....	.....	.....	2.90	.....	.....	.....	.....	.....	200
Northern Belle, Ne.	.....	.....	.....	.....	.....	.....	6.75	.....	6.50	.....	.....	.....	400
North Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario, Ut.	30.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	31.50	29.25	150
Ophir, Ne.	3.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Plumas, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca.	33.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
" Com., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rising Sun, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson Cons., Co.	.64	.63	.63	.62	.62	.60	.61	.60	.60	.57	.57	.49	39,700
Saint Joseph's Lead.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.80	.....	100
Sierra Grande, N. M.	.....	.....	1.15	.....	.....	.....	1.05	.....	.....	.....	1.05	.....	2,500
Sierra Nevada, Ne.	4.00	.....	.....	.....	4.20	.....	.....	.....	.....	.....	4.10	.....	225
Silver King, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	.....	.....	6.00	.....	.....	.....	5.50	.....	6.00	.....	6.00	5.50	360
Stormont, Ut.	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 18.		Aug. 20.		Aug. 21.		Aug. 22.		Aug. 23.		Aug. 24.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alta-Montana, c.	.06	.05	.06	.05	.05	.....	.05	.....	.06	.....	.05	.....	10,100
Am. Flag, s.	.39	.38	.....	.....	.38	.....	.....	.....	.37	.....	.37	.34	18,100
Barcelona, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bear Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'icher, c. s.	.....	.....	3.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
Big Pittsburg, s. L	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradshaw, s.	.....	.....	.26	.....	.....	.....	.....	.....	.....	.....	.....	.....	700
Buckeye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, s.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bye and Bye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calaveras, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
C'lav'r's W.&M.Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., c.	.....	.....	.....	.....	.....	.....	.....	.....	.62	.....	.....	.....	100
Central Ariz'na, s.	.20	.15	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	600
Cherokee, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Climax, Co.	.09	.....	.09	.....	.....	.....	.....	.....	.10	.....	.....	.....	2,700
Cons. Imp'ri'l, s.s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	500
Crowell, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dahlonega, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	.....	.....	500
Dunderberg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastern Oregon	.94	.92	.95	.94	.95	.94	.96	.95	.96	.95	.98	.96	8,200
Elko Cons.	.15	.14	.14	.....	.....	.....	.....	.....	.12	.11	.10	.....	3,200
Enterprise	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fannie Barret	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Globe Copper	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Placer, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granville, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M.& M.Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hortense, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Imperial	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, c.	.09	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Lucerne	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, c. s.	3.35	.....	.....	.....	.....	.....	.....	.....	3.75	.....	.....	.....	300
Miner Boy	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, s L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pri'nt'l & Miller, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Parnell	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quartz Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, c.	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,500
Red Elephant, s.	.06	.....	.....	.....	.....	.....	.....	.....	.06	.....	.....	.....	200
Ruby, of Arizona.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con.	.25	.24	.....	.....	.26	.25	.26	.....	.25	.....	.26	.25	12,600
South Bodie, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, s.	.....	.....	.....	.....	.03	.....	.....	.....	.....	.....	.....	.....	500
Sutro Tunnel	.20	.....	.....	.....	.19	.....	.20	.....	.21	.20	.20	.....	6,150
Taylor-Plumas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, s.	.....	.....	.....	.....	.....	.....	.....	.....	.01	.....	.....	.....	200
Union Cons., c. s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 71,710. Non-dividend shares sold, 70,300.

BOSTON MINING STOCKS.

	Aug. 17.		Aug. 18.		Aug. 20.		Aug. 21.		Aug. 22.		Aug. 23.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic	.....	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	25
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Bonanza D.	1.63	.....	.....	.....	.....	.....	1.63	.....	.....	.....	1.63	.....	300
Bowman Sil	.17	.16	.17	.16	.18	.16	.17	.....	.17	.....	.17	.....	19,400
Bruna. Ant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.70	.....	.....	.....	.....	.....	.....	.....	100
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hec.	245	.....	.....	.....	.....	.....	.....	.....	241	.....	240	.....	21
Catalpa	.....	.....	.....	.....	.....	.....	.40	.37½	.37½	.....	.....	.....	1,500
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Climax	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Co. Virginia	.....	.....	.....	.....	.62	.....	.60	.....	.....	.....	.....	.....	500
Copper F'lis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copperop	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent	.....	.....	.....	.....	.15	.....	.....	.....	.15	.....	.15	.....	400
"Cust"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deer Isle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.04	.....	1,000
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas	.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Duncan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin	.24	.....	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	300
Empire	.....	.....	.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Eureka Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin	9.75	.....	.....	.....	9.75	9.50	.....	.....	.....	.....	9.75	.....	65
Hancock G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harshaw	.....	.....	.50	.....	.50	.....	.....	.....	.....	.....	.....	.....	300
Hukill	.....	.....	.....	.....	.04	.....	.....	.....	.....	.....	.....	.....	1,100
Independ'ce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Q'n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth	.03	.....	.04	.03	.....	.....	.....	.....	.....	.....	.02	.....	19,750
Mass. & N.M.	.04	.....	.05	.04	.05	.....	.05	.04	.05	.....	.....	.....	15,000
Milton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North. Belle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn-Breck	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewabic	3.00	.....	.....	.....	.....	.....	3.25	.....	.....	.....	.....	.....	125
Pine Tree	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicks.,com	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy	.....	.....	45.00	.....	45.50	.....	45.50	45.00	45.38	.....	45.50	.....	137
Robinson	.....	.....	.....	.....	.....	.....	.63	.....	.....	.....	.62	.....	300
San Pedro	.25	.....	.20	.....	.20	.....	.....	.....	.....	.....	.17	.....	1,800
S'ra Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S'ra Grande	.....	.....	1.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Silver Islet	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver King	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simpson Gd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
So. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard	6.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Sullivan	.....	.....	.....	.....	.85	.80	.85	.80	.87½	.84	.92½	.87½	2,900
Sutro Tun.	.20	.....	.....	.....	.20	.....	.....	.....	.....	.....	.20	.....	500
Sycamore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	Aug. 17.		Aug. 18.		Aug. 20.		Aug. 21.		Aug. 22.		Aug. 23.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Argent	.15	.14	.14	.....	.16	.....	.....	.....	.....	.....	.....	.....	7,300
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Battle Mt.	.....	.....	.....	.....	.03	.....	.....	.....	.....	.....	.....	.....	1,000
Buena	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calista	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati	.11	.10	.10	.09	.....	.....	.....	.....	.....	.....	.....	.....	8,700
Comprom'e	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Contention	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virg.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dauntless	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del Monte	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Denver City	.....	.....	.....	.....	.11	.....	.....	.....	.....	.....	.....	.....	2,500
Eureka	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Girard	.03	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Governor	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Grand Uni'n	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Green Mt.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gunnison	.27½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Homestake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horn Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch	.05	.....	.06	.....	.05	.....	.....	.....	.....	.....	.....	.....	13,000
Iron Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd.	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000
Little Maud	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L'g & D'y H	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Sheridan	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500
National	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North'n B'l.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion Pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palmetto E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn-Breck	.06	.05	.10	.05	.09	.....	.....	.....	.....	.....	.....	.....	19,100
Permanent	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro Ex.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potosi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rara Avis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rara Avis E.	.08	.....	.08	.....	.08	.....	.....	.....	.....	.....	.....	.....	8,300
Record	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rico Plon'r.	.....	.....	.....	.....	.....

iron is weak and dull, with indications of a stronger competition, which will probably depress prices to 1·80c. Nails are in fair demand at $2.90.

COAL TRADE REVIEW.

NEW YORK, Friday, Aug. 24.

Anthracite.

The future course of the coal companies is a matter which is discussed with considerable anxiety just now, and there is considerable complaint in the trade that the consideration of the interest of many of the magnates to sustain their operations in Wall street and other financial centers is more potent than the regard for the interests of the trade. Every effort is made on the part of some to create the impression that the anthracite coal trade is enjoying a period of unalloyed prosperity, which will warrant not only a continuance of the present heavy production, but also an upward movement in prices. A number of the New York companies, which are not forced to take extraordinary measures to meet current obligations, appear willing to face the situation as it is and take the course which a wise business policy dictates. Some of them are accumulating coal, having a large quantity afloat in this harbor, and a large number of cars standing on the tracks. Even with the concessions they may be willing to make, they can not market all their coal freely. If buyers merely held off because they believed that there would be a better chance to put in supplies later, it would be a good plan to put up the nominal circular prices, and scare the unwilling into ordering or make them pay more later on. The fact is, however, that the quantity of coal used by one important element in the trade is less than it was last year. So far as the Eastern manufacturers are concerned, it needs no more eloquent proof of their position than to point to the great auction sales of dry goods the other day. It is true that the East is the weakest spot in the country, but it can not be denied that throughout New York, New Jersey, and Pennsylvania the manufacturing industries are in a less degree restricting work. The West is loaded up with coal, and at Buffalo there are miles of loaded cars upon which advances have been made. It will not do, therefore, to argue that the Western markets can be stocked to harden prices elsewhere. In this vicinity, retailers have bought as much as they care to take for the present at June prices, and some of them have bought for delivery to the end of this month. With these facts before them, it is not astonishing that there are many who are unable to see that it would do any good to go on producing at the present rate and at the same time announce higher circular rates. The latter are out of the question on those sizes which come into competition with low-priced bituminous coals. For other sizes, it is possible only by curtailing the production, at least temporarily. The position of the coal trade to-day is not much better or any worse than that of any other leading industry, and the efforts to make the public believe that it is exceptionally situated can only react unfavorably upon it. Those in the trade know enough of the actual situation. A single effort to buy cheaply or to place a lot of coal with a buyer will reveal it. Those who want to buy will simply restrict their requirements, if an effort is made to put up the price without restricting the supply.

Bituminous.

There is nothing new in bituminous coal.

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended August 18th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	3,341	68,188	55,694
Coal for shipment at South Amboy	11,735	488,822	528,482
Coal for distribution	14,471	488,266	442,262
Coal for company's use	3,152	98,788	79,408
Total	32,699	1,142,064	1,105,846
Increase		36,218	
Decrease			

Comparative statement of the production of anthracite coal for the week ended August 18th, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	93,181	2,333,846	79,685	2,097,951
D. L. & W. RR. Co.	121,223	2,954,786	109,564	2,742,072
Penna. Coal Co.	36,130	844,522	33,161	826,485
L. V. RR. Co.	24,687	834,678	42,406	676,565
P. & N. Y. RR. Co.	5,152	128,400	3,875	122,515
C. RR. of N. J.	*	1,202,078	38,651	1,432,577
Penna. Canal Co.	16,703	253,469	15,123	273,956
North & West Br. RR.	6,870	280,919	.....	.....
	306,949	8,832,698	322,465	8,172,121
Lehigh Region.				
L. V. RR. Co.	104,228	2,970,377	98,912	2,902,879
C. RR. of N. J.	*	1,126,889	49,752	1,349,383
S. H. & W. B. RR.	2,380	36,577	.....	40,987
	106,608	4,133,843	148,664	4,293,249
Schuylkill Region.				
P. & R. RR. Co	160,220	4,314,546	141,551	4,044,149
Shamokin & Lykens Val.	34,112	885,083	31,205	756,522
	194,332	5,199,629	172,756	4,800,671
Sullivan Region.				
St Line&Sul.RR.Co.	1,098	38,513	590	35,125
Total	608,987	18,204,683	644,475	17,301,166
Increase		903,517		
Decrease				

* Included in tonnage of Philadelphia & Reading Railroad.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878 ..... 9,674,392 tons.
" " " " 1879 ..... 15,374,328 "
" " " " 1880 ..... 13,195,348 "
" " " " 1881 ..... 16,798,470 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 560,453 tons, as compared with the corresponding period in 1882.

The Production of Bituminous Coal for the week ended August 18th was as follows:

Tons of 2000 lbs., unless otherwise designated

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	59,225	1,494,909
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,791	195,069
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,102	114,584
East Broad Top	267	26,409
Clearfield Region, Pa.		
Snow Shoe	4,441	147,195
Tyrone and Clearfield	49,548	1,758,545
Alleghany Region, Pa.		
Pennsylvania RR.	8,245	273,536
Pittsburg Region, Pa.		
West Penn RR.	4,251	260,748
Southwest Penn. RR.	1,992	66,580
Penn & Westmoreland gas-coal, Pa. RR	36,315	857,940
Pennsylvania RR	15,247	353,636
Total	189,424	5,549,151

The Transportation of Coke over the Pennsylvania Railroad for the week ended August 18th, and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	956	54,663
West Penn. RR.	1,310	65,837
Southwest Penn. RR	43,130	1,305,929
Penn. & Westmoreland Region, Pa. RR	3,600	140,246
Pittsburg, Penn. RR.		501
Snow Shoe (Clearfield Region)	192	12,206
Total	49,188	1,579,382

The Horsford Almanac and Cook Book mailed free on application to the
RUMFORD CHEMICAL WORKS,
Providence, R. I.

DIVIDENDS.

HOMESTAKE MINING COMPANY, MILLS BUILDING,
NEW YORK, Aug. 13, 1883.

DIVIDEND NO. 60.

The regular monthly dividend of FORTY CENTS per share has been declared for July, payable at the office of the Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad street, on the 25th inst.
Transfer-books close on the 20th inst.
LOUNSBERY & HAGGIN, Transfer-Agents.

SAN FRANCISCO, Aug. 4, 1883.

THE BODIE CONSOLIDATED MINING CO. this day levied assessment No. 3 of 50 cents per share, delinquent September 10th. Sale day, October 10th. Same may be paid at the office of Laidlaw & Co., 14 Wall Street.
GEO. W. SESSIONS, Secretary.

WANTED.—A SITUATION; FIFTEEN years' experience in smelting, refining, and assaying lead, copper, and silver and gold. Speaks English, Welsh, French, and Spanish. Highest testimonials as to character and ability. Address,
C. M., Denver, Colo.

TIP TOP SILVER MINING COMPANY.

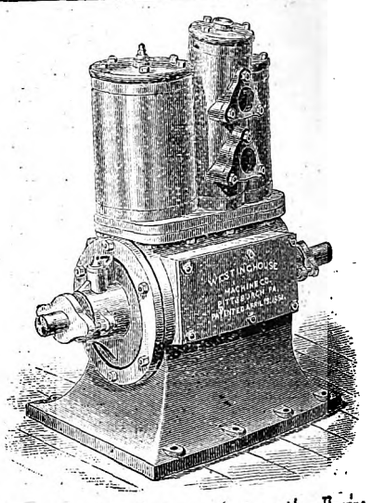
Location of principal place of business, San Francisco, California.

Location of works, Yavapai County, Arizona Territory.

NOTICE IS HEREBY GIVEN that, at a meeting of the Board of Directors, held on the 16th day of August, 1883, an assessment (No. 7) of TWENTY-FIVE (25) CENTS per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary at the office of the company, Room 44, Nevada Block, No. 309 Montgomery Street, San Francisco, California, on all certificates of stock issued at San Francisco, and at the Farmers' Loan and Trust Company, Nos. 20 and 22 William Street, New York City, on all certificates issued at New York.

Any stock upon which this assessment shall remain unpaid on
MONDAY, THE TWENTY-FOURTH (24th) DAY OF SEPTEMBER, 1883,
will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, THE TWENTY-SECOND (22d) DAY OF OCTOBER, 1883, to pay the delinquent assessment, together with cost of advertising and expenses of sale. By order of the Board of Directors. HENRY DEAS, Secretary.

Office: Room 44, Nevada Block, No. 309 Montgomery Street, San Francisco, California.



The Westinghouse Automatic Engine.

THE PROOF OF THE PUDDING IS THE EATING!

LIST OF SALES FOR JULY, 1883.

Hussey, Howe & Co. Rolling-Mill, Pittsburg, Pa.	125 H.P.
Oliver Bros. & Phillips, Wire-Mill, " "	65 "
C. H. Hobbs, Saw-Mill, High Point, N. C.	65 "
American Certaldo Marble Co., Pittsburg, Pa.	50 "
Mutz & Cassidy, Planing-Mill, Ferris, Tex.	50 "
Blakeman & Dobson, Planing-Mill, Rockford, Ill.	50 "
C. L. Blakeslee, Planing-Mill, Schenectady, N. Y.	50 "
P. M. Brown, Flour-Mill, Mill Bridge, N. C.	40 "
Johnson & Caldwell, Oil-Mill, Hillsboro, Tex.	40 "
W. W. Cloud, Saw-Mill, Blythewood, S. C.	40 "
Utica Match Co., Utica, N. Y.	40 "
C. C. Ball, Saw-Mill, Alexandria, La.	40 "
Agard & Co., Flour-Mill, Rockford, Ill.	40 "
Cornish & Curtis, Planing-Mill, Ft. Atkinson, Wis.	30 "
G. H. Blood, Oil-Mill, Pine Bluff, Ark.	30 "
Henry D. Mentzle, Paper-Mill, Ellicott City, Md.	30 "
C. H. Parmalee, Stamp-Mill, Dadeville, Ala.	30 "
J. W. Bullock, Ginning, Calhoun, Ala	30 "
Barr & Peterson, Saw-Mill, Portland, Oregon	30 "
Hudson Lumber Co., Hudson, Wis.	30 "
B. F. McClenden, Ginning, Alvarado, Tex.	20 "
Stonewall Mfg. Co., Cotton-Mill, Enterprise, Miss.	
John R. Miller & Co, Hat Manufactory, Reading, Pa.	20 "
Yale & Towne Mfg. Co., Cranes, Stamford, Conn.	20 "
W. Burgis, Printing, Chicago	20 "
S. H. Ferguson, Ginning, Franklin, Tex.	
H. J. Burton & Co., Electric Light, Minneapolis, Minn	20 "
Niles Paper Mill Co., Niles, Mich.	20 "
S. B. Newman, Ginning, Port Sullivan, Tex.	20 "
J. G. Powledge, Ginning, Aubrey, Tex.	12 "
C. & H. N. Talley, Ginning, Fairfield, Tex.	
Indianapolis Malleable Iron Co., Indianapolis, Ind	12 "
Muhlenberg & West, Machinists, Reading, Pa.	12 "
S. F. Haviland, Planing-Mill, Calera, Ala.	12 "
S. R. McCarty, Ginning, Calvert, Tex.	8 "
W. W. Cook, Ginning, Fort Valley, Ga.	8 "
G. W. Parsons, Rotary Pump, Salisbury, Md.	8 "
J. D. Malone, Ginning, Bethel, Tex.	4 "
John C. Wootten, Philadelphia, Pa.	
Steamer Josie Harry, Electric Light, Memphis, Tenn.	4 "
Steamer Maggie Burke, Electric Light, Mobile, Ala.	4 "
Noah Mitchell, New York	4 "
Jacksonville Gas Co., Jacksonville, Ill.	1,230 H.P.
Total	

Over 11,000 Horse-Power Now in Use.

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THE ENGINEERING AND MINING JOURNAL.

Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXVI. No. 9.

RICHARD P. ROTHWELL, C.E., M.E., ROSSITER W. RAYMOND, Ph.D., CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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FILE COVERS will be sent by mail for $1.25 or delivered at office for $1 each.

Advertising Rates.—See page vii.

Mr. C. A. Green is our accredited representative for New York.

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MR. J. WENTZ WILSON, mining engineer, has left for Battle Mountain, Nevada, to examine properties in that vicinity. During his absence, communications should be addressed to him there.

THERE has been a "break" in the English steel rail market, and our contemporaries are deploring the fact that rails have been selling f. o. b. at £4 per ton. They do not see much of a chance for an improvement when the capacity is so much in excess of the demand, and, as the only way out of the dilemma, speak of the more extended use of Bessemer steel for other purposes than for rails.

IN spite of the fact that business is so depressed, the demand for the services of engineers of ability and experience is apparently greater now than it has been for some time. Applications come to us in greater number than usual, while those who are seeking employment are few. During the past week, we hear of two instances in which lead smelters are wanted, and to-day comes to us an inquiry for a chemist of experience, capable of doing the work required in a metallurgical establishment, in this case a gold chlorination-works.

WE are pleased to note that the long and vigorous agitation of the use of pyrites for acid manufacture is bringing out good results. We understand that the Davis mine in Massachusetts, whose ore was referred to in our issue of May 5th, is now producing at the rate of 2000 tons a month, and is selling not only in the Eastern States, but also in Baltimore. The company controlling the mine is in a position to contract for large quantities, and is taking the wise measure of doing all it can to aid manufacturers in putting up suitable plants for burning and running them.

DURING the present year, coke has made startling inroads into the foundry trade of anthracite coal in the Eastern and Middle States, where formerly the best grades of Lehigh lump were used to melt the iron in cupolas for machinery and stove castings. Connellsville, Snow-Shoe, and other cokes are so extensively used that not more than one quarter or one fifth of the quantity of anthracite used years ago is consumed. The low price of the coke and the comparatively stiff figures for the anthracite have, of course, brought about this revolution. It is likely that the difference between the price of the two grades of fuel will not remain so great for any length of time ; but the new rival is undoubtedly in many respects better suited for the purpose, and it will be difficult to dislodge it.

JUDGE BLATCHFORD has recently rendered a decision in the case of the Gramme Electric Company against the Arnoux & Hochhausen Electrical Company, which is of great interest to foreign patentees or purchasers of foreign patent rights. The Gramme Company controls the patents for the well-known Gramme dynamo-electric machine, and brought an action for infringement against the defendants, who pleaded that, as the Gramme patent in Austria had lapsed in 1880, the American patent expired at the same time. Judge BLATCHFORD sustained their view, thus confirming the position he has repeatedly taken under similar circumstances on former occasions. There can be no doubt that this interpretation of our patent laws subjects to a good deal of hardship those innocent buyers of foreign patents who are unacquainted with the danger they run, and often have no control over the manner in which the patent is handled in other countries. It increases the difficulties which foreign patentees must encounter in placing their inventions on our market, and teaches those who undertake the risk and labor of introducing them after acquiring the rights, that they must guard their movements with the utmost caution.

THE Bureau of Statistics has just issued its bulletin for the month of June, thus completing the figures for the fiscal year. A comparison of the data of this period with the year preceding it is of considerable interest, because in many respects the early summer of 1882 marked the beginning of the period of depression and liquidation, which, let it be hoped, has passed its climax now. Turning first to our imports of iron and steel, we abstract the following table :

IMPORTS OF IRON AND STEEL.

	1883.	1882.
Pig-iron, net tons	485,634	555,570
Castings, net tons	1,834	1,627
Bar-iron, net tons	58,435	75,197
Boiler iron, net tons	30	342
Band, hoop, and scroll, net tons	5,877	1,747
Iron rails, net tons	5,853	91,104
Sheet-iron, net tons	11,717	10,652
Old scrap-iron, net tons	70,964	177,020
Anchors, cables, etc., net tons	1,165	1,760
Steel rails, net tons	126,377	240,024
Steel ingots, bars, sheets, and wire	$12,204,945	$13,341,052
Machinery	2,228,732	2,027,340
Fire-arms	1,453,225	1,498,910
Cutlery	2,113,065	1,959,973

With a few exceptions, in which the increase is insignificant, there has been a falling off in our purchases from foreign competitors. The heaviest item on the list remains steel in various forms, as ingots, rods, etc., and the new tariff leaves no hope that there will be an early reduction in the figures. Old iron, pig, rail, and bar have all fallen off materially, and a comparison of the calendar years 1882 and 1883 will, we know, show a further decline.

The re-exports of foreign iron and steel are comparatively unimportant, the only heavy item being steel rails, of which 36,433 tons were reshipped in 1883, against 22,301 tons in 1882, thus bringing the net imports in 1883 below 100,000 tons.

The exports of iron and steel of domestic manufacture cut a sorry figure, the only redeeming feature being the growth of the export trade in machinery, edge-tools, fire-arms, and railroad stock, much of which, of course, went to Mexico. The following table gives the figures :

EXPORTS OF IRON AND STEEL.

	1883.	1882.
Pig-iron	$140,427	$194,411
Bar-iron	69,278	41,820
Iron rails	10,291	142,122
Castings	299,830	377,997
Car-wheels	184,614	118,195
Stoves	239,222	184,408
Locomotives	2,219,081	1,455,717
Stationary engines	191,208	111,199
Boilers	226,977	146,322
Machinery	6,223,029	5,525,948
Nails and spikes	354,065	335,820
All other manufactures of iron	5,918,610	6,084,365
Cutlery	102,100	92,031
Edge-tools	1,203,971	1,023,276
Fire-arms	1,097,934	907,957

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The movement in metals has undergone considerable change during the year:

IMPORTS OF METALS.	1883.	1882.
Tin, cwts.	237,814	186,616
Copper ore, cwts.	527,394	163,819
" " value	$122,536	$157,708
Pig copper, lbs.	323,987	744,566
Manufactures of copper	$236,719	$315,475
Lead, net tons	2,751	3,777
Spelter, net tons	8,662	9,214
Sheet-zinc, net tons	1,650	2,132

It will be noticed that there has been a very large increase in the imports of tin; and this is rendered more striking when it is stated that the re-exports were only 1177 cwts. in 1883, against 23,144 cwts. in 1882, thus making the net supply 226,537 cwts. in 1883, against 163,472 cwts. in 1882. The imports of copper are insignificant, while ore, though increasing heavily in quantity, owing to the imports chiefly of Canadian pyrites, fell off a little in value. Spelter and sheet-zinc exhibit a falling off in the beginning of this year. The movement has now practically ceased, owing to the exceedingly low prices of the domestic article.

As the following table will show, our exports of metals have been satisfactory chiefly as regards copper:

EXPORTS OF METALS.	1883.	1882.
Copper ore, cwts.	112,923	25,936
" " value	$943,771	$89,515
Pig and old copper, lbs.	8,221,363	3,340,531
" " value	$1,293,947	$565,295
Manufactures of copper	$110,286	$93,646
" " brass	$287,847	$322,439
Sheet and pig-zinc, tons	426	750

It will be noticed that the value of the ore shipped abroad has increased more than ten-fold, and considering that the heavy export has begun only during the past few months, June alone being credited with $206,602, it will be understood that at the end of the year a very respectable tota will be reached. It must be a source of regret to all who have the growth of our home industries at heart to see upward of two millions of raw material leave the country to be manufactured elsewhere and distributed over the world, while we, with a plant unrivaled anywhere, and with superior skill in manipulating and shaping the metal into graceful forms, can not command a market for more than a fraction of the finished articles. Our miners have proved their ability to compete with any producing country in the world. The time has now come for our manufacturers to prove that they are able and willing to do their share.

GLASS FROM GRANULITE.

The manufacture of "pale metal" glass from the rock known as granulite has been carried on successfully by F. SIEMENS at Dresden, Saxony, and at Elbogen, Bohemia. The superiority of the glass and the great economy of production have secured to him a very large share of the bottle trade of the continent; the output of his works during the year 1880 having been about twenty-two millions of bottles, which has since nearly doubled in number annually.

It is now proposed to establish works in England to manufacture glass extensively from a deposit of granulite which has been discovered at Meldon, Devonshire, and using the Siemens process. Mr. SIEMENS, to whom a sample was sent, wrote approvingly of the quality as follows: "The small piece of granulite seems every thing we could wish for. If that kind of stone is to be found in large quantities, and of a uniform character, and easily to be got, it might prove quite a treasure, as it consists almost exclusively of silica and alkaline matter, with perhaps 15 per cent of alumina and but little iron."

These are the essential qualities of granulite for glass-making. The rock is generally classed as a member of the granite family. It consists mainly of quartz and orthoclase feldspar, and is either granular or schistose. It is sufficiently rich in the alkalies to fuse and to make a pale green glass, if a little lime is added sufficient to secure a perfect fusion of the quartz. The rock is nearly white, and in fact is known by the Germans as *Weiss-stein*. It should not contain much iron; the Saxon variety does not contain over 0·71 per cent. Similar rock, or rock which would serve equally well for the manufacture of glass, is found in Canada and in California, and probably in New England.

The economy in the use of the rock over the use of the ordinary sand and alkali is shown by Mr. SIEMENS, who states that, at his works in Dresden, the batch for ordinary green glass with granulite costs 8d. per hundredweight, and gives 93 per cent of glass; while the batch with sand costs 13d. per hundredweight, and yields only 67 per cent of glass; consequently glass from granulite costs only 8½d. per hundredweight, while that from the sand batch costs nearly 20d. or more than double, if calculated upon the glass. There are, besides, advantages in favor of the granulite in respect of fuel, labor, and wear and tear of furnaces.

In the prospectus of the English company, it is stated that the deposit at Meldon has been examined by W. F. RUTLEY, F.G.S., who finds it to be in quantities sufficient to supply any likely demand for glass manufacture in England for the next thirty years. It is proposed to put up the works at Swansea, and to connect the quarry at Meldon by a siding with the London and Southwestern railroad system by which the granulite will be taken to the port of Fremington, to be sent thence by water at small cost to the works at Swansea. The advantages of this location rest in cheap coal, limestone, and labor, with works already built, excepting SIEMENS'S continuous melting-tanks, which are to be added, a license having been obtained from Sir WILLIAM SIEMENS. The company proposes to make, not only bottles in large numbers, but glass castings, as substitutes for woods and metals. Among other articles, millstones, gas and water-pipes, and even railroad ties are enumerated.

These facts should stimulate a search in this country to determine whether deposits of magnitude of suitable granulite are favorably located for transportation to make their development practicable and profitable.

FROM HANCOCK TO ONTONAGON.

Special Correspondence of the Engineering and Mining Journal.

The superabundance of water, this year, has been helpful to many of the copper mines. The Allouez, Peninsula, and Wolverine have been especially benefited, although the first and last could hardly be said to be in want before. However, the Allouez, to do the work of the future, stands in need, quite possibly, of more water than has been available during the past few years. This mine had its regular set-back about the middle of July, by a fire in the stamp-mill, which threatened to prove a serious catastrophe. The blaze was quickly extinguished, and, excepting some incidental damages to the roof, the mill escaped without any injury. The record of the Allouez for June and July is the most satisfactory for years. The showing of mineral for June, nearly 112 tons, was the largest in the history of the mine, and, as I am informed from most trustworthy sources, was produced with an ease hitherto unknown. No. 3 shaft is in copper ground, and is able to take its share of hoisting other cupriferous ground which has formerly been done solely by No. 2. This makes the burden of No. 2 much lighter, or at any rate much more profitable. By economical and skillful handling, the mine is able to send more rock down to the stamps, and at distinctly less prices than ever before. This will be good news for the patient friends of the Allouez, and is thoroughly reliable. This mine has long been under a cloud, and has equally long deserved better than it has had. The ground is lean, scarcely ever at all fat, and very hard withal; the lode is very wide, the copper in small particles, and much has to be done for little; but its present facilities for work are very excellent; its hoisting and crushing plants are very complete; it has a new locomotive, and were its stamp building a little more steady, it would have nothing—except copper—to be desired. The Allouez is promising, though in fairness it ought to be said not immediately flattering. It has enough water at the stamps for twice as many heads, and can now do work for all there is in it. Its neighbor, the Wolverine, seems to be going higher in public estimation as it goes deeper into its well-charged lode, although the real value of the lode is yet a matter of hypothesis. It is publicly stated that this mine can produce copper at 10 cents per pound. But this must be taken *cum grano salis*: it may reach such a figure for a few days, or even a few months; but such a rumor must not be taken as any probable basis for calculating the future of the property. The output for July, however, was in excess of the Peninsula by about 31,000 pounds—a very creditable showing, indeed, although the aggregate for 1883 falls below the Peninsula by some 130,000 pounds. The Peninsula is putting in a new head of Ball stamps, and, with the additional capacity which this will insure, will push its way steadily to the front of the smaller mines. It is spending money quite freely in proving up the various unexplored belts which cover its property, but is more than paying its way, I understand, from the proceeds of the old conglomerate beds. The history of the Peninsula before its re-christening—say from 1865 to 1869—would be a profitable text-book for the directors of at least one other Lake Superior copper mine to study. The old Boston & Albany was ruined by excessive surface expenditure before the value of the beds had been thoroughly proved up, and a warrant for the outlay found in the tangible resources of the copper belt. In this, too, the Wolverine furnishes a good illustration of legitimate development, increasing its plant as it has found reason for such action in the actual showing of the mine.

The Calumet & Hecla is putting in a new hoisting-plant at the Calumet end, thus holding its jumbo as a canvass-backed curiosity, and introducing a horizontal Corliss to do the work for which the jumbo was originally designed. Improvements are also making at the Hecla engine-house, which connects with the hoisting and compressing machinery. The electric lights from each of the two poles are said to be visible from the decks of steamers shortly after clearing from Duluth. It is wrong to say that the Calumet & Hecla intends swamping the other mines when its new Leavitt stamps are ready for action. These powerful heads are put in to economize and facilitate the milling of the rock; and it is probable that this gigantic property, conscious of its ability to crush the backbone of its humble neighbors, if it comes to a case of dog eat dog, will pass them by as the larger Spanish mines do their modest competitors, content with its lion's share, and allowing each dog to have his bone. Of course, if the Western mines infringe too much, it may put in a rejoinder by way of an unprecedented output and unprecedented economy in the management at this end of the property; but for the present, at least, these are both improbable and irrelevant. Few corporations pay such wages as the Calumet & Hecla. Indeed, the wages question forms no stumbling-block at all in the path of the mine to the very highest financial success. The enormous reserves of the company do not make economy either in wages or construction essential to its annual dividends of $2,000,000, and it can not be truthfully said that economy is to any appreciable degree practiced. The stockholders do not seem to put in any disclaimer, although a very respectable company of speculators left it, not long since, to put their funds into telephone stock as being more remunerative and no less sure. But in the other mines, the wages fund cuts a very important figure, although by no means as important as before the introduction of power drills and compressed air. The relation of the construction account to the year's expenditures was at least casually presented in a former letter. The wages question has regulated itself, and needs now to be referred to

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only as a matter of history. There has been a general reduction through the Houghton and Keweenaw mines of about twelve and a half per cent, although in several instances, where wages were already at hard pan, it falls somewhat short of this. A reduction in wages in Ontonagon would have been impossible, unless the miners had turned farmers, and I learn of no very considerable falling off in the year's expenditures in that quarter. It ought to be remarked, in passing, that the question of explosives is now one of importance approximating to that of wages. There is some incoherent talk of a combination among the mines to manufacture their own giant powder on the co-operative plan, and thus reduce the prices at which it is now maintained by powerful monopolies. A reduction in the cost of explosives, together with the reduction in coals which has already set in, would lift a burden from the mines, which, though so far not intolerable, is very embarrassing, and help them to undertake the future mining of copper on a basis of competition in the markets of Europe.

The Tamarack, which, you will remember, is making a vertical plunge of something over 2000 feet after the Calumet & Hecla conglomerate, is going steadily on downward to its prize; a little slowly of late, averaging not quite thirteen feet, but now again at its old pace of from fifteen to seventeen feet per week. It has already passed through several more or less heavily charged copper belts, at least one of which is worth working. The Allouez lode, which some were expecting would be struck very rich in the Tamarack, was passed at something over a hundred fathoms, but was pinched out to a mere sandwich. At the present rate of descent, the shaft will be half-way down by the close of the year; and in another year and a half, the Calumet & Hecla conglomerate will be tapped and the work of developing the property begun. There are some outsiders who still regard the scheme as chimerical; but the cost and the rate of descent have thus far been much within the estimates upon which the experiment was inaugurated. I am told that the ventilation thus far could not be improved, and, barring out the death of a Finlander who fell into the shaft several months ago, no accident has occurred on the property. The mine makes little water—none at all, I believe, after the first three hundred feet. Apropos of the Tamarack, it will be interesting to the readers of the ENGINEERING AND MINING JOURNAL to know that a cross-cut driven in the Osceola (in whose office reposes the management of the Tamarack) has opened up a belt which, under a test process of drifting, has furnished a considerable quantity of barrel and stamp copper, although the extent and value of the find are not as yet known—at least to me. The Osceola is laying the foundations for a new head of Ball stamps at its mill in Hancock, and will soon materially increase its output, which is already in excess of last year.

Very little is doing at the Phœnix, although the fabled bird is far from giving up the ghost. A party of virtual tributers, at the head of which is Hon. Charles Briggs, of Calumet, has the mine in hand for liquidating indebtedness. The mine is said to have produced over 450,000 pounds thus far in 1883; and if the output had continued uniform until the winter holidays, it would have reached a higher figure than any year since 1877. Doubtless, the mine would have continued to work more or less strong if the prices of January had been maintained; but the Phœnix has, for the present at least, been compelled to succumb under the pressure of an export market. It is said by trustworthy persons that better days are in store for the Phœnix; but it is hard work to recuperate after an onslaught of tributers has been made on the galleries of a mine, since tributers raise their funds as Indians do their trophies, by scalping their victims. The Phœnix has had an eventful history, and all who are acquainted with the history of Lake Superior mining will wish this old and finely situated property a future as remunerative as its past has been discouraging and disastrous. Its distant neighbor, the Copper Falls, has been selling at Boston for twenty-five cents; but there were no reports to your correspondent of Keweenaw people loading up very heavily even at that nominal rate. The mine makes a showing of mineral, however, which outstrips the Huron, Wolverine, Grand Portage, Hancock, and Phœnix, reaching, up to August, an aggregate of nearly 600,000 pounds. The cost of production is not high at Copper Falls; and if the yield were uniform, mining could be carried on at a comfortable profit. Your correspondent did this property a trivial but inadvertent injustice last June, by saying that the mine was about to put in a new head of stamps. The mine has two very fine heads of Ball's stamps, with an aggregate capacity of about 300 tons of rock per day. But one, however, has been running since early in 1881; the other is now at work also. Your correspondent makes this correction unsought and heartily, the mistake being a *lapsus calami*. The surface work at the Conglomerate is progressing at its usual pace and volume, but to what purpose must be shown by the sequel.

Over in Ontonagon, which is wonderfully beautiful and picturesque at this season of the year, the Nonesuch was practically idle when these notes were first written, but is now starting into life again. An Eastern syndicate was up while your correspondent was doing the copper country, and arranged to begin active operations at once. The Mass mine at that time had recently discharged forty miners, and was making no effort to keep the mine open ahead. Captain Chynoweth, the agent, then East, endeavoring to persuade the directors to open at least some small reserves, has since returned with instructions to carry on his stopes, but to do no sinking. Several antagonists of the belt scheme use the comparative failure of the Mass as a war-club for thumping the undertaking of our British cousins, since the Mass is sinking the Knowlton vein, the only thing in the belt system of which any thing at all is known. But this is unfair, since the action of the Mass people shows not necessarily that the Knowlton vein is too poor to pay (though it may be a very pungent hint in that direction), but that the Mass people are not willing to hand in enough contributions to attack the beds after the manner of the Pewabic, Osceola, and Allouez. I learn indirectly from England that the Belt stock is not finding much public favor, although I doubt not those who have gone into the enterprise will see it through. The machinery for the stamps is already landing at Ontonagon, and by the time it is *in situ* will have more or less copper to set it pounding. In case the Belt should prove a *fiasco*, it can never be charged against the integrity of American miners; for no disinterested miner was ever asked his opinion of the property. However, time will decide in emphatic tones whether our English relatives have paid too dearly for their whistle.

SPECULAR.

NOTES ON THE EXHIBITION AT DENVER.

Special Correspondence of the Engineering and Mining Journal.

The exhibition was opened this year on the 17th of July, when an address was delivered by Senator H. Miller. The exhibits were, as usual, tardily placed, and it was some time before all was in good trim. Though some counties which were here last year are conspicuous by their absence, the display is, on the whole, very good, and only needs an appreciative public. More space has been provided this year for machinery, but, though taken, has not been entirely filled.

The Lake County exhibit, as representing the richest district in Colorado, ought to be the first described; indeed, it is the first to attract attention, being very properly placed in front of the entrance to the exhibition building. Its value is very much enhanced by two large geological maps of the Mosquito range, lately issued by the U. S. Geological Survey. It would be well for each county and district to copy this plan in the future.

The case which is set apart for the exhibit of the Chrysolite mine is the most complete in this section, and is well worth careful study. It is divided into three sections, having in the center a splendidly executed plan of the mine by Mr. Howard Platt, a very expert draftsman. This plan shows the different properties belonging to the company and their contours. The properties consist of about ten claims. There are also five geological sections, very interesting as showing the replacement of the limestone by the ore-bodies, and also the points where the gray porphyry dikes have cut through all the separate formations into the ore-body. These sections also show very plainly that puzzling phenomenon, very characteristic of this mine, where bodies of limestone lie separated from the beds in irregular masses, much replaced by ore and surrounded on every side by porphyry. The different formations cut through by the gray porphyry dikes are the white porphyry, Cambrian quartzite, Silurian limestone, parting quartzite, and Carboniferous limestone. What are called the second and third iron deposits lying in the limestone are shown, from which some rich ore has been taken. The whole country of the mine is made up of masses of white porphyry. In the cases are, first, specimens of block porphyry, dike porphyry, nodules of dolomite, dolomite sand, quartzite, limestones, etc. Secondly, curious specimens of iron chert; galena from the second iron deposit, in the Carboniferous limestone, and containing 120 ounces of silver per ton; galena from the third iron deposit, in the Silurian limestone, from which deposit some rich ore has lately been taken. Thirdly, rich galenas, containing, in some cases, over 400 ounces per ton; silver lead ores associated with barytes; carbonates of lead and silver containing from 100 to 300 ounces of silver per ton, and from 40 to 60 per cent of lead; sand carbonates containing from 1000 to 2000 ounces of silver per ton; and a specimen of chloride assaying about 5000 ounces of silver per ton, and 40 per cent of lead. There is also a photograph of the mine buildings and neighborhood.

The Silver Cord mine has also a wonderful and splendid mineralogical display. Among the most notable are some specimens of concretionary calcite, some of the concretions measuring three inches across, and being beautifully radiated. This mine shows many splendid specimens of that very rich silver ore embolite, a bromo-chloride, two in particular, consisting of ochreous carbonates, speckled all over with fish-like scales of embolite and cerussite. One specimen of a carbonate of lead shows a remarkable structure resembling petrified wood. A curious specimen of oxide of iron is exhibited, having a botryoidal structure, resulting from the decomposition of a carbonate. There are some fine cut and polished specimens of kaolin, some colored with various minerals, and some colored with copper. Of the hard gray carbonate which forms the staple shipping ore, there is one block weighing a ton. Some beautiful dendrites, due to manganese, and some fine specimens of galena, hard carbonate, incrusted with chloride of silver, sulphato-carbonate of lead containing 103 ounces of silver per ton, help to make up a truly elegant exhibit. As curiosities also, there are specimens of malachite staining siliceous nodules in a sand carbonate, and specimens showing galena and carbonate of lead in contact.

The A. Y. mine shows some of the best specimens in the exhibit, a number of them consisting of highly crystallized pure carbonate of lead, though generally colored a rich brown by iron oxide. One or two in particular are rendered more beautiful still by fine foliated native silver being scattered over them. Some masses are composed of crystals more than an inch long. Some specimens show the lead crystals on brown iron oxide. Among the carbonates from this mine may be mentioned some specimens of an amorphous carbonate of lead, closely resembling the ordinary white-lead of commerce. There is a fine specimen of anglesite (sulphate of lead); also galena, containing from 5 ounces of silver per ton, and 70 per cent of lead. Some curious specimens are shown of galena laminated with iron pyrites and zinc-blende. There are some truly splendid specimens of galena covered with native wire-silver; also black sand carbonate, 60 per cent of lead, disintegrated iron pyrites crystallized in cubes and octahedrons, and galena associated with carbonate of lead. A specimen of limestone, showing the chemical action of water very plainly, has been taken from under the ore-deposit.

In this exhibit, there are also a number of splendid specimens from the celebrated Mike & Starr mine, consisting of galena, with iron and copper pyrites, carrying 520 ounces of silver and 15 per cent of copper, and a specimen of iron pyrites in gray porphyry, containing small quantities of lead, silver, and gold, which, according to many authorities, are representative of the original rock whence all the riches of this extraordinary region have been derived. Some vanadates of antimony are also exhibited.

The Robert Emmet mine shows carbonates containing 175 ounces of silver and 60 per cent lead. The Ready Cash is represented by free-milling ore containing 400 ounces of silver and 10 ounces of gold. Some nearly pure hematite ore is worth mention, in view of the late meeting at Denver to organize an iron smelting establishment.

The Yankee Doodle mine shows a number of good sand carbonates and ocher ore containing 556 ounces of silver per ton, and 61 per cent lead, and 202 ounces of silver per ton and 25 per cent lead respectively. This mine also shows some fine blocks of different colored hard carbonates with over 150 ounces of silver per ton, and specimens of a fine-

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grained, peculiar quartz, etc., overlying the ocher ore. The Henriett mine exhibits sand carbonates with galena, 90 ounces of silver per ton, and crystallized galena and lead carbonate assaying 100 ounces of silver per ton. Also, a grand block of galena, showing the passage into carbonate, fine-grained galena showing curious action of water, and a block of hard carbonate containing large rhombic crystals of cerussite.

Specimens from the Carbonate mine are distinguished by nearly all showing a quantity of embolite on their surfaces. Those worthy of special mention are a breccia of limonite and other oxides of iron covered with the above-named mineral, and a carbonate also showing embolite. The ores shown for this mine run about 400 ounces of silver per ton.

The Iron Silver mines show an interesting series of different-colored sand carbonates in bottles running from four up to 710 ounces of silver per ton; a curious and fine specimen of calcite in calcareous limonite; specimens of native sulphur; and large blocks of rich hard carbonates and galena, showing that the ore exists in large masses. Dendrites and leadhillite are also noteworthy.

Little Pittsburg mine shows galena running from 90 to 800 ounces of silver per ton; and Little Chief mine hard carbonates and galena with embolite assaying from 90 to 500 ounces of silver per ton. The Long & Derry mine is represented by some rich ore with chloride of silver; the Dunkin and Wolfe Tone mines by rich galena; and the Cyclops mine by rich carbonate ore with sulphuret of silver up to 1100 ounces per ton. The Harrison Reduction-Works exhibit samples of matte, speiss, and materials for reducing ores. There is some gold ore from the Double Decker mine, containing 35 ounces of silver per ton; also some horn-silver from the Big Pittsburg, azurite from the Highland Chief, and a beautiful specimen of chalcedony on amethystine quartz. The Matchless mine shows, generally speaking, the richest collection of ore in the Lake County exhibit, although mineralogically poor. It consists chiefly of hard carbonates in immense blocks, and showing, in many cases, embolite, and of a peculiar argillaceous ore which, when taken out of the mine, is in a wet and plastic condition. One specimen of this ore (a black variety) is made up into a large square brick. Its richness is sometimes very great, one sample assaying 2750 ounces of silver per ton. Many others assay over 1000 ounces of silver per ton. There are also some fine large pieces of horn-silver, assaying about 23,000 ounces of silver per ton; and a curious block of flint, interesting as showing the probable presence of thermal waters during the deposition of the ore.

The Robert E. Lee has a few very rich samples of hard and sand carbonates, but nothing very striking. The commissioner for Lake County, Mr. N. H. R. Read, who kindly furnished me with all particulars, has compiled the following list of the production of that region up to July 1st, 1882, which may be of interest as showing the rapid development of the Leadville camp during the last few years:

Yield from 1860 to 1873, gold from placers	$6,400,000
Yield from 1874 to 1875, gold and silver	258,000
Yield for 1876, gold, silver, and lead	85,000
Yield for 1877, gold, silver, and lead	555,000
Yield for 1878, gold, silver, and lead	3,153,000
Yield for 1879, gold, silver, and lead	10,333,000
Yield for 1880, gold, silver, and lead	14,187,000
Yield for 1881, gold, silver, and lead	13,170,000
January 1st to July 1st, 1882	7,817,000

The Colorado Machinery Company has one of the best exhibits in the mining machinery department. It exhibits the celebrated Deane pumps in motion, one capable of delivering 150 gallons per minute; also a large and good assortment of tubes and pipes for various purposes from the National Tube-Works Company, Chicago; a new fan blast ventilator by the Chicago Ventilating Company; patent noiseless exhaust fans by the Boston Blower Company; patent pulverizers and an Embrey concentrator by Stephen P. M. Tasker, of Philadelphia, Pa. There are also mine supplies in the shape of tubs, mine cars, slag-barrows, Fairbanks scales, etc., and a model of Huson's patent endless wire rope tramway.

Among notable new things exhibited this year none is more deserving of notice than a new drill called the Randall chamber drill. This is one of the newest "notions" of the West, as it is also likely to prove one of the most useful. It has borne the test of hard work with credit. The inventor, Mr. Randall, of Pueblo, claims in his specification that it is an improvement on the chamber drill patented by E. J. Williams, in 1879. His object is, to quote his own words, "to provide an improved means for enlarging the diameter of a drill-hole at the bottom thereof." The cutting-bit is fitted to the drill-stock by a strongly made tenon, which fits into a recess in the stock provided with a knuckle or ears, being held there by a pin passing through both. It is so made that the force of the blow is received by beveled shoulders on each, situated at the front and back of the drill. It is claimed that the blow is distributed or conveyed more nearly to the center or axial line of the drill-stock than in any other drill now constructed for the same purpose. When the drill enters the drill-hole, the bit is on a line parallel with the drill-stock; but in practice, it is at an inward angle of about 30 degrees, and cuts outwardly as the drill-stock is rotated, thus quickly cutting out a chamber at the bottom of the drill-hole. The peculiar construction of the curved end of the cutting-bit materially assists its operation. I hope to say something as to the other exhibits in another number.

A. COPELAND.

August 23, 1888.

A TUNNEL UNDER AN IRON MILL.—The last stroke of work on the big tunnel, 1650 feet long, under Jones & Laughlin's Iron-Works, Pittsburg, has been completed. The tunnel was constructed by the Vanderbilt Pittsburg, McKeesport & Youghiogheny Railroad. Its cost will be $500,000. Over six hundred men were employed on it for a year. The tunnel is one of the engineering feats of the day. The roof is only a few feet below the top of the mill floor, where massive rolls, hammers, and hundreds of men were working. The mill is the largest single mill in the United States, and none of the buildings was injured, and work was not delayed an hour. The ground through which the tunnel passes was mill cinder and slag. For over one hundred feet the slag was so hard it could not be blasted. Heavy weights were dropped on it, and the broken pieces buried in holes where they fell, as they could not be moved, the masses were so large. The road opened for a distance of sixty miles on Sunday for freight traffic.

THE GATES PULVERIZER.

We have repeatedly referred to the movement now in progress in milling circles, to crush ore that must be roasted previous to leaching or amalgamation, in favor of rolls as a substitute for stamps. We need not, therefore, rehearse the points which favor the substitution of one class of machinery, and propose simply to call attention to the latest design, brought forward by Messrs. Charles Kaestner & Co., of Chicago, which we illustrate in the accompanying drawings.

As shown in the section and side elevations, the pulverizing mechanism consists of two sets of rolls *D*, placed one above the other, and driven by a single outside gear-wheel on the pulley-shaft. After having been brought down to a suitable size in ordinary crushers, the material to be pulverized is put into a double hopper, from which it is distributed by a simple self-feeding arrangement, shown in the drawing, to the upper set of rolls. Passing through these, it drops on the table shown in the section, and is delivered to the lower set of rolls, by which the bulk of it is reduced to the desired size. Within certain limits, the distance between the individual rolls of a set may be regulated by placing flat pieces of steel between the journal-boxes. The tension on the springs forcing the rolls toward one another, may be regulated by the screws shown in the elevation. The wearing surfaces of the rolls themselves are shells of chilled Franklinite iron, which are held in place by bolts. The material dropping through the lower set of rolls falls upon a revolving screw having elevator buckets on the inside, within an inch of its surface. That portion of the material which does not pass through the screen accumulates with the finer material until the buckets are able to scoop it up and return it to the top set of rolls. The screen is driven by chain from the main shaft and runs on the friction-rollers *B B*. The entire crushing mechanism is inclosed in a casing, the journals, however, being placed out of the reach of dust. We have had occasion to examine the workmanship of the pulverizer at the establishment of Messrs. Kaestner & Co., and noted that it was substantially and well built.

One of the principal objects of the design, aside from that of reducing a maximum of material to the desired size with a minimum of wear and expenditure of power, has evidently been to render the machine compact, and to do away with separate screening and the nuisances of dust and attendant losses. The pulverizer is now in use at the mill of the Portland Consolidated Mining Company, Deadwood, D. T., and the Northwestern Terra Cotta Works, Chicago. We shall soon be in a position to report on its performance at the former establishment.

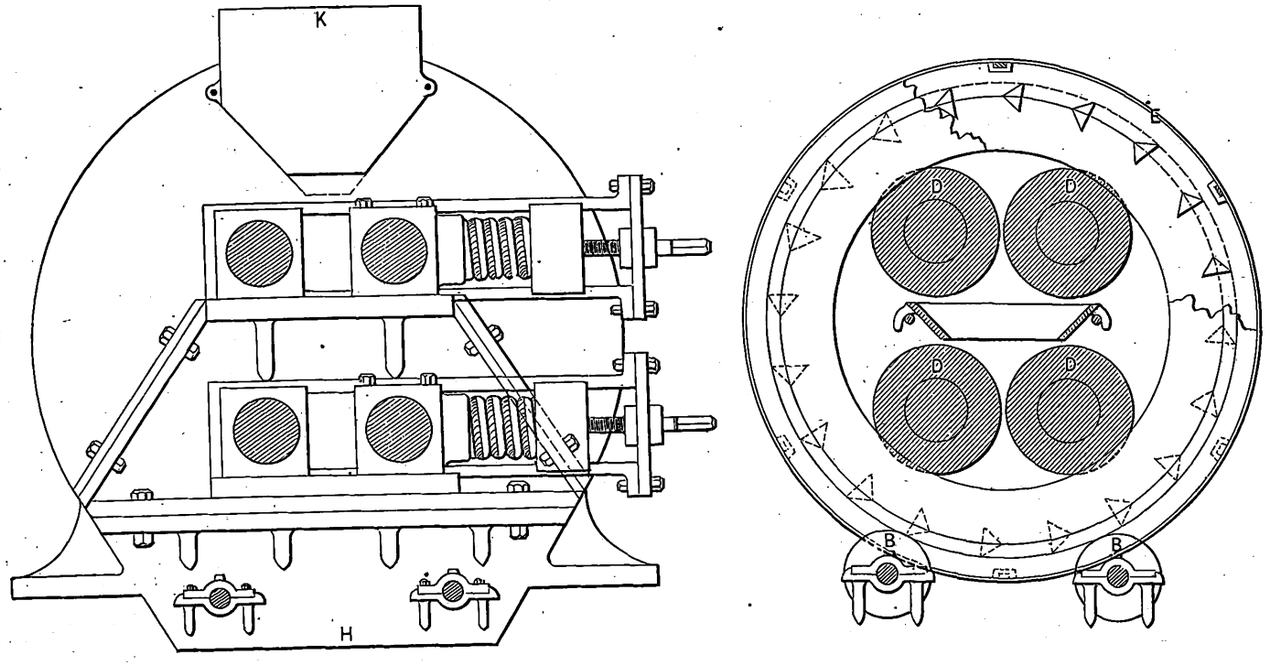
SPLICING THE BROOKLYN BRIDGE CABLE ROAD ROPE.

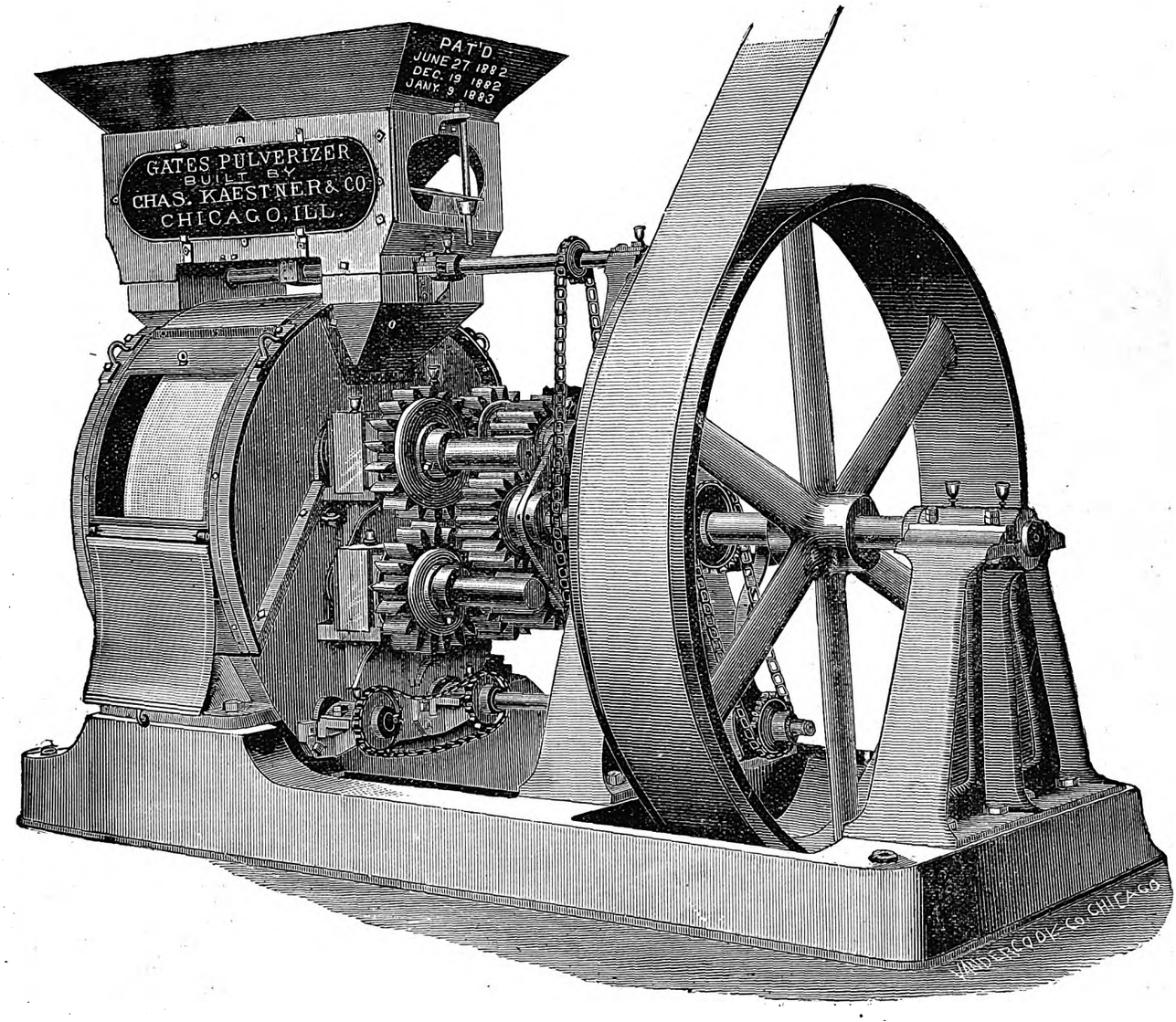
Recently the rope of the Brooklyn Bridge cable road, which is now nearly ready for regular business, was spliced. The rope is 11,600 feet long, or about two miles. Its weight is 31 pounds per foot, which gives it 35,900 pounds for a total weight. The diameter is 1¼ inches, and it has a breaking strength of 50 net tons. The center of it consists of a tarred hempen rope or cord; around the center six strands of wire are coiled, and each strand consists of 19 wires, so that the cable consists of 114 wires, compactly and stoutly wound spirally about a hempen center. The most particular part of the work of rigging this traction cable was uniting the ends so as to make it endless. The cable was furnished by the Roebling wire factory, and when the work of laying it reached the point where splicing was necessary, application was made to the factory for a man skilled in splicing. The best man that could be had was asked for. The best man was at the time in California, whither he had gone to splice some cables for the Cable Street Railroad Company of that city. Engineer Martin was looking about for some other splicer when he learned that the man who had gone to California was on his way back. By waiting forty-eight hours, the man that he wanted was secured.

The splicing of such a cable, as has been remarked, is a pretty nice piece of business. It has been performed on the bridge cable so neatly, that no one can discover where the two ends come together. In order to keep watch of the spliced parts, they have been painted white. The white place is 160 feet long. As nearly as the process of splicing can be described here, it was done in this way: The ends of the cables were drawn 80 feet each way from the point where they met—that is, they were lapped that distance. Then one of the six strands was uncoiled for the distance of 80 feet. Another strand was uncoiled for 68 feet, another for 56 feet, and so on for the whole six, each being 12 feet shorter than the other. This process was observed on both ends of the cable. Then the strands thus "shingled" were intertwined so as to restore the size and shape of the original cable. In order to accomplish this, the hempen core of the original had to be taken out by winding it outward along the trend of the original twist. As each strand of one end was laid about its companions of the other end, its extremity was ingeniously pressed in toward the center from which the hempen core had been removed, so that it is not seen, nor can it be found except by the closest tracing. To all appearance, the cable was made endless at the factory. The engineers of the bridge have been very much interested in the work of making the splice, they having never before witnessed a like operation.

THE DUTY ON CHARCOAL IRON.—A letter was received at the Treasury Department on the 24th from the Champion Horsenail Company, of Appleton, Wis., protesting in strong terms against such a construction of the tariff law as shall preclude from the privilege of entry at the rate of $22 per ton all charcoal iron irrespective of shape or size. This letter is the first one brought out by Acting Secretary French's letter of the 17th inst. to Secretary Swank, of the Iron and Steel Association. In that letter, the acting secretary said the Department was inclined to hold that the concluding proviso of paragraph 148, regulating the duty on charcoal iron, applied only to the kinds of iron mentioned in the paragraph, and not to round iron in coils or rods, or to iron rivet, screw, nail, and fence wire rods in coils or loops, when manufactured by the use of charcoal. It appears probable that the department will hold that, if an importer declares that the wire rod brought in by him is, to quote the letter, "intended for or adapted to the manufacture of rivets, screws, nails or fence wire," it must be admitted upon payment of a duty of $\frac{4}{10}$ of 1 cent per pound, instead of $1\frac{4}{10}$ cents per pound. Once admitted, the iron may, of course, be used for any purpose to which it can be applied.

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THE GATES PULVERIZER.

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THE NICKEL PLATING PATENT.

The decision of the United States Court for the Southern District of New York, Judge Blatchford presiding, sustains once more, goes a little farther, and gives a still broader interpretation to the Adams patent than had been given at any previous trial. Judge Blatchford holds substantially that Adams was the first discoverer of a practical method for electro-plating with nickel, and his patent secures to him practically a broad monopoly of the art, and of all articles electro-plated with nickel. The patent in question was granted to Isaac Adams, Jr., August 3d, 1869, and the two principal claims read as follows:

1. The electro deposition of nickel by means of a solution of the double sulphate of nickel and ammonia, or a solution of the double chloride of nickel and ammonium, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime, or nitric acid, or from any acid or alkaline reaction.

4. The electro-plating of metals with a coating of compact, coherent, tenacious, flexible nickel of sufficient thickness to protect the metal upon which the deposit is made from the action of corrosive agents with which the article may be brought in contact.

The defendant, Pendleton, obtained a patent September 28th, 1880, for what he claims as a new and entirely different mode of plating with nickel. His claims are as follows:

1. In the art of nickel plating, an acid solution of acetate of nickel, consisting of oxide of nickel and acetic acid, said solution having an excess of acid.

2. The method of making acid solutions of acetate of nickel, consisting in slowly digesting oxide of nickel and acetic acid with or without heat, so as to have an excess of acid in the solution, substantially as described.

The court held the Pendleton process to be merely the chemical equivalent of the Adams process, and accordingly gave judgment for Adams, with injunction and an account.

MECHANICAL PUDDLING.

By J. G. Danks.

My purpose in this paper is not to treat the science of puddling generally, but merely to sketch the history of mechanical puddling, the difficulties encountered, and the manner in which they have been overcome. It is necessary first to describe briefly the old or hand system of puddling, as it may assist in understanding the difficulties to be met in performing the work by machinery. Puddling is the process in most general use for converting cast into wrought-iron, by first melting and then agitating the metal while kept at a high temperature; in which operation it is deprived of its carbon, silicon, and other impurities.

The process was first introduced by Henry Cort, in England, in the year 1780. In partnership with Samuel Jellico, at Fontley, in Southampton, he worked out this problem, which was at that time the most important step ever taken toward increasing the quantity and reducing the cost of manufacturing iron.

The bottom and sides of the puddling-chamber in Cort's furnace were lined with sand; and as the removal of silicon is one of the chief objects of the puddling process, it will be readily seen that one of his worst enemies (sand) was present at all stages of the operation. Notwithstanding this, the advantage of his invention to the manufacturing interests of England may be partly seen by the following figures. The total amount of iron manufactured in 1720 was about 12,000 tons, and at the time of Cort's patent (1780) about 90,000 tons, which in 1820 had increased to 400,000 tons, an increase due almost exclusively to Cort's invention. Although he had added millions of pounds sterling to the wealth of the kingdom, and opened the way for the employment of hundreds of thousands of men, the only recognition his services received was the empty honor of being a great inventor and the little estate now occupied by his moldering remains in Hampstead churchyard.

The first important improvement subsequently made in puddling was the invention of Samuel B. Rogers, consisting in the substitution of iron plating to the bottom and sides of the puddling-chamber, covered to a depth of ten or twelve inches with a rich oxide of iron, instead of sand. The plates are so constructed as to allow a free circulation of air, to prevent overheating. This oxide bottom not only permits the working of the iron at a much higher temperature than was possible on the sand bottom, but is itself a valuable agent in the removal of the carbon, silicon, phosphorus, and other impurities contained in the crude metal. The invention of Rogers was fully as important to the trade as that of Cort, yet the most substantial benefit we hear of his receiving was the nickname of "Old Iron-Bottom," by which he was known all over England. But little change has taken place in the process of puddling by hand since the latter invention was introduced; and although it is, in a scientific point of view, one of the most interesting operations in iron manufacture, it is also the most slavish and exhaustive labor to those engaged in it.

The earliest authentic records I find on mechanical puddling are the patents of Mr. Walker and Mr. Warren, of England, who, in the year 1853, took out a patent for a rotating cylinder lined with fire-brick. The axis of the cylinder was inclined to a horizontal axis of rotation, so that, as it revolved, the fluid metal was caused to flow from one end to the other. I am not aware that they ever built a furnace so as to test their ideas in practice. In 1856, Mr. Samuel Danks (the writer's father) filed a caveat in the U. S. Patent Office for a revolving puddling-furnace, and he had a furnace nearly completed in Mount Savage, Md., when the panic of 1857 caused the abandonment of the work for the time. In 1859, Mr. W. Tooth, of London, England, took out patents for a mechanical puddling-furnace, and was given every facility for testing the apparatus by Mr. William Menelaus, of the Dowlais Iron-Works, in Wales, where a complete forge was erected, and some good iron is said to have been produced. The lining used in these furnaces was either fire-brick or gannister, and Mr. Menelaus stated that the latter was found to be the best material he had tried. In 1863, Mr. Tooth and a Mr. Yates obtained additional patents for improvements in the process, all of which were tested at the Dowlais Works. In 1867, after having spent upward of $150,000 in experimenting, it was abandoned. Mr. Menelaus, in a paper read before the Institution of Mechanical Engineers, gave a description of their failures, which were mainly due to the want of a good lining for the puddling-chamber. Afterward, when showing a number of prominent iron-masters through the Dowlais Works, he pointed to the corner occupied by these furnaces as the "burying-ground of mechanical puddling."

It is important to notice that up to this time the only lining used in mechanical puddling was a highly siliceous one (like that used by Mr. Cort in the first introduction of hand-puddling), which would be readily dissolved by the molten metal and the oxides with which it was constantly coming in contact. Under these circumstances, it was found to be practically impossible to remove the impurities from the metal sufficiently to insure a good fibrous iron. Nor was this all; the character of the lining material was such that, when the iron was formed into a ball, its weight constantly broke the lining down, so that it was proved to be unfit to withstand either the chemical or the mechanical action to which it was of necessity subjected. An attempt was made to use an oxide of iron lining in the cylinder; but from the manner in which it was put in, it was evidently an oxide too high in silica for the purpose; or, if an oxide of sufficient purity were melted upon an initial lining of silica, sufficient of the latter would be dissolved during the melting to render it worthless.

During the time when these experiments were carried on in England (between 1863 and 1868), Mr. Danks moved to Cincinnati, Ohio, to remodel the old merchant mill on East Front street, and adapt it to the manufacture of iron rails. Here he again revived the question of mechanical puddling, and had obtained patents for a lining which, it is believed, would answer successfully all the requirements of use. In May, 1868, a small experimental furnace was built, with a capacity of working only about 300 pounds of iron at one charge, being thus limited by the machinery at hand to deal with the iron. Six hand-puddling furnaces were in use in the mill at this time, with the usual complement of workmen; and while the new furnace was approaching completion, the comments made by those engaged in the hand process were not encouraging; for they were, with few exceptions, opposed to any attempts to perform their labor by machinery.

Briefly, the new furnace consisted, first, of a fire-place about four feet square, the outer shell of which was made of iron plates, lined with fire-brick. Adjacent to this was the revolving cylinder, about three feet long and four feet in diameter, with a contracted opening at each end. One end of the cylinder was made to fit close against the fire-place, and the other provided with an adjustable elbow-piece, forming a tight joint with the cylinder end and also serving as a connection between the cylinder and the chimney, by which the waste gases escaped. The cylinder was mounted on four rollers, the end joints kept tight by a strong iron prop which forced against the shiftable elbow-piece, the latter being also provided with a side prop holding it firmly in position while the furnace is at work. The cylinder ends were kept cool by jets of water. The bridge casting, the bridge and door rings, also the front of the shiftable piece, were kept cool by water circulating through them. The fire-place was provided with a bridge-wall reaching half-way up the opening in the cylinder end, to prevent a mixture of the fuel and iron, but leaving a free passage for the gases through the furnace. The fire-grate was also provided with two blast-pipes respectively, for forcing air underneath and over the fire. The bottom blast entered the ash-pit and found its way up through the burning fuel. The top blast entered an air-space formed over the roof of the furnace, and was admitted to the furnace proper through a finely perforated brick arch, as nearly over the bridge-wall as possible. Each blast-pipe was provided with a valve under the control of the puddler. The advantages of forced blast in this form of furnace are many; chief among them are, first, a higher temperature than can be obtained by natural draught; and, second, that a slight pressure of flame may be kept in the furnace, which prevents the entrance of cold air at the cylinder joints, thereby avoiding not only a reduction of the temperature of the furnace, but a waste of iron by oxidation. The cylinder plates are ribbed on the inside so as to hold the lining, and the machine was rotated by a small steam-engine. When every thing else was ready, and the cylinder revolved a number of times, the lining was put in. This was done by first mixing pulverized Iron Mountain ore into a stiff mortar with about six times its bulk of thick lime-cream in a grinding-mill, consisting of a revolving pan and two heavy iron rollers, and with this material covering the ribs of the cylinder plates to the depth of one inch, making an average thickness between the ribs of four or five inches. The lower half of the cylinder was first lined, a good surface being put on it with a trowel, and the whole was then thoroughly dried, by building upon it a wood fire. The cylinder was then turned a half-revolution and the lining completed and dried. This was called the initial lining, and was only used to protect the plates, while the real or working lining was put in.

The furnace being now fired up slowly, a quantity of roll-scale or hammer-slag was first melted so as thoroughly to glaze the initial lining. A large quantity of pulverized ore and some light wrought scrap were now put into the cylinder and melted—the cylinder having been revolved slowly during the melting. After melting, the rotation was stopped and a quantity of dry lumps of ore thrown into the bath, serving the double purpose of presenting a rough surface to assist in agitating the iron, and also to hasten the cooling of the liquid oxide. After hardening sufficiently, a further quantity of ore and scrap was thrown in and melted; this operation being repeated about five times, usually completes the lining. The vitreous coating thus formed is very hard, and I never knew of its breaking down after once being cooled, except at the openings at the ends of the cylinder, where it is thin. The lining gradually wears away, but it is easily repaired and the entire lining need never be taken out unless for some necessary repairs to the plates.

When the furnace was put to the test of puddling iron, the ridicule so lavishly heaped upon it by the men ceased, a lively competition ensued, and it became evident that they had laughed too soon; for the machine had not been in operation many days before it produced seven charges of iron in less time than they could produce six by hand, and required less than one fourth the amount of manual labor, although employing

* Read before the Section of Mechanics and Engineering of the Ohio Mechanics' Institute, February 27th, 1883.

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the same number of men. The quality of the iron was found to be superior in every respect to that made by hand.

This furnace was experimented with for some time, and then, with the view of puddling larger heats and still utilizing the old machinery, two larger ones were built, in which the diameter of the cylinders was about the same, but the length increased to about six feet, it being the intention to divide the charge into two or more balls. This was attempted by leaving apertures in the cylinder plates, through which pieces of soapstone or other refractory material could be inserted, for the purpose of breaking the iron asunder as the furnace revolved. Large lumps of iron ore were left projecting high above the general level of the lining; cast-iron projections, covered with a thin layer of the initial lining, were inserted; but all gave a good deal of trouble, and were finally abandoned as impracticable.

In carefully watching and testing the product of these two furnaces, a much more serious difficulty presented itself. In a cylinder so long in proportion to its diameter, the end next to the fire-grate was always much hotter than the other, and the iron at this end was always the best, thus producing two qualities of iron in each charge. Added to this lack of uniformity (which was not met with in the small furnace) was the labor of separating the iron. There seemed no way left to adapt the system to existing machinery; in fact, experience indicated that the farther we departed from the old method of making the iron into a number of small balls, the better would be the results. Accordingly, furnaces were built with cylinders six feet in diameter and four feet six inches long, in which the entire charge was made into one ball. With slight alterations, the old squeezer was made to take these balls of 600 pounds, and the iron was found to be perfectly uniform. The results obtained were so satisfactory that in 1870 the company authorized the removal of all hand-puddling furnaces as fast as machines could be built to replace them.

One result constantly met with was the subject of much unfavorable comment among those who had not investigated the subject. It was the fact that, instead of the usual loss of from ten to fifteen per cent in weight by hand-puddling, there was a gain of from five to eight per cent; that is, out of 500 pounds of pig-iron charged into the furnace, there were obtained in puddled bars from 525 to 540 pounds. The gain often ran up to ten per cent, but the figures given will represent a fair average.

I will now describe the operation of puddling by machinery, in which we shall find, at least, a partial solution of the above-mentioned seeming impossibility. Puddling is essentially a refining process, and as the refining is best accomplished while the iron is in a fluid state, a gray pig is preferable to a white pig, because it may be kept fluid as long as desired, this property being chiefly due to the amount of silicon it contains. White iron, which usually contains a low percentage of silicon, begins to granulate very soon after melting, unless a large amount of phosphorus is present.

The refining agent used in puddling is an oxide of iron, and a quantity of the latter is usually put into the furnace, in the shape of hammer cinder, squeezer cinder, or roll-scale, with each charge of iron. As soon as they are melted, the furnace is started to revolve slowly, the iron being covered by a bath of liquid oxide. To facilitate the operation, a small jet of water is now thrown, by means of a rubber hose, upon the descending side of the furnace lining, immediately above the liquid iron. This chills a part of the oxide, which, adhering to the lining, is carried down through the iron, oxidizing the silicon, phosphorus, and such other impurities as the iron may contain, and these become incorporated with the cinder. It is interesting to watch these changes taking place. The iron, which at first was quite fluid and somewhat resembling quicksilver, becomes gradually thicker, until, when the refining is complete, it has entirely lost its silvery appearance and comes to the consistency of thick paste or mortar, its melting temperature having materially increased. The bath of oxide, on the contrary, has become more fluid, and its melting temperature decreased. This operation is carried as far as possible without causing ebullition. The temperature is now raised so as to thoroughly liquefy all the oxide, which is now removed from the furnace through a tapping hole. When this is done, the furnace is again put in more rapid motion, so as to thoroughly agitate the iron. Up to this point, the iron has retained a large part of its carbon, which is now rapidly oxidized by the lining of the furnace and causes violent ebullition. The iron has now reached the granulated state, and occupies five or six times the space it did when fluid. The carbonic oxide gas, produced by a union of the oxygen of the lining and the carbon of the metal, presents a beautiful appearance as it bursts through the surface in many hundred jets of pale blue flame. When carbon is burned by free oxygen, it has no effect in reducing oxide of iron; but when the carbon is oxidized by the solid oxides of the furnace lining, the oxide containing it is reduced to the metallic state and is added to the charge; and as from 300 to 600 pounds of iron ore are used (in the shape of lining) for every ton of iron produced, it must be the iron reduced from this lining which increases the charge and makes it greater than the original weight of pig-iron. It is believed by many that silicon has this power to reduce oxide of iron to the metallic state; and it is a fact, well established, that iron containing a high percentage of silicon gives a better yield than iron containing but little silicon, although the carbon in both cases may be the same. The boiling operation usually lasts from ten to fifteen minutes, when the grains of iron unite, forming a spongy mass, which is then removed from the furnace to be squeezed, hammered, or rolled into bars, as may be required.

There were in 1870 and 1871 three forges built to puddle iron by this method—one each in Chattanooga, Indianapolis, and Pittsburg. In the two former, the furnaces and engines were poorly constructed, and, after working for about one year, the defects of building and abuse while working made the repairs so heavy that they were finally abandoned. The plant of ten furnaces in Pittsburg is still in successful operation.

In 1871, Mr. Danks visited England, and, by invitation, read a paper before the Iron and Steel Institute, at a meeting held in Dudley, giving a description of his furnace. This resulted in the selection of a commission of three gentlemen to visit Cincinnati and investigate the subject. The scientific part of the inquiry was intrusted to Mr. George J. Snelus (at that time in the employ of the Dowlais Works), the commercial aspect of the system to Mr. John A. Jones (iron-master of Middlesborough), and the practical working to Mr. John Lester (of Wolverhampton). They came over in October, 1871, bringing with them about forty tons of English pig-iron and iron ore, containing good, bad, and indifferent qualities, all of which were carefully marked. The lining was all taken out of one furnace and a lining of English material put in. Samples were taken from each brand of pig-iron for analysis; also, samples at different stages of the operation during puddling. They weighed all the material used and the iron produced. The examination was a very searching one, and the results fully accorded with our own previous experience. They visited Indianapolis and Chattanooga, where furnaces were at that time in successful operation.

In February, 1872, the first furnace on the Danks system in England was put in operation at the works of Messrs. Hopkins, Gilkes & Co., in Middlesborough. Specimens of the iron produced were severely tested, and exhibited at the quarterly meeting of the Iron Trade. The excitement ran high, and a public invitation was given for the Iron Trade to visit the works in a body on a certain day to see the furnace in operation. In the mean time, a written contract was entered into with the inventor to pay a certain price for the right to use two hundred furnaces; the contract was signed by Mr. Menelaus, on behalf of the manufacturers, and the day fixed for payment. But when the day came, it brought disappointment to the inventor; for, through the efforts of one or two members who had been unsuccessful workers upon this same problem, the contract was repudiated. Many members openly condemned this disgraceful proceeding, and four firms obtained licenses to build furnaces which would puddle 1000 pounds at a charge. Two of these firms met with the same fate as their predecessors at Indianapolis and Chattanooga, and from the same cause. I have no recent information as to whether the others are now working; but in 1878, Messrs. Hopkins, Gilkes & Co. produced with their six furnaces over 10,000 tons of machine-puddled iron, on all of which they realized a handsome advance in price over the iron puddled by hand, owing to its superior quality.

Soon after the starting of our first furnace in England, and the practical demonstration of the successful working of the machine, others entered the field, using our lining and cooling advantages without asking permission; among them were Mr. Adam Spencer, of West Hartlepool, and Mr. Crampton, of the Woolwich Arsenal. Mr. Spencer built an immense furnace, the cylinder of which was about ten feet long, and in which he worked one ton of iron at each charge. He met with the same trouble we had found in the long cylinder, and, failing to obtain a uniform result, soon abandoned it. Mr. Crampton made a new departure in trying to adapt pulverized fuel to the revolving furnace, in 1872. His furnace was a long cylinder with a water-jacket, the shell being made double, and a large stream of water circulating through it. The cylinder was divided into two compartments—one of which was intended as a combustion and the other as a puddling-chamber. The heat obtained is said to have been very intense, but the foreign matter in the fuel impaired the quality of the iron to such a degree that it had to be discontinued. Dr. C. W. Siemens has used the revolving furnace extensively for the manufacture of iron directly from the ore.

On March 5th, 1872, William Sellers, of Philadelphia, obtained patents for a revolving puddling-furnace, in which one end of the cylinder was entirely closed and the gases made to enter and leave through different flues at the open end. The closed end of the cylinder was provided with a large trunnion, by which its rotation was effected and also part of the weight carried, instead of a shiftable flue, by the removal of which access was had to the cylinder. The cylinder and engines were mounted on a pivoted frame, and could be turned at a right angle from their working position. I have no information as to the results obtained with this furnace, but believe none of them is now in operation.

The report of the English Commission made plain the fact that iron of an inferior quality could be rendered sufficiently pure by the process of mechanical puddling to be used in the open-hearth steel process, instead of the expensive charcoal bloom now used. Nothing of importance was done in that direction (in this country, at least) until about one year since, when the Otis Iron and Steel Company, of Cleveland, took up the matter under the direction of Mr. Samuel T. Wellman, superintendent of their works. Their scientific man and also a practical iron-worker were sent to Cincinnati, where our furnaces were at work. Samples were taken back for analysis, and, soon after, they purchased the right to build a furnace capable of puddling one ton at each charge. The cylinder of this furnace is built of steel plates strongly riveted together, and is six feet six inches in diameter and same length. The fire-grate is fitted with our automatic stoker. The furnace has been in operation about six months, and the product put into steel with such favorable results that others are now in process of erection.

It would require a large volume to record all the perplexing problems that have presented themselves to those engaged in perfecting this system. The point which perhaps gave most trouble was the abrasion ring at each end of the cylinder. These rings are not only subjected to a good deal of friction as the cylinder revolves, but also to unequal expansion and contraction. It was important that they should be kept cool; and if the workmen neglected to keep water turned on, they became hot, and, in cooling, became cracked, so that if a large stream of water was turned on, part of it ran into the furnace. The requirements of the case called for a ring which should stand the friction without wearing too fast, be of such material as would stand repeated heating and cooling; and constructed in such a manner that no matter how much water was turned on, it could not get into the furnace. About twenty-five different modifications were tried, both in wrought and cast-iron, and considerable time was required to test their respective merits.

The ends of the first cylinders were straight-faced instead of conical; and when the furnaces were cooled down on Saturdays, the lining was found to have a number of cracks varying from one eighth to three sixteenths of an inch in width, due to shrinkage. During the repairs to the brick-work, these cracks became filled with fine dust; and when the furnace was heated again, they could not close up, and the expansive force was sufficient to break the cylinder plates, though they were provided with heavy wrought-iron bolts and bands. This suggested the conical ends, which were found effectually to remedy the difficulty.

So, indeed, it might be said of nearly every detail of the present mechanical puddling-furnace—all have been suggested by experience; and, although many of the furnaces first started have been discontinued, the work of the past ten years has not been in vain; for progress, though

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necessarily slow, has been sure; and it may be safely affirmed that the mechanical puddling-furnace of to-day is not only a durable but an economical machine.

The full benefits of mechanical puddling will not be realized until it has almost entirely abolished the present plan of making pig-iron for mill purposes. The fluid metal will be taken directly from the blast-furnace to the puddling-machines, where it may be worked in charges of one ton each; and the spongy ball, after having been squeezed into a compact bloom, say of fifteen inches diameter, taken directly from the squeezer to a powerful universal mill, and either reduced to a bar from ten to fifteen inches wide and one inch thick, or, if desired, made into a square billet of any size down to five or six inches; the bars cut and piled in lengths required for different purposes; the billets sheared and taken, while hot, to a heating-furnace, where, with a wash-heat, they may be rolled into any small sections required, without the intermediate process of piling, or having been allowed to cool, in one continuous process from the time the ore is first heated until it is bar iron ready for market. Working under such conditions as these, a product of ten or twelve tons can be relied upon from each machine every twelve hours (instead of one and a half tons made by hand) and of a quality superior to that produced by the old system.

THE SMELTING OF ARGENTIFEROUS LEAD IN THE FAR WEST.*

By O. H. Hahn.

(*Continued from page* 115.)

Retreatment of Speiss.—The question of reworking speisses for the silver and gold they contain has been left in abeyance as yet, although it is known that those produced in Eureka, Nevada, in the early stages of that camp, ran as high as $70 per ton in gold and silver. The speisses of Utah contain comparatively little silver and gold, but considerable cobalt and some nickel, also varying quantities of copper and lead. It is, however, more than doubtful whether it would be profitable to extract any of these metals. Speiss is, at all events, more difficult of treatment than matte. It requires grinding and bolting to separate metallic particles, and roasting at a very low temperature to prevent fusion. The process is, besides, very dangerous to the workman, as the dust produces painful sores wherever it settles on the skin.

Smelting-Furnaces.—The object of the smelting process, now to be described briefly, is to reduce the lead and silver contained in an ore to the metallic state, while the other metals remain in part combined with sulphur, arsenic, etc., and the remaining constituents of the ore unite with the earthy matter, forming slag. The smelting operation is performed entirely in blast-furnaces of different patterns and sizes, which should be adapted to the supply and grade of ore, character of fuel, cost of labor, and other local requirements. The cross-section of the shaft-furnaces of this country has varied from polygonal to circular and from square to rectangular, while the hight has remained almost the same for the treatment of easily reducible as for hard smelting ores, namely, from 12 to 14 feet above the level of the hearth-plates. Experience has proved that smelting in furnaces of small area can only pay in special cases, where, for instance, small supplies of rich ores, or refinery drosses, etc., are to be treated. For this reason, furnaces built on the Piltz principle of circular section are losing ground every day, while those of increasing rectangular section, like Rachette's, are rapidly replacing them. The diameter of a circular furnace can not be increased beyond four feet without evil consequences when working under blast of the customary pressure of half a pound per square inch. Blast of a higher pressure would require a corresponding increase in the hight of the furnace; otherwise, the furnace would become unduly hot at the throat, and cause great losses by volatilization. The capacity of rectangular furnaces, however, can be largely increased without raising the pressure of the blast by leaving the width stationary and merely increasing the length of the hearth area. There are furnaces running now successfully which have a section of 3 feet by 7 feet 10 inches, while the success of 54-inch "cupolas" is still to be announced. The smelting capacity of furnaces is, however, greatly modified by other conditions, namely:

1. The nature of the fuel used, whether charcoal or coke.
2. The volume and pressure of the blast.
3. The size of the material to be smelted.
4. The fusibility of the smelting mixture—to which may be added the temperature of the water, if water-jackets are used.

Charcoal of good quality will smelt more charges in the same time and under the same circumstances than coke; but coke will make cleaner slags and less flue-dust than charcoal. A mixture of charcoal and coke will be more advantageous economically in many localities than either alone. The size of the blower and the quantity of air it supplies should be adequate to the size of the furnace, else it can not reach its highest effect. In using blast of a low pressure, less material will pass through the furnace than with one of higher pressure; but it is advisable to work with a moderate blast, so as to allow the smelting mixture sufficient time for complete reduction. Hard ores require a blast of higher pressure than easily fusible ones. The formation of flue-dust can also be regulated by the pressure of the blast, aside from the fuel.

The best size of material for smelting is that of a goose-egg; iron and limestone flux, however, may reach the size of a man's fist, while quartz should be broken much smaller. Such material smelts very rapidly. Pulverulent ores give much trouble by sifting through the fuel and arriving before the tuyeres in a raw state, where they will cake together and form a sow, or enter the slag and cause a loss of metal. Very fine ores, such as slimes from concentrating-works, especially if they are rich in silver, should be agglutinated with milk of lime previously to putting them into the furnace; otherwise, a large proportion will be blown out of the furnace as flue-dust. If roasting precedes smelting, it may be found judicious to bind the roasted ore also with lime. If the slag should show undue quantities of precious metals, this would indicate the necessity of such a method.

The fusibility of an ore is greatly enhanced if it contains much lead and little silica, alumina, and above all no zinc compounds. A large percentage of oxide or silicate of zinc in an ore, even if properly fluxed, is liable to reduce the smelting capacity of a furnace to one half of what it would be if running on more favorable ores. This I have found to be a stern fact in my own experience.

These remarks will prove that, in the first place, a lead blast-furnace has no fixed smelting capacity in tons of material; and secondly, if we do rate its capacity, we should express it in tons of smelting mixture or charge, and not of ore.

The Modern Type of Furnace.—All smelting-furnaces are at present built with much more care, though probably at greater first cost, than the works of fourteen years ago, and with the view of saving every particle of metal that will leave a profit.

The hearth or crucible of the furnace is so strongly incased in cast-iron plates, and secured underneath by a bottom-plate, that the lead has very little chance to escape in that part. The interior is lined with fire-brick all around; the bottom is made of fire-brick also, in the shape of an inverted arch, so that any lead which might creep through the joints may not raise it up; and no tamping, to the composition of which old smelters paid so much attention, is used. The depth of the hearth is arbitrary within certain limits, say 22 and 30 inches. In one side of the hearth, close to the bottom, a channel four inches square (or round, if preferred), running up toward the top of the hearth-plates, is started for an automatic outflow of the lead. This may widen into a bowl at the top, to admit the introduction of ladles for dipping the metal, but not necessarily, as in many works the lead is tapped through an orifice a few inches below the upper edge of the hearth-plate into a cooling-kettle, so as to admit the skimming of the dross or impurities which may be suspended in the lead previous to its being cast into molds. The water-jackets are placed on top of the hearth-lining in such a manner that their interior lower edges are flush with the walls of the hearth. These jackets may be made of cast-iron, wrought-iron, or any other suitable metal, and may be set perpendicularly or inclined, or they may be provided with boshes of different angle (usually 65 degrees or 70 degrees) to suit the fancy of the smelter, and they may reach to the charge-floor, or may be only a few feet high. I prefer the jackets of Mr. Eilers's construction. They are 3 feet 6 inches high, and have a bosh beginning 10 inches above the center of the tuyere-openings, which are cast into the jackets. They are also provided with a large, projecting lip, rising four inches above the top of the otherwise closed jacket. This lip is open, and mainly serves for the purpose of keeping the jacket filled with water; but it also prevents the formation of steam, allows the introduction of tools to remove scale, and receives the feed-water. It is also provided with an outlet for the hot water. The cold water, on account of its greater density, sinks gradually to the bottom, while the heated water rises and flows into a waste-trough. This jacket, and in fact the whole furnace, has been adopted by many smelters with slight changes, but these changes are only of degree and not of kind. The tuyeres are 10 inches from the bottom of the jacket, and distributed symmetrically about the interior of the furnace, except in front—where they have been found inconvenient and even unnecessary—in the proportion of one tuyere of 3-inch opening for about every 2 square feet of hearth area. So a furnace of 3 feet by 6 feet 6 inches area would receive nine tuyere-openings; one of 3 feet by 5 feet, seven, and so on. The object of the boshes is to enlarge the horizontal section of the upper part of the furnace, with a view to diminish the velocity of the escaping furnace gases, and thus cool them. The front jacket—or jackets, if made in sections—is shorter than the others and reposes on 10 inches of brick-work, in the midst of which the slag-hole is located. This is done in order to facilitate the cleaning or "barring out" of the furnace by mechanical means, should it ever become necessary. Where the charge is of such a nature that the resulting slag will soften the brick front too much, a Luermann cinder-block can be inserted to advantage. The upper part of the furnace, including the chimney, rests on cast-iron plates supported by wrought-iron girders or rails, which are bolted at their ends to the top plates of four cast-iron posts. The space intervening between the tops of the water-jackets and these cast-iron plates, which may vary from one foot to two feet, and is left to facilitate the extraction of leaking jackets, is filled in with courses of fire-brick. The charge-doors are on the long sides of the furnace, not directly opposite each other, but each near diagonally opposite corners, in order to compel the feeders to spread their charges uniformly. The doors are high enough to allow a man to stand erect in them in case wall accretions have to be cut out; they are usually closed to within two feet from the bottom of the frame.

At a convenient hight above the charge-floor, a tube or flue, four feet in diameter, made of stout sheet-iron, is inserted in one of the walls of the chimney—which one, local circumstances will dictate—at an angle of not less than 45 degrees, terminating in a dust-chamber or a system of dust-chambers, which are again connected by a flue of sufficient size with a tall stack. The top of the chimney is provided with a door or damper, which can be opened or closed instantly by means of a chain reaching through the roof close to the feeder's grasp. In the flue connecting the furnace with the dust-chambers, frequently called the "downcast," there is also a damper, placed in such a manner that the feeder can at once open or shut off communication with the chambers. This arrangement is necessary to prevent explosions in the chambers through the sudden blazing up of the furnace, and to protect the workmen from the noxious fumes while the dust-chambers are cleaned out.

At the new Grant Smelting-Works, near Denver, the gases and fumes are drawn off below the level of the charge-door by a plan similar to the arrangement at Freiberg. For a full description of those works and drawings accompanying it, the reader is referred to the files of the ENGINEERING AND MINING JOURNAL, Vol. XXV., No. 12.

Water-Jackets.—Water-jackets have been adopted in every place where there is a sufficiency of water. But wherever the supply of water is scanty and unreliable, I should not advise their use, even if the material for lining the interior of the furnaces is not of unexceptionable quality. On this ground, I believe, the Eureka Consolidated Company has retained its ponderous stone furnaces; for the relining must be certainly expensive, if we consider that the sandstone has to be hauled a distance of thirty-five miles, and that mechanics there receive very high wages. It is true I saw, several years ago, a furnace in operation there which had been in continuous blast for more than a year, according to

* From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey, Department of Industrial Statistics. Albert Williams, Jr., Chief of Department.

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the statements of the foreman; but such campaigns are exceptional and are sometimes made for effect; probably it might have been wiser and better for the furnace if it had been blown out sooner.

Air-Jackets.—In May, 1878, the Eureka Consolidated Company had an experimental furnace erected by Mr. Gerrish, in which air-jackets were to take the place of water-jackets. These jackets consisted externally of sheet-iron, to which were bolted, by means of flanges, copper plates 1¼ inches thick, forming the interior of the furnace. There were eight tuyere-openings with four-inch mouths in the jackets, and one foot above the hearth. Eight inches above these there was another row of openings of the same diameter, but only in the outer shell, which were connected with the former by closely-fitting pipes. The object of these connections was to allow the hot air from the jackets to pass directly into the furnace. Each sectional jacket had of course a connection with the blast main. The furnace was elliptic in shape, and its hearth area corresponded nearly with that of the other furnaces, and was 3 by 6 feet. The blast was supplied by a No. 5 Baker blower, making 104 revolutions per minute. Unfortunately, the experimenter did not provide his furnace with a fore-hearth, as is customary in Eureka; and as he did not or could not flux the ore at all, he did not get the slag to run. A speiss sow frustrated the completion of his experiments. The impracticability of air-jackets was, however, proved to the satisfaction of the company and that of the numerous pilgrims who flocked to Eureka from White Pine, by the appearance of the copper plates, which were perforated like colanders by the action of the speiss.

Except at Eureka and a few other localities, all furnaces are now provided with closed breasts, and the slag is run out intermittently instead of continuously. The slag-pots are so constructed that they hold about 300 pounds, which corresponds to a charge of about 400 pounds.

Blowers.—The blowers mostly in use are the various sizes of the Baker patent, which have driven out of the field nearly all the Sturtevant fans and a good many Root's blowers. They give universal satisfaction, and do not require so much attention as the others. The blast is measured either by mercury or by water-gauges which are attached to the blast supply-pipe of each furnace. A column of two inches of mercury or of 28 inches of water is equal to the pressure of one pound to the square inch.

Fuel.—The fuel is either charcoal or coke, or both mixed. Too much stress can not be laid on the soundness of the wood from which charcoal is made. In Southern Arizona, and perhaps also in other regions, all attempts at smelting with charcoal alone have failed, and I found that all the oak timber, which was the most abundant for making charcoal, was rotten in the core. Hard charcoal from mahogany, cedar, etc., is also to be rejected for use in a blast-furnace, because it decrepitates into small particles, which have the same effect as coal slack or waste in chilling the slag through reduction of the temperature. Nut pine (piñon) makes the best charcoal, and this was formerly the principal fuel at Eureka. Charcoal from lighter woods, such as yellow and white pine, quaking aspen, etc., can not be used alone without reducing the temperature in a furnace. Every smelter who has practiced in Leadville will agree with me on that point.

The best coke I have used is an English patent coke, which is shipped extensively from Cardiff, Wales, to San Francisco, where it costs $14.50 per ton. It is porous and light, and leaves a very small percentage of ash. The Connellsville coke is the next best; it is very dense and heavy, and yields about 5 per cent ash; but it has been driven almost entirely out of the market in the West by the English and Colorado coke, on account of the freight charges, which swell its price to a high figure compared with the others. There are two kinds of Colorado coke in the market, the El Moro and the Crested Butte. I prefer the latter, others prefer the former; yet the difference is but trifling.

Owing to the different fusibility of different ores, the percentage amount of fuel must be referred to tons of charge, in comparing the consumption in various localities. This brings out the remarkable fact that smelting at a high altitude requires more fuel than at a lower one. In Leadville, for instance, the consumption of mixed fuel amounts to from 22 to 24 per cent of the weight of the smelting mixture, while in Salt Lake Valley it amounts to from 14 to 17 per cent; the lower figure corresponding to the summer and the higher to the winter season, when the ores absorb more moisture than in summer.

Where charcoal alone is used, the percentage of fuel is somewhat higher, probably between 26 and 28 per cent. Correct data are lacking, because this kind of fuel is usually thrown into the furnace by bulk, and the weight is only approximated. How little reliability can be placed on such approximations, I had occasion to experience in a remote mining district, where more fuel was used than the proprietor of the works had purchased (inclusive of waste). This is, of course, an absurdity. It is therefore advisable, in the interest of regularity of the furnace operations, to weigh not only ore and flux, but also the fuel, as accurately as possible.

Fluxes.—The fluxes most frequently used are:

1. Quartz, sandstone, clay slate, or other highly siliceous rocks, to supply any deficiency of silica which might be required to saturate the basic gangue in an ore.

2. Hematite, magnetite, limonite, and specular iron ore, and the various manganese ores, if iron is lacking in an ore.

3. Limestone, dolomite, and calcareous shale, if calcic oxide is not in sufficient quantity in an ore to form a slag of the type desired; to which may be added slag and metallic iron, it we follow Webster's definition of flux as "any substance or mixture used to promote the fusion of metals or minerals."

The action of slag is, however, more of a mechanical than of a chemical nature, unless it should have the characteristics pointed out in the discussion of slags. If a coarse-sized smelting mixture is to be worked, an addition of slag to promote its fusion is entirely superfluous, and would only increase the cost of smelting; but if the charge is very fine, or if much zinc is present in it, slag will very materially promote its fusibility. I have found the correctness of this statement to be confirmed while at Robinson, Colorado.

It is a matter of the greatest moment that the fluxes should be as free as possible from impurities, to insure success in smelting. So, a bituminous or a siliceous limestone would not be exactly the correct flux to select if we wanted lime for ore. As carbonic acid does not take any part in the composition of a slag, burnt lime would theoretically be the best; but as it rapidly attracts carbonic acid and water, thereby reducing its money value, and as it presents mechanical difficulties in the furnace, its application has never become general. It was at one time extensively used at the American Smelting-Works in Leadville.

An iron ore containing 22 per cent of silica and 68½ per cent of ferric oxide would be indeed a very bad flux, since the 22 per cent of silica requires a certain amount of ferrous oxide and also a certain amount of calcic oxide to form a slag of the same composition as is desired. The ferrous oxide required by the silica of the flux has then to be deducted from the ferrous oxide corresponding to 68½ per cent ferric oxide. The remainder will be the real available ferrous oxide (or "excess of iron," as it is termed in Leadville), which will probably not amount to one half of the original 68½ per cent. An admixture of iron pyrites in an iron ore would reduce its value in a similar manner, as so much metallic iron would have to be deducted from the total iron contents as is necessary to convert FeS_2 into FeS.

It does not require much reflection to perceive from the foregoing that the presence of extraneous minerals in quantity increases the bulk of the fluxes at an alarming rate, while the ore may become the smallest part of the smelting mixture. In this case, the percentage of lead in the charge will arrive at a point where smelting is no more profitable. Such cases have occurred in Southern Arizona, where bad fuel and poor fluxes have ruined the lead smelter.

(TO BE CONTINUED.)

FURNACE, MILL, AND FACTORY.

The Colorado Coal and Iron Company, at South Pueblo, Colo., is running on single turn, employing about 700 hands. It is quite busy, and was recently working on a large order of steel rails, 36 pounds to the yard, for the Chicago, Burlington & Quincy Railroad Company.

Captain William Hooper, of the Ticonderoga mines, reports that he has used Dixon graphite grease for coating wire rope, and, giving a coating once in ten days, finds that it prevents rusting and decreases abrasion.

A 150 horse-power Cummer engine will furnish the power for the electric light display at the Cincinnati Exhibition, and a 125 horse-power engine of the same make has been selected to drive a line of shafting at the Louisville Exhibition. The Arlington Woolen Mills, Lawrence, Mass., have put in a Cummer engine, and an engine has also been sent to the Nonatun Worsted Company, Newton, Mass. Among the recent orders are a 16 by 30 steam-jacketed condensing Cummer engine, by S. D. Warren & Co., Cumberland, Maine; a 300 horse-power engine for Messrs. Cain Brothers' flouring-mills, at Atchison, Kansas; a 90 horse-power engine for the Keokuk Plow Company, Keokuk, Iowa; an engine and boilers for the Case & Willard Thresher Company, Battle Creek, Mich.; and an engine for C. R. Cooley & Co., Hartford, Ind. At the 550 barrel flour-mills of D. Suppiger & Co., Highland, Ill., a Cummer engine was started a few days ago, and the Brush Electric Light Company, of Cleveland, has just put in a very large Cummer engine.

The new sheet and plate-mills at Birmingham, Ala., are completed.

The Talladega (Ala.) *Home* says that the Alabama Iron Company, at Alabama furnace, has increased its capital stock to $300,000, which is all paid up, and will shortly begin the erection of another furnace of a daily capacity of forty tons.

The Edgar Thomson Steel-Works, at Braddock, Pa., which are now blowing pig from the furnace directly, are putting in the Gjers soaking-pit.

Mr. W. Hollingsworth Whyte, one of the receivers of Thomas H. Paul & Son, says there are two or three parties in Baltimore who wish to buy the Paul Locomotive-Works, and that whichever of them becomes the purchaser will carry on the works. An order of sale at private sale was signed by the court recently. One of the probable purchasers is largely engaged in the machine business in Baltimore.

It is stated by the St. Ignace *Republican* that the Vulcan Furnace Company has 9000 tons of pig-iron on hand at Newberry. The entire amount will be shipped *via* the Detroit, Mackinac & Marquette Railroad and the Detroit & Cleveland Steam Navigation Company's boats to Detroit. The same paper mentions that the Martel furnace, at St. Ignace, has been doing excellent work since going into blast on the 1st inst. Three casts are now run off daily, and the charges are to be gradually increased until the maximum of production is reached. The iron produced is of superior grade.

The blast-furnace and the puddle-mill at Bay View, Milwaukee, were both shut down on the 20th. It is not known when either department will start up again. It is reported that the blast-furnace will not be started up again until next February, but this report is not accredited. An officer of the North Chicago Rolling-Mill Company states that, although it was not known exactly when the furnace will start up again, it would not remain idle very long. It is simply shut down to enable the company to work off the over-stock of pig-iron on hand at present.

The furnace of the Nova Scotia Steel-Works, at Trenton, was lit a few days ago, and the work of manufacturing steel has already begun. The works are conveniently situated on the banks of the East River, a short distance below Smelt Brook, between the river and the line of the Intercolonial Railroad. During the past year, the work of construction and collecting machinery has been in progress, and the establishment is now pretty well equipped. The Nova Scotia Company was formed on the 12th of April, 1882. The situation chosen is an admirable one; for, in addition to the proximity to the coal mines and the iron deposits of the East River, the facilities for shipment by rail or water are unsurpassed. A siding has been built connecting the factory and the coal-sheds with the Intercolonial Railroad, and a steam traveling-crane of ten tons capacity running through the main building moves all heavy weights from place to place when required. The buildings, which are suitable and substantial structures, cover nearly one and a half acres of ground, giving ample room for carrying on the work. The furnaces are capable of turning out some 9000 tons of steel per annum.

The creditors of Brown, Bonnell & Co. met at the bank of Wick Brothers & Co., Pittsburg. Among the more prominent of those present were Messrs. George A. Berry, of the Citizens' National Bank, and Solomon Schoyer, Jr., of Pittsburg; Daniel P. Ellis and W. H. H. Harris, of Cleveland; J. H. Van Dyke, Milwaukee; James Westerman, Joseph Firker, and B. Magoffin, Sharon; E. Ogleby, Wheeling; J. E. McFarland, Meadville; and W. H. Baldwin, J. H. McEwen, Paul Wick, F. H. Matthews, W. H. Baldwin, H. M. Garlick, John I. Williams, H. O. Bunnell, Ralph J. Wick, and A. B. Cornell, of Youngstown. Mr. George A. Berry, of Pittsburg, was elected chairman of the meeting, and W. H. Baldwin, of the First National Bank of Pittsburg, Secretary. Mr. Brown, the receiver, then submitted a detailed and complete report of the business done by the mills under his management. It was reported that a new company was forming. As a portion of the stock yet remained unsubscribed, Messrs. Paul Wick, James Westerman, H. O. Bonnell, Robert McCurdy, and William McCreery were appointed a committee to request the creditors who had not already subscribed to the new company to transfer the balance due them into stock. Before adjournment was had, a resolution was unanimously passed complimenting Mr. Brown on his management, and requesting the court to continue his receivership until the new company was ready to take hold.

From Jerome, Yavapai County, Arizona, Mr. Frederick F. Thomas, superin-

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tendent of the United Verde Copper Company, reports to Messrs. Fraser & Chalmers, of Chicago, that the furnace and machinery furnished by them have worked very well, the furnace reducing 40 tons of ore and yielding 8 tons of black copper per day. The Silver Bear Copper Company, of Kansas City, has ordered a duplicate of the United Verde plant. The mine is near the Copper Queen at Bisbee.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

GIRARD.—The Tombstone *Republican* reports that the mine and mill have been sold under execution, and bid in by Judge G. G. Berry for the amount of the execution and costs—$47,909.04. Under the new management, this property, which has been lying idle so long, will be started up.

PIMA COUNTY.

GUNSIGHT.—According to the Tombstone *Epitaph*, the sheriff has sold the entire property of this company to Charles Hudson, the banker, at the following prices: Mill, $40; Eastern lode, $41; Silver Girt, $40; Gunsight mill-site, $45; 160 acres, $40; total, $206.

PINAL COUNTY.

QUEEN CREEK.—The smelter started up recently is running on Australia ore. Every thing works well so far. The object of this run is principally to test the capacity of the furnace and the quality of the ore. A later report says that a heavy rain-fall has rendered it impossible to proceed with the work.

RAY COPPER COMPANY.—The superintendent reports to the New York office August 20th: During the last week, in Ray mine, winze No. 1 ran into a heavy seam of native copper, being the richest ore we have yet struck. We have sunk on the same some three feet. The north drift is still in the same character of ore as last week. These are the only two points I am working on, because the windlass can not do more than handle the ore as fast as we get it from these two places. I have been pushing the tunnel with all the force I could systematically work. I have also graded from the mouth of the tunnel to the dump, and fixed for the ore-dump. Winze No. 1 is now down 64 feet; the second drift is in 58 feet; north drift, 26 feet. The tunnel is cleaned out and retimbered 32 feet (about 85 feet to winze No. 1 through tunnel).

CALIFORNIA.

INYO COUNTY.

DEFIANCE.—During the past three months, the main incline shaft has been sunk 194 feet, making a present depth of 286 feet. The work is in a ledge carrying frequent bunches of pay ore. Two shifts are kept at work, and the shaft will be continued to a depth of 700 feet. The late run of the furnace was stopped until a supply of "wet" or lead ores can be extracted, with which to smelt about 100 tons of "dry," rich silver ores remaining on the dump.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GREEN MOUNTAIN.—No. 6 tunnel is now in 1724 feet, and is advancing at the rate of seven feet per day by three eight-hour shifts. The company is just completing new cars, and will soon be running out rock, with a train of four. A horse will be put on as soon as the cars are completed, and it is expected an increased advance per day will then be made. The face of the drift is in favorable ground.

SAN BERNARDINO COUNTY.

BULLION.—Work was begun on this quartz mine about two months ago, and has been steadily prosecuted. Developments at the north end of the claim showed the ore to be very low grade, and hence work was suspended here and continued at the southeastern end of the claim. A shaft was sunk to a depth of 50 feet, which passed through a number of small pockets of very rich ore, but the average ore is low grade. While prospecting around the claim, a rich piece of chloride was discovered near the place where work was first begun at the northern end. Work will be temporarily suspended in the new shaft, for the purpose of developing the new strike.

KING.—Between the third and fourth levels, a rich strike has been made. A vein of ore about two and a half feet in width has been uncovered, and assays made show good results.

TAGGART.—Operations continue with good results.

SIERRA COUNTY.

ALASKA.—Two large boilers have been shipped to this mine at Pike City. About five car-loads of other machinery are now *en route*. The hoisting-works are to be rebuilt and in operation before winter comes. The burning of them a few months ago was a severe blow. The lower levels of the mine are showing up well.

RUBY.—The striking of gravel in a shaft that had been sunk from No. 2 tunnel has caused great excitement. Several car-loads of gravel have been washed, and have yielded five dollars in gold. The bottom of this shaft is on a level, and about one hundred feet ahead of the face of the lower tunnel. The lower tunnel will be pushed ahead into the new ground at once.

CANADA.

PROVINCE OF NOVA SCOTIA.

Reports state that the agents of a syndicate of Boston and New York capitalists has purchased the gold mine at Mount Uniacke, one at Chezzetcook, and, it is rumored, several others. Extensive works will be executed upon each of the several properties thus acquired, and the new proprietors intend to push things.

The Sydney & Louisburg Coal and Railroad Company has recently engaged in the manufacture of iron from the ore found in Cape Breton Island. The analysis of the ore as made by Mr. B. J. Harrington, lately Chemist and Mineralogist to the Geological Survey of Canada, is as follows:

Peroxide of iron	85·037
Phosphoric acid	0·032
Sulphuric acid	0·075

The ore is in large quantity on the Island, which also possesses an inexhaustible supply of coal, and the Cape Breton *Advocate* understands that it is the intention of the Reserve colliery to henceforth manufacture its pig-iron from native ores. It will, in that case, manufacture its own wheels and other iron work.

COLORADO.

BOULDER COUNTY.

VAN FLEET STAMP-MILL.—The mill now at Ballarat will be removed to Jamestown as soon as a proper site can be obtained. Good concentrating facilities are what Jimtown stands in need of.

CLEAR CREEK COUNTY.

PACIFIC MINING AND REDUCING COMPANY.—A dispatch from San Francisco says that this company has filed a petition in insolvency. The capital stock was $10,000,000. The company, it is said, expended $80,000 on its works at Idaho Springs, and also expended $80,000 here. The principal unsecured creditors are John Durand, of Rochester, N. Y., $27,644; Dwight Loomis, of Rockville, Conn., $12,296.95; and T. S. Dumont, Summit, N. J., $5337.93.

CUSTER COUNTY.

BULL-DOMINGO.—This mine, near Silver Cliff, which has been lying idle several years on account of litigation, is to be opened up again. The formation is very similar to the Bassick, and while the ore is not of so high a grade, the quantity is larger, as far as developed. All of the old lawsuits are either settled or dead, and the company has been reorganized, with a capital of $200,000. Out of this amount, a working capital of $65,000 is set aside for development-work. Mr. N. B. Stevens, the general manager and superintendent, is now on the ground, and will immediately put a large force of men to work. The concentrator, which has a capacity of from 75 to 100 tons per day, will be started up again. The mine formerly gave work to about 150 men.

HUMBOLDT.—On the 500-foot level, a rich strike has been made. The vein is twelve inches wide, and assays run high.

DOLORES COUNTY.

DOLORES VALLEY.—This organization owns 84 claims throughout the entire San Juan. In Rico, the company has buildings which cover eight town lots. The Zulu, Peru, Little Giant, Jenny Lind, Stony Point, Vampire, and Atlanta, all on Silver Creek, will be worked through a cross-cut tunnel which will cut the veins 1500 feet below the surface. From this tunnel, cross-cut drifts will follow each vein. The tunnel is in 190 feet through a very hard limestone formation.

EAGLE COUNTY.

BUCKEYE.—The Henry Dawson mine, the property of this company, has a shaft 174 feet deep, with numerous drifts, cross-cuts, etc., to say nothing of a cave of no small proportions, with ore exposed on all sides of it. There is in the main workings of this mine a breast of ore known to be forty feet in depth, from which numerous specimens showing free gold have been taken.

EL CAPITAN.—As soon as the best means for saving the gold are found, this property will be worked extensively.

WILD CAT.—This property is said to be one of the most valuable pieces this side of Tennessee Pass. It is developed by a shaft 175 feet deep and a drift in which they struck the ore, which has widened out and now covers the whole face. It runs in gold higher than any other property of this hill. The last find was gray quartz, in which the free gold was seen with the naked eye. It pans well, and assays show it to be a very valuable body, which in time will yield second to none in the camp. It has for some time been working under a lease, doing, however, development-work mostly, rather than with a view to the extraction of ore.

GILPIN COUNTY.

ILLINOIS.—A cross-cut to the north vein at a depth of 350 feet is driving. Since the formation of the pool, $29,000 have been expended in doing development-work in addition to what has been taken out of the mine.

WHITING.—A vein of mineral of over fifteen inches in width has been exposed. Sinking had been done alongside this vein. Another streak of pay—a brownish sort of iron—has been struck, which prospects well in the pan. The shaft is now down to a depth of nearly 300 feet, and sinking is continued.

GUNNISON COUNTY.

ROSE & REED MILLING COMPANY.—The company is ready to start up a five-stamp battery, which will be used to utilize the tailings, as it is believed that stamps will be more effectual in the work than rolls. There is room for twenty stamps, and more will be added when necessity demands.

SILENT FRIEND.—A seven-sixteenth interest in this mine at Pitkin, has been sold for $133,000. The remaining interest was recently purchased by J. W. Hanna, of Denver, in this mine. Both sales are made on a valuation of $300,000 for the whole mine.

WILDER-MCDONALD.—The concentrating-mill has commenced running. The machinery works satisfactorily.

LAKE COUNTY.

A new bank, to be known as the Carbonate Bank of Leadville, has been incorporated, to supply the vacancy created by the failure of the Bank of Leadville. It will open its doors September 2d, in the building occupied by the insolvent bank, with a capital of $50,000. Its incorporators include some of the best men of Leadville.

In our last issue, we referred to the California Gulch Extension of the Denver & Rio Grande Railroad. The latest information states that it will run up on the north side of the gulch, until the Rock and Stone mines of the Iron Silver group are reached. The road will then cross to the south side of the gulch, on the territory of the Gilt Edge chain, and, continuing up the gulch a short distance farther, will recross to the Breece Hill side, making a horse-shoe. The road will then again strike Iron Hill near the Colonel Sellers mine, and wind its way around the hill, ascending gradually, and passing on the way the mines of the Iron Hill Consolidated, Smuggler Consolidated, Silver Cord, and Iron Silver mines. The Rock, Stone, and La Plata mines will be placed within reach of the railroad by a siding which will pass the large Stone ore-bins. The enterprise of the Denver & Rio Grande Railroad Company will give the mines of California Gulch and Iron Hill a much cheaper and more reliable method of transportation for their products.

ADAMS.—Exploration-work in these properties on Carbonate Hill is making very encouraging headway. The drift from the Clontarf shaft, calculated to connect with the Brookland, has advanced 125 feet, which leaves about 175 feet of drifting to connect the two shafts. The drift is running in a solid body of ore, and the mine is shipping from fifteen to twenty tons of ore a day. The mineral in the bins at the mine is all a fine sand carbonate, running from forty to sixty per cent in lead and fairly well in silver. The entire product of the mine is said to be the result of development-work, and no stoping is carried on. The Brookland shaft is supplied with a new lift-pump, which has recently been ordered, and the pumping machinery on the shaft is idle in the mean time. The new pump will be in place and in working order within a week.

FANNY.—A strike of from four to six feet of galena and lead carbonates has been made. The ore, to all appearance, is not of very high grade, but the extent of the body will insure handsome profits for the lessees. The contact in which the ore was discovered is the same as that of the Nellie S. and other neighboring mines.

HARRISON REDUCTION-WORKS.—One of the four furnaces blew out August 20th, and it is expected that the others will be obliged to follow soon. Want of ore is the reason. It is hoped that the suspension will only be temporary. A report just received states that the company has succeeded in securing the ores of the Iron Hill Consolidation Company's mines. The output ranges from fifty to seventy-five tons a day; and the ore is said to be the most desirable smelting ore produced in Leadville.

IRON SILVER.—Included in the new work recently begun by this company is a large tunnel, driven in from the south side of Iron Hill, and calculated to pass below the large ore-bodies lately opened in the Lime and Bull's Eye claims, now working on leases and producing largely.

LEADVILLE GOLD AND SILVER MILL.—The stamp-mill has been shut down for some time past. It is not known when it will be started up.

LITTLE CHIEF.—A number of tons of the ore taken from the recent strike have been shipped to the smelters, and samples of the ore-breast return $150 per ton on the first-class material and $75 per ton on second class. The mineral is a galena and sand carbonate, and shows chloride of silver in appreciable quantity. The ore-body is situated 215 feet north of the Daly shaft, and about thirty feet west of the Little Pittsburgh line. The length of the Little Chief claim from the Daly shaft to the north end-line is 330 feet. The twenty odd jigs of this company, situated in Big Evans Gulch, have been closed down, throwing sixty-four men out of employment. Eight or ten men are still retained in sorting over ore containing a fair amount of silver and running high in iron. The jigs have been running for several months past, and added considerable to the production of the Little Chief mine during July. During the past few weeks, the grade of the dump material has deteriorated in value, until it was found impossible, by the closest work, to make the concentrating enterprise pay. By means of crushing and a complete concentrating mill, there is no question but that much

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of the ore on the dump can be worked profitably, as well as the tailings from the hand-jigs that have lately been worked. Parties are experimenting, and have attained satisfactory results. The results are, that several offers have been made the company's manager for this material. No proposition will be accepted until the next annual meeting of the stockholders, in October next.

LITTLE PITTSBURG.—The drift from the No. 9 shaft, situated near the Amie line, has been extended northward along the line for 175 feet. Winzes and rises have been made at regular intervals, and in several instances iron ore, carrying small quantities of galena, has been intersected. In places, the iron has a thickness of sixty feet, tapering down to as little as two feet. Several tons of ore have been shipped, but only moderate returns were received. The Dives ground is being thoroughly exploited from No. 6 shaft, from which drifts extend to the O. K. and Little Chief claims. Should the work now in progress prove futile in the development of new ore-bodies, a drift will be driven from No. 9 to No. 10 shaft, as between these two shafts a strong chute of iron ore is known to pass.

O'DONOVAN ROSSA.—Operations are to be resumed.

SILVER CORD.—The hoisting-works, ore-houses, and other property of this company, destroyed by fire July 15th, are rebuilding in a more substantial manner, and it is expected that they will be running by the first of October. The mine is looking well, and has an output, with a temporary plant of about 100 tons of ore a day, which averages about $25 a ton. The total output for July was 2886⅓ tons. Expenses for month, $28,884.95. Profit, $40,524 20. This is a very good showing, considering the present circumstances. The total product from January 1st to August 1st, 1883, amounts to $703,332.97.

WILLIAM WALLACE.—The ore-streak, recently discovered and mentioned in last week's issue of the JOURNAL, has since opened out to about eighteen inches of fine mineral, and the ore-body continues improving as the work advances. The ore was evidently the southern edge of a true ore-chute, and gives indications of opening out into a large body.

PUEBLO COUNTY.

COLORADO SMELTING COMPANY.—The works have probably blown in by this time. The boilers were fired up on August 19th, and the main engine started for the first time. It worked smoothly. A big pile of ore is on hand, besides plenty of fuel. The ore-bins are nearly completed. The elevated tramway from the sampling-works to the smelter is ready for use. Only three furnaces will blow in at present, but the material is on the ground for the fourth furnace, and it can be built at any time on a few days' notice.

RIO GRANDE COUNTY.

SAN JUAN CONSOLIDATED.—Mr. Thomas M. Bowen has disposed of a controlling interest in this company to Mr. M. W. Cooper, of New York. The amount paid is reported to be $900,000. Mr. Cooper is very largely interested in the Annie Consolidated mines, which adjoin the San Juan. The mines are now to be worked very extensively.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended August 19th: Ore produced, 300-foot level, 945 tons; 400-foot level, 105 tons. Shipped, 473 ounces gold; value about $8000. The 400-foot level header has advanced five feet, making a total of thirty feet. All other parts of the mine look about as usual.

FATHER DE SMET.—The report for the week ended August 21st shows: Ore extracted from first level, 750 tons; second level, 750 tons; third level, 525 tons. Ore milled, 2025 tons. Golden Gate south header is in 20 feet.

FAIRVIEW.—Work continues. The main tuunel is in 200 feet, and will tap the ledge within the next forty feet, and 156 feet beneath the surface. The mill will be moved from Elk Creek to the Fairview.

ORO FINO.—Much of the machinery for the hoisting-works is on the ground, and will soon be in place.

IDAHO.

SOLACE.—This mine, which is owned by J. B. Haggin, of San Francisco, is showing a good vein of ore that, it is believed, will yield at least $500 per ton. The superintendent is endeavoring to make arrangements with the Vienna Mill Company to have a lot of ore now on the Solace dump run through the mill, but the rate, $35 per ton, is too high.

VIENNA.—The mill has been running steadily for six weeks. Of the 20 tons worked daily, about 12 tons are from the Mountain King and eight tons from the Vienna mine, both of which are the property of the company. The King ore is of low grade, while the Vienna ore is quite rich. The cost of mining and milling should not exceed $20. The ore-bodies in sight in the Mountain King and Vienna mines are very extensive, and ample to keep the mill running for at least three years. Specifications are preparing for ten additional stamps which are to be put in next spring.

MICHIGAN.

The following figures show the total amount of iron ore shipped from all lake ports up to August 22d:

	Tons.
Escanaba	821,929
Marquette	386,961
L'Anse	36,216
Total	1,245,106

NEVADA.

ELKO COUNTY—DELANO MINING DISTRICT.

This district was formed several years ago, and considerable work was done on the various ledges. Some of the claims paid for a short time, but there being no water near, and several other things operating against the district, it was abandoned for a time. Lately, however, work has been in progress on the Louisa mine, which has been developed to a depth of 110 feet on the ledge. The vein is five feet wide, having three feet of good ore, and two feet of ore mixed with clay. Assays run 30, 75, and 210 ounces of silver per ton. The shaft is to be sunk to a depth of 300 feet.

ESMERALDA COUNTY.

MOUNT CARY.—Work on the reduction-works is progressing rapidly. Timbers for the foundation are put in as fast as the grading is completed. The leaching-room is nearly finished. The greatest activity prevails around the works. One hundred and five men are employed on the grade, and every branch of the work is pushed with the utmost vigor.

HUMBOLDT COUNTY.

The copper mines recently located in what is called the Clove Meadows District are said to be quite extensive. Miners are now at work on one of the copper mines, which is now from 12 to 15 feet wide. It is the intention to take out about 1000 tons of ore before erecting smelting-works. This new district is a part of what is known as Columbia District, which embraces Bartlett Creek.

LANDER COUNTY—BORNICE DISTRICT.

The mill in this district is doing good work on ore from Goodell's mine. The roaster has not yet been started. The ore by free process works over 85 per cent. The first bar of bullion turned out was 989 fine.

LINCOLN COUNTY.

DAY.—It is the intention of the company not to start its furnace at Bristol for some time yet, but to make a long run when it is started. At the Day mine, sinking for another level has been resumed, and the shaft is now 35 feet below the bottom level. The ore-chamber on the lower level has been cut into at a depth of 30 feet, and it has been ascertained that the ore continues down to at least a depth of 50 feet, and how much farther work alone will show. Work is to be resumed on the Mendha mine at Highland.

STOREY COUNTY—COMSTOCK LODE.

The Leadville *Herald* states that some time ago a number of the most prominent mining and business men of Colorado organized a company, under the laws of California, for the purpose of prospecting for the southern extension of the Comstock vein. A tunnel was surveyed, calculated to intersect the vein at about 1600 feet from its mouth, and at about 900 feet below the outcrop. The tunnel is now in about 1500 feet, approaching the vein from the east side. So far, the work has all been in porphyry, with the exception of a few spurs of quartz, highly mineralized, and returning some very fair assays. The work is facilitated by the aid of machine drills, air-compressor, and other appliances, permitting rapid progress, and it is expected that the hanging-wall will soon be pierced, and the vein disclosed in all its strength and wealth. The enterprise is said to be one of the greatest in progress in the Sage Brush State, and, should it result favorably, will prove one of the greatest benefits to Nevada.

At Gold Hill, all mining operation are badly crippled on account of the low stage of water in the Carson River, which prevents the crushing of ore. This trouble will not end till the fall rains set in. Meantime about all that can be done in the mines is exploring and prospecting-work.

ALTA.—The report that some parties were making a determined effort to control the company for the coming year brought a large number of stockholders to the annual meeting held in San Francisco recently. The San Francisco *Exchange* says that fair play and no favor was the motto, and was carried out in spirit and letter. A resolution was passed by the company to allow all stockholders to redeem all stock bought in by the company for fifteen days after purchase of the same by the company. The following trustees were elected to serve for the ensuing year: W. H. Watson, W. F. Myers, W. H. Hoag, J. L. Armstrong, and S. de Greayer. The secretary's report shows:

Balance as per last annual report	$23,437.21
Receipts: Assessments Nos. 24, 25, and 26—25 cents each	80,996.68
	$104,433.89
Disbursements: Labor, supplies, tunnel drift (2362 feet), and all other expenses	60,063.83
Balance	$44,370.06

The balance is represented by various assets, including cash in treasury and on hand, $30,430.53.

NEW MEXICO.

BERNALILLO GOLD PLACER MINING ASSOCIATION.—The owners of the placer claim four miles north of Albuquerque have formed a stock company, to be known by the above name. The capital stock is placed at $250,000, and divided into shares of $250 each. It is proposed in this way to raise sufficient money to purchase machinery. The work of sinking the shaft on the placer is progressing.

COLUMBIA.—The Southwest *Sentinel* states that this mine at Lake Valley was sold to the Sierra Bella Company for $30,500. It is thought, however, the purchase was really for the Sierra Grande Company.

OLD MAN.—Workmen are engaged in placing a tramway in the incline shaft, and this, when completed, will give additional facilities and very materially increase the daily output of ore. Southwest from the shaft, a main or working tunnel has been started, and is said to be in ore already. At present, the company has 400 sacks of ore awaiting shipment, and on the dump there are upward of 1500 tons of milling ore, which will be reserved until such time as the company has completed its ten-stamp mill, now in contemplation.

RICHARDS.—This group of mines, consisting of seven claims, shows well for prospects, and some of the mines are producing ore of a smelting value, notably the Columbia. The shaft at fifty feet in depth exposes some fine ore. At this point, however, the crevice is not looking quite so well, owing to the intrusion of a horse, which promises to yield in a few feet. The Black Prince, at forty-five feet, presents a fine exposure of free-milling rock, estimated at two feet in width. On the dump are several tons of rock of fair milling grade. The Gladstone, belonging to the same group, and situated about three quarters of a mile distant from the Black Prince, is a wide vein of heavy iron ore showing spar.

UTAH.

COMET.—A car-load of ore from this mine, sent to Colorado for treatment, after paying the cost of hauling to Frisco, loading on cars, transportation to Colorado, commissions, etc., netted to the owners over $60 per ton For a single test of one car-load, this did well, and when the company gets its own reduction-works, it expec ts to get still better returns. It is putting in hoisting-works, which will soon be ready for operation. Drifts are running on the vein, cross-cutting is doing, and general development-work is going on satisfactorily. The prospects of the property improve as work progresses. This property was sold recently to a French syndicate.

BOX ELDER COUNTY.

FRISCO.—The ore continues to improve, and the vein grows larger and richer as depth is gained. There is a large quantity of high-grade ore on the dumps ready for shipment.

SALT LAKE COUNTY.

GERMANIA.—Two stacks are now running on Wood River ores, while a third stack is nearly completed for use. In connection with these works, the company has a sampling-mill, in which it proposes sampling the ores bought by it for reduction, as also for custom work. The refinery is getting into shape, and will soon be in operation on the silver-lead-bullion production of the furnaces. About 250 men will be employed at the first of November next.

SUMMIT COUNTY.

HOPEWELL CONSOLIDATION.—Investigation shows that, although upward of sixty thousand dollars have been expended, there is very little to show for it, and the property is still a mere prospect. It is now proposed to consolidate the Hopewell Consolidation, embracing ten locations, with a number of other properties, and form a combination which embraces twenty-six claims. If this scheme can be successfully consummated, it will include the Nettie B., Forrest, and a number of other valuable properties.

HORN-SILVER.—In this mine, on Horn-Silver Mountain, a large body of high-grade chloride mineral has been struck. The drift has been following a broken and uncertain stringer, which has just opened out into large dimensions. The pay-seam is nine feet thick. Six samples from the different layers in the face of the ore-body average 320 ounces to the ton.

MINNIE WHEELER.—A shaft is sinking to tap the vein. Cabins and other necessary buildings have been prepared, and it is the intention to continue work without interruption. The property lies close to the Crescent property, being separated only by the Union claim, and it lies in a square block 1400 feet wide and 1500 feet long.

VIRGINIA.

The discovery of tin ore near Lexington is reported.

HOUSTON.—About thirty tons of manganiferous iron ore are daily shipped to the Cambria Iron Company of Johnstown, Pa.

KENNEDY.—It is reported that a bed of manganese ore has been found on these iron lands, situated on the westward slope of Western Blue Ridge, Augusta County.

WAGNER.—J. B. White & Co. are sinking a new shaft on this land, about 30 feet from the shaft that was sunk five years ago, from which, at a depth of 26 feet, several hundred tons of good ore were taken.

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Aug. 25. H.	Aug. 25. L.	Aug. 27. H.	Aug. 27. L.	Aug. 28. H.	Aug. 28. L.	Aug. 29. H.	Aug. 29. L.	Aug. 30. H.	Aug. 30. L.	Aug. 31. H.	Aug. 31. L.	Sales.	
1	Advance M & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
2	Albion, s. L.	Nevada....	$15,000,000	150,000	$100	$622,500	July....	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
3	Allouez, c.	Michigan.	2,000,000	80,000	25	200,000	January.	1883	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B.
4	Alpha Con., G. S.	Nevada....	3,000,000	30,000	100	420,000	March....	1882	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
5	Alta, s.	Nevada....	10,080,000	100,800	100	2,137,200	July.....	1883	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
6	Alta-Montana, G.S.L.	Montana..	5,000,000	500,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.06	....	.06	....	1,100	.....
7	American Flag, S...	Colorado..	1,250,000	125,000	10	300,000	June.....	1877	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	Barcelona, G.	Nevada ...	5,000,000	200,000	25	*	.....	.....	.....	.32	.30	.31	.30	.31	.30	.30	....	.....	.....	.33	.32	7,200	.....
9	Battle Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	Bear Creek	California	300,000	300,000	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	Beance	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
13	Best & Belcher, G. S.	Nevada....	10,080,000	100,800	100	1,306,190	May.....	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
14	Big Pittsburg, S. L.	Colorado..	20,000,000	200,000	100	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	Black Jack, G.	California	250,000	100,000	2½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	Bonanza Chief	Montana .	1,000,000	1,000,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	Bonanza King, Cons.	California	2,000,000	200,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	Bondholder	Colorado .	500,000	200,000	2½	.....	.....	.....	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	Boston Con., G.	California	10,000,000	100,000	100	95,000	October ..	1882	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	Boulder Con.	Colorado..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	Bradshaw, s.	Arizona...	2,250,000	225,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Buckeye	Colorado..	2,000,000	400,000	5	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	" preferred.	Colorado..	.....	.....	.....	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	Bull-Domingo, S. L.	Colorado..	10,000,000	200,000	50	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Bullion, G. S.	Nevada....	10,000,000	100,000	100	3,767,000	May.....	1883	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
26	Bye and Bye	Arizona...	1,000,000	100,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Calaveras, G.	California	500,000	500,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	Cal. W'r & M. Co., G.	California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	Caledonia, S. H., G.	Dakota....	10,000,000	100,000	100	480,000	August....	1882	.15	.....	.....	.70	.....	.55	.....	.....	.....	.....	.....	.....	.....	200	.....
30	Catskill, S.	Nevada....	1,500,000	30,000	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	Central Arizona, S.	Arizona...	10,000,000	100,000	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.28	.19	.25	....	1,750	B.
32	Chapparal	California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	Cherokee, G.	California	1,500,000	150,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34	Chollar, S.	Nevada....	11,200,000	112,000	100	633,000	August....	1883	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
35	Climax	.....	.....	.....	.....	.....	.....	.....	.....	.09	....	.10	....	.10	....	.....	.....	.09	....	.....	....	1,600	.....
36	Colorado Central, S.	Colorado..	3,000,000	300,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
37	Columbia Con., G. S.	Nevada....	5,000,000	100,000	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
38	Con. Imperial, G. S.	Nevada....	50,000,000	500,000	100	1,450,000	May.....	1883	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
39	Con. Pacific, G.	California	6,000,000	60,000	100	150,000	March....	1883	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40	Crescent, S. L.	Colorado..	3,000,000	300,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B.
41	Crowell, G.	North Car.	500,000	500,000	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
42	Dahlonega, G.	Georgia...	250,000	250,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
43	Dardanelles, G.	California	1,000,000	100,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
44	Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.03	....	.....	.....	.....	.....	.02	....	.02	....	.....	.....	5,500	.....
45	Dunderberg, S.	Colorado..	1,500,000	150,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
46	Durango, G.	Colorado..	500,000	500,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	800	.....
47	Eastern Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.95	.89	.90	.89	.85	....	.83	....	.83	.81	.82	.78	4,100	.....
48	Elko Con., S.	Nevada....	.....	.....	.....	.....	April.....	1883	.15	.....	.....	.....	.....	.....	.....	.10	....	10	.....	.10	....	1,700	.....
49	Empire, S.	Utah	10,000,000	100,000	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B.
50	Enterprise	Colorado..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
51	Exchequer	Nevada...	10,000,000	100,000	100	650,000	June	1883	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
52	Fannie Barret, S.	Colorado..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
53	Globe Copper	Arizona...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
54	Gold Placer, G.	Colorado..	5,000,000	200,000	25	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
55	Goodshaw, G.	California	10,000,000	100,000	100	210,000	June.....	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
56	Granville, G.	North Car.	300,000	300,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B.
57	Harlem M. & M. Co, G.	California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
58	Harshaw, S.	Arizona...	10,000,000	100,000	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
59	Head Center, S.	Arizona...	5,000,000	200,000	25	160,000	May.....	1882	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
60	Hortense, S.	Colorado..	2,000,000	20,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
61	Julia, G. S.	Nevada....	11,000,000	110,000	100	1,405,000	April.....	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
62	Kossuth, G. S.	Nevada....	10,800,000	108,000	100	421,200	August....	1877	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
63	Lacrosse, G.	Colorado..	1,000,000	100,000	10	*	.....	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000	.....
64	Leviathan, S.	Nevada....	10,000,000	100,000	100	380,000	September	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
65	Lucerne, S.	Colorado..	5,000,000	500,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
66	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December.	1881	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
67	" common, G.	California	10,000,000	100,000	100	1,975,000	February.	1883	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
68	May Belle, G.	California	10,000,000	100,000	100	84,000	December.	1881	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
69	Mayflower, S.	Colorado .	10,000,000	100,000	100	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
70	Mexican, G. S	Nevada....	10,000,000	100,800	100	2,319,400	July.....	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
71	Michoacan Synd.	Mexico..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
72	Miner Boy, G. S. L.	Colorado..	5,000,000	500,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
73	Miller	Nevada ..	5,000,000	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
74	Mono, G.	California	5,000,000	50,000	100	535,000	January ..	1883	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
75	Moose Silver, S.	Colorado..	3,000,000	300,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
76	Moulton, G. S.	Montana..	10,000,000	400,000	25	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
77	Nevada Syndicate	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
78	North Standard, G.	California	10,000,000	100,000	100	20,000	November	1881	.10	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000	.....
79	North Horn-Sil., S. L.	Utah	.....	400,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
80	Noonday	California	600,000	60,000	10	203,000	December.	1882	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F
81	Old Dominion, C.	Arizona...	3,000,000	300,000	10	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
82	Oriental	Nevada....	2,000,000	200,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
83	Oriental & Miller, S.	Nevada....	10,000,000	400,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
84	Overman, G. S.	Nevada....	11,520,000	115,200	100	3,604,700	May.....	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
85	Parnell	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	....	400	.....
86	Potosi	Nevada..	10,200,000	112,000	100	612,640	August....	1883	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
87	Quartz Creek	.....	.....	.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
88	Rappahannock, G.	Virginia .	.....	250,000	.....	*	.....	.....	.....	.06	.....	.....	.....	.07	.....	.....	.....	.....	.....	.06	....	1,300	.....
89	Red Elephant, S.	Colorado	500,000	500,000	1	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
90	Retort M. & M. Co.	Colorado .	.....	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
91	San Pedro, G. S. L.	New Mex.	.....	400,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
92	Silver Cliff, S	Colorado .	5,000,000	200,000	25	*	.....	.....	.....	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	B., P
93	Silver Islet	Canada....	1,000,000	40,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
94	Sonora Con.	Mexico..	.....	.....	.....	.....	.....	.....	.....	.25	.....	.26	.24	.28	.25	.29	.27	.29	.27	.28	.27	40,400	.....
95	South Bodie, G.	California	.....	100,000	.....	100,000	March....	1882	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
96	South Bulwer, G	California	10,000,000	100,000	100	195,000	May.....	1881	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
97	South Hite	California	10,000,000	100,000	100	.....	January ..	1883	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,200	.....
98	South Pacific	California	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
99	State Line, No. 1, S.	Nevada....	200,000	200,000	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B.
100	" No. 2, S.	Nevada...	5,000,000	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
101	" No. 3, S.	Nevada...	5,000,000	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
102	" No. 4, S.	Nevada...	5,000,000	200,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
103	" Nos. 1 and 4, S.	Nevada...	.....	.....	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
104	" Nos. 2 and 3, S.	Nevada...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
105	Sullivan, G. S. L.	Maine.....	500,000	100,000	5	125,000	December.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
106	Sutro Tunnel	Nevada...	.....	2,000,000	.....	*	.....	.....	.....	.19	.....	.....	.....	.20	.19	.20	.19	.19	.....	.19	.....	8,900	B.
107	Taylor-Plumas	California	.....	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B., P
108	Tioga, G.	California	10,000,000	100,000	100	285,000	October..	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
109	Tuscarora, S.	Nevada...	10,000,000	100,000	100	110,000	October..	1881	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
110	Unadilla, S.	Colorado .	50,000,000	500,000	100	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
111	Union Con., G. S.	Nevada...	10,000,000	100,000	100	1,670,000	July.....	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	5.25	.....	.....	.....	35	.....
112	Utah, S.	Nevada...	2,000,000	20,000	100	1,420,000	July.....	1883	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. F.
113	Vandewater	Nevada ...	20,000,000	200,000	100	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
114	Washington	Arizona...	2,000,000	200,000	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
115	Whalen Copper	Nevada...	2,500,000	100,000	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
116	Wide West	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
117	Willshire	California	250,000	50,000	5	*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 78,085. Total shares sold, 155,652.

small transaction, sold at $5.25. Sutro Tunnel was quiet and steady, selling from 20@19c.

The Leadville stocks were moderately dealt in and were a little strong. Amie was quiet and steady at 15@18c. Chrysolite had a fair business and showed some strength; it sold from $1@$1.15. Dunkin was quiet and steady at 30@28c. Iron Silver sold from $3.05@$3, with a small business. Leadville was quiet and a little weak, selling from 38@30c. Little Chief had an active business, and was quite strong; it sold from 43@62@60c. Little Pittsburg was also strong, selling from 55@60c.; the transactions were small. Climax was moderately dealt in at steady prices, selling from 10@9c.

The Bodie stocks were quiet and showed signs of weakness. Bodie Consolidated was quiet and weak, selling at 67c. assessment paid, and from 30@15@17c. assessment unpaid. Standard had a small business at irregular prices; it sold from $6@$5.38@$5.50. Bulwer was quiet and steady at 70c. North Standard sold at 8c.

The Tuscarora stocks were very quiet and were steady. Grand Prize sold from 25@20c., with small transactions. Belle Isle recorded a small busi-

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ness at 30c. Navajo sold to the extent of 100 shares at $3.10. North Belle Isle exhibited considerable strength under a small business, selling from 37@50c. Elko Consolidated was quiet and steady at 10c.

In the miscellaneous list, Eureka Consolidated was quiet and strong, selling from $6.13@$6.88. Hall-Anderson recorded a small business at irregular prices, selling from $1.15@$1@$1.05. Horn-Silver was moderately dealt in at strong prices; it sold from $6.63@$7. Northern Belle was irregular, under a fair business, selling from $6.50@$6.13@$6.25. Robinson Consolidated was very active and very irregular; it sold from 45@54@46c. Sierra Grande recorded a fair business, and was also irregular; it sold from $1@$1.20@$1.05.

Alta Montana was quiet and steady at 6c. Caledonia sold from 70@55c. under a small business. Central Arizona was quite strong, under small transactions, selling from 19@28@25c. Decatur had a small business at weak prices, selling from 3@2c. Eastern Oregon suffered a decline from its recent strong prices and was quite weak; it sold from 95 78c. Rappahannock was quiet and steady at 7 6c. Sonora Consolidated was very active at steady prices; it sold from 24@29@27c.

DIVIDENDS.

The Charleston Mining and Manufacturing Company, of South Carolina, announces a quarterly dividend of two dollars and fifty cents per share, payable September 1st.

The Evening Star Mining Company, of Colorado, has, according to Leadville papers, declared dividend No. 55, payable August 22d, and amounts to fifty cents a share, aggregating $25,000. Total dividends paid to date, $1,875,000.

The Mount Diablo Mining and Milling Company, of Nevada, has declared a dividend (No. 1) of twenty-five cents per share, payable at San Francisco, August 23d.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF AUGUST, AND FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of August.	Since January 1, 1883.
Atlantic, C.	Mich.		$80,000
Bassick, S.	Colo.		200,000
Black Bear, G.	Cal.		6,000
Boston & Montana, G.	Mont		10,000
Bulwer Consolidated, G.	Cal		35,000
California, G.	Colo.	32,500	65,000
Calumet & Hecla, C.	Mich	500,000	1,500,000
Carbonate Hill, S.	Colo.		60,000
Castle Creek, G.	Idaho	3,000	27,000
Catalpa, S.	Colo.		30,000
Central, C.	Mich.		60,000
Christy, S. L.	Utah.		6,000
Colorado United, S.	Colo.		16,750
Contention, S.	Ariz.		375,000
Con. Gold M. Co. of Ga.	Ga.	4,000	32,000
Copper Queen, C.	Ariz.		375,000
Cosmopolitan	Utah.		50,000
Crescent, C.	"		60,000
Deadwood-Terra, G.	Dak		20,000
Evening Star, S. L.	Colo.	25,000	50,000
Father de Smet, G.	Dak		80,000
Gem, S.	Colo.		7,500
Glen, S.	"		3,000
Granite, S.	"		3,750
Hecla, S.	Mont	15,000	120,000
Henriett, S	Colo		27,000
Holyoke, G.	Idaho	4,000	32,000
Homestake, G	Dak	50,000	400,000
Hope, S. C. L.	Mont		24,000
Horn-Silver, S. L.	Utah.	300,000	900,000
Howell S. & M. Co., G. S. L.	Ariz.	3,750	3,750
Idaho, G.	Cal.	7,750	62,000
Indian Queen	Nev.		3,750
Indian Spring Drift	Cal.		1,000
Iron Silver, S. L.	Colo		200,000
Jocuistitta, S.	Mexico	50,000	150,000
Kentuck, S.	Nev.		21,000
Leadville Consolidated, S.	Colo		40,000
Lexington, S.	Mont.		200,000
Morning Star, S. L.	Colo		25,000
Navajo, G. S.	Nev.		125,000
Northern Belle, S.	"		100,000
Ontario, S. L.	Utah		75,000
Osceola Consolidated, C.	Mich.		75,000
Oxford, G.	N. S.	5,000	30,000
Plymouth Cons.	Cal.	50,000	150,000
Prussian, S. L.	Colo		15,000
Quincy, C.	Mich	140,000	380,000
Richmond, S. L.	Nev.	67,500	270,000
San Francisco, C.	Cal		2,500
Shoshone, G.	Idaho		6,000
Sierra Buttes, G.	Cal.		30,625
Sierra Grande, S.	New Mex.		400,000
Silver Cord, G. S. L.	Colo	90,000	180,000
Silver King, S.	Ariz		150,000
Smuggler, S.	Colo	15,000	36,000
Standard Cons., G.	Cal	25,000	200,000
Total Wreck	Ariz.		50,000
True Fissure, G. S. L.	Utah.		75,000
United Gregory, G.	Colo.		12,000
		$1,387,500	$7,721,625

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

MEETINGS.

Amie Consolidated Mining Company, No. 31 Broad street, New York City. Annual meeting of stockholders and election of trustees, September 15th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, No. 49 Broadway, report that the petroleum market during the past week sold down to $1.05¾, gradually sagging from $1.08½, the opening last Friday, reacting to $1.08½, the opening to-day.

The principal reason for the weakness was that reports of development-work in the oil regions for August promised to be very bearish. The report that comes to hand to-day is less bearish than anticipated, hence the improved tone to the market. The report is as follows:

	Wells completed.	Wells drilling.	Rigs up and building.	New production.
July	260	262	232	3,800
August	309	315	261	4,267
August increase.	49	53	29	467

The high price of oil in June and July stimulated drilling of wells, and there are more wells now under way than for six months. With all these wells in view, and several of them important test-wells to the northeast of Balltown, it is unreasonable to expect any material advance. The charters for export have been large, but these must decline. For August there are 47,681 barrels, against 49,458 in May, 46,670 in June, and 39,634 in July. The "runs" up to the 28th inst. exceed the deliveries by 1300 barrels per day, but the accumulation of oil in August will be insignificant compared with the accumulation of 400,000 barrels in July. Refined oil is 7¾ against 7⅝ Wednesday. The petroleum market during the week has generally been dull, the short interest is not large, and the immediate fluctuations are likely to be within a narrow range.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 25	$1.07⅛	$1.07⅛	$1.06¼	$1.07	1,674,000
27	1.07⅛	1.07⅝	1.06¼	1.06⅜	1,842,000
28	1.06⅝	1.06⅞	1.05¾	1.05⅜	2,084,000
29	1.06⅛	1.07⅛	1.06⅛	1.07¼	1,682,000
30	1.07⅛	1.08¼	1.07⅛	1.07¾	2,112,000
31	1.08⅛	1.08⅝	1.07⅝	1.08⅝	2,264,000
Total sales.					11,658,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Aug. 24.	Aug. 25.	Aug. 27.	Aug. 28.	Aug. 29.	Aug. 30.
Albion						
Alpha		2¼		2⅛	2⅛	
Alta		.80	.80	1	1	1⅛
Argenta				.25	.20	.10
Bechtel						
Belcher			1	1	1	1
Belle Isle			.25		.25	.30
Best & Belcher		4¼	4¼	4¼	4¼	4¼
Bodie			.25	.25	.25	.10
Bullion						
Bulwer						
California		.40	.40	.35	.35	.30
Challar		3⅛	3⅛	2⅝	2⅝	2¼
Con. Virginia		.65	.70	.65	.65	.60
Crown Point		1⅛	1⅛	1⅛	1⅛	1⅛
Elko Cons						
Eureka Cons		6½	7	6¾	6¾	6⅛
Exchequer						
Gould & Curry		3⅛	3¼	3⅛	3⅛	3
Grand Prize		.25	.25		.25	.20
Hale & Norcross		6⅛	6⅛	5¾	5¾	4⅞
Independence						
Martin White			.25		.25	
Mexican		3¾	3⅝	3⅝	3⅝	3¾
Mono						
Mount Diablo		4¼	4¼	4¼	4¼	4¼
Navajo		3	3⅛	3	3	3
Northern Belle				6⅛	6⅛	6⅜
North Belle Isle						
Ophir		3	3	3¾	3¾	3⅞
Overman						
Potosi		1⅛	1⅛	1	1	1
Savage		2⅛	2⅝	2⅝	2⅝	2⅛
Scorpion		.65	.60	.60	.60	.65
Sierra Nevada		4¼	4⅛	3¾	3¾	3¾
Silver King						
Tip-Top						
Union Cons		5⅜	5⅝	5⅛	5⅛	5¼
Utah		3	3⅛	3	3	3
Wales Cons						
Yellow Jacket		3¼	3¼	3⅛	3⅛	3¼

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, August 30.

There is no improvement to note in the market for copper stocks, either in point of activity or prices. To say that the market is dull, feebly expresses the situation. There is, in fact, so little doing that it is almost impossible to get fair quotations, and the few sales recorded from day to day hardly give enough to form an opinion as to the future of business in this line of securities. Ingot copper holds its own very fairly, and, if it should advance from present prices, a change in the market for the principal producing mining stocks would surely follow. The situation is one of waiting and expectation. Calumet & Hecla sold early in the week at $240 and declined to $237, with sales again to-day at $240, and the stock is offered at that price; no bids. The whole amount sold was less than 25 shares, and shows how sensitive the market is. An order to buy 50 shares could not be filled without advancing the price several points; and the reverse, in case the order was to sell at best price. Quincy is steady at $45, all the sales being made at that figure. Less than 100 shares changed hands, and $44 is bid freely, without calling it out. Osceola declined from $18½ (August 14th) to $17¾, with later sales at $18, and closes $17½ bid, $18 asked. Allouez sold at $1¾, an advance of $¼ since last sale (August 14th). Franklin, Pewabic, and Huron are entirely neglected.

In silver stocks, there was a slight increase in the volume of sales at the regular Board over last week, confined, however, to two or three stocks, without any special change in prices. Sullivan sold as before at 87½c. At the Mining Board, sales are recorded at 95@77½c. Catalpa sold at 37½c., a decline of 2½c. Crescent is offered at 15c. without takers. We hear a rumor that Crescent is in debt to the Catalpa, and that the prospects of a dividend from the latter are not very promising. Bonanza declined to 1½c. Harshaw sold at 50c. as before. San Pedro, at 17c. Bowman Silver is slightly higher; sales at 18@19c. Massachusetts & New Mexico is dull at 4@5c. Silver Islet declined from $3⅛@$3.

3 P.M.—There was no change in the market at the afternoon Boards. Calumet & Hecla sold at $240, same as before. Pewabic, at $3¼ regular, and $3⅛ buyer 60 days. For Franklin, $9½ bid, $10 asked. Quincy, $44 bid. Atlantic, $10 bid. Osceola, $17½@$18. Silver Islet, $3 bid. Bonanza, $1½ bid. Bowman sold at 18c. Sullivan, 81¼c. bid; sales 85c., buyer 30. Dunkin, 28c. bid.

BULLION MARKET.

NEW YORK, Friday Evening, Aug. 31.

The market abroad has continued fairly steady the past week; but owing to large receipts here and declining sterling exchange, our market has been nominal and weak at the rates of accompanying table:

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Aug. 25	50⅝	110¼	Aug. 29	50⅝	110@110⅛
27	50⅝	110⅛	30	50⅝	110
28	50⅝	110⅛	31	50⅝	109⅞

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended August 31st, as compiled from various sources, amounted to $222,000, as against $214,000, reported for the previous week. The receipts from January 1st, 1883, to date are $7,613,974.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended August 25th	$581,605
Corresponding week last year	462,849
Since January 1st, 1883	8,913,129
Corresponding period last year	43,211,547

Imports.

Week ended August 25th	$1,380,941
Corresponding week last year	13,690
Since January 1st, 1883	9,602,774
Corresponding period last year	2,383,353

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £395,000 bullion, and the proportion of its reserve to its liabilities was raised from 46 11-16 to 49 9-16 per cent, against 39 3-16 per cent at this date last year. The bank made an additional gain of £75,000 bullion on balance. No report of the weekly statement of the Bank of France has been received.

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BOSTON MINING STOCKS.

	Aug. 24.		Aug. 25.		Aug. 27.		Aug. 28.		Aug. 29.		Aug. 30.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez							1.75		1.75				200
Amie													
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.	1.50						1.03	1.50	1.50		1.56¼	1.50	700
Bowman Sil	.17		.18	.17	.18		.17		.19		.18		14,600
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	240						237½	237			240	238	32
Catalpa	.37½		.40		.37	.36			.37½		.37½	.35	4,600
Central Ariz													
Climax													
Co. Virginia	.67												200
Copper F'lls													
Copperop													
Crescent	.15				.17		.15						600
"Cusi"													
Decatur													
Deer Isle			.05		.05		.04				.05		5,150
Denver City													
Douglas													
Duncan													
Dunkin			.25		.25				.28		.29		1,200
Empire					.16				.16				1,200
Eureka Con.											7.00		12
Franklin							9.75						15
Gila County											.08		1,000
Harshaw	.50						.50		.50				500
Hukill													
Independ'ce													
Indian Q'n													
Little Pitts.													
Mammoth					.03		.02		.03				2,750
Mass. & N.M.	.05				.05				.05		.05		6,250
Milton													
Napa													
National													
North. Belle													
Ontario													
Osceola			18.00		17.50				18.00				68
Penn-Breck.													
Pewabic											3.25		200
Pine Tree													
Plymouth													
Quicks. com													
Quincy			45.25	45.00	45.00		45.50						120
Robinson	.60						.62				.53		400
San Pedro	.17	.15			.17						.18		1,650
S'n Nevada													
S'ra Grande													
Silver Islet									3.00				5
Silver King													
Simpson Gd													
So. Pacific													
Standard											7.75		5
Sullivan	.95	.87½	.87½		.85		.92½	.90	.80	.77	.81¼	.81	4,150
Sutro Tun			.20				.20				.19		450
Sycamore													
Twin Lead	.05				.04								2,000
Vizina													

PHILADELPHIA MINING STOCKS.

	Aug. 24.		Aug. 25.		Aug. 27.		Aug. 28.		Aug. 29.		Aug. 30.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.15		.15						.14		.15	.14	10,050
Aztec													
Battle Mt.	.03				.03								6,000
Buena													
California													
Calista													
Chrysolite													
Cincinnati			.10						.10				2,000
Comprom'e							.16		.16		.16		5,600
Contention													
Con. Virg.													
Dauntless			.02				.02		.02				5,500
Del Monte	.04				.04								4,000
Denver City					.11						.11		5,000
Eureka													
Girard													
Governor													5,000
Grand Uni'n	.02		.03		.03		.03	.02	.03		.03		20,000
Green Mt													
Gunnison					.30		.27½		.27½		.27½		8,500
Homestake													
Horn Silver													
Iowa Gulch			.06	.05	.06						.06	.05	13,400
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd			.06		.07		.06		.06		.07		13,000
Little Maud													
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan	.04						.03				.03		6,000
National													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina									.12				1,000
Penn-Breck.	.02				.09				.10		.10		7,700
Permanent	.02												5,000
Pizarro	.01												1,000
Pizarro Ex.	.03	.02											10,300
Potosi													
Rara Avis									.21		.19		900
Rara Avis E.	.10		.12	.11	.12		.11		.12	.11	.11		15,800
Record													
Rico Pion'r.													
Sierra Apac.											.24		500
Sierra Be.la.			.60		.57½						.57½		2,250
Sierra G'nde			1.12½	1.07½	1.07½		1.10	1.05			1.10	1.07½	5,550
Sierra Nev.													
Silver Cord.			1.60	1.55			1.55						1,700
Silver King.					.02		.02		.01				52,000
Silv'r Plume													
Sonora Con.													
Standard													
Sultana					.02		.03		.02				15,000
Sutro Tun'l.													
Tombstone													
Victor													
Yale Mt.													

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of July.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	‡$97,128	$568,441
*Alta-Montana, G. L. S.	"		§10,625
*Belmont	"		12,604
Bodie, G. S.	Cal.	12,447	161,728
Bodie Tunnel, G.	"		52,742
*Bonanza King, G.	"	45,211	379,434
*Boston & Montana, G.	Mont.		72,318
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah.	16,842	162,513
*Chrysolite, S. L.	Colo.		246,676
Consolidated Bobtail	Colo.		18,723
*Contention, S.	Ariz.	77,985	635,413
Crescent, G.	Cal.		13,000
*Custer, G. S.	Idaho.		43,572
*Deadwood-Terra, G.	Dak.		172,277
*Derbec Blue Gravel, G. S.	Cal.	17,122	72,270
Dunkin, S. L.	Colo.		32,015
Evening Star, S. L.	Colo.		47,061
*Father de Smet, G.	Dak.	30,688	208,851
*Frisco M. and S. Co., G. S. L.	Utah.		§77,084
Gunnell, S.	Colo.		58,828
*Head Center Consolidated	Ariz.		26,502
*Head Center and Tranquillity	Ariz.		60,620
*Hecla Consolidated, G. S.	Mont.		293,922
*Homestake, G.	Dak.		419,148
*Hope, S.	Mont.	20,484	62,447
Horn-Silver, S. L.	Utah.	300,000	1,847,000
*Howell S. and Mg. Co., G. S. L.	Ariz.	§41,361	41,361
Idaho, G.	Cal.		88,642
*Independence, G. S.	Nev.		32,991
Iron Silver, S. L.	Colo.		503,831
*Jocuistita, S.	Mex.		‡228,022
*Kentuck, G. S.	Nev.		12,876
*Lexington, S.	Mont.	106,068	744,556
*Little Pittsburg, S. L.	Colo.	6,446	42,091
*Marguerite, G.	Cal.		45,745
*Martin White, G. S.	Nev.		136,317
Morning Star, S. D.	Colo.		84,428
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev.	74,277	262,100
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S.	"	51,134	447,040
*Ontario, S. L.	Utah.		1,038,687
*Oxford, G.	N. S.	5,276	40,531
*Phœnix, G.	S. C.	3,000	10,700
*Pinal Consolidated, S. L.	Ariz.		181,485
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		101,241
*Silver Cord, G. S. L.	Colo.	69,359	703,333
Standard, G.	Cal.	95,209	738,401
Star, S.	Nev.		27,095
*Stormont, S.	Utah.	18,020	132,330
Syndicate, G.	Cal.	9,300	38,428
Tintic M. and M. Co.	Utah.	10,595	25,196
*Tip Top, S.	Ariz.	10,009	37,868
*Tombstone, G. S. L.	"	82,960	497,199
Wyoming Consolidated	Cal.		31,541
Yellow Jacket, S	Nev.	72,227	265,885
Total amount of shipments to date			$12,871,150

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, Aug. 31.

Copper.—Though quiet, the market exhibits considerable firmness, the only supplies of Lake copper available being from second hands. We note sales from of 250,000 to 300,000 pounds of Lake copper at 18⅛@18¼c. Many buyers indicate their willingness to take Lake at 15c., but there is little offering. Other kinds are naturally scarce, and the range remains 14⅛@14⅛c., according to brand.

A determined effort is apparently making to create the impression that almost under any circumstances the statistical position here warrants higher prices. There is no doubt that it is favorable, but the fact should not be forgotten that we are down to the world's market. We can not for any length of time maintain a much higher range of prices. A rise here, not accompanied by a corresponding rise abroad, could only be short-lived. It would simply divert into this market furnace material which now goes abroad, and the equilibrium would be quickly restored. If this quantity of copper which could thus be shifted were small and readily controlled, we might part company with the rest of the world. But it is heavy and would promptly force us down to the general level. This fact should be constantly borne in mind. No figuring can brush it aside.

The latest English cables are £63 15s. for Chili Bars and £69 for Best Selected.

Under date of August 17th, Messrs. Henry R. Merton & Co., of London, report:

American ingot copper has been sold at £63@£63 5s. net c. i. f. Liverpool for Orford, and £63 15s. for Baltimore. In Furnace stuff, the transactions have been 350 tons ordinary Rio Tinto Precipitate at 12s. 9d., 150 tons rich Rio Tinto Precipitate at 12s. 10½d., 450 tons Cape ore at 12s. 6d.; and at the Swansea Ticketing, 958 tons ores, averaging 9⅜ per cent, realized 11s. 3¾ d. per unit.

Tin.—Business has been quiet at 21c. for spot Straits. The arrivals during the month have aggregated 1700 tons, of which 300 tons are now on the dock.

London cables £93 12s. 6d.@£93 15s.

Lead.—Sales at the lower figures noted in our last having ceased, apparently because even they did not tempt buyers, and there being simultaneously a disposition on the part of Western holders to pick up cheap lead, the price has advanced to 4·30c., at which jobbing lots aggregating 300 tons have been placed. The firm attitude of holders makes it impossible to procure lead at a lower figure, and yet an effort to place large lots would promptly lead to a heavy falling off in the price. The situation seems to be largely artificial, a dead-lock, in which the sellers' side is at some disadvantage, because of the accumulation of stocks. Nothing is reported in Refined. In London soft Spanish has reached £12 7s. 6d.

From St. Louis, Messrs. John Wahl & Co. wire as follows:

The market remains the same, if any thing, a shade firmer. We note sales of 500 tons of Refined, September delivery, at 4·05c., and 130 tons of ordinary Missouri has been sold here to Eastern consumers at 4c.

Messrs. Everett & Post telegraph us to-day from Chicago as follows:

Buyers, fearing an advance, are coming forward and are buying lead quite liberally, so that there has been a large demand for spot lead during the past few days. Our market is strong and higher at 4·07½, 4·10, and 4·12½c.

Spelter.—The cheap lots by weaker producers are disappearing; and while there have been sales at 4⅜@4½c., it would probably be somewhat difficult to obtain supplies at the lower figure. England cables £15 for Silesian.

Antimony.—This metal is quiet, with nothing to report.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Aug. 31.

American Pig.—Business has been restricted to small lots, buyers pursuing strictly a hand-to-mouth policy. No. 1 Foundry continues firm at $21.50@$23 for standard and choice, while No. 2 is still in a less favorable position, showing occasional signs of weakness. We quote $19@$21, according to quality, while inferior to choice Gray Forge fetches from $18@$20, all at tide-water. In Bessemer pig, nothing new is reported and $21 full is now quoted. In Spiegeleisen every thing is quiet at $25.50@$25.75, while higher grades are dull at $30.50.

At the Exchange, the following transactions were recorded: Saturday, August 25th, 100 tons American Pig, No. 1, November, $21.87½; 300 tons American Pig, No. 1, November, $21.87½; 100 tons

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American Pig, No. 1, December, $22; 200 tons American Pig, No. 1, December, $22; 100 tons American Pig, No. 1, January, $22.12½. Monday, 100 tons American Pig, No. 1, January, $22.25; 100 tons American Pig, No. 1, January, $22.25; 300 tons American Pig, No. 1, January, $22.25. Tuesday, 200 tons American Pig, No. 1, December, $22. Thursday, 200 tons American Pig, No. 1, November, $21⅞; 300 tons American Pig, No. 1, January, $22⅜. Friday, 200 tons American Pig, No. 1, December, $22.

Scotch Pig.—Business during the week has been dull at about our quotations. Arrivals are more moderate this week, and freights are cabled lower, 5s. from Glasgow.

We quote ex ship: Coltness, $23.75@$24; Langloan, $23.75@$24; Summerlee, $23; Dallmellington, $21@$21.50; Eglinton, $20.50@$21; and Glengarnock, $22.50@$23.

At the Exchange, the following slightly lower cable quotations were received: Coltness, 60s. 3d.; Langloan, 59s.; Summerlee, 56s. 6d.; Gartsherrie, 56s. 6d.; Glengarnock, at Ardrossan, 55s. 3d.; and Eglinton, at Ardrossan, 48s. 6d. Warrants to-day were 47s.

Rails.—The 40,000 tons Gowen-Vanderbilt are still in the market, not having been closed as yet. There are occasional small lots at recent quotations, but otherwise the market is very dull.

The low cables of English steel rails have given rise in some quarters to the fear that they might capture the Southern trade. Rails are now delivered along the Southern coast at $41, which is several dollars lower than the figures based upon English quotations.

Old Rails.—There have been sales of round lots at $22.75@$23, but it would be difficult to do better than $23.25@$23.50 now.

Scrap Iron.—There is nothing new to report.

Philadelphia. August 30.

The volume of iron transactions for the past week has been below the expected limits. Consumption is large, however, and stocks are generally of moderate proportions in buyers' hands. Low summer prices have led to but little heavy buying. The temper of the market is not favorable to large movements. The producing capacity is large and fully up to requirements; hence weak prices and cautious movements all along the line.

Pig-Iron.—Very little business was done. Small lots were bought, notwithstanding inferior iron was offered at very low prices. Some makes were offered at $17, furnace; but very little desirable iron can be had below $17.50, while $18.50 is firmly held for three or four of the brands that are mostly wanted. Good Forge happens to be fairly sold up, and buyers keep ordering ahead at about the same figures. Foundry brands are quoted $21@$23 for No. 1; $19@$20.50 for No. 2, with some business at an average of $20@$22. Both buyers and sellers are waiting for developments. There is very little room for any further decline, and producers are rather impatient at the dullness. They believe that, when some cause gives an upward turn to the market, consumers who are holding back for no good reason will rush in and place orders and perhaps lift prices 50 cents to where they ought to be.

Bessemer.—Scarcely any thing has been done in Bessemer, although buyers are ready to buy at their price. Prices have advanced to $21@$22 nominally, according to size of lot wanted; but best offers in a large way are under $21. Spiegeleisen has strengthened itself, but no sales can be reported. Quotations, $31.50@$32.

Blooms.—Small lots are inquired for at $48 for anthracite and $58 for charcoal. Sales of Muck Bars have been made in a small way at $34.

Merchant Bars.—But little has been done, and buyers are looking for a further decline. Iron has been bought as low down as 2·05c. Small lots of best makes 2·20c., but 2·15c. would command good iron. There seems to be no regular price. Manufacturers are anxious to get business, and in a good many cases have taken orders at about cost. Skelp is under fair inquiry, and two or three large orders will be placed in a few days.

Nails.—The production is likely to weaken prices. Stocks are not large, but with so great producing capacity prices are easily affected. Car-load lots are quoted at $3, and small lots are going as usual at $3.10@$3.15. Makers think the market will harden up again when September business comes along.

Plate and Tank Iron.—A good many small orders are coming in. The mills have a fair amount of business for September and October. Plate is ordered at 2·34@2·50c. Shell, 3@3·10c. Flange, 4@4·25c. Fire-Box, 5@5·50c.

Structural Iron.—The outlook at the opening of September is encouraging, both as to business on hand and as to inquiries. The railroads are doing a great deal of buying, and building requirements are up to the average. Prices are at their lowest possible limit. Angles, 2·40c. Tees, 3c. Beams and Channels, 3·50c.

Sheet-Iron.—Manufacturers have orders for September and October, and are all working full. For Common, 4@4½c. Galvanized is strong and steady at 45 off list.

Steel Rails.—Negotiations are still hanging fire at $37. Small lots, $38@$38.50.

Old Material.—Tees are offered for shipment at $23@$23.50. Double-heads, $25.50@$26. One small sale.

Scrap.—Selected Yard, $24@$25; No. 2, $23@$23.50; Cargo, $23@$23.50.

Pittsburg. August 30.

Neutral Forge is offered in 500-ton lots at $17@$18. Foundry iron is asked for in 50 to 100-ton lots, but prices named are not low enough. The market is weak, and sellers are now more urgent than buyers. Stocks seem to be accumulating, especially from outside sources. Bessemer iron is under fair inquiry, but no large sales have taken place, because of the high prices for shipment. Muck Bar is quoted at $34; Refined iron is weak at 1.90c., and even less in some cases. There is a strong probability of a shut-down of the nail factories, but some manufacturers think that the September demand will absorb the entire production and enable them to maintain full output at $2.90 rates. Steel rails are $38@$39. Old rails, $23@$24. Scrap iron of all kinds is dull and weak at unchanged prices.

Cleveland. August 30.

The market for the past week shows increased signs of stiffening, consumers taking larger lots and at holders' prices. There is a slightly increased activity in general foundry trade and a decidedly better feeling among mills. Soft foundry and silvery irons are scarce and in large demand, and good brands of strong foundry iron are not any too plentiful. With prospects of a good fall trade, we look for continued better condition of the iron trade. We quote:

No. 1 Bessemer	$21.50@$22.00
No. 1 Foundry, all ore	21.00@ 21.50
No. 1 Foundry, cinder mixture	20.00@ 21.00
No. 1 Soft foundry	21.00@ 22.00
No. 1 Open silvery	19.50@ 21.00
Mill irons	17.50@ 19.00
4 months. f. o.b. cars furnaces.	
Nos. 1 and 2 charcoal	24.00@ 25.00
Nos. 3, 4, 5, and 6 charcoal	25.00@ 27.00
Hanging rock charcoal	24.00@ 27.00
Strictly cold blast charcoal	30.00@ 33.00
4 months. f. o. b. cars Cleveland.	
Bessemer ores	6.50@ 7.50
Hematite ores	4.50@ 5.75

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Aug. 31.

Anthracite.

The circulars announcing an advance on different sizes of anthracite coal have gone forth into the world and have enjoyed their usual wide publicity. For years, there have been only one or two exceptional periods of short duration when the figures on paper have been actualy maintained, but in many instances an increase has had the effect of carrying values up to or near the circular issued a month previous. Judiciously handled announcements of this kind might have been made to produce that effect whenever the situation would warrant it; and it has certainly frequently acted as a stimulant. But, unfortunately, the temptation to use it as such in any case has been too much, and the companies find themselves in the ridiculous position of saying they want more money for their coal without having even a hope of getting it. The views expressed in our last issue have been sustained by the happenings of the past six days. We have not been able to discover that a single buyer has rushed into the market to cover what little requirements he had, and to-day coal is as abundant and is selling as cheaply as last week. The advance is entirely, so far as this market is concerned, a dead-letter. The chief anxiety of those who have coal to place—and there are few who have not—is to find somebody to take it, and no earnest effort is attempted to hold off for higher figures. Of course, those companies which, like the Reading, have a very heavy line trade, are comparatively well situated, as are those who secured a market months ago, by filling up to the best of their ability the best consumers in the market. But those who are naturally favored or have helped themselves do not admire the present state of affairs, which forces them to make concessions far beyond those which they expected to be called upon to make at this season of the year. With the opening of the winter, the market already contracts; and with an abundance of coal coming forward, the tide-water market will be glutted, especially at the present rate of production. The longer buyers wait, the better their position will get, unless the supply is curtailed by stoppage at the mines.

Until now the tonnage has been satisfactory; but it has evidently led to a heavy stocking of all available markets. The work of distribution should soon begin; but the labors of those who undertake this important function will be seriously interfered with if the present double and unreal position of the companies is not abandoned.

It is evident that the movements of the managers are now made exclusively for effect in financial circles. An air of exceptional prosperity is to be given to the interests involved, and to a certain extent this has been accomplished, but only at the expense of discounting the future. The legitimate trade, which has thus far borne the weight, is beginning to stagger under it seriously. Production and prices both can not be maintained.

Bituminous.

The trade drags along, with prices at low figures. In the Clearfield region, cars are getting a little scarcer.

Horsford's Acid Phosphate.

Beware of Imitations.

Imitations and counterfeits have again appeared. Be sure that the word "HORSFORD'S" is on the wrapper. None genuine without it.

WANTED.

An experienced and thoroughly competent chemist for a metallurgical works. One familiar with gold chlorination preferred.

State experience and salary expected.

Address "CANADA," P.O. Box 1833, New York.

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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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THOSE who looked forward to another first-class mystery in connection with the explosion of the boiler of the Riverdale are doomed to disappointment. The boiler was simply excessively corroded, and could not stand the strain of more than ordinary pressure.

NOBEL'S gelatine dynamite is beginning to find its place in rock-blasting, and the indications are, that its principal field will be in the hardest ground, where its greater power fully comes into play, thus counterbalancing its increased cost. In softer ground, much of its power is wasted in shattering the rock, the quantity of material blasted out not being great enough to compensate for its higher cost ; and in some cases, where smalls are objectionable, being actually injurious.

THE completion of the Northern Pacific Railroad will, we are convinced, mark the beginning of an era of prosperity to the mining interests, notably of Montana. The industry which will be most directly and immediately benefited is copper mining and smelting in the Butte District. With increased outlets to market and better facilities for procuring fuel, the cost of production and of marketing ought to be materially reduced, and the Butte smelter be better than ever able to compete in the markets of the world.

THE Franklin Institute, of Philadelphia, has taken a step worthy of its past history and present high standing. It proposes to arrange for the holding of an international electric exhibition on the 3d of September, 1884. The great success of the Paris and Vienna exhibitions gives all the encouragement the enterprise deserves. Though probably visited by many Americans, and though closely watched by the American press, the two exhibitions referred to have not, it must be acknowledged, done much toward diffusing a knowledge of current progress among our own people. This, we feel sure, will be fully accomplished by our Philadelphia friends.

IN a well-meaning article on that hackneyed subject, "Is Mining a Legitimate Business?" the *Western Manufacturer*, of Chicago, with the object of illustrating a point, quotes a note on the Ray Copper Company, of Arizona, and then ventures the following rash opinion : "The probabilities are, that the whole territory of Arizona will not produce $5,000,000 worth of ingot copper in the next ten years." Let our Western friends take a slate and go to work with the following figures as a basis : Last year, Arizona mines produced seventeen millions of pounds of copper, worth, say, on an average, 16 cents per pound. This year, the insignificant mines of that poor territory will probably turn out not less than twenty millions of pounds, bringing in the New York market say fourteen cents per pound. Total, $5,520,000 estimated value. Had not the *Western Manufacturer* better multiply its figures by five, or, better still, abstain from writing on a subject with which it is not familiar?

A NOVEL method of sinking through ground carrying large bodies of water is now attempted at the Archibald mine, near Schneidlingen, Germany, by Herr H. POETSCH, of Aschersleben. He freezes the water. After sinking the shaft through 34 meters of dry ground, he struck the quicksand, and, beginning on the 9th of July with a temperature of the earth of 11 degrees Celsius, he had chilled the ground to 5 or 6·5 degrees below the freezing-point, the temperature of the strata in the center of the shaft being + 4 degrees. According to the latest accounts, working through the frozen material was to begin at an early date. It is possible that, under certain favorable conditions, such a process of preliminary freezing of the water-bearing ground may prove successful ; but we doubt its efficiency in any case where the water is under any pressure, small though it may be.

MR. J. S. JEANS, Secretary of the British Iron Trade Association, has issued a statement showing that, for the first half of 1883, the production of pig-iron in Great Britain was 4,138,225 tons, against 4,252,042 gross tons during the second half of 1882, and 4,241,245 tons during the first half of that year. This indicates a slight falling off, which is also noted in the stocks, which are stated to have been 1,315,775 tons on the 30th of June, against 1,368,854 tons in the beginning of the year. In many respects, this exhibit resembles that by which Mr. SWANK attempted to show that we are rapidly getting down to a sound basis. As with us, there is an evident movement in the right direction ; but its force is not great enough to carry the trade out of the lethargy into which it has fallen.

TECHNICAL TRAINING.

The most important contribution recently made to the discussion of technical education is the address of Dr. T. M. DROWN, delivered June 20th, 1883, before the Alumni Association of Lehigh University, by whom it has been printed in pamphlet form for distribution among those interested in the subject. This address is not only graceful and appropriate in form, but also full of felicitous observations—we might well say epigrams—which, like so many gleams of lightning, both strike to the heart of the subject and reveal with sudden illumination a comprehensive view of it. It contains a treatment of the question from the stand-point of a notably skillful and successful educator, who is himself, at the same time, equally distinguished as a practical expert and investigator. Dr. DROWN speaks with so much authority that his opinion would go far to settle the whole debate, but for the circumstance that his special point of view is that of analytical chemistry, both the science and the art of which occupy a peculiar position, not in all respects comparable with that of the engineering branches. That is to say, the "shop" of the analytical chemist is the laboratory ; and in the laboratory of instruction he can and does

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perform the same operations as in the subsequent laboratory of practice. But Dr. DROWN'S familiarity with other branches of applied science is not inconsiderable; and moreover, his position as Secretary of the American Institute of Mining Engineers has given him special opportunity to watch the careers of school graduates as well as of self-educated, or wholly shop-educated, engineers. Perhaps nobody in the country could estimate fairly, in a general way, the professional standing and success of a larger number of engineers, chemists, and metallurgists.

Dr. DROWN takes strong ground in favor of distinct spheres for the technical school and the workshop. He does not believe in teaching the practice of an art in the school. His broad proposition is, that nothing should be taught in the schools which can be better taught in the field or the shop. Whether the practical should precede or follow the theoretical instruction, he does not positively say; but the drift of his argument shows pretty clearly that he thinks the student should go from the school to the shop or the field.

Not less earnest is his plea for separating the technical school from the curriculum of general culture. He would have the special teaching of engineering, chemistry, etc., be, like the special teaching of law or medicine, a distinct and a supplementary course. In this he is quite right. Some parents may be obliged by poverty to omit the bestowal of a liberal education upon their sons, and to thrust them at once into the immediate preparation for bread-winning. We would not reproach such victims of necessity. But it should be clearly understood that such defective education is an evil; and when they who take this road presume to praise it as the best, they intensify the evil into a nuisance.

Dr. DROWN offers also a timely criticism upon the cramming process which threatens to swamp our technical schools, and by which the aspirant to a degree is made nominally proficient in a dozen different branches, all of which are indeed pertinent and useful, but can not be mastered by one mind in one course of three or four years, now that each branch has been, in the swift progress of this generation, developed into a science by itself. As he justly remarks, "We must be reconciled to the necessity of becoming specialists, and of calling in other specialists to help us. Perhaps the most we can hope for is to be an expert in one department, and to know enough of the related departments to judge of the harmony and fitness of the combined work of many heads and hands."

It is this irresistible tendency toward specialization which makes the scientific and technical courses of the present day such poor substitutes for the full, liberal course, so far as the general culture of the mind is concerned. They do not widen the sympathies and extend the associations. Their natural effect is rather to narrow and intensify the mental activities. If a man is not to become a specialist and nothing more, he must have received, before entering upon his professional training, a culture which will have developed and strengthened tastes and powers capable of resisting the influence of the technical school.

Dr. DROWN'S description of that function of the school which puts the student "into synchronous motion with the science he is studying," is peculiarly happy. But it evidently applies to the analytical chemist pre-eminently; to the physical tests of materials in a smaller degree; and to general engineering scarcely at all. His idea is, that the technical school should be the center of original investigation and experiment; and that this is one of the best possible elements of instruction. This is true enough in chemistry and physics. It has been successfully proved by GIBBS, DROWN himself, and other notable teachers of chemistry; and that part of the address before us which dwells upon it is an interesting revelation of the methods of a famous educator. *

A NEW BRANCH OF ENGINEERING.

A need of which the American public in general, and many individuals and corporations in particular, have been for some time keenly yet vaguely aware, is the service of men capable of giving expert advice on all matters connected with the management of forests. On all sides, we hear that something must be done with regard to the timber supply and the waning forests of the country. Congresses are held; associations are formed; and innumerable "cranks" ventilate their theories and plans. Meanwhile, in certain localities and for certain industries, timber grows steadily scarcer and dearer; and land-owners, with the best will in the world, seeing that they can not afford systematic forest planting and culture after elaborate foreign methods, and not knowing what else they can do, do nothing. Those who simply resolve not to cut down their forests are perhaps the most foolish of all; for there is a stage of growth at which forests should be cut down. And those who, after cutting, do nothing more, but leave the future to nature, find that nature presents them with worthless "scrub" material, instead of the valuable trees they have removed. Now, the all-important fact is, that without large expenditures, and without complicated administration after foreign models, a great deal can be done under present conditions with certain profit. But experienced foresters only can decide, when and what and how. Under the advice of such men, unskilled proprietors and laborers of merely ordinary intelligence and fidelity can accomplish much in the redemption and preservation of valuable timber-species.

In many parts of the East, notably in the anthracite regions of Pennsylvania, the question of mining-timber is a pressing one. The forests which have furnished it hitherto, many thousand acres of which are owned by the great anthracite companies, do not spontaneously renew themselves in satisfactory quality; and the lands themselves, after the forests have been cut, relapse into a worthless wilderness. In many such cases, the owners would no doubt willingly try to remedy this evil, if they could begin tentatively, and on a modest scale. It is not surprising that they are disinclined to launch at once into a grand experiment, and surrender themselves to the theories of enthusiastic naturalists or speculators. We are inclined to believe that, in the vast majority of cases, eleborate schemes of forestry will not pay. The time is coming, but it has not yet come, when slow-growing hard-wood forests can be planted and cultivated, so as to pay fair interest on the investment. There are, no doubt, localities where even this can be done with advantage; but a large part of the work of an expert adviser would probably consist in demonstrating to parties entertaining such schemes the premature character of that sort of work at present. On the other hand, the numerous things that could be, and ought to be, and are not, done by forest-owners, the doing of which would bear fruit at once in increased profits or increased reserves, or diminished waste and favorable renewal of timber-species, would furnish a field for practical advice of great immediate value.

Whoever undertakes to give such advice should be a thoroughly trained forester, familiar with what has been accomplished abroad, and also with what can be done here. Above all, he should understand our commercial conditions, and not be tempted to recommend what is not practicable on that side as well as on the side of technical arboriculture. We are glad to notice that this branch of engineering is now beginning to be represented in this country, and that, as an evidence of this new departure, an office has been opened in this city by Mr. BERNHARD E. FERNOW, whose contributions to various technical societies and to the *Charcoal Iron-Workers' Journal* and other journals have attracted general attention. His career as an official in the Prussian forestry service, and his residence of many years in the United States, where he has managed forest-lands, supply the requisites needed to qualify him as a prudent and safe adviser. The American Forestry Congress recently re-elected Mr. FERNOW as Corresponding Secretary; and in this capacity he is well known in the United States and Canada to the leading authorities in that line. The work of a few engineers with a thorough theoretical and business training will do more to meet existing evils and to organize a reform than endless discussion by amateurs, and for this reason we heartily welcome the pioneers of a new branch of engineering. *

A METHOD OF DISTRIBUTING WEATHER FORECASTS BY MEANS OF RAILROADS.

In a paper read before the American Association for the Advancement of Science, Mr. T. C. Mendenhall describes a system that has only been in operation in Ohio for about a year. To distribute forecasts, signals are placed upon the sides of the baggage-cars, as distinct as possible from each other, so as to be easily recognized at considerable distances, and also to convey as much meaning as possible, so as to predict as many different conditions. A combination of form and color was adopted. The signals are three in number as to form and two in number as to color. The red signals are confined to predictions as to temperature—rise in temperature, stationary temperature, falling temperature. The other color is blue, and that is confined to predictions in regard to the general state of the weather. The question of form was a good deal considered, and three forms were adopted. The sun, moon, and a star were chosen, because every body is familiar with those words. Experiments were made with the triangle, and finally rejected. The device for attaching to the car is due to Mr. Anderson, who has been in the service of the board of commissioners for the past year; and it is really a happy device. The signal is made as large as possible, and the disk can be seen at a long distance. The red sun and blue moon mean higher temperature and general rain. The crescent means lower temperature. The full disk of blue means general rain. The star represents local rains. With regard to the proper working of the system, though it has been in operation but a short time, it has really done good work. Special telegrams are received every morning, and they are transmitted to the train-dispatchers at five o'clock. As yet it is operated only on one railroad. It happens, fortunately, that that road goes through an agricultural region of considerable importance, connecting the cities of Columbus and Cleveland. Two trains start out in the morning at the middle point between those cities. The signals are put on the cars at five o'clock in the morning; and as they run through the morning hours, the farmers along the line can have an opportunity of seeing them and predicting the weather for the day. The railroad company circulated through the whole line little cards having these signals displayed in colors, with their meaning in every combination. This helps, because it enables every body to understand what is meant. A recent communication from General Hazen indicates a disposition on the part of the general government to take hold of the matter and bring it into general operation as far as possible. Postal cards have been sent to various persons along the line, with questions in regard to the practical working of the system, which are answered and sent in at the end of every week; and it has been found that on the average eighty per cent of the predictions are verified.

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CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Sulphur Compounds in Gas-Lime.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: While occasionally experimenting with gas-lime (from the purifiers of the Philadelphia gas-works), I have found that it is not constituted as I think is generally believed; and therefore it may be of interest to give the results of an analysis of it. The combinations to which I call attention are those of sulphur and also of cyanogen with lime. The latter, however, are present in very small quantities only; the combinations of sulphur form the greater part of the gas-lime. I will explain here, in what form and combination the sulphur and cyanogen are contained in the gas-lime, and how I came during my investigation to these conclusions.

I found sulphur, not, as I first expected, as sulphide, but in its free state, and especially as hyposulphite; and I found that the cyanogen combination is a sulpho-cyanide. The latter was found in small quantities in the solution, by treating the lime with cold water, filtering, and extracting with alcohol. The cold aqueous solution did not give the least reaction for sulphureted hydrogen, as it would do, to some extent, if sulphide of calcium were contained in the lime. It reacted for hyposulphurous acid, and was of alkaline nature.

I then boiled some gas-lime with water, and filtered. The solution had a yellow color and reacted for sulphurous acid and also for sulphureted hydrogen. There was no doubt that the hot aqueous solution now contained some sulphide of calcium and sulphite of lime; but the following tests prove that these were not contained in the gas-lime in the same forms before it was boiled, and show how they came to be found in the hot aqueous solution.

I took a quantity of the gas-lime, and boiled it with water and carbonate of soda, the latter a little in excess of the lime. By this treatment, the combinations of lime with sulphur, as sulphide (if such be present) and the hyposulphite, will be converted into carbonate of lime and sulphide and hyposulphite of sodium. If sulphide of sodium be present, the solution should give, after filtering, the reaction for sulphureted hydrogen; but this it did not do; which showed conclusively the absence of sulphide of sodium in the solution, and consequently the absence of sulphide of calcium in the lime: the solution contained hyposulphite of soda. To assure myself of this, I made counter-experiments with sulphide of calcium and carbonate of soda, which gave the reaction for sulphureted hydrogen in the filtrate, as also sulphide of calcium treated with cold water gives a plain reaction for the same. But how could the lime show the reaction for sulphureted hydrogen, thereby proving the presence of sulphide, after having been *boiled* with water only? This is explained by the following facts: Hyposulphite of lime is, when boiled, converted into sulphite and free sulphur; the gas-lime itself contains free sulphur and some caustic lime, and these, when boiled, are partially converted into sulphide of calcium, having the formula CaS_5. In the presence of carbonate of soda, the action of sulphur on the lime and the formation of this sulphide is excluded, and the sulphur is kept in its free state, while carbonate of lime is formed; and hyposulphite of lime is converted into hyposulphite of soda and carbonate of lime.

In the quantatitive analysis of the gas-lime, it is necessary to determine water, free sulphur, insoluble matter, alumina (and iron), silica, sulphocyanide of lime, hyposulphite of lime, carbonate and caustic lime. Free sulphur is extracted with bisulphide of carbon. A portion of the lime being treated with alcohol, the evaporated filtrate will show the amount of sulpho-cyanide of lime. The lime is brought into solution by hydrochloric acid; some insoluble matter is left; the solution contains all the lime, alumina (and iron), and silica, all of which can be determined by weight. To determine the hyposulphurous acid, the gas-lime must be boiled with water and carbonate of soda, filtered, and the hyposulphurous acid determined in the solution volumetrically with iodine. Carbonic acid will be found by adding to the gas-lime a solution of chromate of potash, and then gradually nitric acid, until all carbonic acid is driven out: the difference in aggregate weight of the apparatus, lime-solution, chromate of potash, and nitric acid, before and after the evolution of carbonic acid, is the amount of the latter. The difference between the whole lime and that combined with hyposulphurous and carbonic acid is the amount of caustic lime.

The result of the analysis was the following:

Water	9·793
Insoluble matter	3·562
Sulphur (free)	3·782
Alumina (and iron)	4·401
Silica	3·559
Hyposulphite of lime	49·343
Carbonate of lime	21·260
Caustic lime	2·417
Sulpho-cyanide of lime	2·150
	100·267

PHILADELPHIA, Aug. 28. ADOLF GLEIM.

Belt Copper Mines, Limited.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: We are not, as a rule, in the habit of noticing anonymous communications; but we trust you will allow us, on this occasion, to reply to a communication signed "Specular," referring to the above mines, which appeared in your issue of the 28th of July last. We are unaware of the object which has prompted this and other similar communications which have recently appeared in various local American periodicals; and we are anxious, as the consulting engineers to the company, and those, therefore, primarily responsible, to correct various inaccuracies in it, the chief of which is an insinuation that the present stockholders were induced to invest in the undertaking under what, it is implied, were virtually misrepresentations.

Although the spirit of the communication would lead a casual reader to infer that the writer was intimately acquainted with the property, it is easy to deduce that the information embodied in it has been obtained second-hand.

We are content to pass over the philanthropic spirit by which your correspondent professes to be animated, and even to thank him for the compassion which he is good enough to express for the misguided British investors who have been beguiled into so unpromising a venture; but, in justice both to the original vendors and to ourselves, we must energetically protest against the insinuation conveyed in his letter, that the present stockholders were induced to invest in the enterprise under false representations, which, according to his letter, could only have emanated from American sources.

It is only fair to the mining element of the peninsula to point out that no American experts were employed on behalf of the company to report upon the property, and that it was simply and purely acquired on the recommendation of English mining engineers, after an exhaustive examination made by our firm, in conjunction with one of the best-known mining experts on this side of the Atlantic; so that, whatever the future of the mine may be, we, together with the gentleman just referred to, and we only, are responsible for its acquisition by British capitalists.

In order to protect themselves so far as possible, the directors of the company, previous to taking over the property, applied to the Royal School of Mines in this city to nominate a responsible firm of engineers; and we had the honor of being named by that institution to examine into the resources of the mine and check the reports made by the American experts. Our examination proved satisfactory, and the capital was subscribed chiefly from private sources.

The stockholders knew from the first that the property was almost a virgin one, and that the amount of work done was relatively insignificant; but they were satisfied with our opinion that the veins, where opened up, were strong, persistent, well-defined, and fairly productive, and that, given the necessary time and money, there was no reason why the mine should not develop into as good a property as any of those lying around the shores of Portage Lake. To this opinion, confirmed by a recent and exhaustive examination of the mines, we still adhere.

During the visits referred to, we discussed the possible future of the Belt mines with many of the oldest and most experienced miners of both the Houghton and Ontonagon districts, and the unanimous opinion of those best qualified to judge was, that no reason existed to prevent the Belt mines from proving as productive as their great rivals on the more easterly portion of the peninsula.

It was generally admitted that, while most of the great mines in the Houghton District had enjoyed the numerous advantages derivable from a sufficiency of funds, those in Ontonagon County had been started in the majority of instances with insufficient capital, and compelled to draw their financial supplies from the mines themselves, which, never having been sufficiently developed, finally collapsed from pure inanition, due to want of capital.

We may call your attention to the patent fact, that the principal fault your correspondent finds with the mines is, that they were badly worked and managed in former times; a state of things which it will be little to our credit if we can not reform. The comparison between the daily output of a mine like the Quincy and that of a property on which no work has been done for a long series of years does not call for further notice.

Respecting the points to which a practical miner would attach importance, there is hardly a reference in your correspondent's letter. A brief remark that some person or persons unknown considered the ore was too lightly charged to pay for working, virtually covers the whole question of mining and production.

We may point out that the plant of hoisting and compressed-air machinery for which he intimates "preparations are making," has been at work since February last; that a drift was commenced from a shaft on the Knowlton vein long prior to the present company resuming operations; and that the depth of the shaft on the Bohemian was 180 feet, instead of less than 60 feet, as asserted by him.

The closing remarks of your correspondent are condemnatory of the enormous outlay of capital which is taking place, a criticism somewhat difficult to reconcile with his prediction, in the preceding paragraph, that, at the present rate of development, it is hopeless to expect any thing at all from this property for two years to come. We trust soon to be in a position to offer a practical refutation to this remark.

In conclusion, we again protest against the effort of your correspondent to sow the seeds of discord between the mining interests of two sister nations. Whatever the final result may be, we are content, as we have said, to accept a responsibility which we gladly welcomed from the first.

With a sufficiency of capital to enable us to tide over even a prolonged period of development, an able and industrious staff, and with, as we believe, as good a mine in prospect as any on the peninsula, we await the issue with every confidence in its ultimate success. We are, sir, your obedient servants, BAINBRIDGE, SEYMOUR & RATHBONE.

WESTMINSTER, 2 GREAT GEORGE STREET, Aug. 21, 1883.

THE WAYS THAT ARE QUEER OF JAPANESE MINERS.—Japanese miners have some curious customs which sadly depreciate the value of their work. They do not appear to appreciate the fact that "time is money." An engineer who has just returned from the mines of that country tells us that they light them in a peculiar manner. Every man entering the mine carries with him a large bundle of from five to six-foot bamboo cane, slightly beaten before use. This cane is used as a torch. It burns fairly well for a few seconds until a notch is reached, when the light nearly goes out and the ashes must be knocked off, a process which must be repeated every half-minute. Every six or seven minutes, a new cane must be lighted, so that a good share of the miner's time is occupied in keeping his illumination in a fairly satisfactory condition. Unfortunately, Japanese miners are, besides, great smokers, and they use a pipe having a bowl the capacity of which is equal to that of an ordinary thimble. It takes two whiffs to finish it, when the process of filling up and lighting it must be gone through. Every one has probably had occasion to watch the great deliberation with which an average Irishman, when at work, will fill his clay bowl when the foreman's gaze is not on him; but imagination simply shrinks from the task of picturing the rapid progress of work intrusted to a smoking Japanese miner.

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NOTES ON THE EXHIBITION AT DENVER.—II.

Special Correspondence of the Engineering and Mining Journal.

THE BOULDER COUNTY EXHIBIT.

The exhibits in this section represent about two hundred mines, and the richness of the display stands unrivaled in the Exhibition. There are numerous specimens showing solid pieces of gold as large as a five-dollar piece, and nuggets of pure native silver weighing pounds, besides a fine collection of specimens of that ore second only to native gold, namely, telluride of gold. In the cases are shown the finer picked specimens of ore from the various mines; while in another compartment there are large blocks of ordinary ores, to indicate that the mines are good producers of quantity as well as quality.

The Grand Island District has a very rich show in the cases, in which the following mines take part: Caribou, Poor Man, Seven-Thirty, and St. La Sare. These mines exhibit native silver as wire and nugget, pure silver-glance, and beautifully crystallized brittle silver (stephanite), also ruby silver, rich galena, gray copper ore and arsenite, and nearly all the silver-bearing copper and lead ores. The next case is occupied by high-grade telluride and free gold ores from the Sugar Loaf, Gold Hill, and Central districts. The principal mines represented are the Slide, Prussian, Smuggler, Richmond, Malvina, New Enterprise, Keystone, Mountain Lion, Grand View, and others. There are free gold ores from the Richmond and the Smuggler worth $120 and $70 per pound respectively. A case full of tellurides from the New Enterprise mine is shown which run from $50 to $70 per pound. Another lot of ore, high-grade galena, comes from the Roman Eagle mine, Jamestown. The Black Cloud, in the same district, exhibits some medium pay ore in good-sized blocks, consisting of sulphurets of copper, lead, and zinc, containing $120 per ton of silver and gold. The Buck Horn, which is celebrated as the first mine that started the so-called Jimtown rush, shows some blocks of $70 silver ore with 50 per cent lead as galena.

The Ward District, embracing the Columbia, Celestial, Morning Star, Baxter, and Ny Wot mines, shows some blocks of gold-bearing pyrites. Some fine specimens of copper pyrites are exhibited by a mine in Pennsylvania Gulch, containing $180 silver and 37 per cent of copper. Among the large blocks not in the cases are some splendid lumps of galena from Caribou, assaying from 300 to 500 ounces of silver per ton; also, similar pieces from Poor Man and Black Cloud. There is a quantity of a very fine magnetite ore, also from Caribou mine, which contains a vein of it no less than 40 feet thick. A splendid and curious specimen of galena intermixed with pink fluor-spar is shown; also $40 gold ore from the Pewabic mine, Jamestown. There are four blocks of gray copper ore from the Yellow Pine mine, one of the largest in Colorado, which ore runs from 400 ounces of silver per ton. The blocks weigh altogether about 2000 pounds, and are grand specimens, being literally filled with the ore. The Richmond mine, being determined to contradict the knife-blade theory applied to the Boulder County tellurides, has sent a block to show the width of the pay-streak. It is a foot or more wide and three feet long, and is full of telluride associated with mispickel. The Marshall Coal Company shows some large blocks of the lignite coal worked near the Boulder, apparently of good quality; also, some specimens of good building-stone from the same locality.

GILPIN COUNTY.

This county has a small stand exhibiting some splendid blocks of gold and silver-bearing galena and copper and iron pyrites. A large obelisk, the column colored gold and the base silver, graphically represents in mass the gold and silver mined since 1859, and given as gold, $35,500,000, and silver, $2,850,000; while last year, $2,290,000 gold and $250,000 silver were obtained.

PUEBLO COUNTY.

The exhibit of this county is chiefly of a manufacturing character. Although, as is well known, it contains considerable mineral wealth, it is much of it undeveloped, and unquestionably its chief attraction is in that wonderful, mushroom-like growth called Pueblo, which only three years ago contained but 3000 souls, while now it is claimed that there are at least 20,000 in the combined towns. Here, a vast center of manufacturing industry is rapidly forming, and already it can boast of two colossal enterprises for the treatment of the various ores containing the precious metals, and steel and iron-works which promise to reach large proportions in the future. Indeed, the facilities which Pueblo offers to manufacturers are very great. Her railroad connections are already extended directly northward, eastward, and westward, and will soon be opened to the south, and this by no mere monopoly, but by means of railroads between which there is severe competition. The only exhibits shown at present of any consequence are those of the Pueblo Smelting and Refining Company, the Colorado Coal and Iron Company, and the Colorado Machinery Company, mentioned before. Twenty-four thousand pounds of refined and manufactured lead are shown by the former, consisting of sheet, rod, and tube lead, and the exhibit has excited much favorable comment from Eastern manufacturers and merchants. The second-named company exhibits a collection of its products, namely, steel rails, blooms, and bars, with various sized nails of good quality. The raw materials used are also shown, but come chiefly from the neighboring county, Fremont. One large block of pure magnetite weighing about 1000 pounds is especially fine. The exhibit is fenced in by steel rails twisted closely when cold, and which do not show a single crack or flaw. These exhibits are highly important, as showing that, by the investment of capital, the State need not go out of its own border for many things which both had and have to be imported at great cost from the East.

OLD MEXICO.

Among the latest additions are some most magnificent and valuable specimens of ruby, brittle, and native silver. They are Batopilas ores from the Roncesvalles and San Miguel mines. Among them are specimens showing silver to the value of $25,000 per ton. One is especially worthy of notice, being a large sheet of native silver fully one quarter of an inch thick.

A small collection of carbonate ores, from Carbonate, the new camp in Garfield County, is shown, but is too small for special mention. The Union Pacific Railroad has a very fine exhibit of specimens, chiefly of a mineralogical character, and taken from the various mining districts penetrated by the railroad. There are some fine specimens of fossil palm-wood, generally incrusted on the interior with large crystals of quartz, and in some cases azotized. The specimens are seldom labeled, unless we except the cards printed with the imperious mandate, "Hands off!" so worthy of this company. The Richmond & Danville Railroad has also lately appeared with its splendid display of the riches to be found along its route; but this exhibit has already been shown twice in the East, and has doubtless been described before this by an abler pen. It is more calculated to draw capital away from us than to attract it.

MONTANA TERRITORY.

Mr. J. B. Read, the Commissioner for this exhibit, has kindly furnished me with the following particulars about the mines which are represented here, and which I may say are chiefly situated in the Butte District. The Bell mine is 400 feet down in its new shaft, where the vein measures from 8 to 24 feet thick, and is all pay ore. A splendid block was shown weighing over 200 pounds, and covered with native silver, containing about $250 worth of it, and 50 per cent of copper. The mine has a 60-ton smelter in operation, and ships 10 tons of matte per day. The Lexington is 500 feet deep, and is a silver and gold-bearing quartz-vein, a true fissure in granite. It has 60 stamps in operation. The output from January 1st for seven months has been $742,000. The ore pulps $55 per ton. The mine showed some splendid specimens, many containing visible native silver. The Moulton mine also shows specimens of silver ore from a shaft 500 feet deep, and supplies a forty-stamp mill abundantly with ore. The Alice mine is one of the biggest and best. It is 800 feet deep, and keeps an eighty-stamp mill going, giving a gross output of $90,000 per month. The Anaconda is well known, and by many is considered the second best copper mine in the world after the Calumet & Hecla. The ore is a very rich sulphide (copper glance). The company is putting in machinery costing $90,000, a 500-ton smelter being part of it. There is a 40-foot vein of solid ore carrying from 20 to 70 per cent of copper.

The following mines, also reported here, have the following developments: Colusa, 400 feet deep; ore, copper and silver; 100-ton smelter. Parrott, 300 feet deep; ore, copper; produces 75 tons per day; 75-ton smelter. The Boston & Colorado smelter is also situated there, and does a large business. This district produced $7,200,000 in silver, gold, and copper last year. The Drum Lummon mine is one of the richest mines in this territory, though not in the Butte District. It was sold for $1,500,000 this year. It is to be regretted that, through a disagreement with the authorities, the fine exhibit of this mine should be now lying packed up.

Among the machinery exhibits are several useful machines shown by Fraser & Chalmers. Especially worthy of mention is the splendid Corliss engine which supplies the motive-power for the various machines in motion. There is a Frue vanning machine, also shown in operation, and, being next to the Embrey, gives a good opportunity to study the comparative merits of the two machines. A working model of a mill is shown, which is destined—so many think—to a great run in the near future. It is called the Sturtevant mill, and crushes on a different principle from the ordinary mills for this purpose. The lumps of ore are thrown against each other by two heads revolving at an enormous speed in opposite directions, thus grinding each other. There is an arrangement by which all the ore which will not pass through a 40 mesh is returned until fine enough, and a dust-chamber is attached by which the dust, of which there is a considerable quantity, and which would otherwise be lost, is retained. The company, which has works at Boston, has only one mill in operation as yet. It claims that it pulverizes 2½ tons per hour. It is situated at the Bowker Fertilizing Company's works, Brighton, Mass. It has, however, received several orders since starting here a week ago, and many good authorities have spoken highly of the machine.

DENVER, Sept. 1. A. COPELAND.

FRENCH MINING STATISTICS.

From the Bureau of the Minister of Public Works, has been recently issued a statement of the iron and coal production of France up to the end of 1881, which shows both in that and the previous year some amount of increase. The total yield of iron ore for 1881 was 3,689,000 tons, an increase of five per cent over that of 1880, which was less by 158,000 tons. The production of Algeria was 657,000 tons for 1881, an increase of 43,000 tons. Iron ore is worked in France in thirty-three departments, half of the whole amount (1,796,000 tons) being furnished by the department of Meurthe-et-Moselle. Next comes Ardeche, with 197,000; Haute Marne, 169,000; Saone-et-Loire, 162,000; Pyrenees Orientales, 133,000. Besides the increase in production, there has been a similar increase of importation from Algeria, Spain, Germany, Italy, and Belgium, the total amount being 1,287,000 tons, 119,000 more than in the previous year. The consumption of iron ore during 1881 in the various smelting-works was 4,231,000 tons, of which 6 per cent came from Algeria, and 24 per cent from foreign sources. The production of coal, anthracite and lignite, for the year was 19,766,000 tons, an increase of 582,000 tons over that of the previous year. The departments of Nord and Pas-de-Calais figure for 8,992,000 tons, followed at a respectable distance by the Loire coal-basin, with 3,616,000 tons; Gard, with 1,933,000 tons; Burgundy and Nivernais, 1,552,000 tons; Tarn and Aveyron, 1,080,000 tons; Bourbonnais. 961,000 tons. All these minor coal-fields have fallen off in their production, and the increase of the year is solely due to Nord and Pas-de-Calais. The import of fuel into France for 1881 was 10,221,000 tons, of which 5,386,000 tons came from Belgium, 3,569,000 tons from England, and 1255 tons from Germany. Coal importation has been steadily increasing for several years in France, that of 1872 being only 7,709,000 tons. The exports of coal are very small, and are as steadily decreasing, having been 603,000 tons in 1880 and 601,000 tons in 1881. The peat fuel industry is also on the decrease; for in 1872, the working of peat bogs amounted to 325,000 tons, and in 1881 to but 233,000 tons. Peat is, however, still largely used, there being upward of 1073 recognized peat-beds in the state, on which are 8400 separate workings, employing about 26,000 hands.

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THE DISCOVERY OF TIN-STONE IN THE BLACK HILLS OF DAKOTA.

Written for the Engineering and Mining Journal by William P. Blake, F.G.S.

The discovery of tin ore in the Black Hills of Dakota Territory may be said to have been complete on the seventh of June, 1883, when a sample which had been forwarded by Capt. A. J. Simmons, of Rapid City, Dakota, to General Gashwiler, of San Francisco, was submitted to me for determination. This sample was an irregular fragment, weighing about half a pound, evidently broken from a larger mass. It was dark-colored, very heavy, and had no appearance of crystallization, and did not resemble any of the ores of tin which had come under my observation. It had, however, the hardness of cassiterite, and the characteristic powder or streak. Under the blow-pipe flame, upon charcoal, an abundance of globules of white malleable tin left no reason to question that the ore was mainly the oxide of tin, the mineral species known as cassiterite, which, when pure, contains over 75 per cent of metallic tin.

The fragments were more or less mixed with a feldspathic gangue or vein-stone, and some of them were incrusted with a bright green-colored coating, which resembled the crusts of emerald nickel, but which before the blow-pipe were found to consist mainly of copper carbonate. A quantitative assay of an average sample showed the presence of 40 per cent of metallic tin.

Other samples were telegraphed for, and, on their arrival, I found, in addition to the massive cassiterite, some brown and black ores, having the appearance of columbite, of ilmenite, and of wolfram, and also, a fragmen tinvoiced as "log-spar," which I at once recognized as a fragment of spodumene.

On the 25th of July, I visited the locality and made a full examination of it, and gave a short preliminary notice of the discovery in the September number of the *American Journal of Science.*

THE LOCALITY.

The discovery is in the central portion of the Black Hills, in Pennington County, about twenty miles southwest of Rapid City, two miles from Harney City, and a few miles east of Harney Peak on the backbone or dividing range of the region. It is upon a claim known as the Etta, on a mountain which I have named Tin Mountain, and is at an elevation of about 4300 feet above the sea. Harney Peak, the highest summit of the Black Hills, has an altitude of 7403 feet, according to the survey of Messrs. Newton and Jenney.

This Tin Mountain is in the midst of a very rugged country, and is drained by the tributaries of Battle Creek, one of the largest streams of the Hills. But although the peaks and ridges are rugged, the intervening spaces are comparatively smooth and open, and permit the construction of roads at small expense. The wagon-road from Harney extends up the creek to the cabins on the claim at the foot of the peak of the mountain. There is a thick growth of pine timber over the whole region, and there is an abundance of pure water in springs and in running brooks. The rocks, the vegetation of the valleys, and the climate all remind one of the mountainous parts of Northern New England.

THE GEOLOGY.

The Black Hills, rising like an island in the broad expanse of the plains, are everywhere surrounded by the outcropping edges of the sedimentary formation from the base of the Silurian upward to the Tertiary so far as they exist at the West. These formations dip gently away on all sides from the central nucleus of more ancient rocks, which rise up in a multitude of irregular peaks and broken ridges with a general northerly and southerly trend. These rocks consist chiefly of fine-grained mica-schist and micaceous sandstones, traversed by veins of quartz, which are often auriferous, although the quartz has that peculiar glassy, barren look which is seen in the quartz veins of New England, and appears utterly unpromising for the precious metal. The slates in some portions are highly charged with small brown garnets, forming perhaps twenty per cent of the mass, so that the rocks may be said to be garnet slates rather than mica slates. There is also an abundant development of staurolites and of staurolite slate. Lithologically considered, these rocks remind the geologist of portions of the White Mountain series of formations, and are probably the equivalents of the Coos group of formations, as described by Prof. Charles H. Hitchcock, of New Hampshire. By the geologists Newton and Tenney, in their Report on the Black Hills, the mica-schists of the whole region are referred to the Huronian period; and in the preliminary notice of the discovery of tin ore in Dakota, this view was accepted. Further examination of the rocks and a consideration of the subject require a modification of this opinion, and a reference of the rocks—at least, those which abound in garnets and staurolites—to the later period. There is a sufficient breadth of formation, however, to include all the formations—the Huronian as well as the Coos and later rocks. They may also be called Montalban. No limestone beds were observed, and the magnesian rocks appear to be absent.

Toward the central portion of this area of mica-schists, granitic intrusions make their appearance, and rise in rugged peaks in the midst of the slates. These granitic masses are remarkable for the extreme coarseness of their crystallization; the constituent minerals being unusually large and separately segregated. Large masses of pure quartz are found in one place and masses of feldspar in another, and the mica is often accumulated together, instead of being regularly disseminated through the mass. It also occurs in large masses or crystals, affording sheets broad enough for cutting into commercial sizes. This occurrence of mica has led to considerable prospecting of the region for mica, and numerous claims have been located and worked. This quarrying for mica on the Etta claim brought the heavy black tin ore to notice; for Tin Mountain, where it occurs, is one of these intruded masses of coarse granite. The word intruded is here used considerately; for the phenomena fully justify this conclusion as to the origin of the granite. The surrounding schists are not greatly metamorphosed from their original condition, and the transition from schist to coarse granite is sudden. These micaceous and garnetiferous schists of the Black Hills have been subjected to an enormous amount of crushing and compression, by which they have been folded and crumpled to a remarkable degree. The longer axes of these folds and wrinkles, instead of being approximately horizontal, as is usual, are, on the contrary, nearly vertical or are highly inclined. The troughs of the strata thus stand nearly on end. It results from this folding and upheaval that the structure or grain of the rocks, so far as it is imparted by the folding, is nearly vertical and at the same time is convoluted, and in consequence the formations, in wearing away by erosion and disintegration and decay, are left with a peculiarly uneven surface, presenting a succession of pointed hills and peaks rather than a series of nearly parallel ridges. This folded structure is the basis of the peculiar topography of the country. It is the cause of it. Even the quartz veins partake of the folding, as may be seen by their serpent-like outcrops, and become columnar masses extending to great depths, while their internal extension appears to be comparatively limited. This is true also of the granitic intrusions. They appear as columnar bunches rather than sheet-like veins. The structure indicates a double folding, first horizontally then vertically. These phenomena, although apparently occult and purely scientific rather than of any "practical" significance or importance, have, nevertheless, in this case particularly a direct economical and money value. They go to show that the veins which, with their schistose walls, are so crumpled up, have a great downward extension. They probably extend much deeper than their lateral extension would indicate. In fact, this is not merely a deduction from the structural form, but it is made evident to the eye by a close inspection of any of the outcrops of the schists in which quartz veins occur. If a fragment of quartz is broken out from such outcrops, its form is found to be columnar and approximately cylindrical. So also the slates break out in columnar masses, and not in flat sheets.

The gold-bearing rocks of the Deadwood region have a similar structure, and the paying portions are controlled by or follow the pitch of the folds; which pitch or inclination is not so steep as at the tin region. The granite intrusions coming to the surface form bosses or knobs, and Tin Mountain has this form, being nearly surrounded by the schistose rocks.

MINERALOGY.

The cassiterite occurs near the top of the granite mountain, and apparently occupies a central or core-like position. The massive variety is in close association with feldspar, quartz, and spodumene, while a granular form is disseminated in a massive micaceous albitic rock or greisen, which traverses the coarse granite in the form of irregular veins or bunches.

There are thus two distinct forms of occurrence of the tin ore at Tin Mountain:

1st. Massive in bunches, with spodumene, feldspar, and quartz.

2d. Granular, disseminated in a micaceous aggregate or greisen.

In the massive form, the ore is associated chiefly with the spodumene, which here attains an unusual size. It is not only in direct contact with the spodumene, but actually penetrates it, so that it appears to partly replace portions of the crystals. One of the specimens, weighing 1¼ pounds, is two thirds tin-stone and the remainder spodumene. Another specimen exhibits the tin-stone traversing the spodumene irregularly. Besides this penetration or replacement by massive ore, it is not unusual, on cleaving a mass of spodumene, to find small, flattened grains of cassiterite in the body of the crystal, often mere stains or patches on the cleavage surfaces. In this form, it has the appearance of being a secondary deposition.

Of the massive form of the ore, about one ton of fragments has been taken out. Some of the heavier masses weighed from fifty to sixty pounds. Lumps weighing three and four pounds are common. Most of the larger masses were broken by the miners. They were in fact too heavy to handle with ease. No distinct crystalline faces on these masses have yet been observed. There are small quantities of copper oxide in crusts as already described, and some mispickel has been seen, but does not appear to be an abundant or a constant associate. It is not found in the greisen, the tin ore being apparently the only metalliferous constituent in that aggregation. The ore requires a careful qualitative and quantitative analysis, which there have not yet been time and opportunity to obtain. The specific gravity of selected fragments apparently free of gangue or associated minerals, is 6·753. The streak is brownish-gray. The massive tin ore was first encountered in sinking a pit for mica, and was followed down in irregular bunches for about 15 feet, to the bottom of what is now an open cut.

The granular or disseminated form of the tin ore appears to be the most abundant and constant. The micaceous aggregate in which it occurs consists of a mixture of small scales of mica and of albite, also in small or granular masses, or in plates radially aggregated. The dominant mineral is the mica, which is in crystalline plates seldom over half of an inch across, but is without well-defined lateral planes. Its color is light greenish-yellow. It is dense and hard, and some of the plates are sufficiently clear and transparent to permit of the measurement of the inclination of the optic axes, which was found to be, in air, from 75·30 degrees to 76 degrees. This high angle and the association of the mineral with tin ore and spodumene suggested the reference of the mica to lepidolite; but no satisfactory reactions for lithia can be obtained with the blow-pipe. The weathered surfaces resemble those of the Zinnwald lepidolite, being dark colored and showing the edges of the crystals. The mass weathers well and stands out above the other minerals. It crops out boldly at intervals over the whole top of the mountain for a breadth of 100 feet or more, and penetrates the coarsely crystalline mass formed of orthoclase feldspar, quartz, and spodumene as if it had a separate and later origin, either by intrusion or segregation. The grains often occur irregularly disseminated, sometimes at the base of an aggregation of mica crystals, at the junction with the white-spar, and again it is found more sparingly in the midst of the mica crystals in thin, flattened, transparent plates, recalling to mind the inclusion of plates of tourmaline in the sheets of muscovite mica of New Hampshire and other localities. When in such thin plates, the color by transmitted light is a light clove-brown. Such small crystals are easily detached by splitting the mica plates.

The mineralization of this albitic greisen with tin ore is general throughout the mass; at least, the tin ore can be found wherever the micaceous aggregate crops out, as is shown by breaking off masses from projecting points. But when large blocks of the rock have been blasted out, as in the open cut, and fresh surfaces are exposed, the amount of ore in different parts of the mass is seen to vary considerably, and the size of

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the grains of tin-stone also varies. The size of the grains most abundant is generally under one quarter of an inch in diameter. Masses are, however, found from one half to an inch in diameter, constituting in such masses more than half the weight. The proportion of albite is also variable, and the mixture presents somewhat different aspects when broken from different places, but generally the fracture shows a very brilliant, uneven surface of alternate patches of the white-spar, mica crystals, and black grains of tin-stone. The mica has a splendid silvery luster.

This albitic greisen differs from the typical greisen of the French in having albite with the mica instead of quartz, though the general appearance and mineralization with the tin ore are the same.

The greisen of France is described by M. Manhès, and later by M. Mallard in the *Annales des Mines*, sixième série, x. 325, as formed of irregular fragments of mica and of quartz appearing in the mass like a pudding-stone. It occurs at the tin mines of Vaulry, France, and is regarded as the same in origin as the veins. The tin ore of this locality occurs both in thin veins traversing granite in a schistose region, and also disseminated in the greisen.

A specimen of greisen from France, the precise locality of which is not known, greatly resembles the Black Hills greisen, but is finer in grain, the mica crystals being smaller and more irregular, and densely packed together. There is no albite, but quartz is irregularly mixed with the mica.

It is interesting to note, also, the fact that tin ore occurs similarly in New South Wales. Some of the deposits are described as micaceous dikes, with tin ore plentifully distributed in grains from the size of a pea downward. One of the dikes forms a breccia of mica and partly crystallized tin ore cemented together by oxide of iron. (*Vide* Davies, *Metalliferous Minerals and Mining*, p. 186.)

The occurrence of spodumene with tin ore is novel, not having, so far as I am aware, been before observed. The association is not only unusual, but the magnitude of the masses of spodumene exceeds all record of this species. Crystalline masses extend across the face of the open cut from two feet to six feet in length, and from a few inches to twelve and eighteen inches in diameter. Blocks too large to lift have been freely tumbled over the dump with the waste of feldspar, quartz, and mica. No well-formed small crystals of convenient size to carry away could be found. The gigantic crystals preserve the cleavage characteristics and show the common prismatic planes. The color is lighter and is without the delicate creamy-pink hue of the specimens from Massachusetts. It is very hard, compact, and tough, and is difficult to break across the grain. Some of the fragments are translucent.

The muscovite mica, which occurs in large sheets, is entirely different from that in the greisen. It is like the ordinary commercial mica, but is rarely found in clear plates large enough to give plates over three by four inches in size. The inclination of the optic axes is from 67·30 degrees to 68 degrees.

In addition to this muscovite, there is a small amount of biotite; making three varieties of mica present in the mass. But neither the muscovite nor the biotite appears to be in direct association with the tin ore.

Other minerals, with obscure physical characters, are still under examination.

(TO BE CONTINUED.)

MILL FURNACE-BOTTOMS.

Experiments of interest to the iron trade have, according to English technical journals, been completed recently at the Greatbridge Iron and Steel-Works, Tipton, of the Greatbridge Iron and Steel Company, as to oxide bottoms for mill furnaces. An arrangement that has been adopted at several works in South Staffordshire, and also in Scotland, for doing away with sand bottoms and using oxides, is a hot-air chamber, patented by Mr. Job Tibbs. In constructing a furnace according to his invention, the iron plate bottom of the furnace is inclined from front to back, and also from the fire-bridge to the flue-bridge. At the back, and near the flue end of the furnace, is a hole or channel which opens out into a small supplementary chamber containing wagons, and during a heat the fused cinder formed runs off into the wagon, leaving the bed dry. An oxide bottom used under this arrangement, with a fettling of from 3½ inches to 7 inches thick, as compared with the sand bottom, will, the maker claims, produce a far superior quality of iron, and at a cost of at least 10s. per ton less, so effectual is the prevention of the accumulation of the melted cinder on the bed and its running in among the piles. The patentee claims also that whereas some cinder bottoms are used in plate and rail mills for the first heating, re-heating being accomplished on a sand bottom, by his chamber the second heating can be accomplished on the same bottom as the first. Recognizing its advantages, Mr. Scovil, of Scovil, who leases Coldbrook Rolling-Mills, St. John's County, N. B., Canada, is about to introduce this form of the oxide bottom system into the States, and for this purpose adapt the chamber to gas-furnaces in Pittsburg, where sand bottoms are now almost exclusively used. A native ore that would make as good a cinder bottom in the States as the pottery mine in Staffordshire was expected in the Port Henry ore, a high class hematite material, found in large quantities at Port Henry, on Lake Champlain, in the northeastern part of New York State. Five tons of this ore were sent over to Staffordshire, and it was to test its action that the Greatbridge experiments were conducted. There were present a number of South Staffordshire iron-masters during certain of the days during which the trial was proceeding. The five tons kept one mill furnace-bottom good, while 74¼ tons of finished iron were made from it and rolled into angles and other sections. Throughout the trial, the heat was purposely kept extreme, in view of the prospective use of the gas-furnace, and the opinion was, that the greater the heat the better. On several occasions, the bottoms, during the heats and after them, were perfectly uniform in surface and in color, and, notwithstanding the extra heat, there were no cracks or gutters; while the clearness of the piles as they were taken to the rolls showed that there had been no approach to sucking. The appearance also of the sections after passing through the rolls was all that could be desired. Altogether, the Port Henry cinder was not only as good as that o the pottery mine, but surpassed it and led makers to remark that, if the ore could be got from the States at ballast rate, it would be worth while to import it rather than continue to use the pottery mine. Touching the action of the cinder in the puddling-furnace, it may be added that the cinder from the five tons was taken to two puddling-furnaces, and lasted eleven turns. The yield in this case also surpassed that obtained where the Staffordshire materials are used, being larger by 1½ cwt. per hour for the two furnaces. The cinder from the mill furnace turned out 28 tons 3 qrs. 26 lbs. of puddled bars, and the weight of pig-iron taken to the puddling-furnace was 29 tons 9 cwt. 2 qrs. 16 lbs., or 130 heats of 4 cwt. 29 qrs. 4 lbs. each.

THE TRANSVAAL GOLD LAW.

The following is an abstract, published by *Iron*, of the law passed by the Volksraad of the Transvaal to regulate gold mining in that country. The absence of a law giving encouragement to individual enterprise has been one of the reasons for the neglect of the known rich deposits of gold in the Transvaal, and now that the state has declared that its policy will be to welcome new settlers, many experienced gold miners from Australia and elsewhere will no doubt be encouraged to take out licenses. The law begins by giving the president power to proclaim as a "gold-field" any government property on which gold may be found. If gold in payable quantities is found on a private farm, the owner has the option of taking out, within six months, a concession for the exclusive right to work it. If he does not avail himself of this privilege, the government may buy up his property at a price to be fixed by arbitration. A commissioner is to be appointed for every gold-field, over which he will have authority to keep order, and to deal with all matters arising out of the workings of the mines. He will be assisted by a diggers' committee, to be elected by the license-holders and diggers, whose interests will thereby be fully protected. Every digger and license-holder will be liable to be called on to assist in maintaining order in case of necessity, under pain of forfeiture of the license or concession. The cost of a license to dig or prospect on government ground is fixed at 10s. per month; for prospecting on private ground, with the consent of the owner, the same fee is payable, three fourths of it to go to the owner. Only one claim can be taken out by a single individual, each claim to be 150 feet square, the limits of which must be duly "beaconed." Any person, however, may buy from other claim-holders any number of claims on taking out the proper license for each. The discovery of future gold-fields is encouraged by giving any prospector who discovers gold in payable quantities five per cent of the revenue which the government may receive from such field. This revenue will be derived from the sale of licenses, from a percentage of two and one quarter per cent on all finds, and from a percentage of four per cent on the purchase money on the sale of a claim. There is a curious provision that where the sum of £300 or more has been paid for a claim, or £500 or more for improvements in the erection of machinery, and is abandoned, it shall still remain the property of the owner for a period of six months after abandonment. This provision is intended to allow the owner to reap the advantage of any discoveries which may be made within that period of reefs on adjoining claims which might possibly prove to extend into his property. The least satisfactory part of the law is that which enacts that "any colored person who sells, barters, delivers over, receives, or has in his possession rough gold shall be punished with lashes not exceeding fifty, and be imprisoned for the term of not exceeding twelve months." It is also enacted that no colored person shall have the right to hold a license or be in any way connected with the working of the gold-fields, except as laborers in service of the whites, who are prohibited, under a penalty of £500 or a year's hard labor, from paying the colored servant in rough gold, and from buying gold from any colored person under a penalty of £1000, or a year's imprisonment

THE ELECTRICAL TRANSMISSION OF POWER.—M. Marcel Deprez has recently made a most successful application of his theories on the transmission of power at Grenoble, France. This city, being in a mountainous country, is surrounded by numerous streams, developing a power which, if utilized, might be a source of great wealth. The municipality of Grenoble invited M. Marcel Deprez to repeat the experiments which he had performed with success at Munich and at the Gare du Nord at Paris. The power was supplied by the stream of the Romanche (14 kilometers from Grenoble), and thence conveyed along a copper wire of two millimeters in diameter. The mechanical effect was about 60 per cent, and the utilized power seven horse. A part of this pumped some water employed to produce an artificial cascade. The remainder M. Deprez divided between all the machines of a small work-shop, and lit besides 300 Edison lamps.

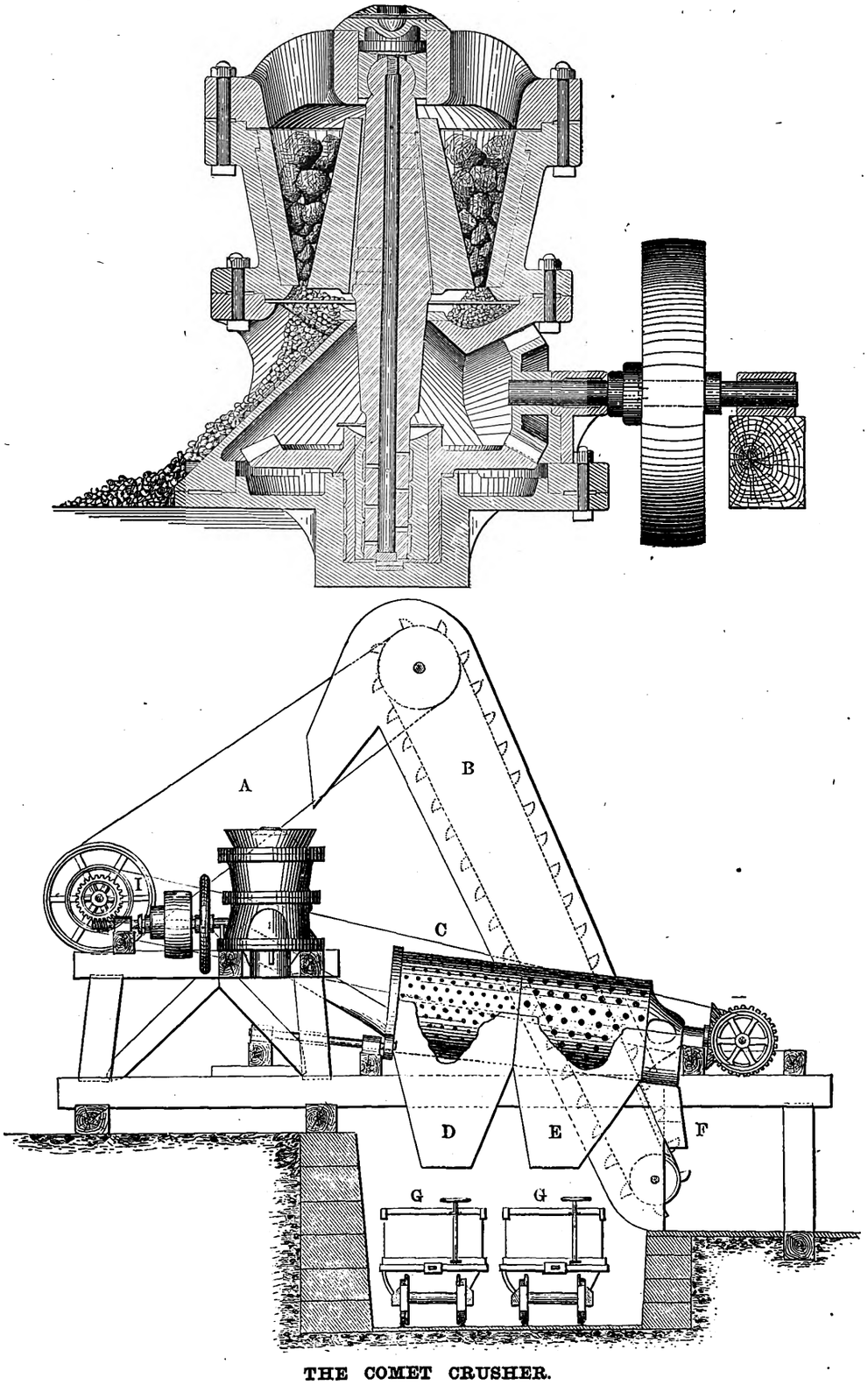
BALANCING THE WEIGHT OF THE HOISTING-ROPE IN SLOPES AND INCLINED PLANES.—Prof. J. von Hauer has called attention to a point which probably has escaped the attention of the majority of mining engineers. In a slope or inclined plane, the lower portion of which is not as steep as the upper part, the weight of the hoisting-rope is balanced. During hoisting, the relative weight of the ascending platform or car goes on increasing, while the actual weight of the rope suspended of course decreases; the reverse being the case with the descending car. By correctly choosing the curve of the incline, the weight of the rope may be balanced. Professor Hauer quotes the following example: The weight of the load was 600 kilograms, that of the empty car and platform 750 kilograms, the weight of the rope 1 kilogram per running meter, and the vertical distance between upper and lower landing 150 meters, the average dip being 32 degrees. Calculating the cycloid curve, the inclination at the upper end was found 36 degrees 17, and at the lower end 27 degrees 16 minutes, the greatest distance between the curve and the straight connecting line being 5·9 meters, and the total length of the incline 283·48 meters. The constant load thus obtained was 317·5 kilograms, against variations between the extremes of 468 and 168 kilograms with an incline of uniform pitch. In many cases, it will be cheaper to build such an incline by following the dip of a seam or the contour of the surface than to cut into the hanging-wall, or sink at a uniform incline in the case of surface planes.

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THE COMET CRUSHER.

Crushers of the well-known Blake type, having a reciprocating action, do work only during a part of the time. The idea of so changing the design that work is continuous, naturally suggested itself, and it is to this class of machines that the Comet crusher belongs, the construction of which is shown in the accompanying engraving. In the jaw-crushers, the rock is broken by the approach of two plane surfaces; in the Comet crusher, the planes are converted into circular surfaces, the reciprocating being changed to the rotary motion of the inner crushing surface, which is mounted eccentrically on the shaft. The distance between a given point of the fixed outer surface and the rotating inner surface varies therefore during every revolution between the maximum and the minimum. During one revolution, therefore, the rock between the two surfaces is once subjected to crushing action, which is thus continuous.

Our section through the center of the Comet crusher clearly shows its construction. Power is applied by belt, and by gearing is transmitted to the upright shaft. The lower end of the latter enters the eccentric sleeve shown; and by changing the portable eccentric sleeve, the throw of the head may be varied to suit the exigencies of each case as to the size to which the material is to be crushed. The eccentric hub is so arranged that double wear may be got out of the gear hub. The upright shaft is made of steel, and being hollow, acts as a reservoir for the oil used for lubricating the step. Messrs. Fraser & Chalmers, of Chicago, who are the builders of the Comet crusher, attach the breaking-head to the upright shaft by means of bolts, avoiding the use of zinc. The outer circular surface is made of plates set with zinc, one of them, however, having a reverse taper, so that it can be quickly removed, and the others be got at. The ore is fed in at the top, and drops out through three discharge-openings so designed that clogging is not possible, while at the same time the gearing is protected. The frame is made in sections, so that while, strong, it can be readily transported.



THE COMET CRUSHER.

The crusher, of which five sizes are made, has an excellent record for crushing material for railroad and street ballast, for which it is principally used. It possesses one feature, which, we presume, should make it of particular value for concentration-works—that of breaking the rock into cubical form; and, as it does not grind but cracks the material, of avoiding undue breakage.

In our second drawing, we show a design for an entire plant, the points of which will be readily understood.

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THE MINING AND METALLURGY OF ZINC IN THE UNITED STATES.*

By F. L. Clerc.

The Present Status of Zinc Mining and Metallurgy.—Even the most superficial inquiry into the condition of the zinc industries of the United States can not fail to expose the barrenness of the literature pertaining to the subject, and the entire absence of reliable statistics by which any comparison may be made with the state of these industries in other countries. A compilation of nominal market quotations shows little more than sudden fluctuations in the price of the various zinc products, which neither the custom-house returns nor the ruling price of foreign products will satisfactorily explain. A more careful examination into the methods of manufacture at the different works, and inquiry into the general results obtained, are apt to leave the impression that the whole subject is enveloped in mystery, belonging more properly to a secret art in the middle ages than to a growing industry of the present century. Every year or two, some European expert makes a rapid tour through the country, and announces that our ores are "equal to the best in Europe, but that our methods of mining and preparing them are extremely wasteful, and our methods of smelting are crude and extravagant, and fully a generation behind European practice in technical value and economy." It can not be denied that there is much justice in these criticisms; nor is a comparison any more favorable to this country, if we regard only the magnitude of our output or the cheapness of our products.

This inferiority can not be excused on the ground that the art of mining or that of zinc smelting is still in its infancy in this country; but it may be explained in part, first, by certain general limitations to improvement imposed by the nature of the operations necessarily involved in the smelting of zinc; and secondly, by the peculiar condition of our ore supply. In its essential features, the metallurgy of zinc is the same all over the world. The metal must be distilled in fire-clay vessels, in the presence of carbon, and condensed out of the reach of oxidizing agents. The dimensions of the distilling vessels are restricted within very narrow limits, by the nature of refractory materials and the thickness of the charge through which the necessary heat to effect reduction can be economically transmitted, and but little improvement is to be hoped for by a change in these dimensions. The operations to which the ore and products must be submitted are numerous, and the repeated handling of them can not be avoided. The recent improvements in European practice have not been the results of changes in the form of the furnaces, or in the methods of treating the ore, but have resulted from careful economies in the use of labor, fuel, and ore, and have only kept pace with the concentration of mining and smelting industries in the hands of strong companies, and are in general such as can only be introduced by companies with abundant capital, and where operations of a certain magnitude are carried on. Moreover, the policy of these companies has been, by regulating the output of the mines and the disposition of the metal, to give a steadiness to the value of both the metal and the ores, which has rendered comparatively safe such investments of capital as would otherwise have been precarious.

Such a condition of affairs can only be gradually brought about in this country, owing largely to the circumstances under which existing works were established, and to the peculiarities of the ore supply. The conditions under which smelting is carried on at the different works in this country are so various that only a general description of them is practicable; and the question of ore supply is so important that it merits more than a passing notice. The greater part of the ore used in this country is obtained as a more or less valuable by-product in the mining of lead ore; and its selling price is not controlled, either by the value of the metal it contains or by the cost of its discovery and mining. Hence its value is subject to sudden changes, and the investment of capital in zinc mining is rendered more or less unsafe. This fact has exerted a controlling influence on the methods of mining and selling the ore, on the districts most extensively worked, on the location of the principal smelting-works, and on their policy toward the ore-producers, and its effects will probably long continue to be felt on the zinc industries of the country. Its full importance may perhaps be obscured by the fact that lead and zinc ores are almost universally found associated together; but where the selling price of both ores is controlled by the value of the metal they contain, each bears its proper proportion of the cost of mining, and neither unduly depreciates the value of the other. The inland location of existing mines and works in this country, as compared with the mines and works of Europe, makes them more dependent on railroad transportation and less easily adaptable to changes in the mining and smelting centers. The metallurgy of lead is so simple that, when rich deposits of lead and zinc ore are discovered, the lead ores are quickly made available by furnaces erected to treat them, and are mined extensively; while large amounts of zinc ore are often neglected or thrown aside as worthless. The metallurgy of zinc is so complicated and expensive that it is slow to adapt itself to new localities, and the works within reach of the new ore-fields have a practical monopoly of these markets.

Sources of Supply.—The present sources of ore supply may be grouped under three divisions: the Eastern, including New Jersey, Pennsylvania, and Virginia; the Middle, including Wisconsin, Illinois, and Tennessee; and the Western, including Missouri and Kansas. These divisions correspond very nearly with distinct types of furnaces and different systems of mining, and may conveniently be treated of separately.

EASTERN DIVISION.

New Jersey.—In the Eastern division, the most notable deposit of zinc ore is in Sussex County, New Jersey, where, near the town of Franklin, there is found an absolutely unique deposit of the three rare minerals zincite (red oxide of zinc), willemite (anhydrous silicate of zinc), and franklinite, forming a rock-like mass, not unlike in appearance an eruption of granite, in which the franklinite represents the quartz, the willemite the feldspar, and the zincite the mica. This mass fills the space between limestone walls, and is crossed by numerous "trap" dikes, ranging from a fraction of an inch in thickness up to twenty feet; and is interspersed with occasional bunches of calcite, fowlerite, and other crystalline minerals. The principal mine is on Mine Hill. The ore is reached by a tunnel about 75 feet below the outcrop, and has a width of from 40 to 50 feet. It appears to be a chimney-like deposit, of the form so common in magnetite mines; no limit to it has yet been found in depth or in horizontal extension. This deposit, which has been the subject of numerous long and expensive litigations, is now controlled and worked by the New Jersey Zinc and Iron Company, with a capital of $3,000,000, which in 1880 consolidated rival claims. The ore is easily mined, and requires little selection. The cost of mining and putting it on cars should not exceed the cost of quarrying an equal amount of limestone.

An average sample would contain about 36 per cent oxide of zinc, 22 per cent metallic iron, and 11 per cent metallic manganese. Owing to its low percentage of zinc and high percentage of iron and manganese, this ore is unsuitable for the manufacture of spelter. The mechanical separation of the zinc ores has been found impracticable, on account of the intimate chemical and mechanical mixture of the different ingredients. The ore is, however, particularly adapted for the manufacture of oxide of zinc, or "zinc-white," for which purpose it is exclusively used. The works of this company are at Newark, N. J., at which point it has excellent facilities for obtaining a cheap supply of pea and slack anthracite coal, and direct communication with the mine by canal and railroad.

A smaller vein on Mine Hill, called the "front vein," has been proved for several hundred yards: it varies from 8 to 20 feet in width, and is occasionally pinched out by the wall rocks; it carries a less proportion of zincite and a greater proportion of calcite than the large vein, but its ores are of a similar character. Part of this vein is owned by the above-named company, and part is at present furnishing ore to the Lehigh Zinc-Works, at Bethlehem, Pennsylvania.

Similar veins are found at Sterling Hill, about two and a half miles distant, and have been worked to a depth of about 200 feet by the New Jersey Zinc Company, now incorporated with the New Jersey Zinc and Iron Company, and by the Passaic Zinc Company. On the property of the latter company, they are accompanied by irregular beds of beautifully crystallized calamine, from which, as it is almost entirely free from lead, a high grade of spelter is made at the works of the company at Jersey City. Mining at this point has been almost entirely suspended during the last few years, as the Passaic Company has had a contract for ore from the large vein on Mine Hill.

The shipments of zinc ore from this county for the year 1882 are reported by the State geologist to have been 40,138 tons; and the total output up to the present time may safely be stated at upward of 250,000 gross tons.

Pennsylvania.—The zinc deposits in the Saucon Valley, Lehigh County, Pennsylvania, which were once extensively worked, now produce but little ore. Their history, however, has a special interest from their connection with the introduction of spelter-making into this country, and from the fact that they belong to a class of deposits which seems to warrant a belief in their continuance to a considerable depth, and because they are a good illustration of the general effect of the characteristic feature of the ore market above referred to. Three principal deposits have been discovered, known respectively as the Ueberoth, Hartman, and Saucon mines: they occur in magnesian limestone of the Lower Silurian formation, and have many points in common, while they also present some striking differences. They were all at one time owned or controlled by the Lehigh Zinc Company, whose works were at Bethlehem, four miles distant. The Ueberoth mine, which is, so far as developments have shown, the largest, was worked continuously from 1853 up to the fall of 1876. It was for many years the main dependence of these works, and produced in the neighborhood of 300,000 tons of ore. The strata of limestone are here very much disturbed and tilted up almost to the vertical, apparently by the obtrusion of the syenite ridge of the neighboring South Mountain. The ore came close to the surface, and a very rich pocket was found in the clay above and around limestone boulders, which is estimated to have produced 100,000 tons of ore. When this body of ore was exhausted, the ore was followed down in crevices between the boulders. These crevices lie in planes parallel to the bedding of the limestone, or in planes perpendicular to it, and preserve great regularity in their position, and a parallel course for several hundred yards in a northeast and southwest direction: they are nearly vertical, and at the depth of 225 feet, to which the mine was worked, showed no signs of closing up. The ores at first were exclusively calamine and smithsonite, but at greater depth blende made its appearance, coating the walls of the crevices, and in some cases penetrating into them several feet; in other cases, segregated as rich seams, which nearly filled the cross-openings. At first, it was confined to the northeastern end of the mine, but at the lowest depth reached it could be traced almost continuously to the extreme southwestern end. The dip of the ore-body appeared to be regular, and to the southwest. Six of these parallel crevices were worked, and about as many crossings; and where they intersected, rich bunches of ore were found, some of which were as much as 60 feet across and 20 feet thick. All the indications seemed to point with increasing certainty to the existence of a backbone or underlying deposit of blende, out of the reach of the action of meteoric waters, from the continuation of which the oxidized ores have been derived. Timbering the mine was always a serious difficulty, but the greatest obstacle to be overcome was the water. Even at a depth of 40 feet, the flow was already very strong; at the depth of 150 feet, it was found necessary to put in what was then the largest pumping-engine in the world. This engine, which is a single cylinder, double-acting, condensing, walking-beam engine, with a pair of fly-wheels, has a 110-inch cylinder and a 10-foot stroke, and is calculated to work four 30-inch plunger-pumps and four 30-inch lift-pumps, with 10-foot stroke, and to take water from a depth of 30 feet. At the time it was stopped, it was running from six to seven strokes a minute, and was working three pairs of 30-inch pumps and one pair of 22-inch pumps, and was easily handling all the water that came to them. The pump-shaft and foundation for the engine were no less remarkable in their way. The latter was built up from the solid rock, 60 feet below the surface of the ground, of hewn blocks of Potsdam sandstone; the former, which measured 30 feet by 20 feet in the clear, was started on a small crevice, and timbered with 12-inch square yellow pine sticks, and divided into three compartments, and further strengthened by two open brattices of the same heavy tim-

* From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey, Department of Industrial Statistics. Albert Williams, Jr., Chief of Department.

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ber. When the pitch of the vein carried it out of the shaft, the rest of the depth was sunk through solid rock.

The Hartman mine, distant about half a mile, was worked at first exclusively for calamine. Its exploitation gradually exposed a central horse of blende, which the method of mining adopted made it necessary to leave for the support of the timbers which carried the roof. The increasing importance of this blende at the lowest level worked, 150 feet, caused a change to be made in the method of mining. The mine was operated for a year after the large engine was stopped, and the last work that was done was the putting in of a slope to develop this deposit of blende. The water in the Hartman was always less strong, the pitch of the crevices less steep, and the surrounding rock less disturbed than in the Ueberoth mine; the strike of the crevices was more to the west, and the blende came nearer to the surface.

The Saucon mine, however, affords the simplest and best illustration of this form of deposit. It is distant about a quarter of a mile, and was originally leased by the Passaic Zinc Company, by whom it was sub-let to the Lehigh Zinc Company on high royalties. When the rich deposit of calamine first discovered was apparently exhausted, this sub-lease was surrendered by the latter company, and in 1875 the original lease passed to the Bergen Point Zinc Company, by whom the mine has been worked ever since. A face of blende was uncovered at the western extremity of the open pit, and the ore followed under a heavy cap of limestone for a distance of 250 feet up to the property of the Lehigh Zinc Company on the west. On this property, it was reached at a depth of 110 feet, under 100 feet of solid limestone, and was followed 150 feet farther on the course of its strike. On both properties, it was followed to a depth of nearly 200 feet. In the fall of 1879, all the property of the Lehigh Zinc Company passed into the hands of its bondholders under foreclosure of its mortgages, and in the spring of 1880 all the mining property was sold to the proprietors of the Bergen Point Zinc-Works.

The workings of these two mines, taken together, show a remarkable regularity of width, pitch, and course, and the deposit is clearly shown to be a large chimney or chute of ore of irregular cross-section, which, however, preserves a lenticular shape, the longer axis of which is about 60 feet, and pitches to the south at an angle of about 30 degrees: the transverse axis measures about 30 feet. The axis of the ore-body dips to the west-southwest with a slope of about one foot in four. The weathered outcrop has evidently given rise to the pit of oxidized ores and to certain irregular detached deposits which lie in the same course, several hundred yards beyond it.

Here, then, are three similar deposits of zinc ore, with their nearly parallel chimneys of blende and their corresponding beds of calamine, which have evidently been brought up from below, by solution in thermal springs, through crevices formed in the limestone by the gradual upheaval of the neighboring South Mountain, and have undergone subsequent alteration from the action of meteoric waters. Nearest the mountain, where the strata are most tilted and the ground most disturbed, the water is strongest and the largest deposit of calamine is found. In the Hartman mine, the strata are more nearly flat, the blende is sooner met with, and the water is much less strong; and in the Saucon mine, the blende is met with at the edge of the pit, and only moderate-sized pumps are required in working it at a depth of 200 feet. That the water in these mines comes from the same surface springs which supply the Saucon Creek, is evident from the fact that, when the big mine was abandoned, this creek shrank at once to a small fraction of its former volume, and only gradually recovered it as the mine filled up. Very careful surveys of the bed of this stream failed to discover any point at which it showed any diminution of its volume or seemed to sink into the ground. It is, therefore, very improbable that the water, having once come to the surface, found its way back into the mine. It was probably tapped in underground courses connected with the springs which give rise to the creek. This is the more probable, as the mine which has the most water is on the highest ground and is farthest from the creek, and the mine having the least water is nearest the creek. It is therefore reasonable to suppose that nearly the maximum quantity of water likely to be encountered was already handled, and that, if a solid body of underlying blende were developed, it could be profitably worked with the machinery already in place. The Saucon mine is still the main dependence of the Bergen Point Zinc-Works, but its continued working must be attended with increasing cost and uncertain risks.

The ores of this region are remarkably free from lead, arsenic, and antimony, and it is this circumstance that gives them their principal value and interest, and has been the basis of the very high reputation of the metal and oxide obtained from them. Only the richest of the ores are, in the present state of the ore market, available as spelter ores, but even the leanest of the oxidized ores produce a very fine quality of oxide. The blende is very peculiar. It is massive, and rarely shows even traces of crystallization; when pure, it has a bluish slate color, has a very characteristic conchoidal fracture, is translucent on thin edges, and gives a clear ring when struck. As generally sent to the works, it resembles broken limestone; is somewhat mixed with iron pyrites, and assays from 35 to 40 per cent of zinc. It is not easy to concentrate, both on account of its non-crystalline structure and of the pyrite it contains.

The causes which led to the extinction of the Lehigh Zinc Company and the abandonment of the two first-named mines were briefly these: the impossibility of competing successfully in the oxide market with the owners of the big mine in Sussex County, New Jersey, after the expiration of the patents covering the oxide process left them free to take the trade, or in the sheet-zinc and metal market with the Western smelters, using cheaper and richer ores, at a time when a general depression of all manufacturing enterprises made it unusually burdensome to carry the heavy bonded indebtedness incurred during a period of high prices and general inflation in acquiring mines and putting up machinery to work them. Under more favorable circumstances, it is probable that these mines could have been profitably worked for years to come; for although the pumping expenses were heavy, they were not excessive, considered as a royalty on the ore, and these charges per ton would diminish in proportion to the amount of ore mined. Now, however, it will probably be left for another generation to discover what value they still have.

Other deposits of zinc ore have been discovered in the same Silurian formation in Pennsylvania, Maryland, and Virginia, which have been worked from time to time, but have produced very inconsiderable amounts of ore. Small oxide-works were built at an early day near Birmingham, Blair County, and at Landis station, in Lancaster County, Pennsylvania, but they were soon abandoned. At the latter point, shallow beds of rich carbonate of zinc were first discovered, but were worked out. About 1876, expensive concentrating-works and two blocks of spelter-furnaces were put up, to treat the grains and kernels of crystallized blende scattered through the underlying limestone, before sufficient exploration was made to warrant such an outlay of money: they have for years been lying idle.

Virginia.—In Wythe County, along the New River Valley, zinc ore is scattered over the surface of the ground, and in connection with lead ores several thousand tons have been mined and sold to various Eastern smelters to be made into oxide. One deposit is at present worked by the Bertha Zinc Company, which has erected concentrating-works and furnaces at Martin's station, and finds a market for the limited amount of spelter which it produces, at prices above the market for Western spelter, because of its freedom from lead.

MIDDLE DISTRICT.

Illinois and Wisconsin.—With the establishment of zinc-works at La Salle, Illinois, began a revolution in the zinc trade, and Eastern smelters were soon to be restricted to the limited market for special brands of spelter. The lead regions around Galena, Dubuque, and Mineral Point had long been known and extensively worked, and large quantities of zinc ore had been discovered in prospecting; thousands of tons had been mined and stowed away in abandoned drifts, or hoisted to the surface and thrown on to the dumps, or scattered around the wash-places as worthless "jacks;" for years, ore was to be had for very little more than the cost of loading and hauling it to the smelters, and in these years were laid the foundations and established the business of those companies which dominate, if they do not control, the zinc industries of the United States. Gradually, as the ore already mined became exhausted, and other companies, attracted by the large profits there seemed to be in the business of smelting, were induced to embark in it, and as the richest deposits of lead ore were worked out and the lower price of that metal caused a falling off in lead mining, zinc ore rose in price and began to be mined for its own sake, and the condition of affairs now existing was brought about. Southern Wisconsin and the Galena District are still important zinc-producing centers, but far larger amounts of ore are now drawn from the still richer lead regions farther West. The best authorities estimate the total output of the lead region of Wisconsin prior to 1876 at 115,000 gross tons, the largest amount shipped in any one year being 19,621 tons in 1872. The output in 1880 is estimated to have been about 15,000 tons. In comparing these figures with the output of Eastern mines, it should be borne in mind that they represent a considerably larger amount of metal than their amounts would indicate, as only the richer ores are sent to the smelting-works, and the poorer are scattered about the mines. With a few exceptions (as in the case of the Illinois Zinc Company, which bought out and consolidated the different interests in an important mine in the Galena District, and by systematic working and better equipment has made it an important feeder to the works), all the mining is done by small companies, mostly unchartered associations of persons living in the immediate neighborhood. The royalties paid to the land-owners vary from one tenth to one quarter of the ore raised. Some storekeeper, farmer, or local capitalist furnishes the small amount of money needed for tools; and the men who work in the ground in winter usually engage in farm-work during the summer. The ore is generally raised to the surface by a windlass, and cleaned by hand with a "pickawee" hammer, or crushed with a "bucking-iron" on a flat stone, or by an itinerant horse power crusher, and is concentrated by sluicing and hand-jigging, and is then exposed for sale. The smelting companies which draw their ore supply from this district have their resident or traveling agents, who examine the ore as it is raised, and either contract for the output of the "diggings," or buy the ore in the ricks. Most of the miners are poor and unable to work their diggings to good advantage, or to hold their ore long after it is cleaned. The output from any given locality is small, but the aggregate is very considerable. The ore raised in this region varies greatly in quality. What has been said above refers particularly to the shallower deposits, or the old abandoned lead workings where water is not troublesome. There are shallow deposits of "dry bone" (carbonate of zinc) which are extensively worked in this way, some portions of which are very rich; but these rich layers have ordinarily a thickness of only a few inches. Above and below them, are heavier layers largely contaminated with limestone, too lean to be sold as spelter ores, which can not be concentrated. The mining for the rich ores alone is seldom very profitable, and large amounts of the lean ores are still scattered through the mines above and below ground. If a reasonable market could be found for this, many mines could be worked which are now abandoned. In 1879-80, three or four thousand tons were shipped by the Lehigh Zinc Company to Bethlehem and made into oxide. When proper care was taken to keep out any material that would discolor the oxide, a very fair quality of paint was made, and a yield of from 30 to 33 per cent was obtained. Within the year, oxide-works have been erected at Mineral Point, to run on this material.

This district, which is called the Upper Mississippi lead region, has been known to contain lead since the beginning of this century, and lead mining has been extensively carried on for upward of fifty years, and has in some cases proved very profitable. The lead occurs in the Trenton and Galena limestones of the Lower Silurian formation, which preserve their horizontal position. It is found in vertical and horizontal crevices, of which in Wisconsin alone more than 2232 have been surveyed by Mr. James Wilson, Jr.; of these, 1325 were east and west, and 482 north and south, the remainder being irregular in strike. These crevices are associated under more than forty different groups, and most of them contain some zinc ore. The east and west openings are found to be most productive, and the lowest contain the greatest proportion of blende. Where the blende is associated with galena, it is capable of being brought up to a high percentage at the mines; but where the two ores are intimately mixed and free from gangue, they are generally bought by the smelters as mined, and separated in the dressing-works at the furnace. There is also a silicate of zinc, much mixed with galena, which is treated at the mines to a rough calcination with wood in piles,

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after which it is crushed and the galena is washed out. Any thing like an accurate description of this region is out of the question. Diggings are opened, change owners, are shut down, cave in, are reopened, and abandoned: little record of the yield of particular ground is kept. The skilled miners who work here are of a roving disposition; each one who wanders away carries his secrets with him; all over the country may be seen abandoned workings of which no one knows any thing beyond vague report.

Tennessee.—In Tennessee, near Knoxville and elsewhere, deposits of zinc ore have for many years been intermittently worked, and considerable amounts of ore have been calcined and shipped to Eastern smelters (and it is now proposed to build works nearer the mines); but they may be passed over, for the reason that they have had very little effect on the metal output of the country, and for the same reason the more important deposits along the line of the St. Louis & Iron Mountain Railroad, which for many years were the principal source of supply of the Carondelet smelters, will only be alluded to.

WESTERN DIVISION.

The Lead and Zinc Region of Southwest Missouri.—The lead and zinc region of Southwest Missouri is known to embrace the greater portion of Green, Dade, Lawrence, Jasper, Newton, and McDonald counties, and to it adjoins the mineral region of the eastern part of Cherokee County, Kansas. Throughout the whole of this region, both lead and zinc have been found; but the most productive district, and the only one at present worked, is confined to the northern half of Newton County, the southern half of Jasper County, and the eastern end of Cherokee County, Kansas, and to the area drained by the three streams, Center Creek, Turkey Creek, and Shoal Creek, which flow west and north and empty into Spring River within six miles of each other. In this region, the towns of Granby, on the south, and Joplin, on the north, are the centers of the principal mining activity. A very careful and intelligent account of this region, so far as it had then been developed, is to be found in the report of Dr. Adolf Schmidt and Mr. Alexander Leonhard, published in the Geological Report of the State of Missouri for the year 1873-74, to which the reader is referred. Work on the survey was interrupted in 1876, and has not since been resumed, for which reason few reliable statistics have since been published. The importance of this region as a source of zinc ore dates from the year 1871. In this year, the first regular shipments of ore were made from Granby to the zinc-furnaces at Carondelet. The discoveries of rich deposits of lead ore at Joplin in the same year, and their wonderfully rapid development, had also an immediate effect on the prosperity of this region. Here, as in Wisconsin, the discovery of zinc ore is proportional to the activity in prospecting for lead ore. The production of zinc ore for the year 1874 is given as 19,000 tons, and the present output is variously estimated at from 1000 to 1500 tons a week. There is no doubt that the latter figure is often reached, and could be maintained from present developments, except when mining is extensively interrupted either by wet weather or excessively low prices for lead or zinc ore; or that more than two thirds of the spelter made in this country comes from ore mined in this region. The ore is found in the sub-Carboniferous formation, and there is an evident connection between the known deposits of ore and the present system of surface drainage. Dr. Schmidt observed, as a remarkable fact, that the largest deposits do not lie along the principal streams, but at the heads of the smaller tributaries. The deposits of Webb City, Carterville, Empire, Galena, Sherwood, Belleville, and Blende, discovered since his examination, and now the principal sources of zinc ore, fall under the same rule. These throw new light upon the character of the mineral formations, and seem to warrant increased confidence in their extent and depth. The most important zinc mines of this region are those at Carterville and Webb City, which are really parts of the same deposit. They produce more than half of the zinc ore raised, and are worked principally for zinc ore.

As these deposits are very regular in their formation, and in a measure rule the ore market, and as the method of mining them is essentially the same as prevails throughout their entire district, a general description of them and the method of mining them will here be given. These mines lie in the open prairie, which was once cultivated in farms, about five miles northeast of Joplin, near the head of a small branch of Center Creek. They were discovered about the year 1877. Here, at a depth of from 40 to 100 feet, and often under a cap of limestone and flint 60 feet in thickness, has been found an immense deposit of zinc-blende, which has been worked continuously for over half a mile. The deposit is in the form of a bed of flint, traversed in various directions by solid bars of barren flint, but in general resembling a breccia of sharp, angular pieces of flint, closely cemented by crystallized blende, with occasional masses of bright, crystallized galena. With the exception of these bars and occasional pillars to support the roof, the whole body is blasted out. Draining is difficult, and rock drifts are sometimes necessary to unwater the ore. Dr. Schmidt considers a secondarily deposited quartzite to be the cementing material between the chert and the zinc-blende in the very similar deposits found at Oronogo; but this is certainly not the case in the best mines at Webb City nor at Sherwood, and zinc-buyers soon learn to detect the difference. Where the cementing material is pure blende, the blende breaks freely from the chert, and can be almost entirely cleaned by crushing and jigging; where the cementing material is quartzite, or black sand as the miners call it, crushing is difficult, and a satisfactory separation is impossible. The mines spread over about a section of land, 640 acres. Their weekly output is about 700 tons. The method of working them is as follows: When a good prospect is discovered in new ground, the land around it is leased from its original owners, on royalties ranging from 10 to 25 per cent, by a number of individuals, who organize various mining, or as they would more properly be called, land companies. These companies have the land divided up into lots 200 feet square, and a plat of it made; select certain lots for themselves, and throw the others open to miners. They usually start a shaft on one of their own lots, and put in a pump. If the indications continue good, many of the lots, particularly those near the pump-shaft, are quickly taken up by parties of miners, who sink shafts upon them, timber the ground, put up hoisting contrivances, furnish all supplies, and bear all expenses.

When ore is struck, it is drifted on and followed in all directions up to the boundaries of the lot in question. The ore is raised to the surface and crushed and washed by the miners, and is sold to one of the zinc or mineral buyers. It is weighed over the company's scales, and paid for to the company, which deducts a royalty of 25 per cent on zinc-blende and 50 per cent on "mineral" (galena); and if it has pumps running, a pump rent of $1 a ton on zinc ore and $2 on 1000 pounds of galena; and pays over the balance to the miners. The royalties, of course, vary with circumstances, but the above are general. The holders of lots hire other labor to do the mining, at from $1 to $1.50 a day; and usually put up crushing and washing machinery on their lots. Very often the same parties control two or three adjoining lots or fractions of lots, and sometimes neighbors go into partnership. Most companies do not allow ores to be taken from the lots on which they are mined until they have been cleaned and have paid royalty. The machinery is usually of the simplest description—a farm or small stationary engine, covered by a shed of rough boards, a small-sized Blake's breaker, set over a pair of rolls, and a horse whim or a whip. The jigs are ordinary hand-jigs, with an overheard breakstaff, working a sieve 2 by 3½ feet up and down in a box of water. The jigging is usually done by contract, and is paid for by the ton of cleaned ore. It is common to see from 10 to 20 of these jigs grouped together under a shed of poles, covered with branches of trees or rough boards. The ore as crushed yields from 10 to 50 per cent of cleaned ore, and the No. 1 grade assays about 60 to 62 per cent of metallic zinc. The tailings must in most cases be piled up on the lot from which they have come; they are drawn up into a mound with two-horse scrapers or belt elevators, and it is not an unusual sight to see jigs and crushing machinery perched on top of these mounds 15 or 20 feet above the surface level, the shafts being timbered up to a corresponding hight. Several land companies have put in fairly effective pumping machinery. Plunger-pumps working in pairs, with wooden walking-beams or bob-cranks, and driven by gearing and a crank-shaft, are the most common; but direct-acting steam-pumps, like the Worthington or Blake, have been largely introduced of late, notwithstanding the disadvantages they labor under from the gritty water of the mines. From a distance, these mines, with their swarms of busy men and heaps of tailings piled around the shafts, remind one strongly of gigantic ant-hills, and present a sight not soon to be forgotten. No one can fail to be struck with the glaring defects of such a method of mining, the absence of system, the useless duplication of machinery, the cheap yet expensive expedients, and the crowding together of conflicting operations. Below ground, the effects are, if possible, worse. Each lot is affected by the policy of its neighbors; pillars are left only when they are thought to be absolutely necessary; each miner tries to get as much as possible out of his own lot, is only interested in it as long as he expects to work it, and is not disposed to improve the value of adjoining lots by unwatering them or proving their ore. The roof and pillars are badly trimmed, and in many cases dangerous, fatal accidents being distressingly common. The officers of the land companies are generally individually interested in one or more lots, and all sorts of questions are continually arising from the conflicting interests of the company and the miners.

Looked at altogether, as the main dependence of the zinc industries of this country, such a condition of affairs is far from satisfactory, and yet it is not easy to suggest a practicable remedy. If a single company with sufficient capital could control all the lots and work them in connection with each other, the output could be largely increased, the cost of mining and dressing the ore greatly reduced, and the value of the mines kept up for a longer period, and the ore could be sold to better advantage than can be hoped for under the existing method. But this is seldom possible after the present system is once in operation; too many individuals have acquired rights in the mines, which they value at what they hope to get out of them. Nor is the present arrangement without obvious advantages in a new country, and it is seriously questioned whether any other could be as effective or as economical. When mineral is once discovered, it requires but little capital to open mines, and consequently the individual risks are small. The miners, working on their own account, with hopes of large ultimate gains, have every inducement to work hard and cheaply, and to follow every clew that may lead to the discovery of ore. There is a large body of keen, hard-working prospectors, who during the season wander from place to place, live in wagons, under tents, or in the open air, and carefully observe and follow every real or supposed indication of ore. How else, it may be asked, could prospecting be so well or so cheaply done? And there is a class of enterprising, skillful, well-to-do miners, naturally associated as partners, who have made one or more good strikes, and are always ready to take hold of any new venture that promises well, either in working a lot or in forming a land company to open new mines. Where else could be found capitalists so willing to risk their money in a speculative venture? Men of this sort are always ready and able to work themselves, or to direct the work above or below ground. How else could be obtained as willing and as watchful superintendents, foremen, and clerks? New towns are started every year, and the mining district is rapidly extending. No uniform development seems to lead to this extension; chance and the policy of the land-owners appear to be the only determining causes.

The towns of Galena and Empire, on Short Creek, in Kansas, were brought into sudden prominence in 1878, and restored the waning fortunes of the Joplin region, by the exertions of two land companies, which, on the strength of two or three rich but undeveloped prospects, laid out two rival towns, and sold town-lots without reserving mineral rights; and by extensive advertising throughout Missouri and neighboring States, created an excitement which had a purely speculative basis, but led to the collection of a large number of miners and a considerable aggregate of money. Fortunately, the results very nearly justified their most sanguine representations. The land companies then withdrew all of their remaining lots from the market, and the success of the mines was secured. They are now the principal mines for lead ore in the region, and their output of zinc is increasing.

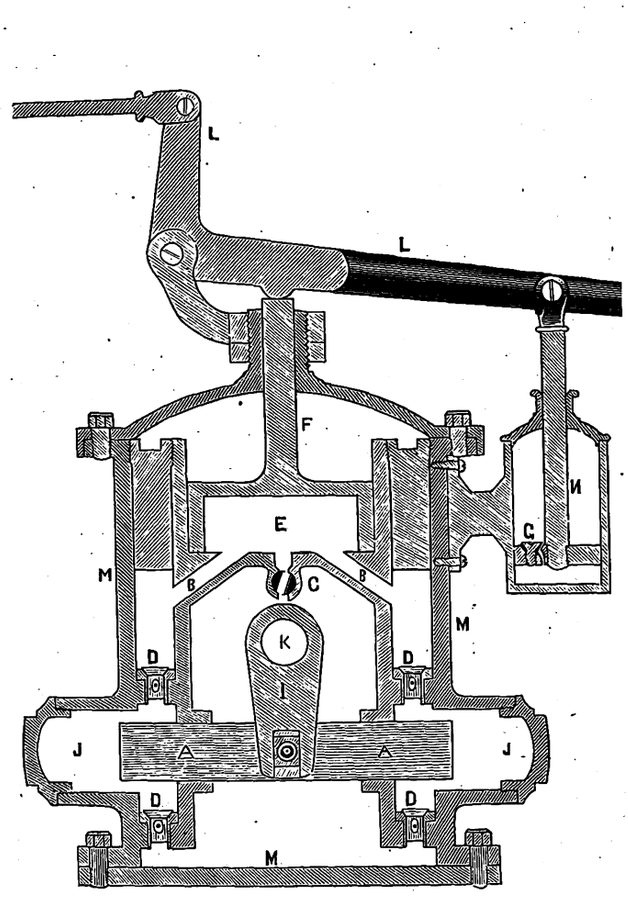
For the discovery and working of shallow deposits, the present system seems the best that can be devised; but it is clearly not adapted to solve the problems of discovering deeper deposits or working them to advantage. No system can be defended which involves extravagant expense in mining and preparing the ore for market, forces the sale of it without

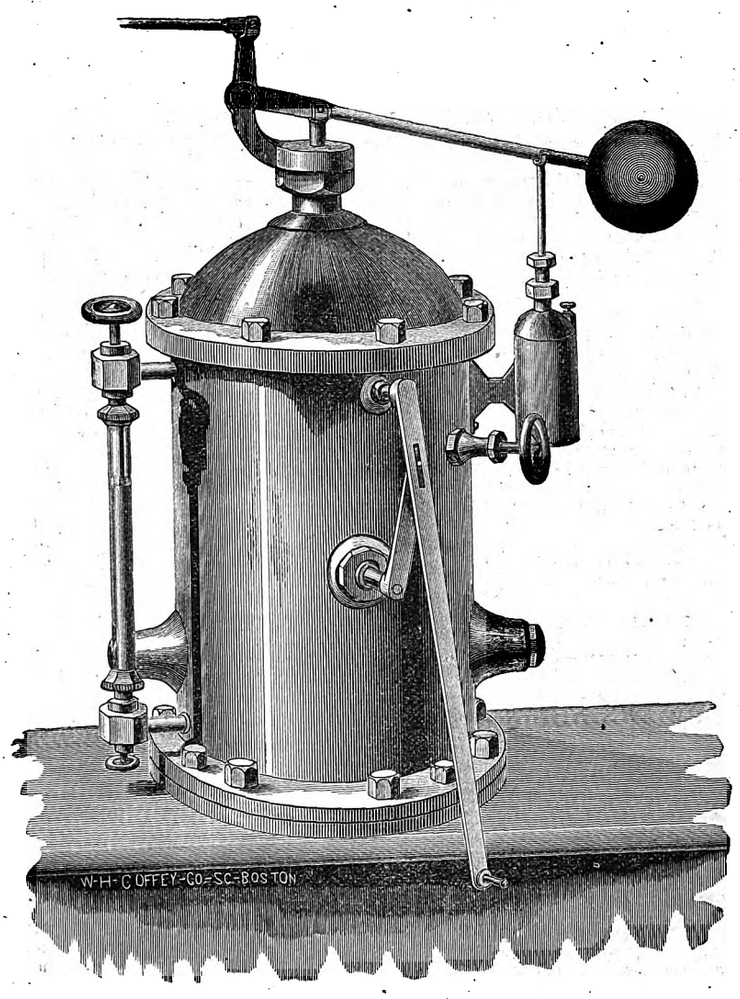
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regard to its value, and renders worthless large bodies of ore that might be profitably worked by a better system; and no basis for a great industry, like the zinc industry, which makes it depend on a hundred chances independent of the price of metal, the cost of smelting, or the known deposits of ore, can be considered very safe to build upon. The caving in of a single mine, the breaking down of a pump, less activity in lead mining, or the scattering of the miners to richer camps may cause a falling off in the output of ore from which it would be very difficult to recover. That mining has on the whole been very profitable in this region, is established from the fact that the country around has steadily and rapidly increased in wealth and population. Within the last few years, three railroads, the St. Louis & San Francisco, the Missouri Pacific, and the Kansas City, Fort Scott & Gulf, have built branches through the ore-fields to each of the three towns, Joplin, Webb City, and Galena. Joplin, with its good streets, gas and water-works, machine-shops and foundries, flour and woolen mills, lead and zinc furnaces, street-cars, and extensive jobbing and retail houses, has been built almost entirely from the profits of mining.

Granby, twenty miles southeast of Joplin, presents a striking contrast. It is dependent on a single railroad, which owns much of the mining land; and the land is all leased or owned by the Granby Mining and Smelting Company. Lead ore has been extensively mined since 1856, and during the war the mines were worked for both armies. The zinc ore obtained is mainly calamine, but blende is also found. The mines are in general shallow and less troubled with water, the ores usually require less mechanical dressing than at other points in the lead region. The company receives from the men all of the lead and zinc ore, deducts the royalties paid to the railroad and its own royalties, and pays the miner on a sliding-scale, based on the price of the metallic lead and the selling price of zinc ore, for the reason that it smelts the lead ore, and at present sells the zinc ore.

This mining point is noteworthy, as it is the only one producing large amounts of calamine. The calamine is naturally rich, not much contaminated with other materials, and occurs with the lead ore in shallow horizontal openings. It was first utilized in 1871, prior to which time large amounts of it had been discovered and left in the ground or thrown aside. Since that time, it has been extensively mined, and has added greatly to the prosperity of the mines. Calamine is by nature less rich than blende in the proportion of 53 to 67 per cent; it is also much more difficult to clean when mixed with rock, on account of its lower specific gravity; but in proportion to the metal it contains, it is more valuable than blende, because it can be smelted more cheaply and the metal more perfectly extracted from it, and when mixed with blende in the furnace charge, it makes it possible to get more metal out of the blende. It is also valuable on account of the superior softness and toughness of the metal obtained from it; but it will not bear transportation to a distance as well as blende, on account of its lower percentage of metal. This ore has been at times the principal supply of the Carondelet Zinc-Works; large amounts of it have been shipped to La Salle and Peru; and in 1874, 4000 tons were shipped to Bethlehem, Pennsylvania, which yielded a little over 32 per cent of metal on the weight of the raw ore. It is less favored by the zinc-works in the neighborhood, because the freight upon it is heavier than the freight on ore from other points, and because furnaces working it can not turn out as many pounds of metal a day as when working on blende, and the output of the works is reduced. (TO BE CONTINUED.)





THE MASON REGULATOR.

THE MASON REGULATOR.

The Mason regulator, illustrated by the accompanying drawings, is designed as a governor for all kinds of direct-acting steam-pumps, engines, and water-wheels. Its principal advantage lies in the fact that it is attached directly to the piston-rod or other working part of the machine without the use of belts, pulleys, or gears. The working parts being wholly immersed in oil, and no packing being used with the exception of one bearing, the regulator will never wear out or get out of order.

The regulator, which is manufactured by the Mason Regulator Company, of Boston, consists mainly of a cylindrical shell or reservoir filled with oil or other liquid. A plunger *A A*, connected by the arm *I* to some reciprocating part of the pump or engine to be governed, works horizontally and in unison with the strokes of the main engine into the pu mp-chambers *J J*, thereby forcing the oil into the chamber *E*, whence it returns through the orifice *C*, to be re-pumped as before. In case the engine acts more rapidly than is intended, the liquid is forced into the chamber *E* faster than it can escape through the orifice *C*, thereby raising the piston *F*, which shuts the throttle through the action of the lever *L*. As the orifice at *C* can be enlarged or diminished by means of the screw-valve, it will be seen that the action of every portion of every stroke can be controlled at the will of the engineer.

The small cylinder seen at one side of the reservoir, near the top, is filled with oil or other liquid, and fitted with a piston which connects with a weighted lever. This piston is provided with a small opening which allows the oil to pass from one side to the other as it rises and falls; the duty of which is to prevent sudden or irregular movement of all the connected parts.

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THE SMELTING OF ARGENTIFEROUS LEAD IN THE FAR WEST.*

By O. H. Hahn.

(*Concluded from page* 133.)

Conditions for Economical Working.—It is obvious that smelting can be conducted most cheaply at a point where ores of a different character find a joint market, and where, at the same time, railroad facilities enable the smelter to procure his fuel, flux, and other necessary materials, and ship his product at low rates of freight. Such a place is Leadville. There we have siliceous, ferruginous, and calcareous ores, which can be combined with each other in such a manner that the least possible quantity of flux is required to smelt them properly; there we have cheap fuel also. But competition has assumed such proportions at Leadville that it requires no small amount of commercial skill to purchase ores in suitable proportions to flux each other, and large smelting capacity to make the business profitable. The advent of the railroads has been of immense benefit to the camp, and the increase of capacity has reduced the cost of labor almost one half, as a comparison of the following figures will show:

The average price of fuel in 1879, when the terminus of the railroad was thirty-five miles away, was for charcoal, 14 cents per bushel of 14 pounds; coke, $36.70 per ton of 2000 pounds. In 1882, charcoal, 10½ cents per bushel; coke, $15 per ton.

The average cost of fuel per one ton of ore was: In 1879, $8.92; in 1882, $5.66.

In 1879, we had, however, much more favorable ores to smelt, which accounts for the difference not being larger in proportion. The cost of labor, when we had to worry along with two 42-inch circular furnaces in 1879 was $5.20 per ton of ore; and in 1882, when we ran five large furnaces, $2.79 per ton.

Tendency to Increase of Capacity.—This will at once show that large capacity will materially decrease the cost of labor. There is a growing tendency now to establish smelting-works in even more central points, where competing railroads intersect each other, and where the items of fuel and labor are open to still further reduction—like Denver, Pueblo, and other places. In Denver, are the extensive Grant Smelting-Works, which, for convenience of construction, effective work, cleanliness, and architectural beauty, yet seek their rival. In Pueblo, is the largest and most complete establishment in the United States, that of the Pueblo Smelting and Refining Company, with its multitude of roasting-furnaces and blast-furnaces, its sampling machinery, and its refining plant; and there is still another plant in course of construction in the same town, that of the Colorado Smelting Company. In regard to individual capacity of furnaces, the Richmond Company, of Eureka, is ahead of all others, if we may accept the statements of the Eureka *Sentinel*, which, in its issue of August 29th, 1879, gives the following items about a new furnace then building there:

	Feet.	Inches.
Length inside jackets	10	8
Width inside jackets	8	4
Hight of jackets	2	6
Hight of furnace from bottom of crucible to feed-floor	16	..
Number of tuyeres	17	..

Smelting capacity, 100 tons.

Considerable stress is laid on the number of bars which this furnace will produce per shift. I should not like to run a furnace of such dimensions; not that I care for the inside length of the jackets, but the width is monstrous, and must require a blast of five pounds to the square inch to penetrate the charge. I hope, for the intelligence of the constructor, that the *Sentinel* is in error.

Furnace Reactions.—The reactions taking place in the blast-furnace have been so often described that it is superfluous to go over the same ground again.

Operating Lead Furnaces.—In regard to furnace manipulations, only a few remarks need be made. In blowing in a furnace, it is advisable, after the hearth has been heated up sufficiently, to charge it with alternate layers of fuel and bullion, and afterward with light charges of smelting mixture and slag, to the top, before turning on a weak blast. The hearth should contain so much bullion that the latter will rise to the top of the hearth in the channel forming the automatic tap. A hearth of 3 by 6 feet 6 inches by 30 inches deep requires nearly 11 tons of bullion to fill it up. I have had occasion, however, several times to blow in furnaces in new districts where no bullion could be had to start with. In this case, the automatic tap was closed at its lowest interior opening with a clay plug, which was removed after the lead showed itself at the slag-spout. This is not a very agreeable operation, inasmuch as the formation of a bottom crust is unavoidable, and this can only be perforated, but not removed by skill or by force, while the furnace is in operation. As long as the communication between the furnace and the channel can be kept open by driving holes through the crust, smelting may proceed; but as soon as this method fails, it is best to blow out the furnace at once. If the furnace is in good working order, when it is *open*, the lead in the tap-channel or well must be of a bright red color; frequently it emits arsenical fumes, in which case it should be covered with lime or ashes, which may be removed before dipping or tapping. The well should also work with the blast; that is, the lead should go down in the channel when the blast is shut off and rise again as soon as the blast is turned on. This is well known by the furnace-men, who begin testing their well as soon as the lead begins to assume a dark color and a sow makes itself felt in the furnace. Usually, there is a tuyere above or near the lead-well. By taking off the cap of the tuyere-pipe and replacing it, the same object is reached as by taking off the whole blast and turning it on again. The presence of a sow makes itself also known at the top, as it begins to blaze up now and then, and as the charges refuse to descend. A change in the composition of the charge is needed, or a water-jacket which may be leaking into the furnace requires to be taken out. The cause is easily discovered and remedied by the metallurgist, yet it takes time to improve a furnace by changing the charge. In a charcoal furnace, a new slag will show itself after the lapse of two or three hours; while in a mixed-fuel furnace it will take six or seven hours. To enable the furnace-man to dip the lead in proportion to its percentage in the charge, he should be informed how much of a bar or how many bars are contained in a charge. He will then know whether he should keep his lead high or low in the hearth. If there is little lead in a charge, say seven or eight per cent, great care must be taken to prevent the lead in the hearth from being lowered so much that a crust would be formed by the chilling of matte or speiss when it gets too far below the tuyeres. Below the tuyeres, the separation of the molten masses according to their specific gravity takes place in the following order: lead, which is of course alloyed with the bulk of the gold and silver contained in the ore, at the bottom; speiss floating on the top of the lead; matte floating on the top of the speiss; and lastly slag. In most places, slag, matte, and speiss are run out together into a slag-pot, which is allowed to cool and is then emptied of its contents. The three products are separated in three distinct horizontal layers. The matte from zinciferous ores makes an exception; having a lighter specific gravity, approaching that of the slag, it does not separate in a horizontal layer, but is scattered through the slag as a scummy mass. An addition of copper pyrites establishes a perfect separation in such a case. If metallic zinc forms during a smelting operation, the blast will blow a portion of it out through the slag-hole, whence it appears in its oxidized state as yellow powder, which on cooling turns white. Another portion of the zinc is volatilized in the shaft of the furnace, and will appear as a white powder in the flue-dust.

Variations in Practice.—The manner in which smelting mixtures are made is not the same in all works, nor is the system of feeding or charging the furnaces the same. In some smelting-works, the weight of the fuel is stationary, that of the charge or quantity of smelting-mixture corresponding to the fuel variable; in others, the fuel is variable and the charge stationary; in still others, the weights of both are variable. The latter plan is an irrational one. I prefer the one where the charge is stationary and the fuel variable, because the furnace is less sensitive to a large quantity of fuel taken off than to changes of charge.

The weights of both fuel and ore charges should be adapted to the area of the furnace at the throat, covering it in thin layers. For a furnace which has an area of 4 feet 8 inches by 8 feet 2 inches at the throat, a good proportion is from 192 to 216 pounds of fuel (half charcoal, half coke) and from 800 to 900 pounds of charge, which is fed into the furnace in half-charges through two doors, and spread uniformly over the fuel. The furnace is kept filled up to the bottom of the charge-doors. The feeding is done by hand, by means of shovels; but it seems that experiments with automatic feeding apparatus ought to be renewed, as they have not had a fair trial.

The best plan for making a smelting-mixture or charge, as it is also called, is of course to mix a large number of tons of ore with iron ore and limestone, or whatever the flux may be, and then weigh out the charges to the feeder. But wherever there is a variety of ores of different character which may vary in moisture, size, and other conditions, an immediate mixture with the fluxes will hardly give a homogeneous material which will make itself felt in the slag. In this case, it is better to weigh each component part of a charge or a half-charge separately into a wheelbarrow or car, and dump it at or into the furnace. A furnace of the above dimensions will take seventy charges per twelve hours, and will require eight men to serve it.

Furnace Products.—The products of smelting may be—

1. Silver-lead, argentiferous lead, also and preferably called "base bullion" in this country, in distinction from gold and silver bullion. This is a remarkable product, and is sold to the highest bidder. There are a number (ten or eleven) of refineries in the country which make it their object to separate the silver, lead, and gold, and to utilize the by-products gained in the refining process.

2. *Speiss.*—This is not utilized anywhere in the United States.

3. *Matte.*—This is either roasted and smelted again or thrown over the dump.

4. *Slag.*—This is only partially re-used.

5. *Furnace Accretions.*—There are two kinds: wall-accretions and hearth-incrustations or sows. The former consists of sulphide of iron in combination with sulphide of zinc and sulphide of lead, and they contain a small amount of silver. They should be roasted before resmelting; but as most smelting-works have no facilities for doing this, they are usually thrown on a charge. The hearth-incrustations do not contain enough silver and lead to make it worth while to have them broken up and resmelted. They are thrown over the dump.

6. *Cleanings, Furnace Refuse.*—These are fragments of bricks with metallic lead adherent: they are roughly assorted and the waste thrown away.

7. *Flue-Dust.*—This is the most important product aside from the lead. As it contains the finest and, in some cases, the richest particles of the ore in admixture with the dust of coal and coke, it is, of course, worth while to save and rework it. Where much fine ore is smelted, as was the case in Eureka during several seasons, the formation of flue-dust amounts sometimes to 15 per cent of the weight of the ore. In the face of this, it is to be wondered at that so many hundred, nay even thousand, tons of flue-dust were blown to the winds before provision was made for saving it. The Richmond Company, at Eureka, was the first to go to work in earnest by building spacious flues for catching the dust escaping from the furnaces; the previous attempt at the Ruby Consolidated works having been a failure.

The great question heretofore has been to get the flue-dust in such a form that it will stay in the furnace and not be blown out again. Simply wetting it is not of much use, and is even injurious to the furnace, as it will form wall accretions which grow thicker and thicker very rapidly. Mixing it with slacked lime has also its drawbacks, as it contains coal-dust, which has a tendency to counteract the agglutinating power of the lime; therefore, from eight to ten per cent of lime is at least necessary to make a mortar which will harden. I have found that sulphate of iron, the copperas of commerce, is the best agglutinator, but it could only be used where it is cheap. Thoroughly incorporated with a solution of copperas and made into bricks, which are dried in the sun, the flue-dust becomes as hard as rock, and is in the best shape for smelting. I once suggested, in 1878, the use of a brick-machine to make the flue-dust into adobes (with lime, of course); but the season was too far advanced, the bricks froze, and on thawing burst, and the experiment was given up. At the Germania works, the flue-dust was sintered in a roasting-furnace,

* From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey, Department of Industrial Statistics. Albert Williams, Jr., Chief of Department.

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which is the best but not the cheapest way. The most common plan now is to work it up with lime and use it along with the ore as fast as it is made.

Losses.—In roasting, as well as smelting, there are certain losses which can not be avoided entirely, but which may be reduced to a minimum. In roasting an ore, it first experiences a loss in weight, owing to the chemical reactions taking place; it loses water and carbonic acid; sulphides of metal are converted into oxides, and thereby decrease in weight. If the roasted ore will then show more silver by assay than the crude ore, this would prove that no loss of silver had taken place. If roasting is carefully conducted, the loss of silver by volatilization should not be over three per cent; but antimony, arsenic, and zinc cause a much higher loss by carrying off silver along with them to an extent which, if the temperature has been too high, may approach 20 per cent. I am not in possession of correct data from works where roasting is carried on, as in Montana and Northern Arizona. The cost of roasting at Robinson, Colorado, was nearly $6 per ton.

The losses in smelting are caused by the formation of speiss, matte, and other by-products which are thrown away. Slag also will cause a slight loss in metals, even if of normal composition. Zinc-blende will increase the loss in the slag considerably. The loss by volatilization is very slight so far as the silver is concerned, and may be entirely avoided by having enough lead in the charge to "cover" the silver. It is, however, not known what exact minimal quantity of lead is required to cover a certain quantity of silver and prevent loss. Smelting in Leadville has proved the fallacy of Kerl's statement that 300 times the amount of lead is required to cover one unit of silver. The volatilization of lead is very large where charges low in lead are smelted; as in Leadville, where frequently charges containing only 7 per cent of lead are treated. The loss of silver at Leadville is between 3 and 4 per cent, while the loss of lead from all sources amounts to from 13 to 15 per cent. At the Horn-Silver works, the loss of lead is stated at 8·71 per cent, but there they treat charges richer in lead.

FURNACE, MILL, AND FACTORY.

The Chalmers & Spence Company, of this city, manufacturers of asbestos materials, has recently covered the pipes of the Brooklyn Bridge. The company has also taken a contract for covering all the boilers, superheaters, etc., of the Atlas line. These vessels were built on the Clyde, but all the covering put on by the builders has been removed and replaced by the Chalmers & Spence Company's well-known air-space covering.

The Harrisburg (Pa.) *Patriot* says that the new Harrisburg & Western Railroad Company (Vanderbilt's Southern Pennsylvania line) has purchased the Wister Furnace at Harrisburg for $60,000. The land gained by this purchase is twelve acres in extent. In accordance with the terms of sale, the furnace has blown out and stands idle; it will torn down. It is now definitely known that the Wister Furnace property is to form the site for the car-shops of the Vanderbilt road.

The Florence furnace, Mich., which has been idle for a few weeks, to allow of needed repairs, went into blast again this week.

McIntosh, Hemphill & Co., Pittsburg, are running to their full capacity in building nail machinery, nail-machines, and heavy castings. Owing to the fact that some of the factories are beginning the manufacture of nails from steel, a remodeling of the nail-machine is necessary, which is one cause for the increased demand.

The work of putting the Grace furnace, Mich., in shape to go into blast has been commenced by Messrs. Sturges, Kruse & Travers, under the supervision of Matthew Travers.

W. S. Bostwick & Co., of Pittsburg, manufacturers of brass castings, report business very brisk. They have booked orders in the last two weeks for over 50,000 pounds of car brasses. Last week, they shipped 15,000 pounds to the Mexican Central Railroad. Orders for rolling-mill work are also very numerous. They expect to begin the use of natural gas under their furnaces this week.

The Meyer blast-furnace at Fond du Lac, Wis., is to be started up on October 1st. This property has lain idle for a number of years.

Reeves Brothers, purchasers of the rolling-mill at Canal Dover, have definitely decided to remove it to Niles, O., and place it in operation. The process of shipping it has already begun, but the location in Niles has not yet been settled.

The Pottstown, Pa., *Ledger* of August 28d says that on Friday the Phœnix Iron Company made the first experiment in rolling steel, and it was entirely successful. An angle bar 3 by 4 was turned out. The company intends making a business of this, and will go into it for the purpose of supplying steel for shipbuilding. It is contemplated in the near future to erect immense steel-converting works. This will give work to a very large number of men. The change in the business necessitates this move, as steel is fast superseding iron in manufacturing, and it does not pay to buy steel ingots for rolling when it is possible to manufacture them.

Spaulding, Jennings & Co. have remodeled their plant in their rolling-mill at West Bergen, N. J. They have disconnected their three-high 9-inch train from the main engine, and are driving it independently by a Westinghouse engine of 150 horse-power. The engine is 14 by 14, and runs 300 revolutions. It stands between the train and the polishing-rolls, and drives each by a separate belt. The belt driving the train has a speed of over 7500 feet, or nearly a mile and a half per minute. This is possibly the highest recorded belt speed, and is entirely successful.

Sweeney & Son, of Wheeling, recently cast a lot of ore-crushed chills for the Ætna mill, and two large water-boshes for the Whittaker iron-works. Cox & Morrison are rushed with work, and will employ several additional men at their boiler-works next week. The foundry of J. M. Woodcock, at Bridgeport, started up last Monday. A new engine has been put in, the floor-room enlarged, and other improvements made the past six weeks, during which time the foundry has been closed. L. B. Purdy and William Blake have returned to Moundsville from Pittsburg, where they contracted for the engines, boilers, and hoisting apparatus for the Moundsville coal-works. The coal will be hoisted by two twin engines, 10-inch cylinders, 24-inch stroke. Steam will be supplied by a 43-inch boiler 22 feet long, with two 15-inch flues.

The Johnstown Street Steel Rail Company has begun the manufacture of the rails at the Cambria Iron-Works. The rail has the ordinary L face used on the street railroads, but the body and bottom are made like the T rail. This form obviates the use of wooden stringers, as the rails can be spiked directly to the cross-ties and connected by splice-bars, making a continuous rail. They are made of Bessemer steel.

The Sunbury, Pa., Nail, Bar, and Guide Iron Manufacturing Company has built a rolling-mill and nail factory at Sunbury, which will be put in operation in two weeks. The works consist of two double puddling-furnaces, one heating-furnace, one train of rolls, 15 nail-machines ready for work, and 10 more machines on the way. John Haas is president of the company.

The Columbia Liberty Iron Company is the name of the new corporation that has purchased the Columbia and Liberty charcoal furnaces and some valuable mineral lands in Shenandoah County, Virginia. Mr. Samuel G. Merrick, of Philadelphia, is one of the leading members of the new company. Mr. Jacob Wissler will become superintendent of the furnaces.

Park, Brother & Co.'s Black Diamond Steel-Works, with their 17-ton hammer, have just finished the largest steel shaft ever made in the United States. It weighs 28,000 pounds, and is 34 feet 6 inches in length. The dimensions are 16¼ inches hexagon, or six square, tapered down to 14½ inches hexagon at both ends. James Bridges and Mr. Bell superintended the manufacture. It was made for the St. Louis & Mississippi Transportation Company, of St. Louis, Mo.

It is proposed to convert the Columbus (Ohio) rolling-mill into a manufactory of truss, bridge, and structural iron. A year ago, the mill was equipped at great expense for the manufacture of steel rails, but the venture did not pay. The officers of the company, in a circular to the stockholders, say: "The time for making rails, either of iron or steel, has passed for the mills, as the larger companies, with their equipment of converters and expensive machinery, can always put rails on the market at a price that would be ruinous to the small producers. Other branches of the iron trade have been suggested, and it has been concluded, after thorough investigation, that the best field for our mill for the present would be in the manufacture of structural iron."

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

FIRST CHANCE.—The mill has been started up, and a full working force put on the mine. A shaft is sinking from the surface, to connect with the main winze (the mine now worked from the tunnel). When the connection is made, they will immediately erect one of Baker's California whims, and sink to the water-line; and after that is reached, will erect steam hoisting-works.

OLD JUDGE.—The shaft, now twenty-five feet deep, shows good ore, which assays from $12 to $35 per ton in gold.

GILA COUNTY.

GLOBE.—The mine is producing about 50 tons of ore a day, and running one stack, smelting the same. The slags of the former management assayed over five per cent in copper, while the new management claims to have reduced them to less than one and a half. A ten-ton silver smelter is erecting and about ready for operation, to work up the galena and carbonate ores of the camp. So states a correspondent of the Chicago *Mining Review*.

MACK MORRIS.—Operations have been suspended, and it is stated that the tools and other effects are for sale.

STONEWALL JACKSON.—The attempts to get the water out of the mine have not been successful.

GRAHAM COUNTY—GREENLEE GOLD MOUNTAIN DISTRICT.

GREAT WESTERN.—Work on the Olie mine, one of the properties of this company, is progressing favorably. A shaft 70 feet deep has been sunk, and it will be continued 30 feet farther, making the shaft 100 feet deep, when drifting on the vein will be commenced.

ORIENTAL.—At this mine, situated about seven miles from Clifton, there is an old open cut that was worked years ago by a prehistoric race, in which their stone hammers and other implements have been found; and about 100 feet north of the cut, there is an old Indian shaft, 15 feet deep, which shows a vein of very rich copper ore at the bottom.

PINAL COUNTY.

Mr. Zeckendorff is reported to have about 45 men at work on his copper properties at Riverside. The ores are a talcose slate, with native copper, being entirely free from oxides, carbonates, or sulphides. Concentrators are to be put up soon that will probably add not less than 10 tons of copper a day to the output of the territory. Several other claims in the neighborhood of the above property show ores averaging high in copper. West of Riverside some ten miles, is the copper property lately sold by Messrs. Jackson, Smith & Sharp, a horizontal deposit of high-grade carbonate copper ore. The new company proposes to erect smelting-works at once, and has sufficient ore supply to justify the undertaking.

SILVER KING.—A large amount of ore is produced. About 1000 tons are now on the dump.

YAVAPAI COUNTY—PECK DISTRICT.

BLACK WARRIOR.—This mine is steadily producing ore, and at the same time dead-work is kept ahead so as to maintain good reserves. Advices up to the 31st ult. report the mine looking most favorably for a regular output. The company's mill has been much improved since its purchase in May last, and is making an enviable record. Report for the last week of August shows an average chlorination of 93⅜ per cent, and of silver left in tailings 9⅜ per cent. The bullion is shipped to the company in New York, and is of high grade, usually ranging from 900 to 950 fine; recent bars, however, have fallen to an average of 860 fine, due to an increase of copper pyrites in the ore.

Mr. Archibald A Alexander, the general manager, gives personal supervision of the mill, while Mr. T. J. Eaman, superintendent, is in charge of the mines. It is proposed to resume work in the company's Tuscumbia mine at an early date. The water supply at the mill has been greatly improved by the sinking of an additional well to bed-rock, where a good flow of water was encountered. A new steam-pump has been added, and the reservoir tanks are now easily kept full.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended August 25th shows: Ore crushed, 155·9 tons; average assay value of pulp, $38.27 per ton; of tailings, $6.48. Bullion shipped, $7072.76. The west cross-cut, 1000 level, is 338 feet long, and the east cross-cut, same level, is 450 feet long. The west cross-cut No. 2, 1000 level, is in 63 feet. The south drift from bottom of winze No. 5 is in 71 feet.

STANDARD CONSOLIDATED.—For the week ended August 25th, the official report shows: Ore shipped to mills, 1407½ tons; bullion shipped, $13,663.46. The east cross-cut, 1200 level, is in 497 feet. The north drift No. 1, 1000 level, is in 304 feet, and shows 2 feet of vein. The south drift No. 2 is in 266 feet; the vein is 5 feet wide, and looks well. The west cross-cut from the north drift, 700 level, is 421 feet long, and is in hard ground. The south drift from the west cross-cut No. 1, 500 level, is 249 feet long, and shows the vein 3½ feet wide. The north drift is in 765 feet, where the vein is five feet wide. The uprise from the south drift is up 118 feet; the vein at this point is 5 feet wide. The uprise No. 2 from the north drift is up 55 feet, and shows 4½ feet of vein. The south drift No. 2, 385 level, is in 771 feet; vein 5 feet wide. The uprise from this drift is up 225 feet. The uprise from the north drift is up 225 feet. The stopes are yielding the usual quantity of good milling ore.

CANADA.

PROVINCE OF NOVA SCOTIA.

A brick of gold, weighing three hundred ounces, valued at $6000, was recently received at Halifax from the mines at Salmon River. It is the result of the past month's operations.

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COLORADO.

CLEAR CREEK COUNTY.

The following is a statement of ore-shipments from Georgetown and vicinity during the month of August:

Shipments from	Tons.	Value in dollars.
Boston & Colorado Works	320	$32,528
Silver Plume Stamping-Works	182	24,388
Miners' Smelting Company	160	19,360
Morris & Noone	301	31,295
G. W. Hall & Co.	27	5,886
Lawson and Silver Creek	250	33,000
Total	1,240	$146,457

The above statement does not include any ore produced in the lower end of the county, which amount would probably swell the above statement to quite $200,000.

CORRY CITY.—The ninety-foot shaft has been pumped out and drifting started east and west. There is a fourteen-inch pay-streak, the iron ore of which assays from 49 to 63 ounces. On the tunnel level, a stope is raising over the shaft. A twelve-inch streak of ore was uncovered there for twenty feet, assaying 280 ounces. An average sample from the tunnel level drift ran 250 ounces. It is the intention to erect a twenty-ton concentrator at the mine, within the next six months. The Diamond Tunnel Company, owner of the Corry City, has made liberal concessions, whereby the lessees have every inducement to put through such an enterprise.

DONALDSON.—There are thirty-six men altogether employed in and about the mine, thirty-three being tributers and three engaged in working the tramway. The tributers pay a royalty of 30 per cent. The net product of the mine is between $3000 and $4000 per month, mostly free-milling quartz from near the surface, the ore being milled in the company's mill at Idaho Springs; the average net value of the ore, both mill dirt and smelting, being about $25 per ton. It is the policy of the company to take out as little of the concentrating ore as possible until such time as the mill at Fall River is completed, which will be some time before the coming winter. The mill, which will have a capacity of about 100 tons per day, is up and inclosed, and a portion of the machinery on the ground. It will have direct communication, by Halliday wire tramway 3800 feet in length, with the mine (the tramway being already built and in operation as far as the wagon-road in Trail Run, a distance of 2508 feet), so that the cost of getting the ore from the mine to the mill will be reduced, the minimum not to exceed 25 cents per ton. The deepest working on the mine is about 3000 feet, and altogether there are about 3000 feet of workings, including shafts and levels.

FREELAND.—The second level below the Freeland tunnel is in a little over 200 feet, and will have to be driven something like 150 feet farther to catch the ore-chute.

INVINCIBLE.—An undivided half-interest in this mine, situated at the head of Chicago Creek, has been sold for $25,000.

SUMMIT TUNNEL AND MINING COMPANY.—This tunnel, which is one of the greatest enterprises of this county, has now reached a depth of 560 feet. The company has fifteen patented lodes running at right angles with its tunnel, none of which has been cut as yet. At a meeting of the company held at Idaho Springs recently, it was decided to sell 20,000 shares, the proceeds to be expended in the purchase of drills, air-compressors, etc., to drive the tunnel as fast as possible.

EAGLE COUNTY.

GOLD PARK.—John W. Bailey has filed a writ of attachment in the United States Court against this company for $62,125, and given bonds to the amount of $125,000. The attachment is made by Mr. Bailey, who has been president of the company, to recover for money to this amount, alleged to have been loaned by him to the company. The marshal has levied upon about a dozen mines belonging to the company located on Holy Cross.

FREMONT COUNTY.

SOUTHWESTERN MINING AND MILLING COMPANY.—The property consists of a group of seven claims. The ore is an argentiferous galena carrying some gold, and the claims with additional development will become profitable producers. This company has an iron carbonate lode exhibiting more than twelve feet of carbonate ore of fair quality.

GILPIN COUNTY.

RARA AVIS.—The mill is to be started up shortly.

GUNNISON COUNTY.

A correspondent of the Denver *Tribune* writes from Irwin that the camp shows more activity in its mining interests than at any other period since its discovery. Machinery is placed and in working order in all of the prominent mines; leases and bonds are secured on some valuable properties, which are rapidly developed either in the interest of the lessees or to further their sale. The concentrators and sampling-works are running day and night, and the amount of ore shipped will not fall short of $35,000 a week. This is not inconsiderable, when it is considered that the amount shipped is produced only in development-work, advantage being taken of the present dry season to make preparations for the taking out of ore later on.

The McDonald-Wilder concentrator started its machinery on the 20th. The works have a capacity of 25 tons in twenty-four hours, and have been running without intermission since the date above mentioned. The character of the ore treated is ruby, native, and brittle silver and zinc-blende.

The Old Mexico & Durango has been shipping ore to the concentrator. The former is worked and yields large quantities of from 60 to 70-ounce ore. The Durango will start up soon, and the lower workings, about 200 feet deep, be stoped out. In this mine, there is a large, continuous body of ore about three feet wide which will mill-run 70 ounces.

The Rose & Reed Company is building its new concentrator in connection with its complete sampling-works. It has contracted to handle the Forest Queen ore, which is now, as always, a large producing mine.

The Bullion King has its machinery in place. The shaft, which will be sunk 100 feet farther before starting levels, is already 120 feet deep, with a south and north drift 150 and 60 feet respectively. The drifting is done on the vein with 100 feet of stoping to the surface in south level. The mine has already shipped about $60,000 worth of ore, and has on the platform at the present time 150 tons of concentrating ore, which runs 40 ounces, all ready for shipment as soon as the Rose, Reed & Co.'s concentrator starts. It is the intention to continue sinking the shaft all winter. In a few days, men will be placed at work in the south drift. Both drifts are started at the 100-foot level.

The Ruby Chief tunnel is driven 187 feet, and will be extended 300 feet farther, to tap the shaft at a depth of about 110 feet, the shaft being at present 100 feet deep. The company has shipped about $25,000 of ore, and has at least 100 tons of 45-ounce ore on the dump, which is hauling to our local mills. This company will work all winter.

The Oakes is working quite a force of men. This property is developed by a tunnel 430 feet; two shafts, one of 75 feet and another 30 feet, with two levels 14 and 60 feet, all the workings showing minerals in place, principally ruby and native silver. The first-class ore will mill-run 200 ounces, and there are 50 tons of 50-ounce ore on the dump. Both shafts are sunk on the vein. In the 30-foot shaft, the pay-streak is three feet wide, and in the 75-foot shaft 18 inches, and will run in both about 60 ounces. The character of the ore is principally ruby and native silver, but is also rich in chlorides and sulphurets.

Messrs. L. R. and H. Thompson, with F. W. Fuller, have bonded the old Shick & Howard extension for $40,000. A body of ore has been exposed unequaled in size by any heretofore discovered in the camp. There are two cross-cut tunnels, each of 300 feet, both cutting the vein at a depth of 200 feet below the surface. The vein is fully 50 feet wide, between well-defined walls, with a pay-streak five feet wide which will run 55 ounces, the selected ore running almost 400 ounces. The old Shick & Howard extension is on the same vein, a spur only of which is at present worked. The ore is similar in character to its neighboring location, the Oakes, namely, ruby, native, and brittle silver, with chlorides and sulphurets.

The Forest Queen has a fine plant of machinery. No more ore than sufficient to pay expenses will be taken out for the present, as it is the purpose of the company to do only development-work. The shaft, which is 225 feet deep, will be worked to a depth of 600 feet. The ore-body is changing in character, the arsenical iron as depth is gained being replaced by galena and copper, ruby and native silver being as large in quantity as previously.

LAKE COUNTY.

A movement is on foot, says the Leadville *Herald*, having in view the consolidation of the Nisi Prius, Leadville, and other lode claims on Rock Hill, together with a large tract of placer ground, the whole to be included under one management, and started out with a working capital of $100,000. The scheme has but recently been suggested, and is still undeveloped. From all that can be learned, it is favorably received, and will unquestionably secure a hearty support. Among the persons mentioned in connection with the enterprise are W. H. Stevens, of the Iron mine, Dennis Sullivan, W. H. James, Governor Grant, James Dexter, and other prominent citizens.

COLONEL SELLERS.—Work was begun on the Sellers shaft in March, 1882, and during the month of September following ore was struck. A great deal of water being encountered, considerable delay was experienced in putting in a large Cornish pumping plant. The first shipment of ore was made about six months ago, and since then the mine has produced regularly. The ore throughout the mine is a sulphide, the base varying greatly. Sometimes it is mostly iron, again zinc predominates, while occasionally galena is greatly in excess. The product of the mine is sold to the Arkansas Valley smelter.

ELGIN SMELTING-WORKS.—These works, operated by the Manville Smelting Company, are doing a very satisfactory business. The smelter has two furnaces, and is producing about twelve tons of bullion a day. The company has large contracts with a number of heavy producing mines, and has excellent prospects before it. Its largest contributors of ore are the Adlaide, Climax Contract, Argentine, Oro City, and Gonabrod mines.

HENRIETT.—Preparations are making for working the upper shaft on the Henriett claim. This shaft is situated near the eastern end line of the Henriett, has a depth of 400 feet, disclosing the first iron, and has not been worked for two years past. It is generally believed that a second body of iron and pay-ore will be found with greater depth.

IRON SILVER.—One of the most important mineral strikes reported this year has been made in the Moyer shaft of the Iron Silver Company. The ore-body shows a thickness of about eight feet, and consists of galena, carbonate, and sulphate of lead ores, with very little iron pyrites. The ore also carries some native silver.

LITTLE CHIEF.—The recently reported new strike continues to hold out well, and the prospects of quite a bonanza are daily improving. The drift running in on the ore has advanced thirty-five feet, and the face shows fine carbonate and galena ores, as well as iron ore carrying a large amount of silver. The sides of the drift also show fine ore. The ore-body, according to all reports, is from five to six feet in thickness, with a length and width still unknown.

MATCHLESS.—The mine has just opened another rich body of chloride and horn-silver ore.

MORNING STAR.—Developments are of a most encouraging nature. A new strike has been made near the line of the Evening Star, and about the center of the Morning Star claim. The mineral is carbonate of lead, and carries from 50 to 200 ounces in silver to the ton. The mine is producing about 50 tons of ore a day. The sinking of the McHarg shaft has been resumed. Both of the new steam-pumps are working admirably, and are keeping the shaft free of water without any difficulty.

NILES-AUGUSTA.—The lessee of this mine, on Carbonate Hill, is shipping iron ore in considerable quantity.

ST. BERNARD & BROOKLAND.—An injunction has been issued to prevent the consolidation of the St. Bernard Mining Company with the Brookland, primary arrangements for such a consolidation having been made at a recent meeting of the former company.

ST. LOUIS.—During the past few days, the workings of the mine have disclosed improved grades of copper ore. Included in the recent discoveries is copper glance, the first yet found in Lake County, from all that can be learned. The mine extends great promise of being a large producer of a great variety of minerals. It is a fissure-vein, and its products are totally different from those of the contract properties in this section.

LA PLATA COUNTY.

A number of gentlemen, representing mining interests in various parts of the San Juan, recently held a meeting in Durango, and perfected an organization known as the San Juan Miners' Association. The general aim of the association is to promote the varied mining interests of the San Juan in every possible way. This includes united effort on the part of the miners of the counties of La Plata, San Juan, Dolores, San Miguel, Ouray, Hinsdale, and Rio Grande to place the mineral resources in a positive and well-defined position before the world; to create a feeling of friendly rivalry between these counties in the way of county ore exhibits; and to stimulate the miners of the San Juan to make as large an annual output of ore as possible.

OURAY COUNTY.

The Ouray and San Juan Tramway will be open to teaming by September 1st. Its main line extends from Ouray to Mineral City, a distance of nine miles, with branches to Red Mountain and Poughkeepsie Gulch.

PARK COUNTY.

LONDON.—The stamp-mill has again commenced active operations, and the Frue concentrators are doing all that was expected as far as can be determined from an examination of the tailings and concentrates. From this time on, a continuous run will be made, handling on an average forty-five tons per day.

PITKIN COUNTY.

FARWELL CONSOLIDATED.—The entire property, situated at Independence, is offered for sale.

RIO GRANDE COUNTY.

SAN JUAN CONSOLIDATED.—Last week, we reported that the controlling interest in this mine had been sold for $900,000. The Colorado papers which made this statement have since contradicted it, and state the amount to have been but $150,000.

SUMMIT COUNTY.

WHITE QUAIL.—The mine, which is leased, is producing about fifty tons of ore a day, the bulk of which is sent to the Greer concentrator.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended August 26th: Ore produced, 300-foot level, 1050 tons. On the 20th inst., we discontinued stoping on the 400-foot level, and started a drift across the ledge from the header, which

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has advanced 11 feet. We have just started a drift south on the ledge. The ore milled now shows an improvement.

FATHER DE SMET.—Superintendent Webber writes, under date of August 19th: Have just arrived at this place, and have been put in charge of property by Mr. Gregg. I find every thing going ahead well, and working smoothly. The mine shows up favorably as to quantity of ore, and I presume the quality is about as usual, though, of course, I can not judge much about it yet, not being familiar with this kind of ore. I inclose you the express company's receipt for bar No. 165, containing 723¼ ounces gold, the result of run of mill for the first half of August. On August 15th, we drew for $23,000.

GEORGIA.

A survey is making from Kingsberry's Mill, on the Tallapoosa, to the Bonner gold mine, for the purpose of constructing works to convey the water to the mines.

The scarcity of water still prevents full operations at the mines in Lumpkin County.

IDAHO.

COLUMBIA & BEAVER.—The company's mill will be started shortly, on Silver King ore. A few lots of ore from other properties will also be worked. It is proposed to charge $35 per ton for working ores, and to guarantee a yield of 95 per cent.

DEER CREEK SMELTER.—The concentrating-works will be completed by the middle of September. By that time, there will be sufficient ore extracted to keep the concentrators at work steadily. The amount of ore out gives a good start to the miners, who are getting more out each shift and opening new stopes.

IDAHOAN.—The mine is worked by an upper and lower tunnel. The upper tunnel is in 525 feet on four feet of ore; a continuous vein of ore followed in from the ledge, with a ninety-foot winze on ore running to the lower level. The lower tunnel and main cross-cut are in 600 feet, and the face is 300 feet below the surface. The first-class ore will average 120 ounces silver and seventy-five per cent lead. There are fully 1500 tons of second-class ore on the dump. Ore is shipped to the Hailey Sampling-Works, and sold in Salt Lake City and Ketchum. The building of the concentrator, ore-houses, and other buildings is pushed with energy.

JAY GOULD.—Some 3000 tons of second-class ore are on the dump ready to be worked by the new concentrator, now in course of construction. The main tunnel is in 825 feet, and cuts the vein at a depth of 700 feet perpendicularly, or 900 feet on the pitch of the vein.

MAYFLOWER.—This mine is worked by two tunnels, 1252 feet in the upper tunnel on a continuous vein of ore. Three shafts are sunk from the upper tunnel, 100 feet each. The lower tunnel is 1000 feet on the vein, 36 feet wide. They have shipped 950 tons of first-class ore to the Omaha Smelting and Refining Company, Omaha, since April 1st, 1883, averaging 180 ounces of silver and 65 per cent of lead. The steam-jig turns out six tons of first-class ore daily, taking seven tons of second-class ore and ledge-matter to make a ton of first-class ore. Forty-six men are employed. The monthly expenses are from $6000 to $7000.

MONTANA.—A vein of gray copper ore has been struck.

PHILADELPHIA MINING AND SMELTING COMPANY.—The output of the works at Ketchum ranges from 350 to 450 bars daily, with an average weight of 100 pounds. For the purpose of protecting the water-power against cold weather, arrangements have been made with the Guyer Hot Springs, by which a steady flow of hot water through the smelting company's ditch will be obtained.

SMOKY BULLION & OPHIR.—The concentrating-works will be ready for work this fall.

SNAKE RIVER PLACERS.—The lands of the Upper Snake River Valley, north of Eagle Rock, according to a correspondent of the Salt Lake *Tribune*, are rapidly locating for mining purposes, and miles upon miles of stakes are seen on both sides of the river. Several companies are now successfully at work, but scarcely a beginning has been made. So far, every experiment under the present process of working has been a complete success. The first company above Eagle Rock, Messrs. Edwards, Quayle & Quirk, lately made an experimental run of forty days, and cleaned up $1060, doing all the work themselves and employing no help. The other companies are doing the same in proportion. Messrs Edwards & Co. say it will take them, at the rate they have been running, about four years to work out one acre of ground. At present, the mining is confined to that part of the valley watered by the Snake River Water Company's canal, and for years to come this canal can furnish all the water needed. The canal takes its water from the South Fork of Snake River, thirty miles above Eagle Rock, and has cost the company over $50,000 to construct. It carries a stream about twenty feet wide, varying from six to twelve feet deep, and can be enlarged to any required extent, the supply of water being practically inexhaustible. The company is now furnishing water to all the miners on very easy terms, in order to encourage the working of the placers, and expects another season to be called upon to furnish water for fully one hundred claims. The contrivance for saving the gold is simple and cheap. Any jack carpenter can make the machine, and it is safe to say that the entire cost of the gold-saving apparatus is easily covered by an expenditure of less than $200. A stream of water carries the gravel through a common sluice-box having a common grizzly. Toward the end of the sluice-box, the black sand and gold-dust are carried through a hole in the bottom of the sluice into a system of shallow boxes carpeted with common burlap cloth; here the gold catches in the burlaps, which are periodically taken up and washed out in a tub and then replaced in the same boxes again. The number of machines which can be used is only limited by the number of hands employed and the volume of water at command.

WOOD RIVER.—The Bullion mine, the property of this company, is shipping twelve tons daily of first-class ore to the Omaha Smelting and Refining Company at Omaha, averaging 180 ounces of silver and 65 per cent lead. The mine has been developed by over 6000 feet of drifts, tunneling, and winzes. The mine has 700 tons of second-class ore on the dump, which will be concentrated about four tons into one ton of first-class ore. The company is working 100 men. The concentrator has been finished, and works well.

YELLOW JACKET.—The ten-stamp mill, which was erected only as an experiment, has given such satisfaction that next year a 100-stamp mill will be erected.

MAINE.

CUMBERLAND COUNTY.

A valuable feldspar mine is said to have been recently discovered in the town of Raymond, on land belonging to the estate of William Mayberry.

MEXICO.

From Parral, we have the following letter: There are new discoveries of rich ores of silver made within the municipal limits of this city almost every day. English, French, German, and American capital is largely investing in the mines in this vicinity, and new works are in course of erection to beneficiate the finds. Anastacio Porros, the mayor of Parral, is erecting a large concentration, lixiviation, and smelting-works. Frederick Stalforth, one of the leading citizens and bankers of this city, has in contemplation the erection of large reduction-works on the celebrated Veta Grande mines. Thomas Parker, of Texas, J. H. Johns, of Kansas City, and Capt. John McCasey, of New York City, are about to build lixiviation-works, some ten miles from this city, to beneficiate the ores of three old Spanish mines of great wealth, the ores of which average ninety-five ounces to the ton, while the average width of the veins is six feet. There is a great abundance of wood and water on the property.

The twenty-five stamp-mill of the Parral Milling and Mining Company is rapidly approaching completion. The general superintendent, Capt. John McCasey, has ten stamps of the new mill running. The mill operates splendidly. The erection of the Stetefeldt furnace is progressing rapidly; the chimney is finished. It is the highest in Mexico, being 103 feet above the grate-bars of the roaster. The old fifteen-stamp mill of this company is running steadily on ore from the Jesus Maria mine. Lixiviation is the process adopted. Superintendent McCasey maintains that lixiviation is the best and cheapest process that can be used to beneficiate the ores of this vicinity. The Sestin Land and Mining Company, of Carmen, Durango, is working ores by the patio process with good results. There is now on the ground all the necessary material for the erection of a ten-stamp mill, the machinery for the same having been furnished by Ribon & March, of Jersey City. N. A. Cowdrey is the president of this company; L. C. Palmer, general manager; and C. H. Ward, superintendent. The Philadelphia syndicate is pushing work on the Gilarania. A depth of 240 feet, and in good ore, has been attained. Parral promises to be a very lively camp this winter.

PARRAL, MEXICO, Aug. 23. M. H. LEWIS.

The Mexican *Financier* says that Major Halliday, of St. Louis, has bought a large number of gold and silver mines in the State of Guerrero, and has started for the States by the overland route through Querétaro, San Luis Potosi, and Monterey, to purchase the machinery and material for three separate plants to work the mines according to the best modern methods. The plants will comprise reduction-works, smelters, and amalgamation-pans.

With a few exceptions, says a correspondent of the Mexican *Financier*, the mines at Pachuca are looking well, and there appears to be a general expectation of a boom shortly. Holders of shares will not sell except at prices considerably above market offers, and there appears to be a general determination to hold on for the rise. Santa Gertrudis is giving good results, those from the south lode especially being eminently satisfactory. The majority of the shareholders are greatly dissatisfied with the careless superintendence and want of proper economy on the part of the direction in supplying sufficient timber to render the shaft secure, a fault which caused the recent caving in of the shaft.

The Encino mine is going on well, and rich developments are expected shortly.

The New Rosario also looks promising and is worked steadily. Several mines in this neighborhood are not now running, from want of capital, notably the California. If outcroppings are any indication of the riches concealed below, then this writer says that the legendary output of the Conde de Regla is in a fair way of being surpassed.

There are several other good undeveloped mines around the neighborhood of Pachuca and El Chico, but until within the last two or three years it was not safe for the foreigner to prospect even, much less work a mine.

Another correspondent states that the Progreso hacienda has at last started up. What the results of their very much mixed ancient and modern methods will be, remains to be seen.

The Gertrudis has recently had quite a bit of bad luck, caused by the heavy rains, about 100 varas of the San Miguel shaft having caved. It is the intention to sink a new shaft at once.

The Anglo-Mexican Copper-Works seem to have a brilliant future. They are hurrying out a No. 1 copper very fast.

The Pachuca River Company is pushing on its operations at a very rapid rate. The concentrating machinery is nearly all erected.

La Blanca mine is sinking its perpendicular shaft fast. It is now down about 100 varas.

San Cayetano el Bordo, under its new management, has taken quite a step up, though considerable work has been done building walls, sinking a new shaft, etc. At the half-yearly stockholders' meeting, a good cash balance was shown.

REAL DEL MONTE.—A dispatch from the City of Mexico states that it is reported that an American syndicate has purchased this company's mines at Pachuca for $4,000,000. The Real Del Monte Company has turned out a success.

MICHIGAN.

The Marquette *Mining Journal* gives the following table, which exhibits in gross tons the total lake shipments of iron ore from upper peninsula ports the present season, up to and including August 29th, together with the amount shipped from the same ports during the correspouding period of last year:

Name of port.	1882.	1883.
Escanaba	1,159,759	875,783
Marquette	655,410	417,985
L'Anse	39,245	42,305
St. Ignace	27,095	19,476
Total	1,881,509	1,355,549

Showing a decrease of 525,950 gross tons.

CHAMPION.—At this mine, the work is confined exclusively to sinking and opening up new ground, all the upper stopes being left intact.

HURON.—The new stamp-mill is giving most excellent satisfaction, while the mine underground never showed better for copper. The product in August will not be far from 55 tons.

IRON RIVER.—A large amount of ground is opening up. It is the intention of the management to employ a large force during the winter, principally in doing preparatory work, while in the mean time a new engine-house will be built and a plant of machinery put in. Stripping will be prosecuted all along the line, the intention being to open up the vein over its entire length—or at least so far as is found on the company's lease-hold.

NONESUCH.—Quite a number of miners are now at work, opening new ground west as rapidly as possible, while others are engaged in sending rock to the surface, which is crushed and put into the hoppers ready for the mill to start. In the mill, they are washing the sands accumulated on the floor. They are also erecting two more of Evans's slime-tables. When they are completed, the stamp-mill will be again started.

ROLLING-MILL.—Negotiations for machinery are going on. The property is to be worked to its full capacity next season.

ROPES GOLD AND SILVER MINING COMPANY.—Another shaft is sinking on this property, about 600 feet east of the Curry shaft, and which is looking well, the lode having similar proportions and characteristics as shown in its Western neighbor. Other shafts on the vein will be sunk shortly.

SPURR.—Operations have been suspended.

WEST CHAPIN.—The find of ore is just sufficient to warrant a continuance of work. An analysis of an average sample from the deposit gave: Metallic iron, 55·27; phosphorus, trace; silica, 18·51.

MONTANA.

LEWIS & CLARKE COUNTY.

A correspondent of the New York *Tribune*, speaking of Helena, says that it is not only in the center of a rich mining country, but it was itself originally a mining camp. Last Chance Gulch, in which the main street of the city is built, was formerly one of the richest placer-mining regions in the world. It is said by old-timers that $20,000,000 have been taken from the ground upon which the city stands. Two years ago, the Odd Fellows' Hall was built, and gold-dust to the amount of $1400 was washed from the dirt taken from the cellar. Every foot of ground in the city has been dug up and washed over again and again by the industrious placer-miner, and within a mile of the main street placer-mining is still going on. Evidence of mining, in the form of irregular heaps of gravel

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and stones, can be seen on every hand. In the early days—a few years following 1865, when the first settlement was made—gold-dust was the only medium of exchange. Coins and greenbacks were unknown.

SILVER BOW COUNTY.

ALICE.—In the 800 foot level, at a point 105 feet west from the main shaft, the main ore-chute that has run the entire length of the Alice property, and been found in each succeeding level from the top to the bottom, has been tapped. Work in this level is pushed, and the baby-hoist on the 700-foot level materially facilitates progress, as well as cares for the water that is encountered. The winze from the 200 to the 300-foot level, at a point 185 feet east from the shaft, is expected to be finished shortly, and connection made below. The ore-body in this winze is of a uniform width of four feet, and of an average value of $100 per ton, although assays running as high as $250 and $300 have been obtained. On the 300-foot level, the same vein has been opened up both east and west; and on the completion of the winze above referred to, a body of $100 rock sufficient to run the mills two years will have been made available for easy extraction and hoisting. On the 400-foot level, prospecting is actively forwarded, to open up the same vein encountered in the levels above.

ANACONDA.—The company is pushing work on the smelter, upon which two hundred men are employed, in running the tunnel for the mill-race, building arches for the calcining-furnaces, laying the foundation-walls, grading for the concentrator, and lining the ditch with lumber.

BELL.—Some ore is hoisted from the old workings, but the greater part of the development is confined to the 400-foot cross-cut which is to connect the new workings with the old. The cross-cut is in about 105 feet, and when the length of 150 feet is attained, the connection will be finished, when active ore extraction will commence. At the smelter, the work goes steadily on, and about 40 or 45 tons of ore are treated daily.

NEVADA.

EUREKA COUNTY.

ALBION.—Some new ore has been opened out with fair indications. Prospecting is vigorously carried on by the company's men and by tributers, several of whom have good pitches.

EUREKA CONSOLIDATED.—The water in the mine is gradually lowering. The water in the old workings of the mine has gone down from above the 1200 level to about the 1300, and the shaft in the Phœnix has already been pumped dry.

LINCOLN COUNTY.

DAY.—The Pioche *Record* says: In working around the ore-chamber lately struck, three feet of copper ore were found on the east side of the ore-chamber. As soon as prospecting the ore-chamber is completed, the copper ledge will be prospected.

STOREY COUNTY—COMSTOCK LODE.

ALTA.—The work of pumping out the lower levels will occupy three or four months.

HALE & NORCROSS.—Through the stoppage of the pumps, work in the winze below the 2600 level has been a good deal retarded. It is found, however, that the donkey-pump is able to clear the winze of water very rapidly.

MEXICAN.—The rock in the uprise from the 2900 level is exceedingly hard, and rapid progress can not be made. Until this hard streak has been cut through, the water will not begin to drain out of the winze down from the 2700 level.

OPHIR.—Good headway is making in opening out on the 150 level in the old ground.

OVERMAN.—It is said that the company contemplates buying the old Petaluma mill, in order to work the ore at present extracted from the croppings by means of a tunnel near the old Overman works.

UNION CONSOLIDATED AND SIERRA NEVADA.—The joint winze is making excellent progress, and will soon reach a point where it will cut the first of the quartz streaks passed through on the 3000 level by the main west drift. These streaks presented a very promising appearance where cut on the 3000 level, and showed a considerable amount of metal, silver greatly predominating over gold.

YELLOW JACKET.—Considerable work is done in the way of exploration.

WHITE PINE COUNTY.

WHEELER TUNNEL.—The tunnel is in 647 feet, and is directed to under-cut the Original Hidden Treasure mine. The face of the tunnel has lately encountered unusually favorable material, at a vertical depth below the surface of nearly 500 feet.

OHIO.

Reports from Cleveland state that there is great excitement throughout Trumbull County over the discovery of petroleum in the village of Champion, near Warren, and people are rushing to the scene from all points of Northern Ohio.

UTAH.

EMMA.—A shipment of fifteen tons of $160 ore has just been made. The 135-foot level is opened 80 or 90 feet west from cross-cut from shaft, and 125 feet east. The ground is said to be the most promising in appearance of any that was ever found in the mine. The vein is 150 feet wide. After being driven a suitable distance, the vein will be cross-cut from this level at promising points, and at enough of them to thoroughly exploit the entire ground.

ONTARIO.—The seventh and eighth levels have both been extended westward during the last few months from 500 to 600 feet in a strong body of as fine ore as ever was found in the mine. The ninth level has not been opened at all. The pumps are taking care of the water, including the last outbreak on the eighth level, and many of them will be relieved and the expense largely reduced when the sixth level tunnel begins to be used, which will be soon.

SAMPSON.—At present, work is principally confined to the sinking of the shaft, which is nearing 180 feet in depth. There is ore on hand, and more might be taken out; but while the shaft is going down, it is not yet determined whether they will drift to the vein, which the shaft has passed through, from the 200 station, or go on to the 300 with the shaft, first.

WYOMING.

The mines at Hartville are shipping copper matte regularly, and the new Silver Crown District bids fair to prove a producing one within a very short time. The Copper King mine, in this district, is a deposit of metallic copper, which, from the indications appearing on the surface, is thought to be about forty feet wide and from 5000 to 6000 feet long. The shaft has reached a depth of 70 feet. At about 75 or 80 feet, a cross-cut will be run to ascertain the width of the body of ore in the claim. Within two miles, in a northerly direction, is a deposit of galena, silver, and gold. One mile north of this are two veins, both of which are worked. In one, are found sulphurets of copper; and in the other, copper pyrites. All these claims look well. Several placer mining districts near Laramie are producing.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED JULY 3D, 1883.

280,349. Composition to be used in Fluxing and Protecting Molten Metals. Francis J. Clamer and Joseph G. Hendrickson, Philadelphia, Pa.
280,425. Apparatus for Concentrating Sulphuric Acid. William West, Denver, Colo., Assignor of one half to Homer Pennock, New York City.
280,541. Pick for Mining-Machines. George D. Whitcomb, Chicago, Ill.
280,544. Coal-Mining Machine. George D. Whitcomb, Chicago, Ill.
280,668. Steam Rock-Drill. Joseph W. V. Rawlins, Houghton, Mich.
280,738. Miner's Lamp. Richard W. Grimes and John Fern, Scranton, Pa.

GRANTED JULY 10TH.

280,781. Mining-Machine. Hermann Bardifzky, St. Louis, Mo., Assignor of two thirds to Andrew Brandenburger and William Tirre, same place.
280,824. Portable Forge. John P. Holt, Cleveland, O.
280,835. Compound Pump. Henry C. Langrehr, San Francisco, Cal.
280,838. Device for Burning Gaseous Fuel in Kilns. Burdett Loomis, Hartford, Conn.
280,903. Cinder-Car. Jerome L. Boyer, Columbia, Pa.
280,904. Hoisting Apparatus for Locomotive and Portable Engines. Jerome L. Boyer, Columbia, Pa.
280,909. Elevator-Bucket. Henry W. Caldwell, Chicago, Ill.
280,934. Ore-Concentrator. Artemas A. Kent, Denver, Colo.
280,954. Combined Steam-Boiler and Crucible-Furnace. Alexander Riegler, Cincinnati, O.
280,955. Combined Metallurgical Furnace and Water-Heater. Alexander Riegler, Cincinnati, O.
280,971. Steam Rock-Drill. Amos Stevens and Arthur L. Stevens, Philadelphia, Pa.
280,983. Tube-Coiling Machine. E. Walter Whitlock, New Haven, Conn.
280,994. Sampling Apparatus. George S. Andrus, Columbia, Colo.
280,997. Air-Compressor. William A. Babcock, South Coventry, Conn.
281,011. Hoisting and Conveying Machine. Alexander E. Brown, Cleveland, O.
281,022. Ingot-Buggy. Simon C. Collin, Braddock, Pa.
281,044. Process of Analyzing Pig-Iron from Blast-Furnaces. Samuel A. Ford, Pittsburg, Pa.
281,060. Amalgamator. William Hawkins and Henry R. Hawkins, Oregon, Mo.
281,063. Furnace and the Art of Working the same. James Henderson, Bellefonte, Pa.
281,074. Process of Extracting Precious Metals from Ores. A. K. Huntington, Hampstead, and Walter E. Koch, Kensington, County of Middlesex, England.
281,098. Device for Cooling Furnace-Fronts. William S. McKenna, Pittsburg, Pa.
281,159. Protecting Plumbago Crucibles. William Tatham, Philadelphia, Pa.
281,184. Roll for Slitting Iron. Howard Greer, Chicago, Ill.
281,212. Mode of Making Molds for Steel Castings. Benjamin F. Watkins, Johnstown, Pa.

GRANTED JULY 17TH.

281,242. Friction-Clutch. Hilen C. Crowell, Erie, Pa.
281,261. Steam Pumping-Engine. Harvey F. Gaskill, Lockport, N. Y.
281,272. Work-Holding Device for Metal-Slotting Machines. Charles Huke, Chicago, Ill.
281,284. Traction-Rope Railroad. Daniel J. Miller and Charles F. Findlay, Chicago, Ill.
281,366. Pile of Combined Iron and Steel. William G. Howell, Philadelphia, Pa., Assignor of one half to William Gerhard, same place.
281,385. Injector. William T. Messinger, Cambridge, Mass.
281,389. Injector. Horace B. Murdock, Detroit, Mich.
281,390. Water-Meter. Lewis H. Nash, Brooklyn, Assignor to the National Meter Company, New York City.
281,440. Traction-Rope Railroad. Adolphus Bonzano, Phœnixville, Pa.
281,446. Hoisting and Conveying Machine. Alexander E. Brown, Cleveland, O.
281,474. Rolling-Mill. Gustav Erkenzweig, Hagen, Prussia, Germany.
281,475. Rolling-Mill. Gustav Erkenzweig, Hagen, Prussia, Germany.
281,511. Machine for Grinding and Pulverizing Ores. William H. Howland, San Francisco, Cal.
281,528. Hoisting Apparatus. Henry B. Larzelere, Greencastle, Pa.
281,565. Manufacture of Explosive Compounds. Marc Eugene Sanlaville and Rodolphe Laligant, Quincié, France.
281,593. Traction-Rope Railroad. William Wharton, Jr., Philadelphia, Pa.
281,595. Rolling-Mill. Samuel R. Wilmot, Bridgeport, Conn., Assignor to himself and Willis F. Hobbs, same place.
281,596. Rolling-Mill Roll. Samuel R. Wilmot, Bridgeport, Conn., Assignor to himself and Willis F. Hobbs, same place.
281,597. Rolling-Mill Roll. Samuel R. Wilmot, Bridgeport, Conn., Assignor to himself and Willis F. Hobbs, same place.
281,625. Kiln for Firing Pottery, etc. Nancy M. Fitch, Auburn, N. Y., Assignor to Stearns Fitch, same place.
281,629. Amalgamating Apparatus. Alfred K. Huntington, Hampstead, and Walter E. Koch, Kensington, County of Middlesex, England.
281,635. Method of Treating Phosphates of Iron and Alumina. Albert H. Koefoed, New York City, and Thomas B. Stillman, Hoboken, N. J.
281,651. Combined Amalgamator and Separator. Theodore R. Timby, Nyack, N. Y.

GRANTED JULY 24TH.

281,700. Friction-Clutch. D. Randolph Kinyon, Raritan, N. J., Assignor of one half to Job C. Kinyon, same place.
281,718. Hand Rock-Drilling Machine. Henry F. Parsons, San Francisco, Cal., and Hugo Borchardt, Bridgeport, Conn., Assignors to Daniel Cook, San Francisco, Cal.
281,719. Rock-Drilling Machine. Henry F. Parsons, San Francisco, Cal., and Hugo Borchardt, Bridgeport, Conn., Assignors to Daniel Cook, San Francisco, Cal.
281,720. Mechanical Movement. Henry F. Parsons, San Francisco, Cal., and Hugo Borchardt, Bridgeport, Conn.; said Parsons Assignor to Daniel Cook, San Francisco, Cal.
281,729. Manufacture of Cast-Iron High in Carbon and Low in Silicon. Jacob Reese, Pittsburg, Pa.
281,735. Coal Cleaner. Joseph Snyder, West Pittston, and Dathan Morse, Hughestown, Pa.
281,746. Means of Attaching Elevator-Buckets to Belts. Frederick A. Wittich and Peter W. Strader, Ashtabula, O.
281,764. Furnace for Manufacturing Iron and Steel. James Henderson, New York City, Assignor of one half to Charles G. Francklyn, same place.
281,782. Ore Reducing and Separating Machine. Cortland E. Moore, Marquette, Mich., Assignor of two thirds to Henry C. Thurber, same place.
281,784. Process of Treating Iron. George Neilson, Chelsea, Mass.
281,810. Brake for Winding or Hoisting-Engines. William C. Waters, San Francisco, Cal.
281,815. Grip for Endless-Cable Ways. Levi J. Wing, Brooklyn, N. Y.
281,828. Movable Jaw for Stone and Ore-Crushers. Daniel Brennan, Jr., Orange, N. J.
281,843. Steam-Engine. Franklin D. Cummer, Detroit, Mich., Assignor to the Cummer Engine Company, Cleveland, O.
281,846. Lid for Miners' Lamps. John B. Deeds and William Mack, Terre Haute, Ind.
281,922. Rock-Drill. William H. Randall, San Francisco, Cal.
281,945. Ore-Roasting Furnace. James M. Thompson, San Francisco, Cal.
281,978. Rolling-Mill. Alfred Crandell, Pine Plains, N. Y.
281,982. Amalgamator. John T. Davis, Rahway, N. J., and Isaac Stead, Philadelphia, Pa.; said Davis Assignor to said Stead.

GRANTED JULY 31ST.

282,035. Device for Promoting Combustion in Furnaces. James E. Baker, Chicago, Ill.
282,041. Apparatus for Compressing Liquid Steel. John F. Bennett, Pittsburg, Pa.
282,042. Pump-Regulator. James H. Blessing, Albany, N. Y.
282,055. Wire-Coating for Drawing. Addison B. Clemence, Worcester, Mass.
282,064. Coke-Oven and Kiln. Friderich C. Eberley and Rudolph Richter, Denver, Colo.
282,071. Steam Motor-Engine. Harvey F. Gaskill, Lockport, N. Y.
282,073. Electric Ore-Separator. Herman Greve, St. Paul, Minn.
282,118. Production of Ferro-Phosphorus. Jacob Reese, Pittsburg, Pa.
282,131. Amalgamator. Hugh M. Thompson, St. Louis, Mo.
282,163. Mechanism for Moving Earth and Excavated Material. Howard A. Carson, Boston, Mass.
282,200. Elevated Wire Railroad. Smith H. Knapp and Alpheus E. Adams, Danbury, Conn.
282,218. Ore-Pulverizing Machine. Henry E. Parson, New York City.
282,265. Metal-Melting Furnace. George M. Bryant, Minneapolis, Minn.
282,266. Apparatus for Manufacturing Iron and Steel directly from the Ore. Henry Clay Bull, Liverpool, County of Lancaster, England, Assignor to Bull's Iron and Steel Company (Limited), same place.
282,274. Mining-Machine. Charles W. Colvin, Wilkes-Barre, Pa.
282,279. Metal Crucible. Mattison Darragh and Scudder H. Darragh, Bridgewater, Pa.
282,315. Furnace for the Manufacture of Iron and Steel and for other Purposes. James Henderson, Bellefonte, Pa.
282,342. Furnace for Distilling and Carbonizing Wood, etc. Jean A. Mathieu, Philadelphia, Pa.
282,349. External Friction Brake-Band for Hoisting Machinery, etc. Daniel H. Merritt, Marquette, Mich.
282,352. Amalgamator. Henry Moon, Thomasville, N. C.
282,382. Rock-Drilling Machine. Alfred Shedlock, Brooklyn, N. Y., Assignor to John D. Shedlock, same place.
282,387. Gas-Producer. Charles W. Siemens, Westminster, County of Middlesex, England.
282,440. Process of Distillation of Coal. William J. Cooper, Westminster, County of Middlesex, England.
282,464. Flux for Welding Metals. Wilhelm Mutter, Syracuse, N. Y.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Sept. 7.

This week has been one of the dullest that the mining market has yet experienced. With the exception of two or three fancy stocks, the transactions have been very small. Elko Consolidated has been the most active stock dealt in, and Robinson and Sonora Consolidated record large dealings. Prices have not materially changed either way. Below will be found a full summary of the market. The total number of sales aggregates 133,810 shares, as against 155,652 last week.

The Comstock shares were very quiet, and were steady. California sold from 26@24c. Consolidated Virginia was moderately dealt in, and was a little weak; it sold from 60@56c. Sierra Nevada was quiet and strong, selling from $4.25@$4 45. Union Consolidated sold from $4.90@$5.13@$5, with transactions of 235 shares. Sutro Tunnel was fairly dealt in at steady prices; it sold from 19@20c.

The Leadville stocks were also quiet and steady. Amie was irregular, under a small business, selling from 15@12@14c. Chrysolite was moderately dealt in at steady prices, selling from $1.10@$1.15. Breece sold at 20c. Iron Silver was quiet and strong, selling from $3@$3.10. Leadville sold at 80c. and Little Chief at 55@50c. The transactions in both were very small.

The Bodie stocks were almost neglected. Bodie sold at 70c. assessment paid, and from 16@12@15c. assessment unpaid. Standard was quiet and irregular, selling from $5.75@$5.25@$5.38.

The Tuscarora stocks were very quiet, with the exception of Elko. Grand Prize sold at 15c. Navajo was dealt in to the extent of 300 shares at $2.90. North Belle Isle was moderately dealt in at strong prices, selling from 40@50c. Elko Consolidated was very active, and at one time quite strong; it sold from 10@16@13c.

In the miscellaneous list, Alice was quiet and steady at $2. Bassick sold at $9, with one small transaction. Eureka Consolidated was quiet and strong, selling at $7.50. Gold Stripe was quiet and steady at 7@8c. Hall-Anderson was moderately dealt in at steady prices; it sold from $1@$1.10. Horn-Silver was quiet and strong, selling from $7@$7.25. Northern Belle sold from $6@$6.13, with a small business. Robinson Consolidated was active and irregular, selling from 46@40@48@47c. Sierra Grande was also irregular, under a small business, selling from $1.05@95@97c. Silver King sold from $7@$6.75.

Alta-Montana was quiet and steady at 5@6c. Barcelona was very quiet at steady prices, selling from 34@33c. Central Arizona sold from 24@25c., with a small business. Decatur sold at 2c. Eastern Oregon was very quiet and was quoted at weaker prices than of late; it sold from 76@75c. Sonora Consolidated was actively dealt in at steady prices; it sold from 27@25c.

A sale of 250,000 shares (a controlling interest) of the United Mining Company was announced to take place at the Real Estate Exchange Sales-Room on Wednesday last. We understand that 30,000 shares were sold, but that no actual transfer of property took place. The company owns four gold and silver mines in Grand County, Colorado, near the town of Teller.

A meeting of those stockholders of the Eureka Consolidated Mining Company who are in favor of a change in the management and of having a transfer-office in this city was held at the office of R. H. Rickard, No. 32 Pine street, on Wednesday last. The meeting was well attended, some 28,000 shares being represented, and Dr. Mackenzie was appointed to attend the annual meeting of the company in San Francisco on the 15th day of October next.

We have received some favorable news in regard to the Stormont Company. The secretary reports that the company is out of debt and has a surplus of about $14,000; and that it is netting from $1000 to $3000 per month at the present time.

MEETINGS.

Rappahannock Gold Mining Company, No. 60 Broadway, Room 15, New York City. Adjourned meeting of stockholders September 14th, at a quarter past four o'clock P.M.

DIVIDENDS.

The Castle Creek Mining Company, of Idaho, has declared its sixteenth regular monthly dividend of three per cent, payable September 17th.

The Dunkin Mining Company, of Colorado, has declared a dividend (No. 16) of five cents per share, or ten thousand dollars, payable October 1st.

The Plymouth Consolidated Gold Mining Company, of California, has declared a dividend (No. 4) of fifty cents per share, or fifty thousand dollars, payable immediately at the offices in New York and San Francisco.

The Standard Consolidated Mining Company, of California, has declared its monthly dividend of twenty-five cents per share, payable on September 12th, at the Farmers' Loan and Trust Company.

PIPE LINE CERTIFICATES.

Watson & Gibson, of No. 49 Broadway, report as follows on the petroleum market:

There has been but little activity during the past week except for a very brief time on Wednesday. The fluctuations were within so narrow a range that the public were not attracted to the market.

Under the report that Grandin No. 14, which is on the extreme southwestern limit of Balltown development, was showing for a large well, the market broke to $1.06⅛. This proving to be untrue, the market reacted to $1.08⅛ under free buying of shorts. The well is now yielding only about seven barrels per hour; and as the sand is said to be of poor quality, the bulls contend that it cuts off the extension of the Balltown pool in that direction. Some important wells are drilling on the northeastern end of Balltown, near Porcupine No. 9, which will test the territory. Until these wells are in, about a week hence, no bull movement in oil is likely. If they prove small, we may look for a spirited advance. Refined oil is 8⅛, a shade higher than a week ago.

Steps have been taken by the leading oil exchanges of the country to form a central organization for the purpose of insuring a uniformity of business methods and the protection of members. The plan is, to have a central organization, to be known as the Conference of Oil Exchanges. The exchanges which have approved the preliminary work are the Oil City, the Titusville, the Bradford, and the Pittsburg exchanges, and the New York Petroleum Exchange. Each of these institutions is to be entitled to three delegates to the conference, which is to meet on the third Thursday of June in every year. Future admissions of exchanges are to be classified as follows: First class, entitled to three delegates, exchanges whose clearances average 100,000,000 barrels per month for the three months preceding the date of application for admission; second class, two delegates, clearances 50,000,000 barrels per month; third class, all other exchanges, which shall be entitled to only one delegate. One of the most important features of the new plan is the provision that "any member of the several exchanges who may be suspended or expelled from either of the exchanges to which he belongs shall likewise stand expelled or suspended from all the exchanges to which he belongs." A suspended or expelled member of any one exchange will be ineligible to membership in any other exchange in the conference. At a meeting of the members of the New York Petroleum Exchange yesterday, the proposed plan was adopted, and S. F. String, D. R. Offley, and P. B. Crosby were selected as a committee to complete the details.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 1.....	$1.08¾	$1.09⅜	$1.08¼	$1.08⅝	1,742,000
3.....	1.08½	1.08⅝	1.07½	1.08⅛	1,672,000
4.....	1.08⅛	1.08⅛	1.06¾	1.07⅜	1,641,000
5.....	1.06⅞	1.08¾	1.06⅞	1.08¼	2,027,000
6.	1.08⅞	1.08⅞	1.08¼	1.08⅜	1,953,000
7.....	1.08⅛	1.08½	1.07¾	1.08	1,311,000
Total sales.					10,346,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, September 6.

The market for copper stocks the past week shows a little firmer tendency as to prices, but continues to rule dull and inactive. There is but little stock offering for sale at present prices, and it would be difficult to fill an order for any considerable amount of the dividend-paying mines, without advancing prices materially. At the same time, there is no disposition to traffic in the speculative mines, although some of them are undoubtedly very cheap at the prices at which they are offered for sale. Ingot copper holds firm at 15⅛@15¼c., and there are indications that higher prices will prevail during the ensuing fall and winter. Should this be the case, we shall, no doubt, have a more active market for all the copper stocks, and more active prices. Calumet & Hecla advanced from $240@$243 on small sales, with no stock offered to-day at less than $245. Franklin was also better, with sales at $9⅞@$10. The August product was 188 tons, a slight increase over the corresponding month of last year. Quincy continues in good demand, with sales at $46, which is also bid, none offered. A gain of 57 tons in the product for August, compared with last year, is reported, and the mine continues to look well. Osceola sold at $18, and Atlantic at $10, same as last week. Huron sold at $1 9-16 (100 shares only), the same being bid. This mine doubled its production in August, as compared with last year, and looks cheap at the price at which it is selling. Pewabic sold at $3. The product for August shows a falling off of about 15 tons from last year.

In silver stocks, there is but little doing, and prices show no material change. Bonanza sold at $1¼. Catalpa, 87½c. Sullivan, 87½c. Harshaw, 50c. Silver Islet, $3⅛@$3, and offered at the latter figure.

At the Boston Mining and Stock Exchange, there was no special feature. Prices for the stocks dealt in show but little change, and there is not much margin for operations. Bowman Silver steady at 17@18c. Massachusetts & New Mexico, 4@5c. Empire, 17c. bid. Dunkin, 29@30c. Sullivan is more active and in fair demand at 87½@92½c.; sales at the latter price, buyer 30.

3 P.M.—At the Board this afternoon, Huron sold at $1⅛, and closed $1¾ bid, $2 asked. Silver Islet sold at $3, closing $2¾ bid. Sullivan, $⅞@$1. Bowman Silver sold at 16c. Calumet & Hecla, $240 bid and $245 asked. Osceola, $17½@$20. Quincy, $46½@$47¼. Franklin, $10. National, $1.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Aug. 31.	Sept. 1.	Sept. 3.	Sept. 4.	Sept. 5.	Sept. 6.
Albion	.....	.....	.....	.....	.....	.....
Alpha	2⅛	2⅛	.....	2	2	2
Alta	.85	1	1	1⅛	1½	1¾
Argenta	.....	.....	.....	.15	.15	.....
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	1	.....	1⅛	1	.....	.....
Belle Isle	.....	.....	.....	.....	.....	.35
Best & Belcher	4	4¼	3¾	4	4	3⅞
Bodie	.15	.15	.15	.....	.....	.25
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
California	.25	.25	.25	.25	.20	.25
Challar	2¼	2¼	2⅞	2¾	3	3⅛
Con. Virginia	.55	.60	.50	.55	.55	.55
Crown Point	1⅛	.....	1⅛	1⅛	1¼	1¼
Elko Cons	.....	.....	.....	.....	.....	.....
Eureka Cons	.....	6⅞	7⅛	6¾	7	8
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	2¾	2¾	2⅝	2¾	2¾	2⅝
Grand Prize	.20	.....	.....	.....	.15	.52
Hale & Norcross	4⅜	4½	4	4	4½	4⅜
Independence	.....	.....	.....	.....	.....	.....
Martin White	.....	.....	.....	.....	.....	.....
Mexican	3¾	3¾	3½	3⅝	3½	3⅝
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	4¼	.....	4½	.....	4½	.....
Navajo	2⅝	2⅞	2⅞	2⅞	2¾	2¾
Northern Belle	6⅛	6¼	6⅜	6⅛	6⅛	6⅛
North Belle Isle	.....	.....	.....	.....	.....	.....
Ophir	3⅝	3¾	3½	3½	3½	3⅝
Overman	.....	.....	.....	.....	.....	.....
Potosi	.90	.90	.80	.80	.85	.87½
Savage	2	2⅛	1⅞	2	2	2
Scorpion	.60	.60	.60	.55	.55	.60
Sierra Nevada	3½	3¾	3⅛	3¼	3¼	3¼
Silver King	.....	.....	.....	.....	.....	.....
Tip-Top	.....	.....	.....	.....	.....	.....
Union Cons	5¼	5⅝	4⅞	4⅞	5	5
Utah	2⅞	3	2⅝	2⅝	2¾	2⅝
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	3¼	3⅝	3⅛	3¼	3¼	3¼

BULLION MARKET.

NEW YORK, Friday Evening, Sept. 7.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Sept. 1	50⅝	109⅞	Sept. 5	50⅝	109¾@109⅞
3	50⅝	109⅞	6	50⅝	109⅞
4	50⅝	109⅞	7	50⅝	109⅞

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended September 7th, as compiled from various sources, amounted to $193,000, as against

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Sept. 1.		Sept. 3.		Sept. 4.		Sept. 5.		Sept. 6.		Sept. 7.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	.....	.....	.....	.....	.....	.....	2.00	.....	.13	.....	2.00	.....	150
Amie Con., Co.	.....	.....	.14	.13	.15	.12	.....	.....	.....	.....	.14	.....	3,300
Argenta, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bar. & Walker, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
Bassick, Co.	9.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belle Isle, Ne.	.....	.....	.....	.....	.16	.....	.70	.12	.70	.15	.70	.....	1,550
Bodie Cons., Ca.	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	.19	.....	1,500
Breece, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer, Ca.	.....	.....	.....	.....	.26	.....	.26	.....	.25	.24	.....	.....	3,000
California, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribou Con., Co.	.....	.....	.....	.....	.....	.....	1.10	.....	1.10	.....	1.15	.....	2,500
Chrysolite, Co.	.....	.....	1.15	.....	.....	.....	.60	.58	.58	.57	.58	.56	4,410
Cons. Va. Ne.	.....	.....	.71	.58	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crown Point	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deadwood-Terra, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.30	.....	300
Dunkin, Co.	.....	.....	.....	.....	7.50	.....	.....	.....	.....	.....	.....	.....	300
Eureka Cons., Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Excelsior, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dk.	.....	.....	.....	.....	.....	.....	.09	.....	.07	.....	.....	.....	1,000
Findley, Ga.	.....	.....	.07	.....	.07	.....	.....	.....	.08	.....	.....	.....	800
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Gould & Curry, Ne.	.....	.....	.....	.....	.15	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Great Eastern, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green Mountain, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	1.05	.....	1.10	1.05	2,800
Hall-Anderson, N. S.	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hibernia, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.00	.....	100
Homestake, Dk.	.....	.....	.....	.....	.....	.....	7.25	.....	.....	.....	.....	.....	540
Horn-Silver, Ut.	7.00	.....	7.25	.....	7.25	.....	.....	.....	.....	.....	.....	.....	.....
Hukill, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independence, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.10	3.00	1,525
Iron Silver, Co.	.....	.....	3.05	.....	3.00	.....	.....	.....	.....	.....	.....	.....	.....
La Plata, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.30	.....	.....	.....	500
Leadville C., Co.	.30	.....	.30	.....	.90	.....	.....	.....	.....	.....	.50	.....	300
Little Chief, Co.	.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pittsburg, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moose, Co.	.....	.....	.....	.....	.....	.....	.....	.....	2.90	.....	.....	.....	300
Navajo, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	800
Northern Belle, Ne.	6.00	.....	.....	.....	6.13	.....	.50	.43	.....	.....	.50	.....	2,000
North Belle Isle, Ne.	.40	.....	.43	.....	.....	.....	.....	.....	32.00	.....	.....	.....	200
Ontario, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ophir, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plumas, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33.00	.....	100
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.01	.....	.....	.....	6,000
Rising Sun, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.42	.....	.43	.44	13,450
Robinson Cons., Co.	.46	.....	.45	.40	.43	.42	.42	.....	.....	.....	.....	.....	.....
Saint Joseph's Lead.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	1.00	.....	.97	.....	2,100
Sierra Grande, N. M.	1.05	.....	.97	.95	1.05	.96	.....	.....	4.30	.....	4.45	4.30	460
Sierra Nevada, Ne.	4.25	.....	.....	.....	6.75	.....	.....	.....	.....	.....	.....	.....	45
Silver King, Ar.	7.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	5.50	.....	5.50	5.25	550
Standard, Ca.	5.50	.....	5.75	.....	5 63	.....	.....	.....	.....	.....	.....	.....	.....
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar.	.....	.....	.....	.....	.....	.....	.55	.....	.15	.....	.....	.....	300
Vizina, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Sept. 1.		Sept. 3.		Sept. 4.		Sept. 5.		Sept. 6.		Sept. 7.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	.06	.....	.....	.....	.05	.....	.....	.....	.06	.05	.....	.....	7,400
Alta-Montana, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Flag, S.	.34	.....	.34	.33	.34	.....	.34	.33	.....	.....	.....	.....	1,000
Barcelona, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bear Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'licher, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Big Pittsburg, S. L.	.....	.....	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	1,000
Bradshaw, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buckeye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, S.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bye and Bye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calaveras, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
C'lav'r's W. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	200
Central Ariz'na, S.	.....	.....	.....	.24	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherokee, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Climax, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imp'ri'l, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crowell, G.	.....	.....	.....	.....	.....	.....	.....	.....	.03	.....	.....	.....	1,000
Dahlonega, G.	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	.....	.....	1,000
Decatur	.02	.....	.....	.....	.02	.....	.....	.....	.....	.....	.....	.....	.....
Dunderberg	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	.....	.....	300
Durango, G.	.....	.....	.....	.....	.05	.....	.....	.....	.75	.....	.....	.....	1,900
Eastern Oregon	.76	.....	.....	.....	.75	.....	.75	.....	.75	.....	.....	.....	.....
Elko Cons.	.11	.10	.12	.10	.16	.11	.15	.13	.14	.13	.13	.....	50,000
Enterprise	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fannie Barret	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Globe Copper	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Placer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Graysville, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hortense, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Imperial	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lucerne	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miner Boy	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Parnell	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quartz Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Red Elephant, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ruby, of Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	25	.....	.25	10,700
Sonora Con.	.27	.26	.26	.25	.26	.....	.....	.....	.....	.....	.....	.....	.....
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.03	.....	.....	100
" Nos. 2 & 3, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.20	.....	.20	9,700
Sutro Tunnel	.19	.....	.20	.....	.20	.19	.20	.....	.....	.....	.....	.....	.....
Taylor Plumas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga	.....	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	.....	1,000
Unadilla, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.13	.....	5.00	225
Union Cons., G. S.	4 90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 36,935. Non-dividend shares sold, 90,825.

BOSTON MINING STOCKS.

	Aug. 31.		Sept. 1.		Sept. 3.		Sept. 4.		Sept. 5.		Sept. 6.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amie	.....	.....	10.00	.....	10.00	.....	.....	.....	.....	.....	.....	.....	65
Atlantic	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Bodie Con.	1.50	.....	1.56¼	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,300
Bonanza D.	.18	.....	.18	.....	.18	.....	.....	.....	.....	.....	.....	.....	.....
Bowman Sil	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bruna. Ant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36
California	240	.....	240	.....	.....	.....	243	.....	.....	.....	.....	.....	2,200
Cal. & Hec.	.37½	.....	.37½	.36	.....	.....	.....	.....	.....	.....	.....	.....	.....
Catalpa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Climax	.....	.....	.....	.....	.6	.....	.....	.....	.....	.....	.....	.....	.....
Co. Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copper F'lls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copperop.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Crescent	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
"Cusi"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deer Isle	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas	.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Duncan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	100
Dunkin	.28	.....	.30	.29	.30	.....	.....	.....	.....	.....	.....	.....	700
Empire	.....	.....	.17	.....	.18	.....	.....	.....	.....	.....	.....	.....	800
Eureka Con.	.....	.....	7.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Franklin	.....	.....	.....	.....	10.00	9.88	.....	.....	.....	.....	9.88	.....	300
Gila County	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harshaw	.....	.....	.....	.....	.50	.....	.....	.....	.....	.....	.....	.....	600
Huron	.....	.....	.5)	.....	.....	.....	.....	.....	1.56¼	.....	1.88	.....	200
Independ'ce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Q'n.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mass. & N. M.	.05	.....	.....	.....	.05	.....	.....	.....	.....	.....	.....	.....	11,300
Milton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa	.....	.....	3.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
National	.....	.....	.....	.....	.....	.....	.75	.....	.....	.....	.....	.....	100
North. Belle	.....	.....	.....	.....	6.00	.....	.....	.....	.....	.....	.....	.....	20
Ontario	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola	18.00	.....	18.00	.....	.....	.....	18.00	.....	.....	.....	.....	.....	28
Penn-Breck.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewabic	.....	.....	.....	.....	.....	.....	3.00	.....	.....	.....	.....	.....	10
Pine Tree	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicks'r, com	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy	.....	.....	.....	.....	45.50	.....	46.00	45.00	46.00	.....	.....	.....	245
Robinson	.50	.....	.....	.....	.17	.....	.17	.....	.....	.....	.....	.....	100
San Pedro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	800
S'ra Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S'ra Grande	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Islet	.....	.....	.....	.....	.....	.....	3.50	.....	.....	.....	3.00	.....	550
Silver King	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simpson Gd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
So. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan	.82½	.....	.....	.....	.90	.....	.....	.....	.87½	.....	.....	.....	600
Sutro Tun.	.19	.....	.19	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Sycamore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	Aug. 31.		Sept. 1.		Sept. 3.		Sept. 4.		Sept. 5.		Sept. 6.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.	.14	.13	.14	.11	.12	.11	.12	.11	.13	.12	.12	.....	24,450
Argent	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Battle Mt.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buena	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calista	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati	.09	.08	.08	.07	.08	.....	.08	.07	.08	.07	.07	.....	10,900
Comprom'e	.16	.....	.16	.....	.16	.....	.16	.15	.....	.....	.15	.....	16,000
Contention	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dauntless	.....	.....	.02	.....	.....	.....	.....	.....	.01	.....	.02	.....	4,000
Del Monte	.....	.....	.....	.....	.....	.....	.....	.....	.03	.....	.....	.....	600
Denver City	.....	.....	.....	.....	.....	.....	.10	.....	.....	.....	.....	.....	100
Eureka	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	3,100
Girard	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	.03	.....	5,900
Governor	.....	.....	.....	.....	.02	.....	.02	.....	.....	.....	.03	.....	31,600
Grand Uni'n	.....	.....	.08	.....	.....	.....	.03	.....	.03	.....	.....	.....	1,000
Green Mt.	.....	.....	.....	.....	.....	.....	.25	.....	.....	.....	.....	.....	.....
Gunnison	.32½	.....	.25	.....	.25	.....	.....	.....	.....	.....	.....	.....	.....
Homestake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horn Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch	.05	.....	.05	.....	.....	.....	.05	.....	.05	.....	.04	.....	16,300
Iron Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.07	.....	8,000
Little Dia'd.	.07	.....	.07	.....	.07	.....	.07	.....	.....	.....	.....	.....	.....
Little Maud	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L'g & D'y H	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.04	.....	5,000
Montana	.....	.....	.....	.....	.....	.....	.08	.....	.....	.....	.....	.....	.....
Mt. Sheridan	.03	.....	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North'n B'l	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion Pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palmetto E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
Pembina	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	.09	.....	16,700
Penn-Breck.	.11	.10	.11	.10	.11	.....	.10	.09	.09	.....	.....	.....	500
Permanent	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro	.....	.....	.....	.....	.02	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro Ex.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potosi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Rara Avis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12,400
Rara Avis E.	.11	.....	.11	.....	.11	.....	.10

$222,000, reported for the previous week. The receipts from January 1st, 1883, to date are $7,806,974.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended September 1st	$465,047
Corresponding week last year	254,720
Since January 1st, 1883	9,378,176
Corresponding period last year	43,466,267

Imports.

Week ended September 1st	$638,717
Corresponding week last year	195,375
Since January 1st, 1883	10,241,491
Corresponding period last year	2,579,027

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £107,000 bullion, and the proportion of its reserve to its liabilities was raised from 47 9-16 to 47 11-16 per cent, against 39¼ per cent at this date a year ago. September 6th, the bank gained £50,000 bullion on balance. The weekly statement of the Bank of France shows losses of 380,000 francs gold and 1,076,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of July.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	‡$97,128	$568,441
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	——	12,604
Bodie, G. S.	Cal....	12,447	161,728
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	45,211	379,434
*Boston & Montana, G.	Mont...	.....	123,556
*Central Arizona, S.	Ariz..	.....	35,845
*Christy, S.	Utah...	16,842	162,513
*Chrysolite, S. L.	Colo....	16,253	262,929
Consolidated Bobtail	Colo...	.....	18,723
*Contention, S.	Ariz..	77,985	635,413
Crescent, G.	Cal....	.....	13,000
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak...	.....	172,277
*Derbec Blue Gravel, G. S.	Cal...	17,122	72,270
Dunkin, S. L.	Colo....	.....	32,015
Evening Star, S. L.	Colo...	.....	47,061
*Father de Smet, G.	Dak....	30,688	208,851
*Frisco M. and S. Co., G. S. L.	Utah...	.....	§77,084
Gunnell, S.	Colo...	.....	58,828
*Head Center Consolidated	Ariz..	1,867	28,368
*Head Center and Tranquillity	Ariz.	19,578	80,198
*Hecla Consolidated, G. S.	Mont...	.....	293,922
*Homestake, G.	Dak.	.....	419,148
*Hope, S.	Mont...	20,484	62,447
Horn-Silver, S. L.	Utah...	300,000	1,847,000
*Howell S. and Mg. Co., G. S. L.	Ariz....	§41,361	41,361
Idaho, G.	Cal....	.....	88,642
*Independence, G. S.	Nev....	——	32,991
Iron Silver, S. L.	Colo...	.....	503,831
*Jocuistita, S.	Mex....	.....	‡228,022
*Kentuck, G. S.	Nev....	2,535	15,412
*Lexington, S.	Mont...	106,068	744,556
*Little Pittsburg, S. L.	Colo....	6,446	42,091
*Marguerite, G.	Cal....	.....	45,745
*Martin White, G. S.	Nev....	——	136,317
Morning Star, S. D.	Colo...	.....	84,428
*Moulton, G. S.	Mont...	.....	123,288
Mount Diablo	Nev....	74,277	262,100
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	51,134	447,040
*Ontario, S. L.	Utah...	.....	1,038,687
*Oxford, G.	N. S....	5,276	40,531
*Phœnix, G.	S. C...	3,000	10,700
*Final Consolidated, S. L.	Ariz...	.....	181,485
*Satemo, G.	N. S....	.....	2,500
*Silver Bow, G. S.	Mont...	.....	101,241
*Silver Cord, G. S. L.	Colo...	69,359	703,333
Standard, G.	Cal....	95,209	738,401
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah...	20,801	152,728
Syndicate, G.	Ca ! ..	9,300	38,428
Tintic M. and M. Co.	Utah...	10,595	25,196
*Tip Top, S.	Ariz....	10,009	37,868
*Tombstone, G. S. L.	"	82,960	497,199
Wyoming Consolidated.	Cal....	.....	31,641
Yellow Jacket, S.	Nev....	72,227	265,885
Total amount of shipments to date			$12,983,020

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

United States Assay-Office at New York.—Statement of business for the month ended August 31st, 1883:

Deposits of gold:		
Foreign coin	$1,037,000	
Foreign bullion	53,000	
United States bullion	520,000	
United States bullion (re-deposits)	109,000	
Jewelers' bars	86,000	
Refined gold	121,000	—$1,926,000
Deposits of silver:		
Jewelers' bars	19,500	
United States coin	300	
Foreign coin	8,700	
Foreign bullion	11,500	
United States bullion (contained in gold)	8,000	
Bullion, Arizona	4,400	
Colorado	27,700	
Dakota	100	
Idaho	3,900	
Lake Superior	1,300	
Montana	127,200	
New Mexico	35,800	
Utah	98,500	
Refined silver	51,600	— 393,500
Total deposits		$2,319,500
Gold bars stamped	$678,299	
Silver "	237,020	— 915,320

METALS.

NEW YORK, Friday Evening, Sept. 7.

Copper.—There have been sales during the week of about 200,000 pounds at 18⅛@18¼c., the latter for wire bars, and 18¼c. is now quite freely insisted upon. A better feeling prevails generally, and in other brands than Lake, slightly higher figures have been realized. We quote 14⅛@14⅝c., according to brand.

England is lower, cabling £69 for Best Selected and £63 7s. 6d. for Chili Bars.

Tin.—A fair business has been done during the week, and prices here keep up well in spite of weaker markets in London, whence cables come showing £94. Singapore, on the other hand, is higher, parity £95 15s., a rise due to the buying of Chinese parties in that market in anticipation of war with France, growing out of the Annam troubles. Here Straits is quoted 21⅛c. spot cash; Australian, 21⅛c.; Billiton, 21¾; and Banca, 21⅛c.

Lead.—Holders are stiffening, and have advanced their asking price from 4·30c. to 4·35c. It would be a difficult matter to secure any round lots for less at the present time. On the other hand, however, any attempt to put a good-sized lot on the market would be impossible without making concessions. The course of the market in the near future will largely depend upon whether holders maintain an unbroken front.

From St. Louis, Messrs. John Wahl & Co. wire us as follows:

There is a somewhat better feeling, due to growing inquiry. The market is very steady at some advances on last week's quotation, with a good demand for refined lead. We note sales of 130 tons of Hard lead at 4·05c., and quote Refined 4·10c. Our receipts are 1000 tons this week, the same as last week.

Messrs. Everett & Post, of Chicago, telegraph:

Our market is strong and the demand good. Buyers are taking lead liberally. We quote nominally 4·12½@4·15c.

Spelter.—The flooding of a number of mines in the Joplin District has made ore scarcer and dearer; and on the other hand, the low prices have caused the closing down of works. There have been sales during the week at 4⅛c., which we quote. England cables unchanged, £15 for Silesian.

We call the attention of those interested in spelter to the admirable paper of Mr. F. L. Clerc, the first installment of which we print elsewhere.

Antimony.—This metal is quiet and dull.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Sept. 7.

According to the figures published in a supplement of the New York Metal Exchange, the total stocks in bond in the ports of New York, Philadelphia, Boston, Baltimore, and New Orleans were as follows:

	Sept. 1, 1882. Tons.	Jan. 1, 1883. Tons.	Aug. 1, 1883. Tons.	Sept 1, 1883. Tons.
Pig-iron	6,927	6,330	3,735	2,261
Spiegel iron	1,514	4,131	1,426	467
Old rails	15,396	5,504	2,204	171
Scrap iron	585	1,384	3,147	157
Scrap steel	718	456	306	306
New iron rails	7,450	6,642	376	355
New steel rails	3,008	4,816	....	121
Grand total	35,598	29,263	11,194	11,818
Increase during August, 1883				624
Decrease during 12 months				23,780

American Pig.—September thus far has been a severe disappointment. There is no use in denying that the evidences of an improvement in August, which were so carefully nursed and were made so much of, have again disappeared. It is true that many furnaces are out of blast, and yet it is true also that the production is still ahead of the requirements. The excess, it is true, is not great, but still there is an excess, so that even No. 1, which for a while was scarce, can now be obtained without difficulty. There is not much shading of prices, however, chiefly for the reason that it is not believed that lower figures would tempt buyers. The fact is, that consumption is very much narrowed down. Eastern consumers who supply the mills with machinery and castings are doing very little business. The great car manufacturing establishments and the many other works which supply the railroads are doing comparatively little. The stove trade is only moderately active, and the only branch in which there is unusual activity is the pipe-makers, who are as busy as they can be, and are behind in their orders. This is not a glowing picture, but we believe that it closely reflects the condition of the trade.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has the following returns from 91 furnaces:

	No. 1.	No. 2.	Bessemer Forge and lower grades.	Grade not specified.	Total.
Stocks Aug. 1	14,738	21,998	44,014	4,468	85,218
" Sept. 1	14,852	20,891	36,913	5,329	77,985
Production in July	8,105	5,655	8,762	5,452	27,974
" " Aug.	7,798	3,947	4,400	7,218	23,363

These figures are encouraging so far as the supply is concerned, but they do not invalidate the above statement, which is based upon the shrinkage of the demand.

Transactions during the week have been on a moderate scale. We quote No. 1 Foundry, $21.50@$23; No. 2, $19@$21, according to quality; and Gray Forge, $18.25@$19.50, all at tide-water. Bessemer Pig is lifeless, and Spiegeleisen is quiet at $30.50@$30.75 for 20 per cent, at which figure a 1000-ton lot changed hands. Lower grades are dull at $25@$25.50.

At the Exchange, the following sales were reported: Saturday, 200 tons No. 1, January, $22.25; Monday, 300 tons No. 1, December, $22; Thursday, 200 tons No. 1, December, $21.87½, and 200 tons No. 1, January, $22; and to-day, 500 tons No. 1 at $22.25.

Scotch Pig.—Though the arrivals have been moderate, a considerable portion has gone into store, an indication of the fact that it is difficult to place the metal at current figures, which are still quite firmly adhered to. Freights are cabled lower, 4s. 6d. from Glasgow.

We quote ex ship: Coltness, $23.50@$24; Langloan, $23@$24; Summerlee, $23; Dallmellington, $21@$21.50; Eglinton, $20.50@$21; and Glengarnock, $22.50@$23.

At the Exchange, the following slightly lower cable quotations were received: Coltness, 60s.; Langloan, 59s.; Summerlee, 56s. 6d.; Gartsherrie, 56s. 6d.; Glengarnock, at Ardrossan, 55s.; and Eglinton, at Ardrossan, 48s. 6d. Warrants to-day were 46s. 5d.

Steel Rails.—Very little business has been done, outside of small lots, of which some were placed for prompt delivery at $37.50 at mill, which is equal to about $39 at tide. In the pending large orders, nothing has been done, buyers' and sellers' views being too far apart.

Old Rails.—There have been sales of some small lots at better figures, and $23.50@$24 is now asked for Ts.

Scrap Iron.—Very little has been done, quotations remaining $23.50 ex ship.

Philadelphia. September 7.

There is a tendency to better prices in iron and steel. A number of large buyers have purchased for from thirty to sixty days' requirements. Lowest prices have been reached.

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Pig-Iron.—Special brands have been moving rather more freely during the past few days at $22.50@$23.50. Sales of about 2000 tons of Standards in 50 to 100-ton lots were heard of at $22@$22.50. Some movement in inferior No. 1 is reported at $21.50. No. 2 continues dull, but some business was closed at $19.50@$20. Two or three makes are still held at $21. More activity may be reported in mill irons at $19@$20 delivered, and a fair amount of business is now about to be closed at about $19. Some inquiries are for 1000-ton lots. Dealers in Scotch report more business for the week, but prices lower. Bessemer can not be moved at tide-water rates, $21.

Charcoal Blooms are worth $57.50 and anthracite $10 less.

Muck Bars.—Bars range from $33.50 to $35 asked.

Merchant Iron.—Only a quiet steady demand is reported at 2·15@2·20c. for Refined, and 2@2·10c. for not first-class. Local mills are working full-time, but with very little business for October, hence prices can not be regarded firm. Western iron is coming this way at from 2@2·10c., and has a disquieting effect, mainly in preventing large transactions. Skelp is not active, though negotiations are pending for large lots.

Plate and Tank.—The favorable situation continues, and large and small transactions are frequent at 2·35@2·50c. for Boat and Tank iron; 3c. for Shell iron; 4@4¼c. for Flange; and 5@5½c. for Fire-Box. Requirements which were withheld during August are now coming forward.

Structural Iron.—A few orders were placed for small lots, early delivery, at 2·40@2½c. for Angles; 2·75c. for Tees; 3½c. for Beams and Channels.

Sheet-Iron.—The sheet-mills are securing their full share of business at card rates, being 4@4½c. for Common. Galvanized deliveries for building requirements are large.

Wrought Pipes and Tubes.—Two or three inquiries are on hand this week for large requirements. The local establishments are busy. Boiler tubes are generally quoted 60 off, and gas and steam pipe 70@75, according to order.

Steel Rails.—Small business is coming along. Large orders are likely to be placed any time; but, for unexplained reasons, there is a delay. Quotations for winter delivery $37@$37.50; fall, $38@$38.50; light sections, $40@$41.

Old Material.—Offers at $24 by sellers for large lots. Bids at $23. Double Heads held at $26. No orders.

Scrap.—Cargo nominally $23.50. Yard No. 1, $24@$25. Nothing worthy of note doing.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Sept. 7.

Anthracite.

The situation has not materially changed since our last report. Coal continues abundant, and as the few buyers there are are cautious, there is a constant pressure to move a surplus. That there can be no real improvement in the prices so long as such a condition of affairs lasts, will be patent to any one. The fact, too, that dealers are largely supplied and are expecting considerable coal still to be delivered, does not encourage the belief that the trade will witness the usual fall activity. The news from the iron trade is discouraging, and from Eastern manufacturing centers the frequently repeated tale of dullness is repeated. The early future must decide whether it will be possible to continue full work during the rest of the year. Two of the companies will probably, from special reasons—on account of heavy deliveries, or the facilities offered for pushing coal Westward—resist any such change in the programme; but there is little doubt that they too will feel the pressure as soon as the markets begin to contract with the beginning of winter.

The Western Association will meet in Chicago next week, with the object of patching up some of the differences there. How far the attempt to keep the trade in order will be successful, remains to be seen.

Bituminous.

There is a very sharp competition for what little trade there is, and cutting is apparently indulged in quite liberally.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended September 1st, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	104,005	2,533,162	55,187	2,235,321
D. L. & W. RR. Co.	129,058	3,199,182	78,501	2,930,636
Penna. Coal Co.	36,695	918,238	24,005	888,623
L. V. RR. Co.	42,899	902,771	14,123	710,713
P. & N. Y. RR. Co.	4,831	137,562	2,964	128,778
C. RR. of N. J.	*	1,202,078		1,513,984
Penna. Canal Co.	15,518	282,087		291,116
North & West Br. RR.	†	288,129		
	332,006	9,463,209	174,780	8,697,171
Lehigh Region.				
L. V. RR. Co.	118,338	3,201,863	64,742	3,078,373
C. RR. of N. J.	*	1,126,889		1,445,141
S. H. & W. B. RR.	†	37,175		41,996
	118,338	4,365,927	64,742	4,565,510
Schuylkill Region.				
P. & R. RR. Co.	292,565	5,570,315	106,785	4,324,429
Shamokin & Lykens Val.	34,046	950,363	30,105	815,696
	326,611	6,520,678	136,890	5,140,125
Sullivan Region.				
St Line&Sul.RR.Co.	1,642	41,540	1,092	37,694
Total	778,597	20,391,354	377,504	18,440,500
Increase		1,950,854		
Decrease				

* Included in tonnage of the Philadelphia & Reading Railroad. † Reports have not been received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878		10,737,415 tons.
" " " 1879		16,972,754 "
" " " 1880		14,216,454 "
" " " 1881		18,033,921 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 594,558 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended September 1st:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	2,926	75,716	58,748
Coal for shipment at South Amboy	16,148	516,363	558,332
Coal for distribution	18,097	523,063	470,810
Coal for company's use	2,325	103,627	84,422
Total	39,496	1,218,761	1,172,312
Increase		46,457	
Decrease			

The Production of Bituminous Coal for the week ended August 25th was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year Tons
Cumberland Region, Md.		
Tons of 2240 lbs	55,742	1,550,651
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	8,021	203,090
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	4,242	118,825
East Broad Top	315	26,715
Clearfield Region, Pa.		
Snow Shoe	4,085	151,280
Tyrone and Clearfield	43,594	1,802,129
Alleghany Region, Pa.		
Pennsylvania RR.	7,668	281,204
Pittsburg Region, Pa.		
West Penn RR.	6,262	267,010
Southwest Penn. RR.	1,736	68,316
Penn & Westmoreland gas-coal, Pa. RR	27,241	885,181
Pennsylvania RR	16,150	369,786
Total	175,056	5,724,187

The Transportation of Coke over the Pennsylvania Railroad for the week ended August 25th, and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	804	55,467
West Penn. RR.	1,458	67,295
Southwest. Penn. RR	41,670	1,377,599
Penn. & Westmoreland Region, Pa. RR	3,847	144,093
Pittsburg, Penn. RR.	667	1,168
Snow Shoe (Clearfield Region)	252	12,458
Total	48,698	1,628,080

Wholesale Prices of Bituminous Coal.

Clearfield, at Philadelphia	$3.00@$3.25
" " South Amboy	3.30@ 3.50
" " New York, alongside	3.05@ 3.75
Cumberland, at Baltimore	2.90@ 3.00
" " Georgetown	2.75@ 3.00
" " Philadelphia	3.25@ 3.30
" " South Amboy	3.80@ 4.00
" " New York, alongside	4.00@ 4.40

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports, per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Newburg	3 95	3 95	3 90	4 10	4 40	4 40
Scranton at Hoboken	3 90	3 90	4 00	4 30	4 70	4 80
Lackawanna at Weehawk'n	3 90	3 90	3 90	4 30	4 70	4 80
Wilkes-Barre at P. Johnston	3 90	3 90	4 00	4 30	4 70	4 50
Plymouth R. A. at P. John.	.....	....	4 25	4 50	5 25	4 75
LEHIGH COAL.						
Honey Brook at Port John.	5 00	4 35	....	4 50	4 70	4 50
Fulton at South Amboy	5 25	4 40	.....	4 40	4 30	4 40
U.L.&Coun.Ri'ge at Eliz'pt	.....	....	.....	.....	.....	....
SCHUYLKILL COAL.						
At Elizabethport.						
Hard White Ash	4 85	4 85	....	4 40	4 80	4 50
Free-Burning White Ash	.....	3 90	.....	4 30	4 80	4 50
Schuylkill Red Ash	.....	.....	.....	4 40	5 05	4 50
Shamokin	.....	.....	.....	4 55	5 05	4 60
Lorberry	.....	.....	.....	4 70	5 25	4 60
Lykens Valley (Brookside)	.....	.....	5 10	5 40	5 75	5 40
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 50	4 50	3 90	4 05	4 50	4 15
Free-Burning White Ash	.....	3 65	3 65	3 95	4 50	4 15
Schuylkill Red Ash	.....	.....	.....	4 05	4 70	4 15
Shamokin	.....	.....	.....	4 20	4 70	4 25
Lorberry	.....	.....	.....	4 20	4 75	4 25
Lykens Valley (Brookside)	.....	.....	4 60	4 90	5 25	4 90

Jermyn coal, at Hoboken, is quoted per ton of 2240 lbs.: Lump, $3.90; Steamer, $3.90; Broken (grate), $3.90; Egg, $4.15; Stove, $4.45; Chestnut, $4.45; Chestnut, No. $23.

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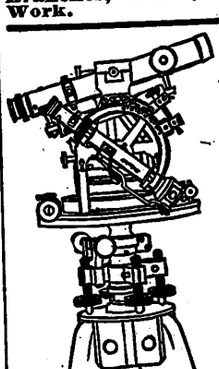
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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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THE annual meeting of the American Society of Mechanical Engineers will be held in this city on the 3d of November.

A STATEMENT has appeared in some of the newspapers in this city, to the effect that a decision has been reached in reference to Alabama coal and iron lands. Our correspondent in Washington has been unable, by personal application to the heads of departments, to verify this rumor. For some mysterious reason, which it is suspected is of a political character, all claims of the kind are now uniformly suspended.

AN interesting example of the originality which American iron-makers bring to bear upon the solution of exceptional problems is furnished by the manner in which the managers of the Lucy furnace, at Pittsburg, got over the difficulty of handling their cinder. There was no room for dumping in the vicinity of the works; and after many and expensive experiments, cars were designed which allow the cinder to be carried over long distances in a liquid condition. It is related that the cinder was thus in one winter carried a distance of forty miles, to help break up an ice-gorge, or rather melt it away—a feat which was successfully accomplished.

THERE has been much rejoicing in Silver Cliff, Colo., over what is termed the brilliant success of the Duryea process. There has been a banquet, the band has played, and toasts have been drunk, and Silver Cliff's citizens are reported to be at "fever-heat," though it is not stated whether the toasts did it. We regret that in their excitement the Silver Cliffians have not as yet submitted any very intelligent account of what was done at the furnace, and how it was done. We are inclined to believe, however, from stray data in the columns of our Colorado contemporaries, that the process has undergone some modification since the time we last heard of it. It seems that the silver is not converted into a vapor which is leisurely condensed, but that "slag and molten lead pass automatically from the cylinder into the sump." We await the publication of a full record of work without "fever-heat," and trust that we may soon be able to place the result before our readers.

MINERALOGY and geology are sciences with which a mining engineer strives to familiarize himself. Many of those eminent self-made mining engineers who infest some of our mining camps are conscious of the fact that it impresses the average layman to hear hard words. Their efforts to talk wisely would be amusing if they were not occasionally dangerous. The latest example of an unfortunate struggler with the mysteries of mineralogy is Mr. F. P. THOMPSON, M.E., of Monterey, who, as he tells the world in a report on the Minas Viejas of Villaldama, Nuevo Leon, Mexico, has "followed the avocation of mining during a quarter of a century." If he has, he has learned nothing worth knowing since he began. According to our authority, who may be able to wield a pick well enough, the country-rock of the Villaldama District is granite and the dike "siliceous limestone or quartzite." The copper ores are "sulphate and carbonate, and nearly all of them silver-bearing. Some of the latter contain so large an amount of gold that they become in fact a gold ore, with which copper is only associated. These characteristics will probably continue until water-level is reached, when the ore will become a sulphate and be much richer, assuming the character of 'brognordite'—a complex compound of antimony, arsenic, sulphur, lead, and silver, which yields readily to the lixiviation process." The so-called "brognordite" carries from 46 to 48 per cent of lead. We advise Mr. THOMPSON to stop writing. He is weak on mineralogy, geology, and metallurgy. Unfortunately, he is a type of a class to whom we respectfully but earnestly tender the same advice.

MR. JOHN JARRETT, ex-President of the Amalgamated Iron and Steel Association, recently testified before the Senate Committee on Education and Labor, whose members, by the way, have been forced to listen to an endless gush of bosh. Mr. JARRETT is conceded to be a clear-headed, intelligent man, of much executive ability, and his utterances on the subject of the condition of the miners and iron-workers, if not accepted as conclusive evidence, are at least listened to with respect. Mr. JARRETT is quoted as saying, concerning the miners: "In consequence of their utter demoralization, they spend at least one half of their earnings in drink." That the latter is, unfortunately, one of the most serious circumstances connected with our mining population, there can be no doubt whatever. The appeals constantly made by their own mates, in the labor journals, to the body of the miners, furnish confirmatory evidence of the fact. We believe, however, that Mr. JARRETT is slightly mixing up cause and effect. A man "demoralized" by lack of work or poor pay does easily take to drinking; but the trouble is generally brought about in just the other way. The men have the bad habit, are shiftless, lazy, apt to jump at the first opportunity to pose as the martyrs of "grinding monopoly," etc. The leaders of the miners' organizations recognize the evil, and yet their efforts, based as they are upon a mistaken notion of the "dignity of labor," are misdirected. We do not want them to become temperance apostles, because that would not do any good; but they could do much toward diverting the occupations of the men in their leisure hours into better channels. They would, in the end, accomplish more real good than by going about preaching strikes, or persecuting "scabs," as they occasionally do. Their main work, of course, is to organize, and to further such methods as arbitration, which is entirely proper and right. But they only too frequently agitate in the manner indicated, while they ought to be at work creating reading-rooms and providing popular lectures and other means of instruction and diversion.

THE NEW ENGLISH PATENT LAW.

After much discussion and quite extensive modification, the new English patent bill has become a law. Its provisions will be closely scanned by Americans, because in no country outside of their own are the rights conferred upon inventors by the patent laws so valuable as in Great Britain. In many leading industries, the race between British and Ameri-

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can specialists is very close, and improvements brought out on either side of the Atlantic are eagerly watched on the other. The liberality of our own patent laws has favored English inventors, while the provisions in England have checked a corresponding utilization of American inventions there. The new law enacted in Great Britain begins to approach our own in at least one important particular, that of reducing the fees. Briefly, the system adopted is the following: An inventor must send to the patent-office a provisional specification, and, on applying for provisional protection, pays a fee which has been reduced from £5 to £1. The application passes the scrutiny of an examiner, who decides whether or not the specification fairly describes the invention, whether its title sufficiently indicates its object, and whether the application conflicts with any other unsealed application. Appeals from this examiner's decisions go to the law officers of the department. The applications may be made directly to the office by post, without the intermediacy of an agent; but certain provisions in the new law make such a case dangerous, and the experience of most inventors in this country with our liberal office has been such as to generally discourage any such attempts at saving the agent's fees. When the provisional specification has been approved—remaining secret until that time—the inventor must prepare his final specification within a period of nine months from the date of application. It is again passed upon by the examiner, and then is open to public inspection, and is sealed when passed by the comptroller. The government fees for completing the patent for the first term of four years are £3 now, instead of £20 formerly. There is no alteration in the amount of the subsequent payments for the extension of patents from the first term of four to fourteen years; but in place of paying the £50 and £100 in lump sums at the end of the third and seventh years, these amounts are payable under the old law at the option of the patentee, either in one sum of £50 at the end of the fourth and £100 at the end of the eighth year, or by annual payments of £10 before the end of the fourth, fifth, sixth, and seventh years, £15 before the end of the eighth and ninth years, and £20 before the end of the tenth, eleventh, twelfth, and thirteenth years. The English patent-office has therefore made a compromise between its old system and that in force in this country. It has justly made it easy for the poorest to obtain protection for his invention, but still exacts a tribute from a patentee when he presumably has had ample opportunity to gather some slight return from it. A patent that has not shown vitality enough during a period of four years of freedom from payments to survive an annual expenditure of £10 deserves to lapse. We have too many idle patents waiting until some one else will make room for the invention, in order to force a round price for an investment of one hundred dollars, more or less, in a "bright idea." Thus far, the provisions of the new English patent law will, on the whole, meet with the approval of thinking inventors and manufacturers.

There is, however, a very vicious clause, awkwardly framed, which we fear may be used by unscrupulous persons, particularly to the prejudice of foreign inventors. It reads: "If, on the petition of any person interested, it is proved to the Board of Trade that, by reason of the default of a patentee to grant licenses on reasonable terms, (*a*) the patent is not being worked in the United Kingdom; or (*b*) the reasonable requirements of the public with respect to the invention can not be supplied; or (*c*) any person is prevented from working or using to the best advantage an invention of which he is possessed, the Board may order the patentee to grant licenses on such terms as to the amount of royalties, security for payment, or otherwise, as the Board, having regard to the nature of the invention and the circumstances of the case, may deem just, and any such order may be enforced by mandamus."

The object of this clause is too evidently that of preventing a misuse of the exclusive rights granted to inventors by patentees. It may be intended to meet such contingencies as the refusal of a foreign inventor to allow English manufacturers to enjoy the benefits of an improvement, or of an English inventor to moderate real or imaginary extortionate claims for compensation. It may be the desire to guard against high prices of patented articles by keeping the supply limited, or may be proposed to check any attempts to block progress by withholding the use of prior patents. We have in this country repeatedly felt and, in some industries, are still suffering under the evils to which such abuses of the rights of patentees occasionally lead. But still we do not believe that compulsory licensing in the form proposed by the new English law would commend itself to any one. The provision is framed so indefinitely that it is difficult to understand how it could pass the scrutiny of legislators or the public and the press, without the most vigorous protests. It puts a power into the hands of unscrupulous or influential manufacturers against poor inventors, which will probably be wielded in more than one case to browbeat the latter. It leaves it in the hands of government officials to decide what are "reasonable terms" for licensing. In England, as well as elsewhere in the world, government officials are generally the very last to whom such questions should be submitted for decision, because the fact that they are not in daily contact with the business community renders them unfit for it. It is to be sincerely regretted that the new English patent law is marred by such provisions, which, we repeat, will be particularly dangerous to foreign patentees, because the sympathies of judge and jury in cases coming under it will be against them.

THE POSITION OF LEAD.

The course of the lead markets should be closely watched by the majority of miners, particularly in Colorado and Utah, because its fluctuations largely affect the returns for ores shipped to smelters. Like every other metal produced in this country, though in a less marked degree, lead has almost constantly declined since the beginning of the present year, as the following summary of the prices will clearly show:

PRICES OF LEAD IN NEW YORK IN 1883.

	Range.	Average.
January	4·50 @ 4·70 cents.	4·65 cents.
February	4·50 @ 4·60 "	4·55 "
March	4·50 @ 4·65 "	4·55 "
April	4·40 @ 4·62 "	4·50 "
May	4·30 @ 4·55 "	4·40 "
June	4·40 @ 4·45 "	4·40 "
July	4·30 @ 4·40 "	4·32 "
August	4·20 @ 4·30 "	4·25 "

On the whole, the market in this city has shown less buoyancy than that in the West, where consumption has been going on at a less slackened pace than in the East, particularly for corroding purposes. The result is, that the views of those interested in the metal on the Atlantic coast are liable to be tinged with a less hopeful tone, while on the other hand, we fear that the confidence of producers in the West is not quite warranted by the situation. It will be well to look the matter squarely in the face. Two facts, we believe, will be generally conceded: consumption throughout the country, East and West, has not, thus far, been as large as it was last year; while production has been heavier than ever before. The result has been an accumulation of stock which some have estimated as high as from 20,000 to 25,000 net tons. It is probable that this guess is not very far from the truth. One point, however, must be considered in connection with this stock, which somewhat modifies the force with which those who argue from its existence point to it. As usual, consumers have bought sparingly on a falling market, particularly as they, like all prudent business men during the current year, have shrunk from adding unnecessarily to their engagements. We believe, therefore, that an inventory of the manufacturers throughout the country, if made now, would show a marked decline in the stock of raw material held by them. The producers and their agents have been carrying more than their usual share of the surplus. It is concentrated in the hands of a few parties, who have recently by their firm attitude stayed the gradual decline of the metal. Consumers, on the other hand, convinced that holders must weaken under a load to which they must add constantly to sustain their position, are obstinately buying only to cover pressing needs. The representatives of the three or four works which are carrying the stocks, however, look forward to the time when the exhaustion of supplies of raw material will force buyers to enter the market for large lots. Much depends on the activity of the demand for shot and the inquiry for building purposes. Should the fall trade prove a disappointment, manufacturers will have no trouble in supplying themselves through those producers who, under the circumstances, believe in the policy of selling lead as fast as they make it. Their number and the capacity of their works are, we believe, rather in the majority, and therefore it is likely that the present deadlock, with its stiff nominal prices, may continue for quite a long period. There is also the danger that, should the candle be held too high, one or two more of those who are carrying heavy stocks will unload on the market, leaving the others to bear their burden as best they may. Unless the consumption increases considerably, lead can not ultimately resist the pressure because production is going on unabated. For weeks and possibly for months to come, it will hold its own, or may even be pegged up; but this steadiness should not deceive producers as to the dangers with which the metal is beset.

This fact should be borne in mind: There is no scarcity of lead, no exceptional consumption to warrant even current figures, but the metal is artificially sustained. In common with all producing interests, we hope that an expansion of consumption will warrant the prices now asked. They are fairly remunerative to the makers in the different sections of the country. The latter, however, should be prepared to meet every contingency, and do all within their power to reduce the cost of production. The present period of uncertainty will certainly enable buyers of ores to dispose of the purchased metal without a steady loss, which they must suffer on a constantly declining market. According to their view of the future of business in general, miners, we presume, will show an inclination to make long contracts if they are pessimists, or hold back if they are sanguine. Weighing all the evidence which has come under our observation, we are inclined to believe that little is to be gained by the latter course.

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CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Early Discovery of Tin in the Black Hills.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your "Correspondence" column of August 25th, "Glück Auf," writing from the Black Hills, speaks of the recent discovery there of tin in paying quantities. In view of the importance which attaches to the discovery of valuable tin ore in the United States, it may be of interest to relate how, as far back as 1876 or 1877, Mr. Richard Pearce, of the Boston & Colorado Smelting Company, then at Black Hawk, Colorado, discovered tin which came from the Black Hills country. A prospector, sending ore-samples from that section to the Boston & Colorado Smelting Company for assay, unable to secure currency, sent gold-dust in payment. Examining the gold-dust, Mr. Pearce found some black grains, which proved not to be magnetic iron, as might have been expected, but tin oxide. Interested, of course, he sent at once to the prospector for samples of the black sand from which the gold-dust of his section was obtained. The samples which were received contained high percentages of tin oxide; but the region was then much more difficult of access than at present, and investigation was carried no farther. It is to be hoped, however, that the improved transportation facilities for the Black Hills, now that both vein ore and placer deposits of tin have been discovered, may warrant the investment of capital, and at no distant day result in the profitable production of tin in the United States. J.

DENVER, COLO., Sept. 5.

Granulite in Canada.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The article in last week's ENGINEERING AND MINING JOURNAL on the subject of Glass from Granulite by the Siemens process is one which is very interesting. I had occasion, a few months ago, to inquire fully into the subject while in London; and one of the directors sent a specimen of a railroad tie out here, which is now in Philadelphia. The purpose then was to sell the patent for America, or to obtain orders. The latter was found impossible, the answer given by the railroad companies being, that in a country like America, where timber was plentiful, there was no advantage in adopting glass ties. Then, with regard to the patent, the first thing necessary was to find the quality of mineral suitable for the purpose. To obtain this, I went into Canada last June, and pitched my tent on the various islands situate on the inland lakes, conveniently placed for cheap and easy transit. The result of my travel, extending over one hundred miles, was the discovery of immense deposits of suitable granulite; also beautiful pink granite, relieved by the presence of mica and feldspar, making a magnificent stone for building purposes. I also met with virgin iron lodes, and one copper lode. A great part of the country through which I passed abounded in phosphate of lime, as well as limestone, to say nothing of the enormous deposits of red and yellow sandstones.

Doubtless some of your readers have prospected the banks of the Hudson, as well as the Adirondacks. If so, I should like to know something of the strata. I am sir, yours obediently, T. B. ALDERSON,

NEW YORK, Sept. 8. Mem. Inst. M.E. Eng.

Bessmerizing Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of July 7th, I note a letter from Dr. Percy, the eminent English metallurgist, which I can not allow to pass without a reply. I regret that Dr. Percy did not take the trouble to read my English patent. He would have recognized that my process of treating copper ores differs essentially from the one patented in 1856 by Mr. Keates.

I need not call attention to the fact that if Mr. Keates had really discovered in 1856 a more economical and truly industrial process, he would certainly have applied it since on a large scale in the Swansea or Liverpool copper-works. This has not been done—not even, I may venture to say, in the works belonging to the inventor.

Besides this, Dr. Percy himself, who has since published a treatise on the metallurgy of copper, does not say a word on this method, which he would not have failed to allude to if it had produced results.

I have stated in the foregoing, and I will show, that my process differs completely from the one to which Dr. Percy points. My process is based on doing away with coal for the purpose of producing the necessary temperature, which is solely generated by the intermolecular combustion of the iron, the sulphur, and the other metals which are more readily oxidized than the copper in the matte. Is there any thing similar in the description in the Keates patent? None; on the contrary, the specification calls for a heated reverberatory in which the operation is carried out. Consequently, the use of fuel is necessary. It is distinctly stated, in the description, that it is necessary to raise the temperature of the furnace, in order that the matte may remain in a state of complete fusion during the action of the blast.

The intermolecular combustion to which reference is made in the above, and which is the foundation of my process, has led me to design a special apparatus which does not resemble the reverberatory furnace described in the Keates patent. I believe that these explanations will suffice to make the subject clear to your readers. PIERRE MANHÈS.

LYONS, FRANCE.

A RECENT bulletin of the Census Bureau is that giving a partial estimate of the consumption of forest products as fuel. It appears that 32,375,074 persons use wood for domestic purposes. Illinois consumed during the census year 5,200,104 cords, value, $14,136,662; Indiana, 7,059,874 cords, value, $18,334,729; Iowa, 5,090,649 cords, value, $14,611,280; Minnesota, 1,669,568 cords, value, $5,873,421; Michigan, 7,838,904 cords, value, $18,197,249; Wisconsin, 7,207,126 cords, value, $11,863,739; Dakota, 422,948 cords, value, $3,028,300; Montana, 119,947 cords, value, $460,688.

THE DISCOVERY OF TIN-STONE IN THE BLACK HILLS OF DAKOTA.

Written for the Engineering and Mining Journal by William P. Blake, F.G.S.

(*Concluded from page* 146.)

QUANTITY OF THE TIN ORE.

The extent and quantity of the greisen rock and the percentage of tin-stone in it are the two most important questions in an economical and mining point of view. As regards the first, the chief evidence, at present, is in the outcrops or exposures at the surface. These are extensive and decidedly encouraging. Without regarding the possible occurrence of massive ore in bunches, and confining the estimate to the greisen rock alone, it may be said to crop at intervals over a length of 100 feet by from 70 to 100 in breadth. These outcrops are irregular in form, and vary from two feet to twenty feet, or more, in width. There are four chief outcrops, all showing tin ore. Very little work has yet been done to open up these outcrops of greisen. An open cut some twenty-five feet long and about fifteen feet deep at the face is the largest excavation. It cuts through the pit which was sunk at first for mica, and followed the heavy black ore downward. In cutting this opening, a considerable quantity of the greisen rock has been blasted out, showing specks and grains of tin ore throughout its substance. This greisen should be regarded as the chief and most reliable ore, though no doubt many masses and branches of the massive cassiterite will be developed, apart from the greisen when the ground is opened. The greisen is favorably placed for cheap mining: the surface of the hill slopes off from it each way, permitting it to be attacked by cuts or open quarry in several directions. It is easily drilled for blasting, and the most effective and economical method of getting it out, in quantity, will be to work it in open quarry, putting in heavy blasts, and then cracking up the large blocks by smaller holes, letting the fragments roll to the base of the hill, where, by means of a suitable barrier of pine logs, forming a rude ore-bin, they may accumulate and be delivered as needed through chutes into cars below, thus avoiding the expense of lifting and handling. The cars should then deposit the rock at the top of a mill, so arranged that the ore need not be again handled or lifted until the concentration is complete.

The greisen rock can be crushed with great ease, either under stamps or by rolls. The tin ore separates easily from the mica and spar, and, after crushing, can be washed out by the ordinary methods of panning or concentration. This was demonstrated by many trials in panning. There is very little loss. The ore settles to the bottom, and deports itself very much as gold does in panning out. The ordinary concentrating apparatus will handle the tin-stone effectively. Water is abundant at all seasons, except probably for a time in the depth of winter, when the snows do not melt fast enough to fill the rivulets.

On reaching the mill, the broken rock should pass over coarse grates, in order to separate the heavy blocks from the medium-sized masses. There should be three rock-breakers; one of unusual size, to receive masses of rock from 15 to 24 inches in diameter, and the others to take the product of the first breaker together with the other masses that are suitable for a 15 by 9 breaker. The two 15 by 9 breakers should be arranged to have automatic feeding, which can be easily secured, and would effect a great saving. The crushed ore can then be passed through rolls, or directly to the stamps. If stamps are used, the grates should be coarser than for gold quartz, and slotted punched screens will no doubt deliver the mica much freer than woven wire screens, or screens punched with round holes.

PERCENTAGE OF TIN-STONE.

Ordinary hand samples of the greisen, taken from the large masses broken from the open cut, and rejecting the richer portions, will yield from 6 to 10 per cent of clean tin-stone, or black tin, of high grade. Some masses will yield from 10 to 50 per cent by weight; but the general run of the ore is about 6 per cent, excluding the poorer portions. The general average of samples broken from all parts of the outcrops at the surface is about 3 per cent. It is certain that there will be no difficulty, when the ground is opened by blasting, in selecting the rock so that an average of at least 3 per cent can be maintained, if this limit shall be found desirable. But it is probable that rock containing only 1 per cent may be profitably worked if the mill is properly placed and equipped.

The percentage of tin-stone, or black tin, in the greisen, it will be seen, compares favorably with the percentage of tin-stone in the ores of other and well-known tin regions. In Cornwall, for example, where the statistics of tin mining and smelting are carefully kept under the direction of the government, it is found that the average percentage of black tin in the whole mass of tin ore as mined and stamped, or prepared for dressing, is not over 45 pounds to the ton, or 2 per cent. So, also, at Altenberg, Saxony, the smelting ore, or black tin, is 2 per cent of the whole mass. But a much lower percentage than this has been worked. According to Phillips and Darlington, it did not exceed 17½ pounds of black tin to the ton at one of the largest mines in West Cornwall in 1855; this being equivalent to 0·86 per cent. The same authority, in describing the effectiveness of the ordinary stamp-mill in crushing tin ores, gives the following figures: The average number of stamps in use at the Polberro mines was 70, and the number of tons crushed in the course of five years was 106,249 tons. This quantity averaged 20$\frac{1}{10}$ pounds, or 0·89 per cent of merchantable black tin per ton. The profit per stamp amounted to £210 for the whole period, or £42 per stamp per annum.

STREAM-TIN.

Stream-tin, or alluvial tin ore derived from the disintegration of the veins and rocks, occurs here as in all important tin regions, and it promises to play an important part in the future development of the region.

It is found, as might be expected, in the water-courses which head at and near the Etta claim on Tin Mountain, and in other places, thus giving good evidence of the existence of other veins and resources than those on Tin Mountain. On Battle Creek, between the Etta location and Harney City, in sluicing for gold, a large quantity of heavy black mineral in grains from the size of peas to the magnitude of pigeon-eggs and larger are abundant. This heavy black ore has always been a hinderance to the placer miners on that stream, and has been thrown away as useless. I

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find it to consist largely of tin ore of good quality; some of it shows small adherent scales of mica, indicative of its derivation from greisen.

It is not easy to reach the bed-rock along this creek, owing to the abundant supply of water and the deficient drainage, without a bed-rock flume, which has been proposed by the gold miners for the gold alone. It is now probable that both the stream-tin and the gold will be mined together, and to much greater advantage than if worked alone. Prospecting for stream-tin along the valley of this stream is still in progress.

The ore has been found also on Iron Creek, and later on Spring Creek, ten miles or more north of Tin Mountain. This last is comparatively free from fragments of a heavy black mineral, apparently wolfram, which accompanies all the stream-tin ore yet found, but which is harder than wolfram and has a lower specific gravity (h. 6; sp. gr. 6·1 to 6·7). Several species are probably represented in the alluvial concentrations; but there is a notable absence of magnetite, of hematite, and of chromite.

The evidences, so far, go to show that there is an extensive region of deposits of stream-tin, and that tin ore must occur at many distant points in abundance; and in the case of mining it, it must hold a relation to the parent sources similar to that of placer gold to the gold in veins. In alluvial tin mining, the production per hand per day must depend, of course, chiefly upon the abundance of the ore and the depth of gravel and clay under which it lies. The "*pitting-off*," or removal of the top stuff, is the chief item of cost. The same methods and economies of working practiced in alluvial gold mining are applicable here also. The rockers, toms, and sluices, as well as the hydraulic and drifting methods, are all available. Water and fall, or grade, are essential. The bulk and quantity by weight are, of course, very much greater than in the case of gold, and some modifications of riffles and sluices are required. The work is not so delicate, and may be more roughly and rapidly carried on than it can be when gold is to be saved.

The larger part of the tin of commerce is obtained from stream-tin. In Cornwall, at first, the tin ore was obtained solely from the alluvions of the tin region; and even as late as 1876, it is reported that 800 persons were engaged in mining for stream-tin on Red River. A considerable amount of ore is yet obtained from stream-deposits rather than from veins; and at the present time, the great production of New South Wales is from alluvial tin ores, such as were shown in profusion at the Centennial Exhibition, and again at Paris in 1878.

According to Professor Liversidge, the tin-bearing area in New South Wales is estimated at 8500 square miles. The production up to 1882 was 62,268 tons, valued at £4,339,461. The ore occurs in veins and as stream-tin. The veins traverse granite, and are considered to be like those of Cornwall. The ore is found, also, in veins of greisen, and in granulite or eurite. Sometimes the ore is found disseminated in large and well-formed quartz crystals.

The stream-tin ore occurs in much the same manner as gold, and in drift or stream-deposits of different periods of deposition and at different levels. Two distinct sets have been recognized, the older and the newer. Some of the deposits are worked under 60 or 70 feet of basaltic capping. The older tin-stone deposits are frequently so closely cemented as to require stamping. The ore is usually obtained by sluicing or by jigging. Wolfram is not abundant.

The Banca and Billiton tin is chiefly from alluvial ore, which is mined by Chinese labor.

According to Davies, at the alluvial tin mines of Banca, a miner, with the aid of water, removes from 350 to 530 cubic feet of earth in nine hours, or by estimate 12,000 cubic feet yearly, with an average product, after smelting the black tin, of twelve hundred pounds of metallic tin. In Australia, stream-tin miners are reported to handle 10 tons of earth daily.

The Chinese miners of Banca have an ingenious and simple apparatus for prospecting the deposits before digging. It consists of an iron rod about an inch in diameter and twenty feet long, which is forced down through the upper layer of sand and clay to the bed-rock. A small conical tube at the lower end serves to catch and retain a sample of the gravel from the bed-rock, and will show the presence of tin ore if it exists in sufficient quantity. A copper tube with a steel shoe is also used to obtain samples. An apparatus of this kind would be very useful at the Black Hills, particularly in the small valleys where there is a large amount of water in the soil.

The annual production of Banca tin is about 4000 tons. In the island of Billiton, the production in 1876 was 3721 tons.

NOTES ON EXPLOSIVES FOR MINING.

Sir Frederick Abel, of Woolwich Arsenal, who ranks among the very highest European authorities on the manufacture and application of explosive compounds, has, in a presidential address before the Society of Chemical Industry, made a number of observations which can not fail to be of interest to the mining public. This address is largely historical, and naturally refers frequently to subjects coming within the domain of an ordnance officer. From the long document, we choose the following extracts:

So far as mining or blasting-powder is concerned, its production at a comparatively very low price, and the absence of any standard or test of power, contributed to maintain the manufacture in a stationary condition, except in so far as any expedients could be adopted for increasing the margin of profit of the manufacturer, until, about twelve years ago, more violent explosive agents began to enter into serious competition with it. The attention which dynamite and gun-cotton had already excited at about that time, and the recognition of the fact that blasting-powder might be economically and otherwise advantageously replaced in many kinds of mining work by explosive agents more rapid and more violent in their action, led to the invention or resuscitation of a great variety of explosive mixtures for which special advantages were claimed. The greater number of these have enjoyed a very brief and inglorious existence. On the other hand, some preparations of nitro-glycerine and gun-cotton have become so firmly established as valuable blasting agents that the manufacturers of blasting-powder have long since been taught that the days are passed when powder could maintain its supreme position as the only or even the most practically useful explosive agent for industrial purposes, and that cheapness no longer contributes an all-important feature in the advantages to be claimed for it. The miner has now become critical in regard to the quality of blasting-powder supplied to him, and this has not only led to the bestowal of greater care upon the incorporation of the ingredients, and upon their quality, but has also brought about the extensive introduction of two or three forms of blasting-powder which are very decided improvements upon the ordinary black powder sold under that name.

One of these is the extra strong mining powder (E.S.M.) manufactured by Curtis & Harvey, which, in point of care bestowed upon its introduction, has much resemblance to artillery gunpowder; and the compressed powder first brought out by Messrs. Davey & Watson and manufactured by Messrs. Hall & Son, but now also produced by other manufacturers, which is at present extensively used in mining districts, and with results very satisfactory as compared with those furnished by the old blasting-powder. The perforated cylindrical form of charge, of dimensions suitable for different-sized bore-holes, was first applied, in connection with compressed gun-cotton, about sixteen years ago, and was found to present advantages independent of the nature of the explosive agent. The compact cylindrical masses of the material are convenient to pack, transport, and handle, while the conversion of the substance into a homogeneous mass of considerable density, solid throughout, except that a fuse-hole passes through the center, considerably reduces the space which it occupies in a blast-hole. Hence the effective action of the charge is increased, partly by an increase of the space available for tamping, and partly by a concentration of the action toward the base of the hole, where it is desirable that the maximum amount of work should be performed. More than one offspring of compressed gun-cotton has been similarly applied in mining industry. . . .

Although very few of the substitutes for blasting-powder which had entered the lists against it twelve years ago and upward, and which are more or less analogous to the old black powder in their composition, survived the experimental stage, one or other explosive preparation of this class still comes to the front from time to time, its claim to originality consisting generally in the novelty of its fancy designation or in the addition, to the ordinary powder constituents or to slight modifications of them, of some ingredients possessing mysterious functions, known only to the inventor and unfathomable by the chemist. Thus, many years ago, a very crude kind of blasting-powder known as Kellow's, composed of spent tan impregnated with saltpeter and sprinkled with sulphur (with the addition of a very small proportion of potassium chlorate, in the strongest variety), was manufactured for a short time in the neighborhood of Plymouth. Its comparatively safe character received practical demonstration by the factory being twice burnt without the occurrence of an explosion. That it failed to compete with common blasting-powder, even as made twenty-five years ago, need hardly be stated. However, from time to time I have met again with my old acquaintance (though sometimes sawdust had been substituted for the tan) under a new alias, such as pyrolythe or pudrolithe, or espir powder, and each time it has been re-endowed, by the re-inventors, with properties more remarkable, in point of safety and great explosive force, than it possessed before. Now the addition of a little lampblack, and of that very original ingredient of an explosive mixture, ferrous sulphate, have imparted to it fresh features of novelty and virtue, and it appears before the world as the patent safety blasting-powder, under which name it is warranted to explode only when desired, and without the development of any noxious gases or vapors whatever.

Among the more legitimate novelties in the way of blasting-powders are those recently patented by Professor Himly, of Kiel, in which sulphur is absent, and which consist of mixtures of solid hydrocarbons, such as the paraffines, or of pitch, with saltpeter, and a proportion of potassium chlorate, crude benzol, which acts as a solvent of the hydrocarbon or pitch, being used as the means of mixing it intimately with the oxidizing agents. Facility and safety of manufacture, freedom from hygroscopic properties, and superiority in point of force, are among the chief advantages claimed for these preparations, and there appears good reason why these should be realized, while, with the adoption of efficient arrangements for the recovery of the solvent, their economical manufacture should not present any practical difficulties. It may be interesting to refer to the fact that, about twenty years ago, when the subject of the improvement of time-fuses was under consideration, and their construction for use with the then new breech-loading Armstrong gun presented difficulties in respect to the fuse composition from the deteriorating action of atmospheric moisture, it occurred to me to incorporate explosive mixtures with India rubber, with the aid of benzol, whereby plastic or pliable sheets of regularly and more or less quickly burning fuse composition were obtained which were altogether free from hygroscopic properties. . . .

The circumstance that compressed gun-cotton *per se* tends, upon explosion, even in thoroughly sound and well-tamped blast-holes, to vitiate the air in underground workings and badly-ventilated places much more injuriously than nitro-glycerine preparations, on account of the somewhat considerable proportion of carbonic oxide evolved from it, constitutes one important reason why it should not find favor as a blasting agent. The same objection does not apply to compressed mixtures of finely-divided gun-cotton with the proper proportion of a nitrate, and the results of extensive experiments, made under my direction ten or twelve years ago, established the value of such preparations as mining and blasting agents. Nitrated gun-cotton, for the nitration of which barium nitrate has been selected, for reasons which I need not discuss here, finds a somewhat extensive sale now in some mining districts, and, I believe, in the colonies. As the term "nitrated gun-cotton" would scarcely have given an air of novelty to this preparation, it was introduced to the mining world some years ago under the name of tonite, and more recently under the designation potentite. . . .

Dynamite has now been so long in extensive use that its properties are familiar to all who have paid any attention to the application of explosives. In point of convenience, its plasticity gives it decided advantages over rigid cartridges, like compressed powder or gun-cotton, or tonite, on account of the greater facility of loading blast-holes with it, while, in point of power, kieselguhr dynamite, containing 75 per cent of nitro-glycerine, is, in most kinds of work, about equal to pure compressed gun-cotton. In the open air, its detonation is a little sharper than that of the latter. In experiments with long trains (continuous and spaced) of compressed gun-cotton, dry and wet, and of dynamite, which I made some

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years ago, with the aid of Captain Noble's chronoscope, I found that detonation was transmitted by dry compressed gun-cotton at the rate of between 17,000 feet and 18,000 feet per second, by wet gun-cotton at between 19,300 feet and 19,900 feet per second, and by Nobel's kieselguhr (No. 1) dynamite at the rate of 20,000 feet to 24,000 feet per second. Mr. McRoberts, the talented director of the dynamite works at Ardeer, states that a ton of dynamite cartridges of the usual size (¼ inch-diameter), laid out in a line end to end, would extend one mile. According to the foregoing results, this train of cartridges would be entirely exploded in one fourth of a second if detonated at one extremity. . . .

Blasting gelatine, in its most perfect form, is translucent, of a pale yellowish color, and sufficiently firm to enable a cartridge to retain its cylindrical shape if kept lying on a flat surface. It does not soil the fingers, and the components are very difficult indeed to separate, even through the agency of a solvent of both and attempted precipitation of the nitro-cotton. Of the first sample which I received from Nobel's Explosives Company, I placed a portion in water, and have kept immersed for three and a half years. After a time, it lost its translucency—first superficially, and gradually throughout. A very small proportion of nitro-glycerine passed into solution in the water, and the mass, at the end of three years, had increased about 10 per cent in weight. Part of the sample was removed from the water, and at once placed in the cylindrical cavity of one of the leaden proof cylinders which I use for obtaining a strict comparison of the force exerted by different explosives. It was readily detonated, and, compared with a corresponding amount of a fresh sample of gelatine, the force exerted was only slightly inferior. A weighed portion of the sample exposed to the air very gradually regains its translucency in parting with the small amount of water which it has absorbed. Blasting gelatine varies somewhat in the readiness with which it is detonated. As a rule, it is not so sensitive as dynamite, but no difficulty is experienced in effecting its explosions with ordinary detonators, unless a considerably larger proportion than usual of nitro-cotton has been used in its manufacture. It is rendered extremely non-sensitive by incorporating with it a small proportion of camphor or other solid carbo-hydrogen; and this addition was contemplated by the Austrian military officials (who have adopted the gelatine for field service purposes), in order to insure its safety from explosion by the penetration of transport-wagons containing it by rifle-bullets, which in its ordinary condition it is somewhat liable to, though not nearly to the same extent as dynamite. The great proneness of the camphor mixture to escape complete explosion, even when strongly confined, led to the abandonment of this idea. The chief point needing attention in the manufacture of blasting gelatine is the character of the nitro-cotton. If the latter contain an excessive quantity of collodion-cotton on the one hand, or of trinitro-cellulose on the other, a portion of the nitro-glycerine, or rather, a liquid mixture of that substance with a very small proportion of nitro-cotton, is liable to separate after some time, and is then not unlikely to be a source of danger.

When it is remembered that two molecules of nitro-glycerine contain an atom of oxygen above the amount needed for the complete oxidation of the carbon and hydrogen, while the small proportion of nitro-cotton incorporated in the gelatine requires an additional supply of oxygen for its complete oxidation, and that the entire substance is converted into gases and vapor of water, it will be admitted, I believe, that a chemically more perfect explosive is very difficult to conceive, while, in regard to its physical properties, it certainly leaves very little to be desired. It is therefore not surprising that blasting gelatine should make rapid strides in the favor of mining communities, or that it should bid fair gradually to displace dynamite in many of its applications. In Austria, the latter appears to have been entirely superseded by it, and it is already extensively used in many other countries, while in Great Britain a temporary check in the manufacture has already been felt a serious inconvenience. The rapid and continuous growth of the dynamite industry during the past sixteen years is demonstrated by the following statement of the annual sales from factories in different parts of the world with which Mr. Nobel is associated:

	Tons.		Tons.
1867	11	1875	3,500
1868	78	1876	4,300
1869	184	1877	5,500
1870	424	1878	6,200
1871	785	1879	7,000
1872	1,350	1880	7,500
1873	2,050	1881	8,500
1874	3,120	1882	9.500

Besides the factories included in this statement, there are several others on the continent, where considerable quantities of dynamite and similar preparations are manufactured, and the patent rights in this country having expired the year before last, two or three extensive factories are entering into competition with the works at Ardeer, which, notwithstanding this, and the importations that have taken place, have been doubled in extent during the past year. A sharp line can not be drawn between the character and effects of the two great classes of mining explosives whose history I have been discussing, namely, the cleaving and displacing agents represented by the old black powder and analogous preparations, and the rending and shattering scattering the fragments to great distances. Successful results were subsequently obtained with a powder composed of saltpeter and ammonium picrate, which, under the name of picric powder, I devised thirteen years ago, for use in shells (it being prepared in France contemporaneously by M. Boutiny). This powder proved to be even somewhat less sensitive than ordinary gunpowder, and there was a tendency to some portion of the charge escaping ignition when the shell burst. The satisfactory results obtained shortly afterward with shells charged with wet gun-cotton led to the abandonment of experiments with picric powder, which is, however, about to be taken up abroad.

A substance resembling anthracite coal has been brought to Hailey, Idaho, to be tested. The specimens came from a deposit twenty feet wide at the head of Trail Creek, about twenty-three miles northeast of Hailey. The deposit lies flat, under a big sandstone reef, and can be raced on the surface for over 1500 feet. It is undergoing a thorough est; and if found to be good coal, a company will take hold of the eposit and open it up for household and smelting use.

THE CUMMER ENGINE.

It is a gratifying evidence of the fact that economy is more closely studied in many branches of manufacturing and mining, that a better type of engines is beginning to find more general use. In the textile and other leading industries, progress in this direction has been rapid and well sustained for years; but it must be confessed that in our mines, and to a less extent in our rolling-mills and other metallurgical establishments, attention has been paid to the subject of economy of fuel only during the past decade. To a certain extent, this hesitation on the part of managers to adopt modern engines has been justified by the plea that it would not do to place a delicate mechanism where it could not get proper care, and that it was less uneconomical to waste fuel than to run up heavy bills for repairs and be subject to the annoyances and losses that frequent stoppages would entail. Experience has shown that many of the drawbacks have been overrated or have been met by more recent designs of engines, and the close margins under which works have been forced to run for long periods have taught the necessity of carefully studying economy in many departments hitherto neglected. To those in charge of such works is assigned the duty, and we believe most of them recognize it, of carefully watching progress; and there is therefore a more general disposition to look into the record and examine the claims of the growing number of engines of modern design which are now in the market. Among those engines which have, during the past few years, attracted considerable attention is the Cummer engine, first in the West, its home, and now in the East. We had occasion, some weeks since, to visit the well-appointed new shops of the Cummer Engine Company, at Cleveland, and to watch the methods adopted for building the engine, as well as to note its performance. A description of its principal features, and a presentation of the reasons for which details in the design and in the construction of parts were chosen, are its best advocates to attention. We need only add that we have been much impressed with the system adopted at the works to carry out the intentions of the designer.

The Cummer engine is an automatic cut-off engine, and therefore possesses the advantage common to the engines of this class of avoiding wire-drawing, using steam of higher pressure and admitting of closer regulation of the speed. As distinguished from the type of releasing automatic cut-off engines, of which the Corliss engine is the most prominent and successful example, the Cummer engine does away with the system of cams, springs, and tappets. The Cummer engine belongs to that class in which the valve, being at all times connected with the governor, has a positive motion. The cut-off is varied by shifting the eccentric around the shaft so as to change its angularity, and thus change the point of closure of the valve. This is effected through suitable mechanism by the movements of weights revolving in a vertical plane, their centrifugal force being kept in control by being made to lift a dead weight. Fig. 3 shows a vertical section through the center of the governor, and its parts—the plan, Fig. 2, also showing a horizontal section. The cut-off eccentric, with its sleeve, fits loosely on the governor-shaft, and, as shown in Fig. 4, is connected with the flying ends of the governor weights by means of rods or links in such a manner that the cut-off eccentric, with its sleeve, is moved around the governor-shaft, either forward or backward, as the flying weights change their position. Thus the steam is cut off correspondingly, earlier or later in the stroke, as the governor or flying weights adjust themselves to the load. As shown in Fig. 2, the horizontal plan of the engine, the governor-shaft is driven from the main shaft by a train of gears. It is hollow, as shown in Fig. 3, and through it passes a thrust-rod. One end of the latter is attached to a cross-bar which, passing through a slot in the governor-shaft, is made to revolve with it. This cross-bar is, as shown in Figs. 3 and 4, connected with the flying weights by bell-cranks and rods. The other end of the thrust-rod which passes through the hollow governor-shaft fits into a step which is jointed to the vertical arm of the large bell-crank shown in Fig. 3. Any movement of the weights in the governor case causes the thrust-rod to move correspondingly out or in, and thus raises or lowers the weight located under the engine, and through the rods and clamp-collar shifts the eccentric around the shaft in either direction, cutting off earlier or later as the case may be. The balancing of the centrifugal force of the flying weights of the governor by the constant centripetal force of the hanging weights would be perfect for the speed for which the governor is adjusted. An increase or decrease in the speed is taken care of by the spring shown in Fig. 3, the duty of which, however, is very light; this spring is adjustable by having its point of attachment shifted. The tension of the spring increases as the flying weights move outward, so that, when any change of speed occurs, the steam is cut off proportionately to the load, thus making the governor very sensitive within a wide range, without having the drawback of the changes which springs doing the whole of the duty undergo. By placing the governor on its own shaft, its diameter, and with it the size and friction of the eccentric and eccentric sleeves, may be reduced, and offset rods and offset rocker-arms be avoided. With small shafts, too, the points of attachment for the rods connecting the clamp-collar with eccentric sleeve with the governor weights may be brought much nearer the center of its shaft than would be possible if the eccentric sleeve was placed on the main shaft. For a given angular movement, the eccentric on a separate shaft need move through an arc only from one third to one fourth as large, and consequently a slight movement of the weights makes a much greater change in the point of cut-off and renders the governor more sensitive.

The main eccentric is, as shown in Figs. 2 and 4, attached to the end of the governor-shaft directly. It operates the main valves and then the exhaust-valves through the intervention of a rocker-arm. With the object of avoiding the derangement of the exhaust due to the use of the common D valve under same conditions, the Cummer Engine Company has adopted a separate steam and exhaust-valve, each with its own chest-ports and exhaust passage. They are operated from one eccentric and have each the same travel, while the cut-off valve slides upon the back of the main steam valve. In order to reduce the throw of the valves, and to use much smaller eccentrics, the "grid-iron" form of valve, shown in Figs. 5 and 6, has been adopted. Fig. 5 shows the main valve in plan and section; and Fig. 6, the cut-off; there being three openings in the former, while the latter admits steam from one of its outside edges and from corresponding inner edges of its two openings. The exhaust-valve

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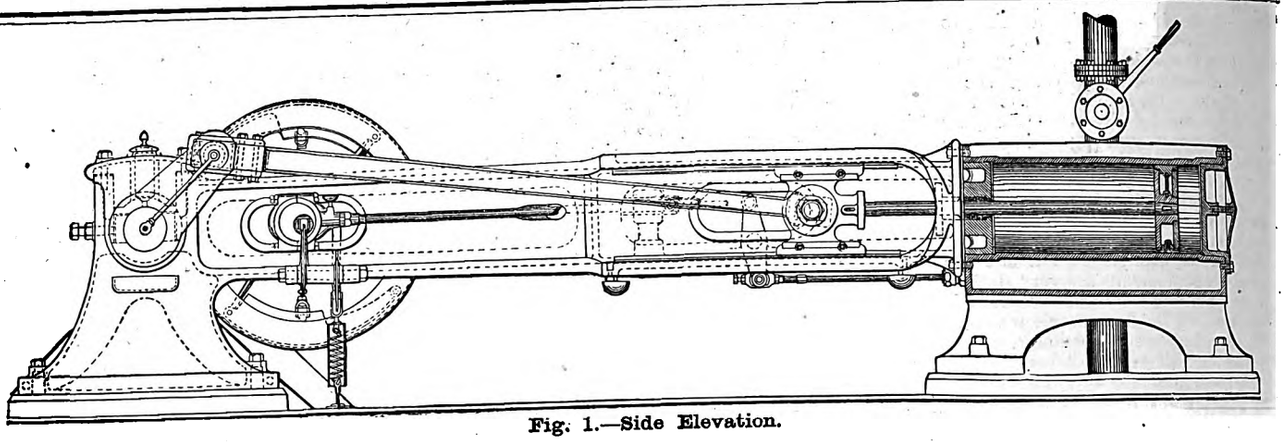


Fig. 1.—Side Elevation.

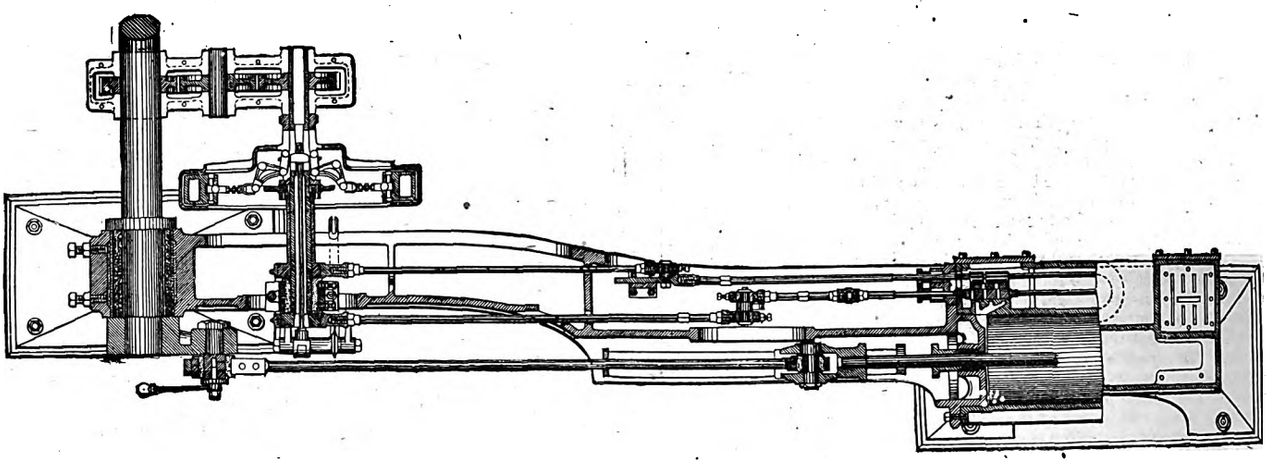


Fig. 2.—Plan.

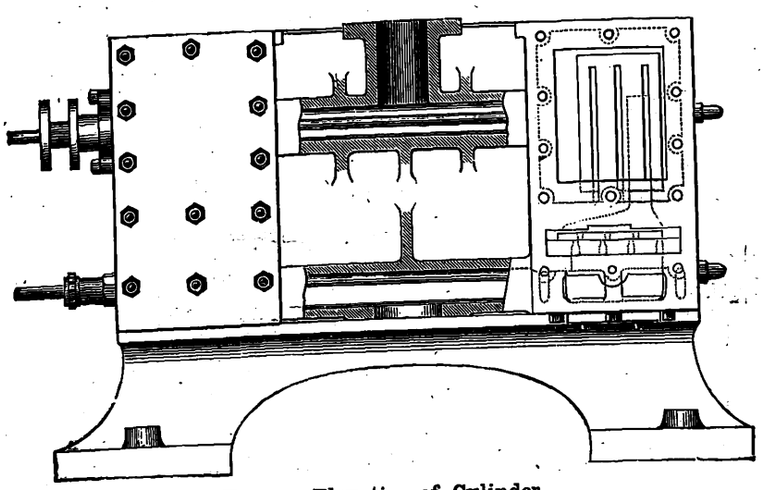


Fig. 7.—Elevation of Cylinder.

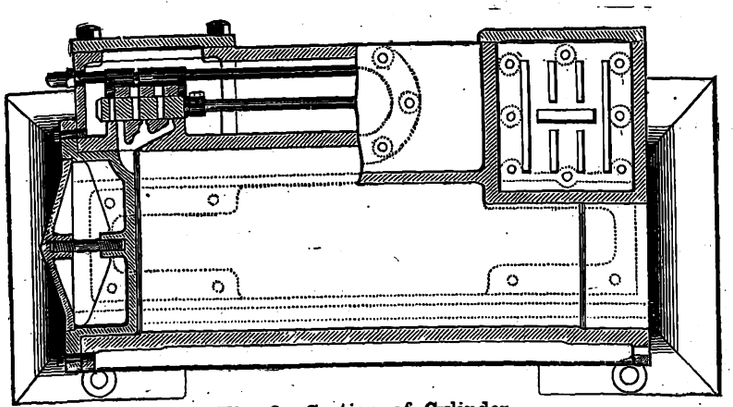


Fig. 8.—Section of Cylinder.

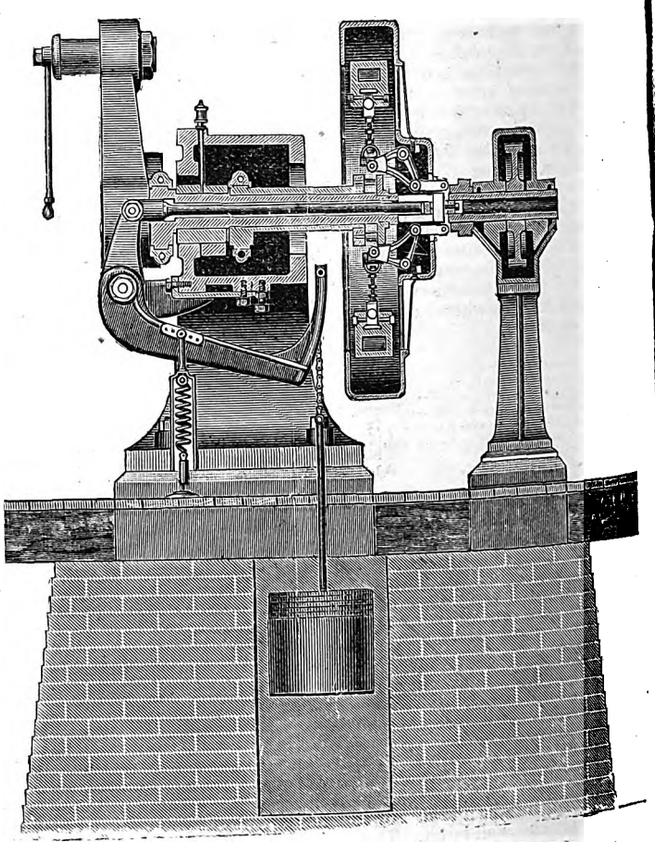


Fig. 3.—The Governor.

THE CUMMER AUTOMATIC CUT-OFF ENGINE.

has three openings, but, as one of its outside edges admits steam also, there are four ports in its valve-seat.

Fig. 7 shows an elevation, Fig. 8 a longitudinal section, and Fig. 9 a cross-section of the cylinder, in which appear the general features and arrangements of parts. The elevation shows in part-section the steam passage with a short length of pipe, and below it the exhaust passage. On each side, are the steam and exhaust-chests; that on the right has the cover removed, showing steam and exhaust-valves. The valve-stems are also shown; they pass through the steam and exhaust passages, and connect the valves at one end with those at the other. Fig. 9 is a cross-section through the cylinder and its base; the plane of section being through the valve-chest, shows the steam-valve with its cut-off, and

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underneath them the exhaust-valve sliding in a horizontal plane. The exhaust-valve seat is made removable, for greater convenience of construction and to allow for refacing. Below the exhaust-valve is seen the exhaust passage, and there is also shown the means by which the valve is moved; this consists of a clamp-collar which fits the valve-stem and is provided with a prong coming up through a slot in the valve-seat and attached to the valve. One half of the horizontal section, Fig. 8, shows the main and cut-off valves for that end with its steam passage. The other half is sectioned to show the exhaust valve-seat. In this figure and also in the cross-section, Fig. 9, we see how the steam enters the cylinder through a three-ported seat, afterward uniting to form but one opening into the cylinder, and how steam is exhausted through the lower part of this same port, which then by one large opening communicates with the chest in which the exhaust-valve is located. There is no real connection between the two, however; each valve within its own chest controls its own ports, and live steam can not enter the exhaust. In Fig. 8, there is a sectional view of one cylinder-head; this is inclosed by a conical shaped cover fitting air-tight; its surface is polished so as to look well and prevent radiation, while the air in the interior space acts as a non-conductor of heat. The head for the opposite end is formed by the inner end of the frame, which fits into the cylinder and is bolted to its flange. The cylinder itself is covered with non-conducting material, and the whole inclosed by a neat cast-iron lagging.

The piston is made large enough to give ample wearing surface, and with sufficient weight and careful distribution of metal to secure strength, no extra weight being given for any other purpose. The piston consists of three parts: the piston proper, to which is fitted the tapered end of the piston-rod secured by a cotter; the chunk-ring; and the follower. These parts are all clearly shown in the section. The plan exhibits the piston with its follower removed, but showing in section the four bolts which hold it in place when connected. It will be noticed that the piston itself and also the follower are made considerably smaller than the cylinder, and that the chunk-ring is external to these, and forms the bearing surface. The chunk-ring is turned up so as to be an accurate fit, and is then adjusted so as to be perfectly central by means of four stud-bolts, which appear in the plan and section; their outer ends have a conical point which bears against the chunk-ring, while the other ends are tapped into the boss of the piston and are provided with jam-nuts. The center of the chunk-ring is grooved, to receive the cast-iron piston-ring, which is pressed outward by several small spiral springs spaced around the circumference. The positions of these springs appear in the plan, and one of them is shown in the section. An additional packing is provided by turning two small grooves in the chunk-ring on each side of the central piston-ring. The advantage of using a chunk-ring is, that a very exact fit can be made, and, by using the central adjustment, perfect alignment can be secured. A greater wearing surface for the same thickness of piston is obtained, because the chunk-ring is the same width as the piston itself and bears over its whole surface, whereas, in the ordinary form, a part of the piston, and the follower also, are turned down below size and do not bear at all. By this arrangement also, whenever, after long wear, it becomes necessary to rebore the cylinder, it is only necessary to turn up a new chunk-ring instead of fitting up a whole new piston.

In the vertical section, Fig. 2, is shown the form of cylinder-head adopted by the Cummer Engine Company. It projects within the cylinder, and is designed to reduce clearance to as low an amount as possible. The forward head, as shown in the engraving, is formed by the end of the girder frame, but, in the company's present practice, the head is made separate and bolted to the frame. Objections have been made against this deep form of cylinder-head, on the ground that the annular space between the head and counter-bore affords so much more condensing surface than the ordinary form of cylinder-head; but, in point of fact, this objection does not hold at all, because the cylinder-heads are made a true fit for an inch or so at the outside bearing and an easy sliding fit for the rest of the length. The space between the counter-bore and head, which is about the thickness of a piece of paper, becomes, when in use, completely filled up with a deposit from the oil used to lubricate the cylinder, which is driven in by the steam, and, as experience has shown, effectually prevents any condensation from this cause.

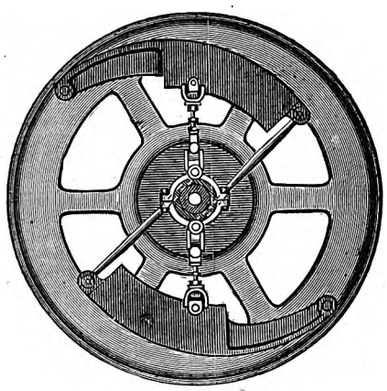
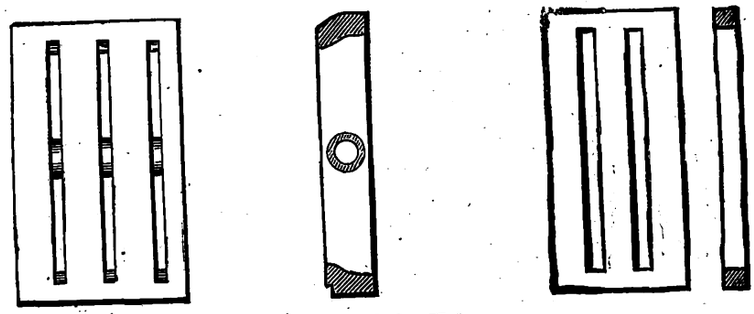


Fig. 4.—Governor.



Figs. 5 and 6.—Valves.

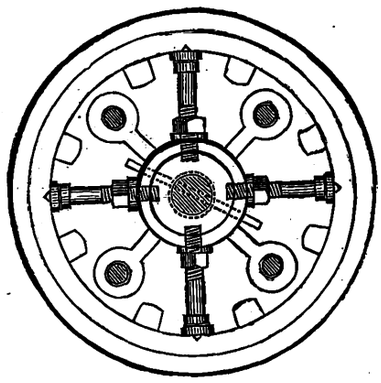
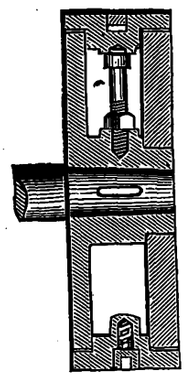


Fig. 10.—Piston.



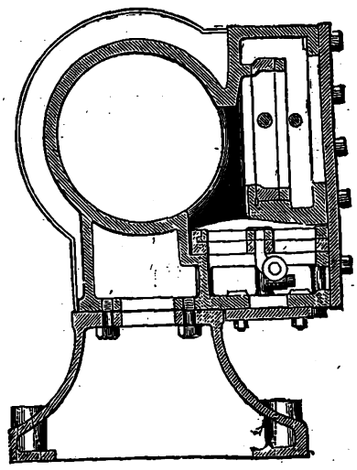


Fig. 9.—Cross-Section of Cylinder.

THE CUMMER AUTOMATIC CUT-OFF ENGINE.

DRIVING MACHINERY BY SAND.—A Western exchange gives an interesting account of the method recently adopted by Mr. J. Townsend, of Virginia City, to run a number of arrastras by sand. The arrastras are placed in a light sandy field where only sufficient water for drinking purposes and to moisten the ore to be operated upon can be obtained. The sand drives a large overshot wheel, taking the place of water. It was at first Mr. Townsend's intention to run the arrastras by means of a large windmill; but as the speed was naturally irregular, he adopted the present method. The windmill now runs a belt containing a number of buckets, and these carry sand up to a large tank somewhat in the way that grain elevators carry wheat. A stream of sand being let out upon the overshot wheel, causes it to revolve, just as it would under the weight of a stream of water, and thus far the method is said to have been found very successful. When there is a considerable wind, sand is stored up for use when calms prevail, and in this manner the mill may run continuously.

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THE MINING AND METALLURGY OF ZINC IN THE UNITED STATES.*

By F. L. Clero.

(*Continued from page* 151.)

EASTERN ZINC-WORKS.

Spelter Furnaces.—The reduction-works at Newark, Jersey City, Bergen Point, and Bethlehem employ the same general type of furnace, adapted to the use of anthracite coal. They all manufacture oxide of zinc as well as spelter. None of them can produce metal as cheaply as any of the Western works; but they all produce a brand of metal very free from lead, which commands a continued sale. The furnace used differs from the ordinary Belgian furnace chiefly in the substitution of a shallow ash-pit from 16 to 18 inches deep, with luted ash-doors, into which a blast of air is admitted under the fire, in place of the high underground ash-pits and tunnels of the latter. The grate is composed of flat perforated bars of cast-iron, placed close together, so as to permit the use of pea coal. The method of cleaning the fire is as follows: At the back end of the grate, and on a level with it, there is a flat ledge of fire-brick; the live coals from the top of the fire are pushed back on to this ledge, the cinders are barred up from the grate and scraped out at the fire-door; the fire is then drawn forward and spread over the cleaned bars, fresh coal is thrown in, and the blast is admitted, and in a very short time the furnace is brought to the required heat. By means of the blast and chimney-dampers, the fire is easily controlled, and the heat is regulated to suit the requirements of the different operations of smelting. Furnaces of fifty-six retorts are in general use. Nothing seems to be gained by any considerable increase in the number. If the furnace is charged twice in twenty-four hours, which is the usual practice, this is about as many as can be attended to properly by three men—one charger and one long-shift and one short-shift man; for if the operation of cleaning and charging is prolonged, the time left for reduction becomes too short to properly exhaust the charge. If the furnace is enlarged so as to employ two more men, the work of firing becomes excessive if there is only one fireplace; if there is a fireplace at each end, a cross-wall between them adds little to the cost of construction, but it greatly strengthens the block and facilitates repairs; but at the same time it divides the block into four furnaces. Anthracite coal, with a blast, gives a good flame and sufficient heat in all parts of the furnace. It is customary to protect the lower retorts from the radiated heat of the fire by a row of thick tubes, called cannons, about the same size as the retorts, but open at both ends. Where the furnace is charged only once in twenty-four hours, much time is lost, during which part of the furnace is not working; and the lower retorts are too long exposed to a strong heat under circumstances which make it very destructive to them. It may also be considered as proved that any considerable departure from the long-established dimensions of the retorts—from 6½ to 7 inches internal diameter—is a mistake where the furnace is charged twice in twenty-four hours and the ore is sufficiently valuable to make close working desirable. It is worthy of note that the workmen everywhere desire larger retorts and twenty-four-hour charges, for the simple reason that their active working hours are reduced at the same time that the amount of metal on which they are paid premium is increased.

Oxide Furnaces.—The oxide furnaces in use are also of the same general type. Each furnace has a rectangular horizontal cross-section, about 3½ feet wide by 6 feet deep, and is covered by a full center arch; 8 or 10 inches below the spring line of the arch is the grate, which is formed of flat cast-iron bars, 6 feet long, 6 inches broad, and an inch thick, perforated by tapering holes, one inch diameter below and one quarter inch diameter at the top, set as closely together as the strength and stiffness of the iron will permit; these bars lie close together, and rest on three or four bearers set crosswise into the side-walls of the furnace. Below the grate is an ash-pit from 18 to 20 inches deep, closed in front by iron doors. The opening into the furnace is under an arch in the front wall; this doorway is sometimes closed by iron doors, but the simplest and best method of closing it is with a bank of moistened ashes piled up against it; for this purpose, a shelf about 20 inches broad projects in front of the furnace on a level with the grate-bars. The front opening is usually a semicircular arch the full width of the furnace. The ash-pit is connected with an air-flue coming from centrifugal fans, and provided with a damper, by which the blast is regulated. There is an opening in the arch of the furnace for the escape of the zinc oxide and other products of combustion; this opening either leads directly into the iron or brick flue running to the cooling apparatus, or into a short flue, from which the gases may be turned either into the oxide flue or into an open chimney, according to which of the two systems of working is adopted. It is customary to place two such furnaces end to end, and work them from opposite sides; and the end wall between them is sometimes omitted, a single opening through the arch answering for both furnaces. A row of such pairs of furnaces side by side is built, and the same air and oxide flue answers for the row.

The method of working the furnaces is as follows: One man attends to four or six adjoining furnaces, and charges them alternately, one every hour. When opposite furnaces open into each other, these two furnaces are charged at the same time. When the time comes for cleaning out a furnace, the draught is shut off, the pile of ashes is removed from the front of the furnace and thrown to one side, to be used again. What is left in the furnace from the preceding charge is in the form of a more or less solid clinker, covering the whole surface of the grate: this is loosened and broken up with suitable bars, and is drawn out in front of the furnace. The bed coal is thrown in on the cleaned grate, and spread evenly in a layer of about an inch deep, the front opening is partly closed with a loose piece of sheet-iron, and a little air is admitted through the ash-pit; the cinders and ashes of the preceding charge are thrown out of the way of the workman, and, by the time this is done, the bed coal has been sufficiently ignited from the heat retained in the sides and arch of the furnace to receive the charge. This consists of a mixture of crushed ore, with about half its weight of anthracite coal, as finely crushed as can be used without falling through the grate. The charge is spread over the fire and leveled carefully; the front of the furnace is closed with its bank of ashes, and more blast is let on. A charge remains in the furnace from four to six hours, according to the practice at different works. When the ore used is calamine, smithsonite, or franklinite, it is charged raw; when it is blende, it must be very carefully roasted beforehand. When franklinite is used, the hard clinkers remaining in the furnace are reserved for the manufacture of spiegeleisen, and are called the "residuum." The fine residues of the charge are mixed in with the succeeding charge; by this means, the fire is kept open for a longer time for the penetration of the blast, and a thick crust of residuum is obtained, more suitable for treatment in a blast-furnace. The ashes are removed from below the grate only once in twenty-four hours, and the charge is in all cases slightly moistened before being thrown into the furnace. As the charges are made alternately every hour, the heat in the conduits and all parts of the apparatus is kept very uniform, and sufficient to instantly burn any particles of coal drawn over with the gases, and no trouble is experienced from their effect on the oxide. The practice of some works in only turning the gases into the oxide flue when the zinc flame makes its appearance, seems an unnecessary precaution. An excess of air is always admitted, so that it is probably the active agent in oxidizing the zinc, and very little carbonic oxide would be found in the bag-room. It is very important that the men should watch the working of the furnace carefully, and by regulating the admission of the air, and by closing all blow-holes with a rake, should force the air to pass through the charge as uniformly as possible.

The apparatus for cooling the gases and oxide varies considerably in different works, but consists essentially in some combination of brick or iron flues, with towers or ascending pipes, with or without sheets or jets of water and steam-chambers. Beyond it are exhaust-fans, to draw the gases carrying the oxide from the furnace and send them through settling-chambers to the bag-rooms. The gases, now cooled and carrying only light flakes of merchantable oxide, are distributed through the bag-rooms by iron branch pipes, along the tops or the bottoms of which are set rows of nipples close together, to which are attached cotton bags. These bags are often 40 or 50 feet long, and hang down from the branch pipes or are suspended vertically above them from the roof. Two hundred square feet of bag surface to one square foot of grate surface is a proportion found to work very well in practice. The bags are about two feet in diameter, and, when suspended from the branch pipes, the lower ends need not be closed if they are long enough to be given a half-twist and rest on the floor or on a slightly raised bench under them. An ingenious variation of this arrangement may be seen in the works of the Lone Elm Company, at Joplin, Missouri, for the collection of the white fumes from the lead slag eyes. There the lower ends of the bags are tied to nipples in the top of closed bins, into which the collected fume may be directly shaken, and from which it may be packed, when the lower ends of the bags are closed by a sliding gate. The bags thus form the only outlet from the furnaces. The cooled gases pass freely through the meshes of the cotton, and the finest flakes of oxide are arrested on the inside. These must be shaken down from time to time, to keep the meshes open and to collect the oxide in the bottom of the bags. When the oxide, after collection, is kiln-dried to drive off one or two per cent of moisture absorbed from the furnace gases, and bolted to remove cotton fibers and occasional specks of iron-rust and lumps of hardened oxide detached from the pipes, its quality is certainly improved, and it will keep better without caking; but this is not always considered necessary. As collected, the oxide is too light and feathery to be directly packed, and must be compressed by suitable machinery.

This oxide process is not new, and is generally well known, but it is probably the only valuable contribution America has made to the metallurgy of zinc. Its operations, though very simple, are not without their difficulties. Very slight and often not very obvious causes suddenly affect the color or body of the oxide; different ores require different treatment, and the heat conditions and amount of air admitted at different points of the apparatus seem to have almost as decided an effect on the quality of the oxide as has the character of the ore treated: all of the volatile constituents of the ore will be found in the oxide. Besides containing traces of sulphur, arsenic, antimony, and cadmium, commercial oxide frequently contains minute but weighable amounts of lead, iron, manganese, lime, magnesia, and ash, which often do not seriously affect its color. If the color is good, a small percentage of lead is supposed to add to the body of an oxide. There is good reason to infer that the unnatural color imparted to an oxide by these elements depends much less on the actual amount of them which it contains than upon the nature of the compounds into which they enter, some of these compounds being white, others possessing more or less coloring properties. Conditions of volatilization, oxidation, and condensation, therefore, strongly determine the color of the resulting oxide. Color being a purely physical property, it is also probable that, apart from the effect of extraneous coloring substances, the color of an oxide depends also on its physical texture, and sometimes results solely from physical causes. There must be a certain proportion between the volume of gas, the amount of oxide carried by, and the dimensions of the flues. Apparatus that will work very well with certain ores, or with a certain number of feet of grate surface, will not give equally good results with richer or poorer ores, or with more or less grate surface. In working some ores, it is necessary to run as hot as is consistent with safety to the different portions of the apparatus; with others, the best results are obtained by running cold. It is well to start with sufficient cross-section of flues, and with a reserve of power in blast and exhaust-fans, and with large cooling and settling-chambers, and numerous doors for cleaning them and admitting air. Water in the ash-pits is in some cases found to be very useful in protecting the grate-bars and equalizing the temperature. Considerable control can always be had over the heat by varying the weight either of coal or ore in the charge; both must also be regulated to suit the time the charge is to remain in the furnace. Lime or limestone is often added to the charge, and acts sometimes chemically in liberating the zinc from its combination with silica; at other times, it is added to stiffen the charge and prevent it from running through or stopping up the grate-bars.

In the works at Jersey City, Newark, and Bethlehem, franklinite is now exclusively used for the manufacture of oxide, and the residuums are treated for the extraction of the iron and manganese in small cupola

* From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey, Department of Industrial Statistics. Albert Williams, Jr., Chief of Department.

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furnaces, about 20 feet high above the tuyeres, and 6 feet wide above the boshes. Nearly all of the iron is obtained, but little more than half of the manganese. The operation is beset with many difficulties. The 3 or 4 per cent of zinc oxide left in the residuum is very troublesome, and has heretofore prevented the use of large furnaces. The pipes for collecting the fumes from the tunnel-head require cleaning two or three times a week, and during the cleaning the furnace cools down and manganese goes into the slag; the spiegeleisen drops suddenly from as high as 23 per cent often below 10 per cent of manganese, and eight or ten hours are required to bring the furnace back again to its proper working condition. If the manganese could be got into the pig to the same extent as the iron is utilized, a ferro-manganese of 33 per cent could be obtained.

The fumes collected from the spiegel furnaces and the impure oxide obtained from the flues and sweepings of the oxide-works are usually made into metal in the ordinary spelter furnaces, but the latter is sometimes converted into good oxide by reburning.

(TO BE CONTINUED.)

MISTAKES IN MINING.

Written for the Engineering and Mining Journal by George C. Tilden, C.E.

While spending the summer vacation in Clear Creek County, Colorado, the writer noticed that it was unusually quiet, and although the usual quantity and quality of mineral were sold to the sampling-works at an unusually high rate, there was a lack of activity as far as concerned investments. There were but few new mines worked, and some of the old ones, which have been and are still capable of producing large quantities of ore and at fair profit, if properly managed, were idle. As a cause of this, it was suggested that Clear Creek County had lost favor with Eastern capitalists, because it had not done what they expected it would. If the mines of this county can not influence capital, it is not caused by any want of value on the part of the mines, but through mistakes made by the capitalists themselves. To call attention to a few of these mistakes, without reference to the mines at which they were made, will not be out of place.

It is a mistake to believe that a vein is a continuous ore-body that will always carry ore, and that the assay value of the ore will increase as depth is attained. It is a mistake to believe this, and provide no capital for development. It is a mistake to expect from a mine, when once opened up, more than a fair percentage of profit on a fair valuation. It is a mistake to judge of the value of a mine, or even of a stope, from specimen assays. It is a mistake to accept the opinion of a young mining engineer, fresh from some Eastern mining college, in regard to a mining or milling investment. The young man in taking charge of the property obtains considerable valuable information and experience; but his company unfortunately has to pay for it.

The above is written with no intention to disparage graduates of institutions of technical training, but to imply that theory in mining is useful only in so far as the mining engineer is capable of combining it with practice. We have had altogether too much of the theoretical man in Colorado. He has made the greatest number of mistakes. He comes here intrusted with business important both to the reputation of our State and to the interest he represents. All theory—no practice—no business education. He thinks mine management a profession. It is a business as well. Ground is to be let. This requires a knowledge of its value per foot or fathom for breaking, and the royalty it can command. Contracts are to be made. Rents are to be determined, and other business to be transacted. Mineralogical, geological, or any technical training, although of great value, is not all that is required. The manager of a mining property must have a business knowledge of mining. Surely the man of theory has left his mark in Clear Creek County.

It is a mistake to sink a perpendicular shaft and drive a cross-cut to work the veins of Clear Creek County, when in every case an incline would be less expensive and answer the purpose as well. It is a mistake to drive a cross-cut tunnel fifteen hundred feet, at an expense of at least twenty-five dollars per foot, and not secure a title to a single vein that it will intersect. It is a mistake to work the mines of Clear Creek County by any other than the "tribute system." It is a mistake to build tramways, concentrating or stamp-mills when there is only a prospect of obtaining ore. It is a mistake to build a plant to treat ore by some new "ten dollar a ton and save ninty-nine per cent of the assay value" process, without first making a thorough but comparatively inexpensive inquiry into the chemical and mechanical laws upon which the new idea is based. It is a mistake to run a mine in debt and then expect to pay up by allowing the tributers to produce the greatest quantity of mineral in the shortest space of time by gouging and understoping. It is a mistake not to keep the development-work of a mine in advance of the work of extraction. In Clear Creek County, it is a mistake not to open up at least five fathoms of ground for every fathom stoped. It is a mistake to build a forty thousand dollar mill on property that belongs to some outside party who, after completion, will give a lease for only a year. It is a mistake to think that the merchantable ore of Clear Creek County will pay the cost of transportation to a concentrator that is far remote from the mines. I fear it would be a mistake to attempt to treat the ores of Silver Plume at that place, as has been suggested by some. They do not contain enough lead for treatment in a water-jacket. They contain too much lead to waste by any process that does not secure the lead. They contain too much zinc. They are too refractory. The only advantage they possess is their grade. They command the very highest rate in Golden and Denver, when they are mixed with less refractory ores, and only by judicious mixing can they be smelted with profit. Mining in Clear Creek County is profitable, but not to parties who make the mistakes I have mentioned. No enterprise can succeed where errors of equal importance occur.

THE DUTY ON ROUND IRON.—The Customs Division of the Treasury Department is in daily receipt of letters complaining of the decisions of collectors of customs with respect to the tax on round iron and wire rods. Nothing, however, will be done toward settling the dispute as to the construction of the tariff act in so far as it relates to this class of imports until after Secretary Folger returns to the department. With the object of securing the fullest information possible on the subject, Assistant-Secretary French, about two weeks ago, addressed a letter to the secretary of the Iron and Steel Association in Pennsylvania, asking for data and for his views regarding the construction of the law; but up to the present time, the desired information has not been received from the association.

TUBES AND WIRES UNDERGROUND.—The pipes for the pneumatic tube service of the Western Union Telegraph Company are laying between the building of the company at Broadway and Dey street, and the new building at Fifth avenue and Twenty-third street. Four brass tubes, each 3 inches in diameter, will be put down. In the same trench will be laid two 5-inch iron pipes for holding telegraph wires to be used in local business. The company now has 75 miles of wire underground between the main building and the Stock and Cotton Exchanges and the North River cables. The pipes are laid four feet underground, to be out of the reach of the frost. The pneumatic tubes will be in operation early in the winter. Pneumatic tubes now run to the newspaper offices, the Stock and Cotton Exchanges, the Equitable Building, and the cable offices. The new Produce Building will be connected with the main office in the same way.

THE PRODUCTION OF AUSTRIAN MINES AND SMELTING-WORKS IN 1882.—Official statistics have just been published on the production of the mines and works of Austria in 1882. The unit is, unless otherwise stated, the metric ton of 1000 kilograms:

Mines.	1882.	1880.
Coal	6,559,002	5,889,631
Lignite	8,996,290	8,420,647
Iron ore	902,510	696,832
Graphite ore	15,577	13,718
Manganese ore	8,418	8,874
Smelting-Works.		
Pig-iron	435,478	320,302
Spelter	4,791	3,756
Copper	482	500
Lead and litharge	11,889	9,235
Quicksilver	409	369
Tin	34	29
Gold (kilograms)	16·4	41·3
Silver (")	31,095	30,257
Antimony	161	125
Sulphuric acid	12,282	12,234

FURNACE, MILL, AND FACTORY.

Says the *Philadelphia Record:* Nine vessels loaded with Bessemer ores from Spain, each carrying from 1800 to 2000 tons, are expected to arrive at this port within the next two weeks. An old iron broker of this city, in commenting upon the fact yesterday, stated that this was an unusual occurrence. Three years ago, it would not have been considered so unusual, as the arrival of that number of ore-laden vessels in this city was a frequent occurrence. Philadelphia in those days ranked first in prominence as a port of entry for vessels with cargoes of that kind. This prominence, he contended, had been transferred to Baltimore. The reasons given for the diversion of this traffic from one city to another were numerous.

The gas-well at the Laughlin nail mill, Harper's Ferry, is going down as fast as possible.

The Benwood Iron-Works, Wheeling, have begun the work of boring for gas on their property between the mill and the Baltimore & Ohio Railroad.

An innovation in the manufacture of iron in Cleveland has been the recent introduction of Canadian ores. These hematites have been introduced into the burden of the Central Furnace of the Cleveland Rolling-Mill Company in the proportion of 25 per cent to 75 per cent of Lake Superior ores, and with very satisfactory results. The Hocking Valley coal and iron syndicate has also, we learn, arranged to give these ores a trial.

The Crozier iron furnace at Roanoke, Va., turns out one hundred tons of first-class metal per day. They use coke from Pocahontas. The ore is supplied from the Houston mines, fifteen miles distant on the Shenandoah Valley Railroad, and from the Upland mines, twelve miles distant on the Norfolk & Western Railroad.

Smethport, Pa., is to be lighted and heated with natural gas by November 1st, from the Wilcox gas-well, sixteen miles distant.

The blast-furnaces of the Joliet, Ill., Steel Company are running steadily. The converting mill and rail-mill are making 175 tons of rails at a turn, or 350 tons every twenty-four hours.

From Pittsburg, it is reported that it is proposed to start up the sixteen puddling-furnaces built a year ago at D. J. Painter & Son's mill. The puddlers at Everson & Macrum's mill are to go on double-turn. Work on Moorhead & Co.'s new open-hearth steel-furnace is pushed ahead.

The Farrell Foundry and Machine Company, at Ansonia, Conn., has added a 60 horse-power Westinghouse automatic engine to drive all its foundry work, independently of its main engine and water-wheel. It is also using a smaller one as an independent power for the blower in the forge.

The Western Nail Association held its regular quarterly meeting at Pittsburg, September 12th. Reports received from all sections indicate the trade to be satisfactory, and that plenty of orders are coming in. Stocks are reported to be very light and assortments badly broken. In view of this, it was decided not to order a stoppage of the mills, as was anticipated, but to continue them in operation until further orders. The card rate was not changed.

Reports from Niles, Ohio, state that ten of the business men of that place have incorporated the Goshen Iron Company, with the view of purchasing the interest of the Ward Iron Company in the New Philadelphia rolling-mill. The new company designs paying off the liens on the mill as soon as possible, and will avail itself of the benefits accruing from the town according to the original contract. The capital stock is $300,000.

At Chicago, on the 12th inst., the Washburn & Moen Manufacturing Company, the patentees of barbed wire, filed a bill in court to restrain the Lyman Manufacturing Company from manufacturing more than 2500 tons of barbed wire annually, according to contract. The damages for over-manufacture are laid at $100,000.

At Clinton, Mass., the Clinton Wire Cloth Company is putting in apparatus for galvanizing the wire cloth at its mills. Hitherto, this part of the work has been sent elsewhere to be done.

A conference has been arranged for the 15th, between the proprietors of the South Chicago Rolling-Mills and a committee of the striking employés. It is understood that the men are ready to resume work on the company's terms, and the general impression is, that work will be begun in two weeks.

The Mont Alto Charcoal Furnace, 9½ by 43 feet, resumed work a short time since after an idleness of three months. Fire was lighted in the furnace on Tuesday morning, August 14th, and the output during the first twenty-four hours was 5¼ tons No. 2 and 8⅓ tons No. 1, a total of 14 tons of pig-iron. During the

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second twenty-four hours, the product was 30 tons No. 1 pig on less than 100 bushels of charcoal per ton of 2268 pounds of pig-iron. Since this remarkable start, the furnace has continued to do excellent work.

The Florence, Mich., *News* states that there is some talk among the Florence mine management of building a blast-furnace at the mine at no distant day.

The Fort Scott Machine Works, Fort Scott, Kansas, have received an order for a concentrator for the works of the late Alta-Montana mine.

GENERAL MINING NEWS.

ARIZONA.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—The furnaces have been closed down, and the work of clearing away and getting ready for the new plant of five furnaces and concentration-works has already begun. The Clifton *Clarion* says that the new plant will be built about ten feet higher than the present furnaces, on the side of the hill, which will give a good fall for the slag. The narrow-gauge railroad will be raised so as to come in about 70 feet higher up on the hillside than the furnaces, and a side-track about 40 feet below it. Large chutes will be erected to receive the ore as it is brought down from the mines, and bins and sheds will be built to contain the coke. The high-grade ore will pass from the chutes into the crushers and from there to the furnaces, and the ore of a low grade will pass into the concentration-works and then to the furnaces. A new water-power is also to be constructed. The water will be taken from the San Francisco River, and a flume 4000 feet in length, four feet deep, and seven and a half feet wide, will be built, which will furnish ample power for the new plant and also for any additional works that may be required in the future. Every advantage will be taken in constructing the new works to facilitate economical operation.

PIMA COUNTY.

A correspondent of the San Francisco *Exchange* says: The project of putting up reduction-works in Tucson is by no means dead. Every day shows more the need of them, and shows also that they will not only be a financial success themselves but a great advantage to the surrounding mining districts. There are many rich ledges in this vicinity which would not warrant reduction-works, but which could ship ore to Tucson and reap a large profit.

OMEGA.—This smelter will start up shortly.

PEER.—This mine is situated in the Quijotoa Mountains about eighty miles southwest of Tucson. The ledge is from 15 to 20 feet wide, and may be distinctly followed for 3000 feet, cutting through a high butte, where it displays itself clear to the bottom of the gulch. Five tons of the ore have been sent to Benson, and the owners received between $400 and $500 per ton. But little work has yet been done on the claims. The work going on now is sinking for water, the nearest water now being four miles from the mine.

PINAL COUNTY.

SILVER KING.—The damages made by the recent storms have been repaired and work continues as usual.

CALIFORNIA.

INYO COUNTY.

LASKY MILL.—Of late, this mill, at Beveridge, has not been running very steadily, and has been crushing only fifteen hours out of the twenty-four. Since the 22d of July, it has reduced 80 tons of Keynot ore which resulted in 340 ounces of gold at $14, amounting to $4760. Twenty-one tons of ore from the True Business mine were also crushed, which yielded 75 ounces of gold, worth $15 per ounce, amounting to $1125. The works are now in steady operation, and there is plenty of ore on hand.

COLORADO.

ARAPAHOE COUNTY.

EUREKA SMELTING AND REFINING COMPANY.—A small plant of machinery has been put up by this company in South Denver, where it is working ore by the new Brett process. It is claimed that by this process ore can be treated at from 90 cents to $1.15 a ton, or for $1.50 at the very highest. Three men are employed at the new works, which has a capacity of about fifty tons a day. It is understood that ground is looked for on which to erect capacious works, and that a party of capitalists is backing up the enterprise.

PUBLIC SAMPLING-WORKS.—This company, which has a plant at Black Hawk, has begun operations by erecting similar works in Denver. The works, it is estimated, will cost $25,000.

CHAFFEE COUNTY.

HORTENSE.—This mine has been leased. It is one of the best developed properties in the county, containing over two thousand feet of tunnel and drift. There is also a wagon-road to the mine, which cost $6000. A great deal of money has been expended on the property, and a considerable amount of good ore has been shipped. Only a small force has so far been put to work, but more men will be employed in a short time.

TWIN LAKE HYDRAULIC COMPANY.—A large amount of work will be shortly commenced by this company near Vicksburg. It will take out a ditch from Clear Creek, to work its placers in Cache Creek, which will involve the construction of about seven or eight miles of ditch and flume and a tunnel 1800 feet long through the divide between the creeks. It will be recollected that the company recently purchased the rich placers in Cache Creek, lately owned by the Gaff Mining Company. The chief difficulty heretofore experienced, a lack of water, will be entirely obviated by this new enterprise.

CLEAR CREEK COUNTY.

Under date of September 7th, Mr. Linwood O. Towne sends us the following notes from Rico:

GRAND VIEW.—Something of the nature of a "strike" has been taking place for the week past among a large number of the workmen employed by the company. Work at the smelter has, however, not been interrupted, new men being found without difficulty where necessary. Besides Rico mines, the Silver Bell of Ophir is furnishing a large and constant supply of ore to this smelter.

LITTLE MAGGIE.—This mine is now working a force of men, and shipping ore daily to the Grand View smelter. Development is being pushed by means of a tunnel now in 320 feet, and in incline, down 100 feet, with drifts from the latter. The shipments, which are mainly from the tunnel, consist of carbonate and sulphate of lead, running well in silver.

NEWMAN GROUP.—It is rumored that this group, on which, for some unknown reason, no work has been done all summer, will soon be opened and worked under the efficient management of Mr. F. W. Reed.

SOUTH PARK.—The main tunnel is now in 400 feet. Within a few days, a small quantity of low-grade lead carbonate was exposed, which, however, at once changed into the usual high-grade sulphide and native silver, which latter has been found in greater abundance in South Park than elsewhere in Rico.

MATTIE.—During August, seventy-one tons of smelting ore were shipped, which netted the company $7300. At present, the third level shows a continuous ore-body, which in the breast is about a foot wide solid, besides mineralized quartz aarying in width from six to twenty inches. The ore is mainly gray copper, and at this point seems even richer than that hitherto traversed. This month the output will be largely increased over August.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY.—The output of the Ute and Ulé for August was 600 tons. The new shaft from the third level of the Ute is 60 feet deep on a 4-foot vein. The quartz is banded with 10-inch streaks of mineral. Should the width of vein continue in the level below as above, it will open stoping ground for two years at an output of 300 tons a month. The Ulé drift west in the 7th level continues its usual production of ore. This level has been drifted 250 feet over a fine body of ore. The stopes above are producing largely. Up to September 1st, there were 2400 tons of concentrates stored in Lake City by this company.

LAKE COUNTY.

AMIE.—The No. 2 shaft has been leased, and parties are now making preparations to work the mine. The belief is current that quite a body of mineral still remains in the stopes to the south of the shaft, now inaccessible on account of the caving of some of the drifts. To reach the prospective bonanza, the present lessees will drive a drift on the 130-foot level to the southwest, and penetrate the old stopes.

BIG CHIEF.—The drift driven to the east and starting from a point near the Castle View shaft, is about 150 feet in length, and at its face a winze down 25 feet shows five feet of ore and 20 feet of good iron. The ore runs from 50 to 60 per cent in lead and from six to ten ounces in silver, and is a fine gray sand. The iron also runs well in silver.

CATALPA.—The lessees have done considerable exploration-work within the past few weeks, resulting in the development of several small ore-bodies. The mine has begun extracting ore and will resume shipments shortly.

CHRYSOLITE.—The iron incline from the Colorado shaft No. 2 is now within about 275 feet of the Roberts shaft. Recently the mineral showed a great improvement, but before development could be sufficiently advanced to prove up the prospective mineral body, the water drove the miners out. During the past few days, three pumps have been kept in active operation in the incline, and the water is lowering quite rapidly. The draining of the incline is also affecting the Roberts shaft, in which the water is falling at the rate of about two feet per day. The ore-shipments from the mine are about the same as for a number of months past. The company has about $240,000; one half of which is loaned out drawing four and six per cent, and the remainder is out on call loans. The revenue derived from its capital is ample to pay the expenses of the company in the East and leave a surplus. Although a great deal of expensive exploration has been done in the past twelve months, the earnings of the mine have been in excess of the expenditures, and the fiscal year will show a slight gain.

COLONEL SELLERS.—The lessees of the lower shaft are reported to have struck ore at a depth of 210 feet. The mineral is iron pyrites and galena. The Little Helen shaft, adjoining, is also reported in mineral.

DOLPHIN.—In this property, adjoining the Matchless mine on the south and west, new developments have been made recently, which promise to permit the mine to make extensive shipments of rich ore again. For some time past, the mine showed little or no pay ore, and considerable exploration-work was done, which finally resulted in opening a body of black iron ore, situated west of the working-shaft. The mineral carries no lead, but considerable chloride of silver.

HIBERNIA CONSOLIDATION.—The recent strike in the new south shaft on the May Queen claim proves to be one of the most important and remarkable discoveries made this year. For years past, exploration-work has been in progress on this hill, and innumerable new shafts have been sunk, without success, however, until the present shaft was put down. Sinking has progressed, and the development now shows twenty-one feet of ore, and the dump contains at least eighty tons of fine shipping mineral. The new strike gives promise of opening out a large shoot of ore, the trend of which is carrying it through the heart of the Hibernia Consolidation and other properties to the east.

IRON SILVER.—Several hundred tons of ore have already been taken from the recent strike in the Moyer shaft.

LEADVILLE GOLD AND SILVER MILLING COMPANY.—The mill, idle for some weeks past, will resume operations the early part of next week. The mill is now receiving ores from the Robert E. Lee dump, and, when started up again, will run regularly.

LITTLE CHIEF.—A settlement was made by this company with the smelter for the first ore from the new strike, and amounted to fifty-eight tons net weight. The ore averages 154 ounces to the ton. The mine also settled for a small lot of ore sorted from the old dump, which returned about $1000. The two settlements returned the company, $10,000, will be transmitted to the New York office. There are four additional lots of ore at the smelter, which will be settled for in a few days. Two of these are mineral extracted from the new ore-body, while the other two are second and third-class material. It is calculated that the mine will earn during September at least $20,000, and possibly considerably in excess of this amount. The new ore-body is not as solid at present as it was a week ago, the high-grade ore being scattered through the iron. One breast, however, shows about ten feet of $50-ore, while in portions several feet of $100 to $150-ore are exposed. The drifts running on mineral are advanced. The first, having a northwesterly course, has a length of forty-five feet, the other heads to the northeast, and is in ten feet. Both drifts show good ore.

The favorable result of the new strike shows itself in a dividend of $20,000, payable October 9th. This dividend is the first declared since August, 1880.

MAID OF ERIN.—That portion of this claim not in conflict has been leased to parties working the Big Chief mine. Considerable high-grade ore is taken out.

NEW PITTSBURG.—The Keene shaft, which had a depth of 217 feet when work was begun, is down 328 feet. A drift is driving from the bottom of the shaft to the southwest. An incline is also worked, having an easterly course. The product of the mine is not as large as it was some months ago. For some time past, the Heytrosser shaft has been worked for iron. The mineral carried from ten to twenty ounces in silver to the ton, and forty per cent of iron in excess of the silicon.

PILOT.—This mine, on Printer Boy Hill, recently shipped three loads of ore to the Elgin Smelting-Works, averaging about thirty dollars per ton above smelting charges. The mine is now reported to show about five feet of ore, from which assays have been obtained of seven ounces in gold and fourteen in silver to the ton.

PARK COUNTY.

The Hall Valley camp is fast coming into prominence, and bids fair to soon rank with the best ore-producing districts of the State. A correspondent of the Denver *Tribune* says that the extensive and very complete mill fitted up during the past year by the Quincy Mining and Milling Company has afforded an opportunity for treating the ores, which until now have lain on the dumps awaiting the time when the means for their treatment should be furnished. As a direct result, more claims have been worked this season than ever before. The Hall's Gulch Consolidated Mining and Tunnel Company has been working the past two years, and is now rewarded by a splendid showing of high-grade ore, particularly in the shaft now sinking on the Great Eastern. At a depth of 100 feet, a vein about two inches wide has appeared, showing black copper and silver glance. The ore-bodies in the several shafts and tunnels show veins of bismuth and copper ore, carrying silver from 18 inches to over three feet in width, and mill-runs on car-load lots give $85 to the ton, the ore showing richer as progress from the surface is made. A large force of men is at work day and night on this mine. The Manhattan is another claim owned and worked by this company, and is making an excellent showing at the present time. A large quantity of ore in the ore-house ready for shipment showed it to be rich in copper and galena, carrying a large percentage of silver.

The Ypsilanti Mining Company, located near the Great Eastern, is showing up well. A force of 30 men is now engaged day and night, and with the most satisfactory results. A large amount of ore is shipped daily for treatment. This property has been recently purchased.

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The Bullion Prince Mining Company is working day and night-shifts on its cross-cut tunnel, run to cut the Brooklyn and Tropic lodes, which have been found to be valuable by sinking shafts. The ore is galena and gray copper, carrying silver. A mill-run of ore taken from the Brooklyn shaft near the surface gave a value of $44 per ton at the smelting-works at Golden. These lodes will be cut by the tunnel at a depth of over 300 feet, and it is expected large ore-bodies will be developed when the Brooklyn lode is reached, which is now only a few feet from the breast of the tunnel.

The Lisbon Mining Company has a claim in the Whale Extension, so called on account of its being an extension and next adjoining the famous Whale mine. The ore shows at the surface, and only a slight excavation disclosed a solid pay-streak of galena and silver from four to six inches in width.

The Snake River Mining Company has a shaft 100 feet deep in the Rosalie, with tunnels running into the mountain from the shaft, from which shipments of ore have been made of satisfactory value to the owners, who are preparing to work the properties on a much larger scale than before. The ore is free-milling, showing silver only, and is easily worked. The smelter at Argo gives mill-runs of 61 ounces to the ton in ore taken less than 25 feet from the surface.

FANNY BARRET.—The large caves lately discovered in these workings are not in a proper condition to thoroughly explore; consequently but little is as yet known regarding the real mineral value of their contents. Large bodies of iron exist in every section yet examined, and it is thought that when they have been thoroughly examined in all their openings, some valuable mineral will be found.

PITKIN COUNTY.

TAM O'SHANTER & MONTEZUMA.—For some weeks past, these mines have been shipping largely and regularly to Cañon City. Recently, Governor Tabor leased the Ashcroft, formerly the Brooks & Bethune smelter, and arrangements were made for reducing the product of the mine near the premises. Metallurgists have been on the ground, and pronounce the project practical. The mines are capable of producing fifty tons a day, and able to keep the works in blast. The reduction of the ore, it is said, can be effected a great deal cheaper at the mine than at Cañon City, including freight on ore.

SUMMIT COUNTY.

SILVER WAVE.—A rich strike of sand carbonates was recently made in this mine on Battle Mountain. The ore-body is between sixteen and seventeen feet in thickness, and runs nineteen ounces in silver and 75 per cent in lead.

DAKOTA.

CALEDONIA.—The superintendent reports for the week ended September 2d: Ore produced, 300-foot level, 1050 tons; shipped, 595½ ounces of gold; value, about $10,250. East cross-cut on 400-foot level has reached hanging-wall; work discontinued in this direction. The south drift is in 5½ feet.

ESTRELLA DEL NORTE.—The clean-ups are yielding very satisfactory returns, and, according to local papers, fully justifying the high opinion entertained regarding those properties.

FATHER DE SMET.—The superintendent's report for the ten days ended September 1st shows: Ore extracted from first level, 1200 tons; second level, 1200 tons; third level, 620 tons. Ore milled, 2970 tons. Golden Gate, south header, second level, in 24 feet. On August 21st, the total length of header was 19 feet, instead of 20 feet, as reported. Contract work stopped, header being run on company account.

IRON CITY.—W. E. Fulton, who recently went to Deadwood to examine the silver mines of the Iron City Mining Company, reports that they are valuable properties. General Manager Porter has been removed for mismanagement, and the mines will be further developed.

IDAHO.

The Willoughby, Clifford, Geneva, and Euclid claims have been sold to an Ohio company.

BULLWACKER.—An experimental run of this ore was made recently. A sample lot of about 15 pounds was put through the furnace. The result was two bars of base bullion weighing about seven pounds, and assaying at the rate of 290 ounces of silver per ton.

QUEEN OF THE HILLS.—The ore of this mine is very bright and pure galena, going about 75 per cent lead and 104 ounces silver. A new strike was made recently in the tunnel 225 feet from the mouth, and at a vertical depth from the surface of 150 feet. The vein, where struck, and on which some drifting has been done, is in width from twenty to forty-two inches, varying in different places. Besides this width of solid galena, there are eighteen inches of second-class ore. This strike is in solid ground, and is of so much importance that the property is looked upon as being worth double what it was estimated at, and was offered for it ten days ago, when parties wanted it at $25,000. It is near the Minnie Moore mine, and is supposed to be similar in quality and extent.

MEXICO.

SANTA BARBARA MINING DISTRICT.

The Chihuahua *Enterprise* speaks of this district as follows:

Among the principal mining districts of this State, Santa Barbara takes a foremost place. The ores are all low, hardly any going beyond three hundred dollars per ton, and as low as twenty dollars. All the silver is carried by the carbonates and sulphurets of lead. To work these ores, a large concentrating-mill is erecting by the Tecolote Silver Mining Company, of Harrisburg, Pa., which acquired by purchase three mines, Tecolote, Tecolotes de Abajo, and Santa Maria de la Bufa. About one and a quarter miles from the mines, the mill is building, and of the railroad from the mines to the mill, 855 feet. As the property is situated on a very high mountain, in fact, the principal one of the district, all the ore to be milled can be taken out of the mines by tunnels, and no money will have to be spent for hoisting and pumping water. Two hundred and sixty-six feet of new tunnels have been run already in the vein, producing ores daily, and 270 feet of cross-cut tunnel, half-way up the mountain. The mill machinery and rails are already on the road.

MICHIGAN.

The following is the product of the mines named for the month of August:

	Tons.
Calumet & Hecla	1833
Quincy	332
Franklin	183
Atlantic	166
Allouez	111
Pewabic	55
Huron	53
Peninsula	51
Copper Falls	39
Grand Portage	39
Hancock	36

Mr. Edward Ryan has purchased 39 acres of land on Pilgrim River at its mouth, for a stamp-mill site, in connection with the valuable copper disclosures he is interested in lying to the southwest, near Six-Mile Hill, on the Ontonagon road. The Houghton *Mining Gazette* says that one of the leading advantages of this location for reduction-works consists in being able to "flume" water from Pilgrim River into a mill for mineral dressing purposes, thus saving the cost of pumping, which is an expensive item. Mr. Ryan has also organized a corporation, called the Houghton & Rockland Railroad Company, for the purpose of furnishing rock transportation facilities from the mining lands he is handling to the lake shore at Pilgrim River, and extending the road along the mineral range to Ontonagon County, if developments in the future out that way warrant its construction.

ANDERSON.—Work at this property has recently been attended with most gratifying results, the ore taking a sudden change for the better, being now almost entirely free from the bunchy quartz which has thus far appeared. The shaft is now down 115 feet in the ledge on the foot-wall side of the vein, and if the ore continues to improve as it has in the last four feet, the shaft will be sunk but a few feet farther, when a drift will be run across the vein to further determine its value.

CALUMET & HECLA.—The improved iron jig will soon be put in the place of the wooden jigger in the dressing-mills of this mine.

CONGLOMERATE.—The extensive surface improvements on this mine are now well in hand. The new dressing-works, which embrace one of the most complete stamp-mills on the lake, will be ready to go into operation in a month or so. The railroad from the mine to the dressing-works will be in running order by the first of October.

EMMET.—This company has decided to sink another shaft 1000 feet to the northeast of the one now going down, and which will be in swampy ground. It is expected this work will require about two years to see its completion.

LAKE CHICAGOAN.—The mine has been unwatered and mining operations resumed.

MILWAUKEE.—It is probable that work will be resumed shortly. Arrangements are in progress whereby the question of royalty will probably be adjusted to the satisfaction of all parties concerned. The new rate will probably be 40 cents per ton.

OSCEOLA.—Developments in the old Osceola mine, on the deposit lying immediately west of the conglomerate, continue promising, and the openings afford considerable copper considering their extent.

PENDILL.—What was left of the effects of this mine has been sold recently to satisfy the claims of creditors. The old location will be used by the Detroit, Mackinac & Marquette Railroad Company as a depot site.

MONTANA.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED.—A committee of stockholders, consisting of Hon. Thomas A. Hendricks, Judge E. B. Martindale, Hon. John C. Wright, and Hon. A. D. Lynch, who recently made a minute examination of the property and works of the company, make the following report to the board of directors regarding the management of Superintendent Knippenberg: The general management of the property, under Mr. Henry Knippenberg, is characterized throughout by intelligence, integrity, and economy. He has surrounded himself by the best class of men that could be collected in a large mining enterprise, and has succeeded in instilling into each the desire which is uppermost in his own mind, that is, to promote the interests of the stockholders. While we can not enter into details, we think it is proper to say that the company is peculiarly fortunate in securing the services of Mr. Knippenberg as general manager, and of Mr. James Parfet as superintendent of the mines. Mr. Parfet has displayed great skill in opening up the mines, and great energy and sagacity in keeping his reserves in sight, so as to be able at all times to point out the ores required to keep the concentrator and smelter employed, for a full year in advance, without additional development.

GALLATIN COUNTY.

EASTERN MONTANA MINING AND SMELTING COMPANY.—The smelter has started up on custom rock and is making weekly shipments. It is under lease to the Wills Mining and Smelting Company, and will be run regularly.

GREAT REPUBLIC.—The water-jacket smelter now erecting at Cooke City, to treat the ores of this and other mines owned by the company, will have a capacity of forty tons.

JEFFERSON COUNTY.

News from the mines around Boulder Valley shows the following:

ALICE.—While running an open cut on this claim, to find the vein before sinking a shaft, ore was found which returned 199 ounces of silver to the ton.

AMAZON MINING AND SMELTING COMPANY.—Some good ore is taken from the Lexington, the property of this company. The company's machinery has arrived in Helena, and will be sent to the mines at once.

BOBTAIL.—This mine is developed by a shaft 70 feet deep and another shaft 25 feet deep; the pay-streak is two feet wide, and produced very fine carbonates of lead on the surface; at the bottom, the ore is mostly galena. The ore is of a very good grade in lead and melts very easy. Several lots have been shipped, and yielded from 50 to 300 ounces in silver to the ton.

EQUITABLE.—The company owns some very promising prospects. Most of the work is done on the Willie location. The shaft sunk is now 55 feet deep, and the ore produced shows highest assays.

JOSEPHINE.—This claim, owned by the same parties as the Bobtail, shows about the same character of ore. The shaft is 25 feet deep, and at the bottom the vein proves to be seven feet wide.

STOCKTON.—A body of ore six feet wide, with only one wall exposed as yet, has been struck in the new shaft at a depth of 23 feet. The ore consists of a streak of galena about one foot thick, a sample of which assayed eighty-six ounces in silver and $35 in gold to the ton, the other five feet consisting of good concentrating ore. This lode is opened by four shafts, developing the vein for a length of over 200 feet, and there is good ore in every one of the shafts. A tunnel is now driving which will tap the vein 125 feet below the surface. The tunnel is 60 feet in, with about 90 feet more to run.

LEWIS & CLARKE COUNTY.

GLOSTER.—The work at the mine is progressing rapidly. The pan-sills are in for the new pan-mill, the grading is all completed, and the foundation-walls of the enormous building (200 by 60 feet and 80 feet high) are all laid. The excavations for the foundation for the large 300 horse-power engine are making. The entire sixty-stamp mill with twenty-four pans and twelve settlers, crushing 180 tons of ore per twenty-four hours, will be running by the 1st of November. The contractor has begun work on the shaft, and expects to sink 100 feet within ninety days. This shaft will be 18½ by 7½ feet, with three compartments.

SILVER BOW COUNTY—SUMMIT VALLEY DISTRICT.

CLARK'S FRACTION.—The developments at this mine, which lies between the Alice and Magna Charta properties, continue to demonstrate the value of the old Rainbow lode. The 40-foot ledge in the face of the 80-foot cross-cut has been fully described in previous reports. A drift has been run from the east 300 feet of the Alice, which has reached a point directly beneath the 80-foot workings, and a three-foot ledge of high-grade ore has been uncovered. The assays average 100 ounces, and several samples went from 280 to 530 ounces. The drift will be run through the Fraction 221 feet to the Magna Charta line, when cross-cutting and uprising on the ledge will be commenced.

SHONBAR.—The principal work just now is sinking the shaft for the 300, 400, and 500-foot levels. An additional pump has been put in at the 230, which keeps the water clear.

TRAVOLNA.—W. A. Clark has purchased S. E. Larabie's interest in this mine, in which the first discovery of silver in Summit Valley District was made by William Farlin in 1875. Mr. Clark is preparing to begin active operations in the mine.

NEVADA.

ELKO COUNTY.

INDEPENDENCE.—The superintendent's annual report shows that during the past year 267 17-20 tons of ore, averaging $322.88 per ton, have been extracted and milled. The Navajo Mining Company, having the mill in use, milled the ore

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at the rate of $25 per ton, net cost, and worked it to 93 per cent of the battery assay. Settlement was made at that percentage. We received and shipped to the Anglo Bank of California bullion to the amount of $62,910.45; and after deducting bullion discount, on the balance of the bullion, and paying for the milling of the ore, we received from the Navajo Company in coin $8472.07. The ore-seam averaged very small, but the grade of ore ran unusually high. This ore was extracted above the 300 level, and considerable work has been done in the same locality without discovering any more ore. Above this ore-chute, drifts and cross-cuts have been driven to the extent of about 200 feet, and a cross-cut on the level extended west a distance of 612 feet. Nothing of value was developed in these workings. The west cross-cut passed through a very hard formation, and the ventilation being very bad, progress was slow, and the work necessarily expensive. The main drift north on this level has been extended during the past year 380 feet. The formation encountered looks very favorable for ore; and in time, cross-cuts will be extended to the right and left, to thoroughly prospect the ground then opened. On the 400 level, a prospect-drift has been driven south 928 feet. It will be continued until it has reached a point under No. 1 shaft at the south end of the mine, which has been sunk to the depth of 190½ feet. At this point, connection with the shaft by an uprise will be made, thereby securing good ventilation. At present, a fan is kept running constantly, to enable us to work in the drift. As soon as this connection is made, cross-cuts can be extended at all favorable points. About 400 feet from the face of the drift, one cross-cut has been started east, and is in 105 feet, and one west advanced 18 feet. In this distance, nothing of note has been encountered. Considerable work has been done in repairing and retimbering old drifts, necessary to be kept open, in view of future workings. Although no development of any consequence has been made the past year, the prospects are flattering for good results, when cross-cuts are extended from the drifts now driving north and south on the 300 and 400 levels.

NAVAJO.—The following is a summary report by the superintendent of the work done during the past year: Although some bullion was shipped prior to my last annual report, no estimate was made of the results of the experimental mill-run, conducted for ten days previous to that date; but the results from the same will now be included in the total estimate of the milling done for the past year.

The mill-run covers a period of 321 days, of which the actual running time was 309½ days; showing a loss of 11½ days, including all stoppages. Milled 3955·6 tons of Navajo ore, and 282¼ tons of custom ore, making an average crushing of 13⅜ tons of ore per day. The average battery pulp-assay of the ore from the Navajo mine was $199.40 per ton, and was worked to 92·6 per cent of the battery assay; custom ore averaged $332.10 per ton, and was worked to 92 per cent.

Shipped bullion on customers' account to the amount of $64,863.42. On Navajo account, to the Bank of California, from Navajo ore $730,379.38; from custom ore, $21,549.37; from profits on custom ore, $2206.58, making a total production in bullion of $818,898.75 (assay value) from the 21st July, 1882, to the 7th June, 1883; of which amount $729,874.58 was shipped during the fiscal year on company account.

The quantity of ore crushed for a battery of ten stamps, and the percentage to which it was worked, has been unusually satisfactory. The condition of the mill for the last half of the run added materially to the cost of reduction, and the repairs required on the engine necessitated a suspension of work for a considerable length of time. The mill is now repairing, and, when completed, will materially reduce the cost of milling. Since the Grand Prize works were destroyed by fire, we have been without a supply of water. Will now make connection with the Navajo works, in anticipation of a partial and perhaps a sufficient supply when water is encountered on the 650-foot level.

During the past year, the shaft has been sunk 330 feet, making its total depth 680 feet. The formation encountered was extremely hard and difficult to work, requiring ten months' steady work to sink it to its present depth.

The ore reserves on the 650, 500, and 450 levels are sufficient to supply the mill for a considerable length of time, although the grade of ore may be as much lower, as that milled the past year has proved to be higher than it was placed at in my estimates of last year.

As soon as the compressor is in working order, pipes will be laid to conduct compressed air to the various points where work is in progress, and power drills will hereafter be used in place of hand-drilling, which we expect will result favorably in an economical point of view, as well as speedier work, of which there is no doubt, as the rock encountered in this mine is extremely hard, and, by hand-drilling, progress necessarily slow and expensive.

Prospect-work has been carried on to an extent to readily determine, at a nominal expense, the value of as many new levels as have been explored during the past five years.

WHITE PINE COUNTY.

MARTIN WHITE.—At the annual meeting, held in San Francisco recently, the following report was presented:

We have run on the upper level 286 feet of drifts. In doing this, we have extracted 120 tons of ore, assaying from 30 to 200 ounces and over. One half of a ton that was put in sacks will assay 5000 ounces per ton. We have also found a good body of ore, into which we have drifted twenty feet, and the ore taken out will assay 80 ounces altogether. The vein is wider than the drift, but I do not know how much. From the location of this ore and its character, I think it is the most valuable body of ore that has been opened within the year. We have worked out stope No. 1 on the 160-foot level, from which were extracted about 400 tons of ore, assaying 30 ounces and upward, besides a large amount of second-class ore that will be worked at a profit some future time. We are now working in two places on this level with fair promises as to ore. We are also working on a small body of ore in the Mountain Pride tunnel that promises well, the ore assaying over 30 ounces. This body or vein has been drifted on about thirty feet. Some of the distance, the drift cuts all the ore; in others, the ore extends beyond the sides or limits of the drift. Although small, this is the best find of ore that we ever had on this level in my estimation, as it is directly under the best ore-bodies of the upper levels, and it will probably connect with them.

The secretary's report shows that there is $33,513.30 worth of supplies on hand and ore extracted valued at $44,182.30.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents have been granted by the General Land-Office since the last date:

ARIZONA.

TUCSON DISTRICT.

Solomon Warner, Santa Tomas lode. Horseshoe Mining Company, Alta lode. Merrimac Silver Mining Company, Lucknow lode. Heirs of Jacques Traves, deceased, Mariquitta lode. Joseph McCarter, Cuprite lode. Philip Corbin *et al.*, Hendricks lode.

CALIFORNIA.

MARYSVILLE DISTRICT.

J. M. Ward, placer. John A. Edman, Victor and Diadem quartz mines. Albert E. Malmlund, Red Point quartz mine. B. B. Jordan, placer. Floyd Taber, placer.

SACRAMENTO DISTRICT.

Gold Hill Mining Company, Gold Hill quartz mine. Charles Hegarty, Gold Beater quartz mine. Digory Hobbs *et al.*, California quartz mine. James L. Sperry, placer. A. Chichizola *et al.*, placer. Thomas Legg *et al.*, Chicago quartz mine. George G. Allen, California Consolidated quartz mine.

STOCKTON DISTRICT.

Alvin A. Preston *et al.*, Grecian Bend placer.

COLORADO.

CENTRAL CITY DISTRICT.

Annie R. Sprenger *et al.*, Edinburgh lode. Benjamin T. Wells, Seven Twenty lode. Robert M. Richardson *et al.*, My Daisy lode. Peter D. Graham, Graham lode. Consolidated Bobtail Gold Mining Company, Warnick lode. Clarence Stephens, Harrison lode. Alfred E. Lea, Cornet No. 2 lode. John Turck, Aliunde Tunnel No. 1 lode. Enoch J. Coffman *et al.*, Lord Byron lode. George W. Hall, What You Please lode. Diamond Tunnel Gold and Silver Mining Company, of Baltimore City, West E. K. Baxter Sulphuret lode. Winnebago & O. K. Mining Company, Dean lode. W. G. McDowell *et al.*, Nellie Maud lode. Laura Schwartz, Silver Glance lode. Samuel Dagenais, Dum Spiro Spero lode. Charles P. Baldwin, Highland Laddie lode. John Olsen *et al.*, Mammoth lode and mill-site. Pelican & Dives Mining Company, Bertha lode. D. C. Barber *et al.*, Tamaroa and Du Quoin lodes. William Williams *et al.*, Last Chance lode. H. B. Benton, Baltimore Belle lode. A. H. Colburn, Sporting Times lode. Jacob Geyer, Maverick lode.

DURANGO DISTRICT.

E. J. Warner, Boston placer. Thomas Blair, placer. Oriental Mining Company, Oriental lode. Abbie A. Bock *et al.*, Tornado No. 1 lode. Cleveland Consolidated Mining Company of Colorado, Cumberland and Alabama lodes and mill-sites. D. A. Cook *et al.*, Catalpa lode. Dolores Silver Mining Company, Atlantic Cable lode.

LAKE CITY DISTRICT.

Dennis Kenyon *et al.*, Jim Fisk lode. Summit Mining Company, Summit lode. Belle of Ouray Silver Mining Company, Belle of Ouray lode. Riverside Tunnel and Mining Company, Riverside lode and mill-site. George N. Propper *et al.*, Grizzly Bear and Seventy Six lodes. Providence Mining Company, Belle of the West lode and mill-site. J. W. Strayer *et al.*, Cincinnati lode. Eugene Parsell, H. D. Nye and Bonanza King lodes. Manhattan & San Juan Silver Mining Company, Occident lode. Indian Chief Mining and Milling Company, Extension lode. Henry Lawrence *et al.*, J. B. Trickey lode.

LEADVILLE DISTRICT.

Warrior's Mark Mining Company, Ætna, Warrior's Mark, Warrior's Mark No. 2, Cassandra No. 1, Cassandra No. 2, Cassandra No. 3, Cassandra No. 4, Cassandra No. 5, Queer Name No. 1, and Queer Name No. 2 lodes. Excelsior Consolidated Gold and Silver Mining Company, Little Hattie lode. Thomas S. Wells, placer. W. Z. Ransom *et al.*, placer. Alleghany Mining, Smelting, Tunneling, and Milling Company, placer and Randell placer. George M. Robison *et al.*, Laura lode. Charles F. Reynolds *et al.*, Main lode. B. B. Hugus *et al.*, Alpha, Maverick, and Beta lodes. John S. Harris *et al.*, Hiland Chief, Miller, Dolphin, and Hazeltone lodes. Moses H. Evans, John C. Godfrey lode. George E. Pease *et al.*, First National and Nisi Prius Extension lodes. Harold Godwin *et al.*, Germania lode. J. W. Kennedy *et al.*, Pointer lode. Diana Mining Company, Diana lode. John A. Smith *et al.*, Omega and Alpha lodes. H. C. Bostwick, Mineral Point, Big Smoke, and Little Lilly lodes. Lyman Fay, Rip Van Winkle lode. E. J. Hawkins *et al.*, Hoosier lode. J. P. Whitney, Claremont lode. George Yule *et al.*, Pacific lode. Pitkin County Mining Company, Bob Ingersoll lode. George S. Newman *et al.*, Cod Fish Balls lode. John R. Bensley *et al.*, Montreal lode. William R. Pollock *et al.*, Cassa lode. Federal Silver Mining Company of Colorado, Henry D. Foote and B. F. Warren lodes. New Haven Mining Company, Bullion lode. Sidney S. Chapman, Aërie lode. Monarch Mining Company, Great Monarch lode. William A. Morrison *et al.*, Susquehanna lode. John Boylan *et al.*, placer including lodes. J. W. Smith *et al.*, Montezuma lode and mill-site. Abner R. Brown *et al.*, Silver Crown lode. Charles G. Arnold, placer.

PUEBLO DISTRICT.

W. J. Schoolfield *et al.*, Rappahannock lode. Richard Irwin *et al.*, G. W. lode. James Turner *et al.*, Denver No. 2 lode and mill-site.

DAKOTA.

DEADWOOD DISTRICT.

Jacob H. Benham *et al.*, Eureka lode. James ——, Chief of the Hills No. 2 lode.

IDAHO.

BOISE CITY DISTRICT.

Vienna Consolidated Mining Company, Alturas lode. James B. Haggin, Pittsburg lode. Ornament Gold and Silver Mining Company, Trade-Dollar and Ornament lodes and mill-sites. Robert C. Chambers *et al.*, Sentinel lode and mill-site. Ohio Consolidated Gold and Silver Mining Company, Ohio North and Ohio South lodes and mill-sites.

MONTANA.

HELENA DISTRICT.

Daniel C. Noble, Company and Company No. 2 lodes and mill-sites. Edward King, placer. Marcus Daly, Rob Roy lode. Lee Mantle, Britannia lode. Henry Elling *et al.*, Strawberry lode. George Woodworth *et al.*, Black Hawk lode. O. B. O'Bannon, placer. Thomas Ford *et al.*, Elm Orlon lode. William A. Clark *et al.*, Piccolo lode.

NEVADA.

CARSON CITY DISTRICT.

Ferdinand S. Van Zandt, Bonanza and Alameda No. 2 lodes. J. B. Overton, Santa Rita lode. Auburn Consolidated Gold Mining Company, Paine and Silver State lodes.

EUREKA DISTRICT.

Madeline Goetz *et al.*, Star of the West lode. A. L. Fitzgerald, Geraldine lode and mill-site. Nicholas Barlow *et al.*, Belle of the West No. 2 lode. Luther Clarke, Central Consolidated lode. J. A. Miller, Perkins lode. Falcon Mining Company, Gazelle and Henry Clay lodes. Thomas Wesry *et al.*, Central Hill lode.

NEW MEXICO.

LAS CRUCES DISTRICT.

Thomas F. Conway *et al.*, Ivanhoe lode. John D. Bail *et al.*, Contention lode. Mimbres Mining and Reduction Works Company, San José lode.

SANTA FE DISTRICT.

Abraham Spiegelberg *et al.*, Bourbon and Norma lodes.

OREGON.

LA GRAND DISTRICT.

Samuel Colt and Hiram Colt, placer.

UTAH.

SALT LAKE CITY DISTRICT.

Samuel W. Smith *et al.*, Cornucopia ledge and Company and Silver Coin lodes. Silver Key Mining Company, Old Judge lode. Lehi W. Jones, coal. George J. Marsh, coal. New Bedford Silver Mining Company of Utah, Lackawaxen and Sallie Murphy lodes.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Sept. 14.

The mining market this week has shown considerable activity, and better prices have prevailed. The chief interest has been centered in the Leadville stocks, which have been quite active and strong. This is owing to several important strikes having been made in the district, and the prospects of early dividends being declared by some of the companies having mines there. Amie leads in the transactions, and, as a dividend has been declared, it sold quite strong. Little Chief was also very strong under reports of a rich strike. The fancy stocks have come in for a good share of the business done, but about the only one which has shown any change in price has been Robinson, which has been weak. Eastern Oregon has been allowed to drop back to its normal figures, the "bull" clique evidently becoming tired of booming it. The total number of shares aggregates 165,926 shares, as against 133,810 last week.

The Comstock shares were very moderately dealt in at about steady prices. California was quiet and a little weak, selling from 30@24c. Consolidated Virginia was also quiet and irregular; it sold from 56@53@54c. Sierra Nevada was weak, under a very small business, selling from $5.50@$4@$4.25. Union Consolidated was quiet and steady at $4.90@$5. Ophir sold at $4.25; Gould & Curry at $3.25; Hale & Norcross at $4.70; Yellow Jacket at $3; and Best & Belcher at $4.40. These stocks all record but one transaction each. Sutro Tunnel was very quiet and steady, selling at 19c.

The Leadville stocks show a decided improvement both in the dealings and prices. This is owing to several rich strikes recently made in this district. Amie was very active and quite strong, selling from 13@23c. This company has recently declared a dividend, the first in several years. It is rumored that this dividend was declared by the present managers, in order that they might retain the control of the company, as there has been a decided disposition on the part of some of the stockholders to oust them from the management. Chrysolite was also strong, with a fair business, selling from $1.10@$1.25@$1.15. Dunkin was quiet and steady, selling from 32@36@35c. Breece sold from 19@18c. Iron Silver was quiet and steady at $3.10@$3@$3.05. A rich strike has been made in the Moyer shaft of one of this company's mines, and it is reported that a dividend will soon be declared. Leadville was quiet and steady at 32@30c. Little Chief was active and quite strong, selling from 47@61c. A rich strike is reported to have been made in this mine. Little Pittsburg was also strong, with a small business, selling from 57@63c. Climax sold from 10@8c.; the business was small.

The Bodie stocks were quiet and steady. Bodie Consolidated was quite strong under a small business, selling from 70@95c. Standard was a little weak, under small transactions, selling from $5.50@$5.25. Bulwer sold at 70c. North Standard was quiet and steady at 7@10c.

The Tuscarora stocks were very quiet at steady prices. Navajo was quiet at $2.50. North Belle Isle was moderately dealt in at steady prices, selling from 47@45c. Elko Consolidated suffered a slight decline from last week, under an active business; it sold from 12@10c.

In the miscellaneous list, Alice was quiet and steady at $2.10@$2.15. Eureka Consolidated was quite strong, with a fair business, selling from $7.13@$7.63. Green Mountain was quiet and steady at 70c. Hall-Anderson was fairly dealt in and was steady; it sold from $1.25@$1.15. Horn-Silver was quiet and strong, selling from $7.13@$7. This mine is reported as looking very well. The annual meeting of stockholders will soon take place in Utah. Northern Belle was moderately active and was a little weak; it sold from $6.18@$5.88. Robinson Consolidated was very active and weak; it sold from 47@37@38c. Sierra Grande was very quiet at steady prices, selling at $1.05.

Alta-Montana was quiet and steady at 4@5c. Barcelona was active and irregular, selling from 34@49@40c. Central Arizona was quiet and strong, selling from 25@30c. Eastern Oregon was quite weak from its recent strong prices, with a small business, selling from 40@46c. Oriental & Miller sold from 12@10c., with small transactions. Sonora Consolidated was quiet and steady, selling from 24@30@27c.

The Secretary of the Tombstone Mill and Mining Company writes us that the company has just completed the payment of another installment of $25,000 on its funded debt; that the mill and furnace are now running regularly; and that the mines promise well for the future.

MEETINGS.

Dunkin Mining Company. Office of the company, Leadville, Colorado. Election of trustees and the transaction of such other business as may come before the meeting, October 12th, at twelve o'clock M.

The Horn-Silver Mining Company. Office of the company, Frisco, Utah. Annual meeting of stockholders and election of trustees on Tuesday, October 12th, at twelve o'clock M.

Little Chief Mining Company, No. 137 Broadway, New York City. Annual meeting of stockholders and election of trustees, October 2d, from twelve o'clock M. to two o'clock P.M.

The Sierra Grande Mining Company, the Sierra Bella Mining Company, the Sierra Apache Mining Company. Office of the company, Lake Valley, Mexico. Annual meeting and election of trustees, September 26th.

The Yedras Mining Company, No. 62 Cedar street, New York City. Special meeting of the stockholders Friday, September 21st, at twelve o'clock noon.

DIVIDENDS.

The Amie Consolidated Mining Company, of Colorado, has declared a dividend of five cents per share on the capital stock, payable at the office of the company October 2d, 1883. The transfer-books will close September 24th, and reopen October 10th, 1883.

The Barclay Coal Company, of Pennsylvania, announces a semi-annual dividend of three per cent, payable September 15th.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 12) of two per cent on the capital stock, payable September 18th.

The Homestake Mining Company, of Dakota, has declared a dividend (No. 61) of $50,000, payable September 25th. Total dividends to date $2,212,500.

The Little Chief Mining Company, of Colorado, has declared a dividend of $20,000, or ten cents per share, payable October 9th.

The Oro Grande Mill and Mining Company, of California, has declared a dividend of $24,000.

The Plymouth Consolidated Mining Company has declared a dividend of fifty cents per share.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

During the latter part of last week, there was a dull dragging market, in the neighborhood of $1.08 for petroleum. On Monday morning, the announcement was made that the monthly statement for August of the United Pipe Line Company, instead of showing an increase of stock over the preceding month of about 80,000 barrels, showed a decrease of 197,000 barrels in gross stocks. It has been six or seven years since the surplus was reduced in any one month, and this fact was used as a pretext for manipulating the market to higher prices, forcing the shorts to cover and every body to go long. Under the influence of this statistical showing, and the advance to 8⅝ of refined oil, free buying was stimulated and the bulls were triumphant.

On Wednesday, the market opened at $1.16, sold up to $1.16¼, the highest point this month, when a general selling movement developed, carrying prices down to $1.12½. Meanwhile, the price of refined was reduced to 8⅛@8¼, and the fact became apparent that the "runs," or receipts, exceeded the shipments 23,000 barrels, and the decrease in gross stocks was due to the Pipe-Line Company charging off on its books over 200,000 barrels of oil. This was really deceptive to the trade until the figures were analyzed and the explanation given. Now, however, up to the 11th inclusive, the shipments nearly exceed the deliveries about 150,000 barrels, and September will probably show a real decrease in oil on hand. The charters for export are large, being at the rate of 55,000 barrels daily this month, against 49,000 in August and 39,000 in July.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 8.....	$1.08	$1.08¾	$1.07⅞	$1.08¾	747,000
10.....	1.09	1.17⅞	1.08⅞	1.11⅞	3,514,000
11.....	1.13⅛	1.15⅞	1.12¼	1.15⅞	4,954,000
12.....	1.16	1.16⅝	1.11⅞	1.12⅛	5,890,000
13.	1.12⅞	1.13¼	1.11⅝	1.11⅝	3,031,000
14.....	1.12	1.12½	1.11⅛	1.11⅛	1,606,000
Total sales.					19,742,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Sept. 7.	Sept. 8.	Sept. 10.	Sept. 11.	Sept. 12.	Sept 13.
Albion	....	....	....	....	....	....
Alpha	2¼	2¼	2¼	2⅛	2⅝	2⅛
Alta	1⅝	1⅝	1⅝	1⅝	1½	1⅝
Argenta	.10	....	....	....	....	....
Bechtel	....	....	....	....	....	....
Belcher	1	1⅛	1⅛	1⅛	1¼	1⅛
Belle Isle	....	....	....	....	.25	.30
Best & Belcher	4	3⅞	3⅞	3⅞	3¾	3¾
Bodie	.60	.55	.55	.75	1	.70
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.25	.25	.25	.25	....	.25
Challar	3¼	3¼	3¼	3¼	3	3⅛
Con. Virginia	.55	.60	.60	.55	.55	.55
Crown Point	1¼	1¼	1¼	1⅜	1⅜	1⅜
Elko Cons	....	....	....	....	....	....
Eureka Cons	7⅛	7⅛	7⅛	8	8	7⅞
Exchequer	....	....	....	....	....	....
Gould & Curry	2¾	2¾	2¾	2¾	2¾	2¾
Grand Prize	....	.10	.10	.10	....	.10
Hale & Norcross	5	4¾	4¾	4⅛	4	4⅛
Independence	....	....	....	....	....	....
Martin White	....	....	....	....	....	....
Mexican	3½	3½	3½	3⅜	3¼	3¼
Mono	....	....	....	....	....	....
Mount Diablo	4½	....	....	4⅝	4⅝	....
Navajo	2⅝	2⅝	2⅝	2⅝	2¼	2⅝
Northern Belle	6¼	6¼	6¼	6	....	6⅞
North Belle Isle	....	....	....	....	....	....
Ophir	3¾	3¾	3¾	3¾	3¾	3⅝
Overman	....	....	....	....	....	....
Potosi	.80	.85	.85	.85	.75	1¼
Savage	2¼	2⅛	2⅛	2	2	2
Scorpion	.60	.50	.50	.60	.55	.60
Sierra Nevada	3¼	3¼	3¼	4¼	4⅛	4⅛
Silver King	....	....	....	....	....	....
Tip-Top	....	....	....	....	....	....
Union Cons	5	5	5	5	5	5
Utah	2¾	2¾	2¾	2⅝	2⅜	2⅝
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3¼	3⅜	3⅜	3½	3⅛	3¼

The following are the financial balances of the various mining companies on September 1st:

CASH ON HAND.

Alta	$32,784.66	‖ Day	$22.53
* Argenta	866.32	Gould & Curry	30,841.27
Andes	9,507.00	Hale & Norcross	4,985.92
† Albion	363.55	Jackson	3,849.85
Benton Con	8,476.11	Mexican	5,002.62
Best & Belcher	362.23	Northern Belle	13,290.13
Bulwer	914.08	Ophir	76,073.29
Bodie Con	13,287.02	Occidental	5,860.01
‡ Belcher	24,786.00	Potosi	8,158.34
Crown Point	23,591.28	Scorpion	168.77
§ Con. Virginia	87,161.26	Standard	132,706.73
California	1,802.81	Sierra Nevada	15,608.45
Con. Imperial	4,479.19	Savage	22,509.63
Challar	8,755.61	Utah	9,455.57
Challenge Con	5,365.28		

INDEBTEDNESS.

** Grand Prize (overdraft)	$10,063.56	Martin White (cash overdraft)	66.11
Lady Washingt'n	4,052,98		

** Outstanding draft $2,000.
* Albion indebtedness, exact amount not yet known; approximate $260,000.
† Due Sutro Tunnel Company, $10,920.
‡ Monthly expense of mine, amount unknown.
§ Outstanding drafts, $5,728.98.
‖ Bills payable, $91,151.81.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, September 13.

The market for copper stocks has been quite strong the past week, and orders to purchase some of the best mines have resulted in an advance of prices, while but few stocks have been sold and but a limited amount offered. There is no change in quotations for ingot copper; but there is a firm tone to the market which, no doubt, strengthened the belief that some of the stocks have been selling below their value, and at present prices are undoubtedly low, and warrant an advance before the winter season sets in. Quincy has been in most active demand, and although less than two hundred shares are reported as sold, the price has advanced from $46@$53½, closing, however, at $52 bid, $53 asked. Calumet & Hecla advanced to $245, a gain of three points. Very little stock is offered, and it is difficult to fill orders at current prices. Franklin advanced from $9⅞@$11, with sales of 300 shares. This stock has been unduly depressed, and ought to sell higher. The non-payment of the expected dividend has, no doubt, had its

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influence on the stock. Osceola is steady at $18, with but little stock in the market. Atlantic advanced $\frac{1}{4}$, with sales at $10\frac{1}{4}$. Huron was strong in the early part of the week, at $1\frac{7}{8}$, without bringing out the stock; but later, from some reason which we could not learn, a block of 500 shares was put on the market and offered down to $1\frac{1}{2}$ before finding a purchaser, and to-day $1\frac{3}{8}$ was the best bid. Pewabic sold at $3\frac{1}{8}$; but there is not much demand for it, as the outlook is not so promising as its friends could wish.

In silver stocks, there is very little doing. Bonanza Development was the most active, and advanced from $1\frac{1}{8}$@$1\frac{7}{8}$ on sales of 750 shares. Catalpa sold at 37½c., and very dull. It is reported that the mine is just about paying expenses, and not much outlook for a dividend this year. Sullivan advanced from 87½@97½c., at the Mining Board, where the stock has been quite active. Sales on buyer's option, 30 days, were made at $1.02½. Bowman Silver has ruled heavy for the week, and sales reported at 16c., and but little doing in it. Massachusetts & New Mexico, steady at 5@6c, the latter on buyer's option. Dunkin sold at 30c., but to-day 33c. was bid, 37½c. asked.

3 P.M.—There has been literally nothing doing in mining stocks to-day at the regular Stock Board, and very few sales at the Mining Exchange. We giv closing quotations: Calumet & Hecla, $245 asked Franklin, $10½ bid, $11⅛ asked. Huron, $1¼ bid. Osceola, $17½ bid, $20 asked. Pewabic, $3 bid, $3½ asked. Quincy, $49 bid, $52 asked. Allouez, $1¾ asked. Atlantic, $9 bid, $11 asked. Silver Islet, $2 bid. Bonanza, $1¾ bid, $1⅛ asked. Catalpa, 35c. bid, 37½c. asked. Sullivan, 90c. bid, $1 asked.

METALS.

NEW YORK, Friday Evening, Sept. 14.

Copper.—The firm tone repeatedly referred to in recent issues continues. There are few sellers of Lake copper and a limited number of buyers, but better prices are paid. We quote 15⅛@15¼c. Other brands are slightly higher, 14⅛@14¾c. according to brand.

England is a little better, cabling £63 10s. for Chili Bars.

The following are Messrs. James & Shakspeare's statistics for the month of August:

	Aug 1 to 31. Imports. Tons.	Deliveries. Tons.	
Fine foreign, chiefly Australian.	699	1,152	London.
Chili Bars	715	1,378	Liverpool and Swansea.
Chili Ingots	350	335	
Chili In ores and regulus	Nil.	Nil.	
American	1,390	1,430	
Spanish precipitate and sundries.	3,074	2,453	
Totals, England	6,228	6,748	
American	670	710	France.
Chili bars, ingots, and Barilla	2,394	2,496	
Sundries	35	35	
Total, England and France	9,327	9,989	

	Stocks. Aug. 31 Tons.	July 31. Tons.	
Fine foreign, chiefly Australian	4,078	4,531	London.
Chili Bars	23,334	23,997	Liverpool and Swansea.
Chili Ingots	451	436	
Chili In ores and regulus	1,813	1,813	
American	138	178	
Spanish precipitates and sundries	4,457	3,836	
Totals, England	34,271	34,791	
American	390	430	France.
Chili bars, ingots, and Barilla.	2,047	2,149	
Sundries	30	30	
Total, England and France	36,738	37,400	
Advised by mail and telegram:			
Chili	11,207	11,147	
Australian	900	1,000	
Stock and afloat, gross total	48,845	49,547	

The pith of the statistics is given in the following figures for the first eight months of the year:

	Jan. 1 to Aug. 31. 1883. Tons.	1882. Tons.	1881. Tons.
Imports	60,421	51,353	49,789
Deliveries	58,810	53,609	53,246

This shows a very heavy increase in the imports, and a less marked growth in the deliveries.

Tin.—There has been considerable speculative activity, London holding at £94. We quote spot values: Straits, 21c.; Australian, 21⅛c.; Billiton, 21⅛@21⅝c.; and Banca, 21¾c.

Lead.—There has been some activity, and the happenings of the past few days have borne out the views which we print editorially to-day. There have been sales of 300 tons, ordinary Germania and other Western lead, at 4·32½c.; and as we go to press, it is rumored that an additional lot of 300 tons of Germania Common has been disposed of at a slightly lower figure. There have also been sold 180 tons of Germania Refined and 100 tons of another brand of Western Corroding at 4·35c., both to one white-lead manufacturer, while the common lead has been pretty widely distributed. These sales indicate clearly that, as soon as any effort is made to place even moderate quantities of lead, the market swerves under it. So far as the Western holders are concerned, their policy is apparently to keep our market here high, in order that its quotations may serve as a basis for the many minor transactions in other manufacturing cities, which take their cue from us. It is evident that, if any attempt were made to force a larger quantity on our market, it would promptly fall off under the weight. We quote 4·33½c. for Common, and 4·35c. for Refined.

From St. Louis, Messrs. John Wahl & Son wire us to-day:

The market is a little easier. We record sales of 160 tons of Refined at 4·08c. and quote Common nominally 4@4·02½c.

Messrs. Everett & Post telegraph from Chicago as follows:

For both Common and Refined, there is a fairly active demand, and the prices are stiffly held, offerings being only moderate. Otherwise, there is no change of any description, quotations being nominally 4·10 4·12½c.

Spelter.—The firmer feeling still prevails, and it would be difficult to shade 4½c. for ordinary Western. Silesia is held at 5@5⅛c., without any business doing.

Antimony.—There is nothing new to report in this market.

BULLION MARKET.

NEW YORK, Friday Evening, Sept. 14.

Nothing worthy of comment has occurred in the silver market abroad or here since our last week's ratings.

Date.	London. Pence.	N. Y. Cents.	Date.	London. Pence.	N. Y. Cents.
Sept. 8	50⅝	109⅞	Sept. 12	50⅝	110
10	50⅝	109⅞	13	50⅝	110
11	50⅝	110	14	50 11-16	110

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended September 14th, as compiled from various sources, amounted to $181,300, as against $193,000, reported for the previous week. The receipts from January 1st, 1883, to date are $7,988,274.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended September 8th	$450,590
Corresponding week last year	170,000
Since January 1st, 1883	9,828,766
Corresponding period last year	43,626,267

Imports.

Week ended September 8th	$225,480
Corresponding week last year	28,311
Since January 1st, 1883	10,466,971
Corresponding period last year	2,607,338

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, reduced the bank's minimum rate for discount from 4 to 3½ per cent. During the week, the bank gained £140,000 bullion, but the proportion of its reserve to its liabilities was reduced from 47 11-16 to 46¼ per cent, against 39 3-16 per cent at this date a year ago. September 13th, the bank gained £29,000 bullion on balance. The weekly statement of the Bank of France shows losses of 2,575,000 francs gold, and of 4,475,000 francs silver.

Purchase of Silver Bullion.—The Treasury Department purchased 296,000 ounces of fine silver to-day for the mints at Philadelphia, New Orleans, and San Francisco.

BULLION PRODUCTION FOR 1883.

Mines.	States.	Month of August.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$568,441
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"		12,604
Bodie, G. S.	Cal		161,728
Bodie Tunnel, G.	"		52,742
*Bonanza King, G.	"		379,434
*Boston & Montana, G.	Mont	5,274	128,830
*Central Arizona, S.	Ariz		35,845
*Christy, S.	Utah		162,513
*Chrysolite, S. L.	Colo	21,379	284,308
Consolidated Bobtail	Colo		18,723
*Contention, S.	Ariz		635,413
Crescent, G.	Cal		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		241,617
*Derbec Blue Gravel, G. S.	Cal		72,270
Dunkin, S. L.	Colo		32,015
Evening Star, S. L.	Colo		47,061
*Father de Smet, G.	Dak		208,851
*Frisco M. and S. Co., G. S. L.	Utah		§77,084
Gunnell, S.	Colo		58,828
*Head Center Consolidated	Ariz		28,368
*Head Center and Tranquillity	Ariz		80,198
*Hecla Consolidated, G. S.	Mont		293,922
*Homestake, G.	Dak		586,674
*Hope, S.	Mont		62,447
Horn Silver, S. L.	Utah		1,847,000
*Howell S. and Mg. Co., G. S. L.	Ariz		41,361
Idaho, G.	Cal		88,642
*Independence, G. S.	Nev		32,921
Iron Silver, S. L.	Colo		503,831
*Jocuistita, S.	Mex		‡258,959
*Kentuck, G. S.	Nev		15,412
*Lexington, S.	Mont	112,147	856,703
*Little Pittsburg, S. L.	Colo	12,414	54,505
*Marguerite, G.	Cal	3,034	65,594
*Martin White, G. S.	Nev		136,317
Morning Star, S. D.	Colo		84,423
*Moulton, G. S.	Mont		123,288
Mount Diablo	Nev		262,100
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S.	"		447,040
*Ontario, S. L.	Utah	194,283	1,409,544
*Oxford, G.	N. S.	4,734	45,265
*Phœnix, G.	S. C.		10,700
*Pinal Consolidated, S. L.	Ariz		181,485
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		101,241
*Silver Cord, G. S. L.	Colo		703,333
Standard, G.	Cal		738,401
Star, S.	Nev		27,095
*Stormont, S.	Utah	23,377	176,105
Syndicate, G.	Cal		38,428
Tintic M. and M. Co.	Utah		25,196
*Tip Top, S.	Ariz		37,888
*Tombstone, G. S. L.	"	51,574	548,764
Wyoming Consolidated	Cal		31,541
Yellow Jacket, S.	Nev		235,885
Total amount of shipments to date			$13,872,328

* Official. † Net value. ‡ Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.*

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Sept. 14.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has the following returns from 102 furnaces:

	No. 1.	No. 2.	Bessemer, Forge, and lower grades.	Grade not specified.	Total.
Stocks Aug. 1	21,127	23,690	46,093	4,595	95,505
" Sept. 1	21,682	23,850	39,523	5,719	90,774
Production in July	16,605	7,214	9,736	5,724	39,279
" " Aug.	17,746	5,772	6,851	7,532	37,901

American Pig.—We have had occasion to verify the statement of the condition of the market made in our last issue. What should be the busy season has set in, and thus far it shows no signs of meeting the expectations of makers. September and October are the months in which the largest amount of business is closed, and yet the orders on the books are few and limited. There is no doubt that consumption has fallen off more largely, particularly in some quarters, than was believed, and the theory that consumers are waiting until deliveries on contracts made in the summer are completed will not fully account for the dullness. Such season contracts were made later this year than in ordinary years, but they were also very much lighter.

Transactions during the week have been on a moderate scale. We quote No. 1 Foundry, $21.50@$23; No. 2, $19@21, according to quality; and Gray Forge, $18.25@$19.50, all at tide-water. Bessemer Pig is lifeless, and Spiegeleisen is quiet at $30.50@30.75 for 20 per cent. Lower grades are dull at @$25.50.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Sept. 8. H.	Sept. 8. L.	Sept. 10. H.	Sept. 10. L.	Sept. 11. H.	Sept. 11. L.	Sept. 12. H.	Sept. 12. L.	Sept. 13. H.	Sept. 13. L.	Sept. 14. H.	Sept. 14. L.	SALES.
Alice, Mon.			.15	.14	.19	.16	2.10 .19	.17	.22	.18	2.15 .23	.20	200 32,250
Amie Con., Co.	.13												
Argenta, Ne.													
Bar & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.													
Bodie Cons., Ca.					.75		.75	.70	.95				
Breece, Co.	.19										.18		650 1,000
Bulwer, Ca.					.70								100
California, Ne.			.30				.24				.24		1,050
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Chrysolite, Co.			1.15		1.10		1.15		1.25	1.15	1.20	1.15	4,600
Cons. Va., Ne.			.56	.55			.58		.54		.54		5,810
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.					.35	.32	.36		.36	.35	.35		1,800
Eureka Cons., Ne.	7.13				7.50		7.63		7.63				1,390
Excelsior, Ca.													
Father de Smet, Dk.					4.25								50
Findley, Ga.													
Gold Stripe, Ca.					.07								300
Gould & Curry, Ne.			3.25										5
Grand Prize, Ne.													
Great Eastern, Dk.													
Green Mountain, Ca.							.70						200
Hale & Norcross, Ne.	4.70												100
Hall-Anderson, N. S	1.25	1.15	1.25				1.20		1.20		1.15		6,200
Hibernia, Co.													
Homestake, Dk.													
Horn-Silver, Ut.			7.13	7.00	7.00				7.00		7.13	7.00	1,330
Hurlill, Co													
Independence, Ne.													
Iron Silver, Co.			3.10		3.05	3.00	3.10	3.05			3.05	3.00	2,050
La Plata, Co.													
Leadville C., Co.							.32	.30			.25		231
Little Chief, Co.	.50		.48	.47	.50	.49	52	.51	.55		.61	.58	7,600
Little Pittsburg, Co.									.57		.68	.60	1,100
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	2.50												4.0
Northern Belle, Ne.			6.13	6.00					6.00	5.88	6.00	5.88	1,520
North Belle Isle, Ne.			.45		.47						.45		1,400
Ontario, Ut.													
Opair, Ne.			4.25										5
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.47	.42	.42	.40	.42	.37	.40	.38	.39		.39	.38	28,300
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	1.05		1.05										700
Sierra Nevada, Ne.			5.50				4.10				4.25	4.00	140
Silver King, Ar.													
Spring Valley, Ca.													
Standard, Ca.	5.38	5.25			5.50		5.25						390
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket	3.00												100

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Sept. 8. H.	Sept. 8. L.	Sept. 10. H.	Sept. 10. L.	Sept. 11. H.	Sept. 11. L.	Sept. 12. H.	Sept. 12. L.	Sept. 13. H.	Sept. 13. L.	Sept. 14. H.	Sept. 14. L.	SALES.
Albion													
Alta-Montana, G.											.04		
Am. Flag, s												.05	.04
Barcelona, G.			.34				.49	.39	.42		.42	.40	2,800 7,500
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'cher, G. s.			4.40										5
Big Pittsburg, s. L.													
Bradshaw, s.												.25	2,300
Buckeye													
" pref.													
Bull-Domingo, s. L.													
Bye and Bye													
Calaveras, G.													
C'lav'r's W. & M. Co.													
Cal., B. H., G.							.50						100
Central Ariz'na, s.	.25										.30	.28	2,600
Cherokee, G.			.01										500
Choliar	2.95												100
Climax, Co.							.09	.08				.10	.08 1,800
Cons. Imp'r'l, G. s.													
Crowell, G.													
Dahlonega, G.											.02		500
Decatur	.02												1,000
Dunderberg													
Durango, G.	.05												100
Eastern Oregon	.40		.40		.45	.44	.45	.40	.44	.43	.46	.45	4,400
Elko Cons.	.11		.12				.12	.10	.12	.10	.11	.10	22,700
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G													
Harlem M. & M. Co.													
Hortense, s													
Imperial													
Lacrosse, G.													
Lucerne													
Mariposa Prel., G													
" Com., G													
Mexican, G. s.													
Miner Boy													
Mono													
North Standard, G.											.09	.07	.10 1,000
N. Horn-Silv'r, s. L.													
Ori'nt'l & Miller, s.							.12		.10				500
Parnell													
Quartz Creek													
Rappahannock, G.							.07						1,000
Red Elephant, s.							.06						1,500
Ruby, of Arizona													
Silver Cliff, s.	.12												500
Sonora Con.	.25	.24	.25				.25	.24	.30	.25	.28	.26	11,300
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, s.													
" Nos. 2 & 3, s.													
Sutro Tunnel						.19					.19		700
Taylor Plumas													
Tioga													
Unadilla, s.													
Union Cons., G	4.95						4.90				5.00		550

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 102,471. Non-dividend shares sold, 63,455.

BOSTON MINING STOCKS.

	Sept. 7. H.	Sept. 7. L.	Sept. 8. H	Sept. 8. L.	Sept. 10. H.	Sept. 10. L.	Sept. 11. H.	Sept. 11. L.	Sept. 12. H.	Sept. 12. L.	Sept. 13. H.	Sept. 13. L.	Sales.
Allouez											1.75		100
Amie							.15						200
Atlantic							10.25						70
Aztec													
Bodie Con.													
Bonanza D.	1.88	1.75			1.75		1.88	1.81¼	1.88	1.75	1.75		1,550
Bowman Sil	.17	.16			.17	.16	.16		.16		.16		6,100
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.			242				245		245				21
Catalpa	.40	.37½			.37½		.37½		.37½		.37½	.30	1,625
Central Ariz													
Climax													
Co. Virginia					.56	.55					.52		300
Copper F'lls													
Copperop													
Crescent	.12						.12						400
"Cusi"													
Decatur													
Deer Isle	.06				.06				.04		.06		6,500
Denver City													
Douglas													
Duncan									.15				300
Dunkin											.35		20
Empire					.20		.19		.30	.19	.19		8,400
Eureka Con.									7.63				10
Franklin	10.00						11.00				11.00		350
Gila County													
Harshaw					.62½								100
Huron									1.63	1.50			550
Independ'ce													
Indian Q'n.													
Little Pitts.													
Mammoth	.02												500
Mass. & N.M.	.06	.05			.05		.06		.06	.05	.05		15,700
Milton													
Napa													
National													
North. Belle	6.25												25
Ontario													
Osceola	18.00						19.00		18.00				32
Penn-Breck.													
Pewable									3.25	3.13	3.25		400
Pine Tree					.09								200
Plymouth					.10				.12	.11	.13		1,600
Quicks. com													
Quincy	49.00		49.50	48.88	49.25		50.50	49.50	53.50	52.00			162
Robinson	.45				.43						.40		400
San Pedro													
S'ra Nevada													
S'ra Grande													
Silver Islet													
Silver King													
Simpson Gd													
So. Pacific													
Standard													
Sullivan					.95		.97½	.95	1.00		1.00	.97½	1,300 200
Sutro Tun.	.20												
Sycamore													
Twin Lead.													
Vizina													

PHILADELPHIA MINING STOCKS.

	Sept. 7. H.	Sept. 7. L.	Sept. 8. H.	Sept. 8. L.	Sept. 10. H.	Sept. 10. L.	Sept. 11. H.	Sept. 11. L.	Sept. 12. H.	Sept. 12. L.	Sept. 13. H.	Sept. 13. L.	Sales.
Amer. Cons.													
Argent	.12				.11		.12	.11	.11		.11	.10	14,500
Aztec													
Battle Mt.					.03								2,000
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.07								.07				8,800
Comprom'e	.16	.15	.17		.15		.15	.14			.15	.14	20,400
Contention													
Con. Virg.													
Dauntless	.02		.02		.02								9,900
Del Monte							.08	04					2,000
Denver City	.10				.10		.09						2,800
Eureka													
Girard													
Governor									.04	.03	.03		9,300
Grand Uni'n	.03		.03		.03		.03		.03		.03		33,000
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Gulch	.04		.03		.04	.03	.03		.03		.04	.03	30,200
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.							.07		.08	.07	.07		7,000
Little Maud													
Little Pitts.													
L'g & D'y H.													
Montana													
Mt. Sheridan			.04										2,700
National													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina						.11							600
Penn-Breck.			.09		.09		.09		.10		.11	.10	16,900
Permanent													
Pizarro													
Pizarro Ex.									.02				1,000
Potosi													
Rara Avis						.15					.15		1,100
Rara Avis E.	.10		.10		.11	.10	.10		.11	.09	.10		19,600
Record													
Rico Pion'r.													
Sierra Apac.							.18				.18		400
Sierra Be.la.	.57½				.55	.50					.60		4,800
Sierra G'nde	1.05	1.00	1.07½	.95	1.07½	1.02½	1.10	1.05	1.07½		1.12½	1.07½	10,465
Sierra Nev.					1.55				1 55				200
Silver Cord.													
Silver King.									.02				7,500
Silv'r Plume	.02												
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.													
Tombstone	.90		.90	.85	.87½								600
Victor													
Yale Mt.													

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At the Exchange, the following sales were reported the market closing weak and unsettled :

Saturday, 100 tons, No. 1, November, $21.87½ ; 100 tons No. 1, November, $21.75 ; 200 tons No. 1, January, $22.25. Monday, 100 tons No. 1, November, $21.87½ ; 100 tons No. 1, December, $22 ; 100 tons No. 1, January, $22.25 ; 100 tons No. 1, February, $22.25. Tuesday, 100 tons No. 1, December, $21.75 ; 600 tons No. 1, January, $22. Wednesday, 500 tons No. 1, January, $21.87½. Thursday, 100 tons No. 1, February, $21.87½ ; and to-day, 300 tons No. 1, February, $21.87½.

Scotch Pig.—Though arrivals have been light, there is a growing tendency to send them to store. A part of the pig coming in is delivered on contracts still running, while only a comparatively small proportion is brought in by outsiders, who are apparently giving up the business in disgust. Freights are slightly higher.

We quote ex ship : Coltness, $23.50@$24 ; Langloan, $23@$24 ; Summerlee, $23 ; Dallmellington, $20.50@$21 ; Eglinton, $20@$20.50 ; and Glengarnock, $22 $22.50.

At the Exchange, the following lower cable quotations were received : Coltness, 59s. ; Langloan, 58s. 3d. ; Summerlee, 56s. 6d. ; Gartsherrie, 56s. ; Glengarnock, at Ardrossan, 54s. 9d. ; and Eglinton, at Ardrossan, 47s. 9d. Warrants to-day were 46s. 5d.

Steel Rails.—We have been unable to learn that any large orders have been placed, as rumored. The one in the market, referred to in these columns before, was for June, July, and August delivery, the section being a difficult one, and the inspection severe. This lot has not yet been placed, according to good authority. For small lots, early delivery, the quotation remains $37.50 at mill.

Old Rails.—No business of magnitude is reported. We quote $23.50 for Ts.

Scrap.—Beyond sales of small lots from yard, there is nothing to note. We quote $23@$23.50 ex ship.

Philadelphia. September 13.

There are indications that the lull in the demand for iron, which has lasted for several weeks, will soon terminate in a healthful activity. This is indicated by the number of inquiries for forge and foundry iron, and offers made a little below makers' terms. A number of buyers of forge irons have been in the market to buy enough for sixty days ; but the general run of buyers are still purchasing for current requirements and trusting to future output to bring lower prices. This is becoming more and more dangerous, on account of the number of heavy sales which have recently taken place. Good brands of Forge are scarce, and, during the last few days, consumers have been paying $18.50@$19 at furnace, but there is still a good deal of iron to be had at $18. There are plenty of offers in hand at $17.50, but nothing but an inferior iron can be had at that price. Inquiries for 1000-ton lots of Forge are made, with offers at $17@$17.50, but very little business of this kind is done as yet. It is probable that, during the next week or ten days, buyers will decide what they will do, and pay about $18 or $18.50. Foundry irons are selling at $22@$23 for No. 1 and $19@$21 for No. 2, averaging about $20 and $22 for the two numbers. If all the offers made were accepted, business would be active. Makers feel themselves safer now than two weeks ago. The restriction in production during the second quarter of the year is beginning to tell, and wise buyers are beginning to look for supplies before any decided upward tendency can manifest itself.

Bessemer is quoted as usual at $21@$21.50, without business of any importance. There are offers at less. Scotch iron is moving more freely, but in small lots. English iron is under inquiry, but no purchases have been made.

Muck Bars.—Sales of Muck Bars have been made at $33.50, with $34 generally asked.

Blooms.—A few lots of Charcoal Blooms have sold at $57@$58.

Merchant Iron.—Merchant iron is moving at 2·10@2·25c. The cutting of rates which has been going on for the past thirty days seems to be discontinued. There are fears of Western competition, and this leads to the naming of lower rates than would be named otherwise. For large lots, 2·10c. is taken, but 2·15@2·20c. are the usual prices.

Nails.—Nails are quoted at $3, and are quite active, but in lots smaller than car-load. Lots for export are selling at $2.90. Stocks are not large, and, if the West does not get too anxious to sell, the above figures can be maintained.

Plate-Iron.—Quite a number of small orders of 50 to 100-ton lots have been taken this week at 2·40@2·50c. for Common and 3@3·25c. for Shell, with Flange at 4@4·15c.

Structural Iron.—Structural iron manufacturers report an active inquiry for bridge iron, and orders for early delivery for building purposes. The mills are well supplied with business, and prices, in small lots, are firmer than usual, at 2·30@2·50c. for Tank. Beams, Channels, and Tees are unchanged. Inquiries for several hundred tons have been made, and the outlook points to a steady activity up to the winter months.

Sheet-Iron.—The sheet mills are all crowded with orders, most of them all for delivery during this and next month, and business is likely to be closed this week for November delivery. Prices are firm.

Wrought Pipes and Tubes.—This week's business was done between 70 and 75 per cent off for pipes, and boiler tubes 60 off in small lots. The aggregate of consumption is heavy.

Steel Rails.—No change has taken place in rails, although large transactions are said to be on the point of closing at or below $37. A large amount is wanted, and buyers seem to insist upon the acceptance of their own terms. Old rails are quiet with $23 bid, and offers at $24. Scrap is without change, and demand light.

Pittsburg. September 13.

The American Tin Plate Association has just issued a circular, which is distributed by thousands over the country, calling attention to the prostrate condition of that industry and the means of relief which that Association intends to advocate before the next Congress. All persons who favor the imposition of a protective duty are requested to send their names, addresses, and occupations, that they may be added to the list of names now under compilation. The Western Nail Association met to-day, and took the necessary and proper action for the protection of the interests of the nail trade. The demand for nails has fallen off during the past few weeks, owing to the completion of the contracts for building requirements, and considerable apprehension is felt as to the possibility of disposing of the output of the 2500 machines throughout the West. Stocks are slowly increasing, but the market has been tempted to make heavier purchases by concessions to $2.75 and $2.70.

The merchant iron trade is lacking in activity, because of the apprehensions in consumers' minds that the producing capacity is so far above requirements as to lead to competition which will yet depress prices below the exceptionally low limits of 1·80c., which is now named for large lots. Small lots are 1·90@2c. Producing capacity is working to about 80 per cent. The merchant steel mills are working to almost full capacity, and deliveries are made upon summer contracts throughout the West ; but the new fall business comes in very slowly.

Heavy concessions have been made on forge iron to secure business. Gray Forge is selling at $17.50@$18.50 ; No. 2 Foundry, $20 ; C. B. Charcoal, $33@$35, four months' time, and $26@$29, cash, according to quality. One thousand tons Muck Bar sold at $33.50. Wrought pipes and tubes are active. Pipes are selling at 75 per cent off list. Oil-well Castings, 43@45c. per foot. Two sales of American Ts were made at $24. Inquiries are out for English Ts, and Eastern buyers have orders for several thousand tons at fixed prices, which it is not probable will be filled for some time. The demand for Spikes is active at 2·60c. shaded. Track-bolts are 3c. Construction Iron, Plate, and Tank, are in active request, and mills are crowded with orders for sixty days.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Sept. 14.

Anthracite.

By energetic work, chiefly on the part of middlemen, the anthracite coal which comes to this market is taken care of. Buyers have not awakened from their lethargy, and the market drags along There is no accumulation of stocks, so far as we can learn ; but on the other hand, prices show no signs of materially improving. On the contrary, the trade has every reason to indulge in congratulations that coal has not followed the example of every leading industry of tending to materially lower figures. We have expressed our views concerning the best course to pursue to maintain this desirable state of affairs.

From the East, come discouraging reports. A correspondent writes us this week : "Hardly any coal has been sold." The low freights from Philadelphia give the shippers from that port an advantage equivalent to 25@30c., which the Boston agents of New York parties must meet.

Concerning the West, the special correspondent of *Coal* writes :

If, with the experience of the past week confronting them, there remain any operators in the coal market who maintain that an advance in circular rates necessarily means an advance, or even stiffening up, in selling prices, such benighted operators are simply past conviction to reason. Your correspondent has yet to meet with the first wholesale dealer or shipper in this market who honestly contends that the advance in the circular one week ago to-day has had the least effect either on the activity of the market or on prices. Anthracite is selling at just about the same rates as in June and July, and there is just about as much cutting in circular rates proportionately as then. Milwaukee is, if any thing, more of a thorn in the flesh of the Chicago trade than it was last year. A good proportion of the shortage in our supply of anthracite, as compared with that on hand a year ago, has been diverted to Milwaukee, that market having about 50,000 tons more, while Chicago has about 98,591 less, than one year ago.

To the iron trade, the following notes on coke from the letter of the Pittsburg correspondent of *Coal* will be of interest:

Coke remains at the price quoted last, your exchanges to the contrary notwithstanding. A statement has gone forth that "an advance to $1.10 has taken place." This of itself is vague. It is too low for foundry and a trifle high for furnace orders. The fact of the matter is, that coke is selling at $1.05@$1.10 for furnace orders, free on board, and $1.15@$1.25 for foundry and selected, and there has been no change for nearly two months. Manufacturers, however, talk of advancing rates 5 or 10 cents next month, dependent on the condition and prospects of the iron trade in the interim. The "pool" question excites more interest than the markets in coke just now. Appearances indicate that the present pool will be broken up and that the Vanderbilt line and the Baltimore & Ohio will be awarded a larger share of the trade which is now enjoyed by the Pennsylvania and its leased lines. If these lines can not agree on a new pool, so much the better for the coke men, who seem to sniff a cutting of rates in the near future. Crushed coke is inquired for at $1.75 per ton at the crusher. Its merits as a substitute for hard, at three times that price, are becoming yearly more recognized in the market. The scarcity of cars in this trade which existed a week ago has about ended, and shippers are not complaining on this score.

Bituminous.

We are informed that the recent troubles among the miners in the Clearfield region are over. There is a slight scarcity of cars there. In general, a little improvement in the number of inquiries is noted, though quotations remain at the low figures.

Horsford's Acid Phosphate.

Valuable in Indigestion.

Dr. DANIEL T. NELSON, Chicago, says : "I find it a pleasant and valuable remedy in indigestion, particularly in overworked men."

DIVIDENDS.

HOMESTAKE MINING COMPANY, MILLS BUILDING, 15 BROAD STREET,
NEW YORK, Sept. 12, 1883.

DIVIDEND NO. 61.

The regular monthly dividend of FORTY CENTS per share has been declared for August, payable at the office of the Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on the 25th inst.
Transfer-books close on the 20th.
LOUNSBERY & HAGGIN, Transfer-Agents.

THE CENTURY CONSOLIDATED MINING AND SMELTING CO. ; OFFICE, ROOM 56 TRIBUNE BUILDING.
NEW YORK, Sept. 14, 1883.

Notice is hereby given that a special meeting of the stockholders, for the purpose of amending the company's by-laws, will be held at the office of this company on Tuesday, October 2d, at 3.30 o'clock P.M.
By order, B. FRANK WOOD, Secretary.

G. E. RANDOLPH & CO.,
CENTRAL CITY, COLORADO,
GENERAL AGENTS FOR NON-RESIDENT OWNERS OF ACTIVE OR IDLE MINES.
Correspondence Solicited.

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METALLURGIST AND ASSAYER,
GOLD AND SILVER REFINER.
Practical Mill Runs of Ores, 500 Lbs. or Upward.
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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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Mr. C. A. Green is our accredited representative for New York.

Mr. A. R. Brown, Jr., is our accredited representative for Boston and the Eastern States. Office, Room 1, Simmons Building, 40 Water street, Boston.

Mr. J. Viennot, 150 South Fourth street, Philadelphia, is our accredited representative for Philadelphia.

Mr. A. H. Taylor, 159 Lake street, Chicago, is our accredited representative for Chicago and the Northwest.

Mr. O. D. Cotton, Columbus, O., is our accredited representative for Ohio, Kentucky, and Indiana.

Mr. O. J. Frost, care Boston & Colorado Smelting Company, Argo, Colo., is our accredited representative for Denver and vicinity.

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AFTER a comparatively long period of activity, the investment of Northern capital in Southern coal and iron lands has fallen off. A reaction has set in and the Southern States will now have to prove that the expenditure of large sums was fully warranted. The trade is one in which both the new-comers and the residents must develop all their energies.

PRIVATE dispatches received in this city announce the sudden death of J. W. GASHWILER, at San Francisco, on the 15th of this month. General GASHWILER was widely known in mining circles, having been early identified with the development of the mines on the Comstock and with the introduction of water into Virginia City. Since then, he has been actively connected with many mining enterprises in California, Nevada, Dakota, and Sonora. He was a man of superior natural abilities and a noble, generous nature, and there are many who will feel that they have ost a genial and valuable friend.

WE seem to be entering upon another cycle of boiler explosions at iron and steel-mills. Only a few days since, a boiler exploded at the works of the Cleveland Iron Company, and to-day comes the news of a worse calamity at the steel-mill of MESSRS. PHILIPS, NIMICK & Co. The technical details in regard to both accidents have not as yet reached us, and it is therefore premature to venture any opinion on the subject. It remains to be seen whether, in both instances, the precautions were disregarded which experience has shown must be observed in such cases. It is not very long since that the experts of the Hartford Steam Boiler Inspection and Insurance Company published a plan for the setting of boilers heated by waste gases in iron and steel-mills. With the exception possibly of saw-mill owners, our iron manufacturers can claim the sorry distinction of being most neglectful in this regard.

MANY of those who are daily testifying before the Senate Committee on Labor and Education in this city are startling their best friends. The temptation to talk carries them off to the discussion of subjects which they do not understand, or to which they have not given due consideration. This week, the Rev. Dr. R. HEBER NEWTON wound up an otherwise clear and moderate testimony by the recommendation that new mineral resources should be reserved for public use, to be worked for the benefit of educational funds. Imagine an army of government prospectors scouring the mountains of the West on salary, men carefully picked from the hangers-on of pot-house politicians of Eastern cities, or the scramble of "superintendents" for appropriations to drive endless tunnels or unfathomable shafts! Dr. NEWTON would be frightened at the annual deficit.

AN idea which, so far as we know, is novel in connection with mine pumping-engines, has been carried out in a lignite mine in Germany. The lignite is obtained by stripping, and the quantity of water accumulating during rainy seasons is enormous. At one of the pumping-shafts, an engine was put in for two sets of pressure-pumps having 2·5-foot plungers and 7·22-foot stroke, the maximum lift being 236·2 feet. The pumps are driven by the engine through the intermediacy of bob, without any gearing. The engine itself is horizontal, with a 27·9-foot fly-wheel weighing 30 tons. It has a 4·59-foot cylinder and 7·22-foot stroke. Its chief peculiarity was, that it was provided with a small special engine, intended to carry the main engine over the dead-center ; when running slowly, the crank of the auxiliary engine being placed at right angles to the main crank. When running without expansion, the engine could be worked at the rate of two revolutions per minute as a minimum, and nine as a maximum, without using the auxiliary engine. When cutting off at three eighths of the stroke, the number of revolutions per minute could not be carried below five. They were, however, brought down to 3½ strokes by the aid of the auxiliary cylinder, which, by the way, had a diameter of 1·60 feet and a stroke of 3·9 feet. The contrivance in question is therefore useful and economical in fuel in those cases where the flow of water is so small that the pumping-engine must be run at the lowest speed attainable.

THE report of the Northern Pacific Railroad Company, just placed before the stockholders, contains some allusions to the traffic from the Montana mining regions secured by the completion of certain sections of the road. It appears that base bullion will form one of the important articles of freight. On one day, July 4th, 511 tons of bullion left Helena, and the Barker District shipped 250 tons from Billings. These quantities may to some extent represent accumulations made in anticipation of lower charges of haulage, still they show that Montana will soon be in a position to come forward as a heavier lead producer, provided the railroad adopts a liberal policy. It is particularly in regard to fuel that the company should lend the mining industries of the territory a helping hand. We presume that for some time to come the output of the Carbonado mines, which is to be increased soon to 1000 tons a day, and of the newly opened collieries at Wilkeson will be chiefly for the company's own use. If the railroad will be content with a fair profit on mining and transportation, it will greatly stimulate the working of smelting ores, copper and lead, and will aid those treating refractory ores of the precious metals. Indirectly, the business which the carriage of supplies and of machinery will bring it will fully compensate for lower returns in fuel. Competition in the base metals is exceedingly severe, and Montana will need all the advantages of cheap transportation to enable it to conquer the place to which it is entitled because of its natural resources.

WHILE no one denies the existence of large quantities of high-grade copper ores in Arizona and New Mexico, we are inclined to believe that the working of lower grade ores will, at no very distant date, attract the attention of managers and metallurgists. There are few mines which can for any great length of time keep up the strain of furnishing ores running from 15 to 25 per cent of metal to even a small smelting-plant which is capable of devouring a great deal of first-class ore. One or two concerns have during the past years shown the welcome signs of working

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a steadily declining average, a proof that, by greater economy, they are able to be less exacting in their sorting. The accumulation of ores, running from 6 to 10 per cent, on the dumps and in the mines, will, we hope, be an incentive to closer watching of all the details of cost. As yet, smelting raw oxidized ores for a high grade of copper with fuel generally expensive is the rule, and the metallurgical problem is one of the simplest, being reduced to the work of providing the necessary fluxing material. Soon, however, increased cost of development-work, of hoisting and pumping, will counteract waste, and changes in the composition of the ores will force modifications in metallurgical treatment, complicating it. In a longer or shorter time, according to locality, the engineers of that section will have to solve two questions, probably in rapid succession—how to treat their low-grade ores, and how to meet the difficulties of a change in their character. It is urged, with some show of force, that, so far as the low-grade siliceous ores are concerned, especially when suitable fluxing materials can not be had, and when fuel is costly, some of the humid processes of extraction would prove the most economical. Talent of the highest order and mature experience will have to be brought to bear upon the solution of these questions, which ultimately will decide the future of many enterprises.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Argentiferous and Auriferous Bismuth Ores.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Can you or any of your readers inform me who buys gold and silver ores containing bismuth, and how much they pay for the bismuth? I have about 100 tons carrying 30 ounces of silver, one quarter of an ounce of gold and seven per cent of bismuth. If I can get a price on the bismuth that will pay for mining the ore, larger quantities can be procured. R.

DENVER, COLO., Sept. 11.

NOTES ON THE EXHIBITION AT DENVER.—III.

Special Correspondence of the Engineering and Mining Journal.

GUNNISON COUNTY.

This county is rapidly coming forward to take a front rank among the rich counties of this rich State. Already its principal districts are household words among miners. Colonel Cornwell, the commissioner, kindly supplied me with information respecting the Pitkin District, which he specially represents. The Porcupine group is one of the principal mines in the district, as may be judged from its properties, which consist of eight claims and a placer. There are 1500 feet of tunneling which has disclosed five mineral-bearing veins carrying carbonates and galena in copper-stained rock, assaying from $50 up to $600 in gold and silver. The owners have just started within the last few days to make shipments of ore. One specimen shows a beautiful piece of turquois. The Fairview mine has a 14-foot vein of ore carrying sulphurets and carbonates of lead and copper, bearing silver. The Silver Islet, which also exhibits some rich chlorides and sulphurets with a small quantity of galena, has 1500 feet of development and a vein which runs from 20 to 53 feet wide. The Governor St. John, on Green Mountain, is also represented by specimens of chlorides, etc., showing copper as well as lead. The mine has 300 feet of shafting and levels, and shows a 9-foot vein of ore reported high in silver. The Silent Friend has 300 feet of developments on a 9 to 10-foot vein of the same character of ore as the above-mentioned mines. One block of pure ore shown weighs 2360 pounds. The mine has recently been sold for $800,000. The Mineral Farm is one of the most extraordinary properties represented from this district. As yet, the ore has been found in rich boulders only, one of which is exhibited weighing 3500 pounds. These boulders are often rich in chlorides and sulphurets, and assay from $11 to as much as $500 silver per ton. Efforts are making to find the vein, but as yet without success. The Volunteer mine is well developed, and shows specimens which assay $50 per ton, three fifths gold and two fifths silver. The Midnight has 350 feet of shafting. The Terrible is worked between the limestone and porphyry, and has 300 feet of development. The ore shows bromides of silver with gold, and some of it assays $100 per ton. Two big blocks are shown, containing gray copper ore, and weighing 1000 pounds. The vein is 3½ feet wide. The Quiet Friend, from Quartz Creek, is one of the instances of chance finding so numerous in a country like this. The men were digging out a space for an ore-house, when the diggers suddenly came upon a 3½-foot vein, carrying galena and a copper-stained rock, and assaying $150 silver to the ton. Some rich specimens, assaying $2500 per ton, are shown from Native Silver No. 2. The Way Up mine has 150 feet of development and a 6-foot vein showing galena and lead carbonates in quartzite and calcite.

TIN CUP DISTRICT.

In this department, there are numerous exhibits of good gold and silver ores; but I am unable just now to obtain any reliable information about them.

ROCK CREEK DISTRICT.

We have here an excellent exhibit of ores which are fair ordinary samples, and many of which denote a great future for the district. In this region, are mountains crossed by numerous veins showing mineral at the surface, which as yet are merely prospected. Very few of the specimens exhibited are from mines which have more than 25 feet of development. Mr. R. J. Walter, the courteous commissioner for this district, informed me that, out of about 600 prospected claims, only about five were in more than 100 feet. The following will give some notion of the capabilities of this district. The Eureka lode, which shows some large and rich blocks of solid copper pyrites, assays from 40 to 200 ounces of silver per ton. The Buffalo carries rich steel galena, assaying 75 ounces of silver per ton. The Shakespeare is another mine having steel galena as its staple ore, with a small quantity of copper, assaying 200 ounces of silver per ton. The Homestake has some very fine pieces of ore on exhibition. This lode is the biggest in the country, being 30 feet wide. Some of the ore carries from half an ounce to three ounces of gold, 70 ounces of silver, and from 10 to 30 per cent of copper per ton, much of it carbonate. The King lode lately struck a six-foot vein, carrying 160 ounces of silver per ton. The ore is iron pyrites and galena, according to the specimens shown. The Anna is another very wide lode, containing galena and copper pyrites assaying from 20 to 60 ounces of silver per ton. The Lulu carries that very rich silver ore known technically as antimonial silver, yielding 600 ounces of silver per ton. A contract has been let for several hundred feet of tunneling. The Brockway is a galena-bearing lode, with a small quantity of copper as carbonate on the specimens shown. It will run 40 ounces of silver and 50 per cent of lead to the ton. The Prince of India shows some fine large specimens of copper pyrites and specular iron ore. The Pennsylvania carries what is called "fine galena," and assays 60 ounces of silver and from 40 to 60 per cent of lead per ton. The Grand Republic has specimens of gray copper with iron pyrites, and sulphurets of silver with a little galena, running 300 ounces of silver per ton. The Crown has a galena ore with 75 per cent of silver per ton, and a 16-inch pay-streak. The Whopper has good specimens containing a perfect medley of minerals. The pay-streak is four feet thick. The Milwaukee gives promise of being very rich. The vein is 12 feet thick with a 24 to 36-inch pay-streak, the ore containing ruby silver. The Irene is quartz vein impregnated with brittle silver and some iron pyrites and specular iron. The miners have gone in a good distance, and the yield has been 20 ounces of silver per ton from the surface. The August Flower is an antimonial silver-bearing lode 10 feet wide, of mineral associated with barytes right across. I hardly dare say more, lest I should be thought guilty of attempting to exaggerate; but it seems a pity that such capabilities as are here indicated should lie comparatively dormant for want of courageous capitalists. The district has itself to thank for this. Like so many others, when first its riches were discovered, the owners did not know how to ask enough. Some wanted $200,000 for mere prospects, and capitalists wisely refused to pay any such sum. Now things are very much the other way, and valuable claims can be purchased which are well worth the money asked.

SAGUACHE COUNTY.

The districts represented here are Kerber and Blake, one or two mines only showing from Ford Creek. As a rule, the specimens shown are not at all striking in appearance, and in only a few instances are they very rich. The associated mineral seems to consist chiefly of quartzite, and, as will be seen, the developments are not great. Nevertheless, there are a good number of mines represented. The following list will give some notion of the present status of the principal mines:

Kerber Creek District.

Name.	Depth.	Width of pay-streak.	Value per ton.
Eureka lode	60 feet.	6 feet.	$70
Payson "	100 "	3 "	80
Last Chance "	85 "	3 "	80
Paragon "	200 "	4 "	85
Antoro "	50 "	5 "	100–5000
Boss Mammoth "	84 "	20 inches.	150
Little Elva "	75 "	3 feet.	130–1200
Superior "	100 "	2 "	150– 500
Whale "	100 "	7 "	250

Ford Creek District.

Last Resort lode	105 feet.	30 inches.	385

Blake District.

Wild Cat lode	70 feet.	18 inches.	25–1200
Centralia "	75 "	4 feet.	20– 150
Mountain Lion "	90 "	1 "	65
Anna "	50 "	2 "	340

Several ores show the presence of copper as carbonate. Most of them, however, have the ore as a sulphuret. Whale mine shows a fine large block of ore, as do also several others. Messrs. Norton & Co. show some neat heaps of bituminous coking coal, fire-clay, beautiful crystallized limestone, which seems very pure, and rich brown hematite.

FREMONT COUNTY.

This is the Pennsylvania of Colorado. It contains, in great abundance, coal, oil, and iron ore. I have already had occasion to refer to two of these in speaking of the iron-works at Pueblo. The coal is of a bituminous nature, and makes first-rate coke. The oil, however, is the product which is attracting most attention just now. It is a splendid lubricant as taken from the well, and, as such, though the flow is not so great as in the Eastern oil-regions, it is more valuable, and some say will pay better. The owner of the principal wells, the Land Investment, Coal and Oil Mining Company, shows, in glass vases, from the Peabody well, some specimens of the oil, refined and unrefined. The new well lately struck oil at 960 feet, and is now down about 1100 feet. The company is taking out about 15 barrels per day with the sand-pump. The Peabody well is between 1200 and 1300 feet deep. The fine Brandford freestone is represented by a large carved column. This freestone was employed in building the magnificent court-house at Denver. For ores containing precious metals, this county is not so celebrated as many others; but some fine oxides and carbonates of copper containing silver are shown. One, a red oxide of copper from Green Mountain, contains

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25 per cent of copper. The company is putting up a smelter to treat it. There is also a fine carbonate of copper ore, a sample of which contained 438 ounces of silver per ton, shown from the mine called Pride of the West. Some bullion is shown from the Royal Gorge smelter, Cañon City, which is shipping about 2½ cars of bullion per day just now. Last year, the output of coal in this county averaged 1036 tons a day, and will exceed that figure this year. The county also produces a very fine mineral paint, and some good plaster of Paris.

CLEAR CREEK COUNTY.

This county, as is well known, is nearly the oldest in this State, being about the first to attract attention to the rich argentiferous galena of the Rockies. Of course, most of the specimens are of this mineral. There are specimens from the Stevens, the first mine of any consequence in the county, and therefore an old reliable. The average run of this ore is from 80 to 100 ounces of silver per ton. The average went up some time ago to about 200 ounces, until it was thought the sample had been manipulated; but it was soon explained by gray copper ore found impregnating the ordinary galena. Some specimens of this shown assay as much as 2000 ounces of silver per ton. The ore runs also from 50 to 60 per cent of lead, being on the average the richest lead ore in the State. The greater part of the mines represented are from the Griffith District, though there are also a good many gold ores from the southern portion of the county. It seems almost impossible to do justice to this splendid exhibit without occupying too much space. It is characterized throughout by the size and rich appearance of its specimens, a feature which distinguishes it from other exhibits. Among the many valuable properties represented may be mentioned the Mascott, on Saxon Mountain, which assays 10 ounces of gold, 90 ounces of silver and 24 per cent of copper per ton. Some fine specimens are shown. The Magnet Sequel mine is leased at a royalty of no less than 70 per cent. The Consolidated Pay Rock is 600 feet deep, and has a mill which works a large quantity of ore each week. The Mint, West Argentine District, which gives great promise, has ore assaying from 150 to 800 ounces of silver per ton. The Meath is also another mine of good promise. It has 1070 feet of development, all in mineral, and only eight fathoms have been stoped as yet. As to the rest, I must give a more concise list:

Griffith District.

	Ounces silver per ton.	Feet deep.
Pelican	400	100
Lebanon Tunnel	686	....
Matilda Fletcher	800-1000	....
Consolidated Hercules & Roe	600	180
Shively	700	550
Baltimore Tunnel	600	....
Griffith	80	50 per cent lead.
Cincinnati	328	....
Bismarck	300	....
Dunkirk	500	410
Dunderberg	225	....
Cashier, 8 ounces gold	40	10 per cent copper.
Mendota	126	110
Diamond Tunnel	100-500	800
City Grove, 2 ounces gold	150-700	6 per cent copper, and some
Vulcan	318	135 lead.
Cliff	600	160

East and West Argentine District.

	Ounces silver per ton.	
Arcadia	100-1000	25-50 per cent lead.
Telephone	200	....
Terrible	528	Some very large blocks of ore.

These are no mere specimen assays, but represent the regular mill-runs. The depth also has nothing to do with the development, which, as is to be expected in such an old district, is very extensive in most cases. In a mine known as the Colorado Central, a large mass of obsidian, containing five ounces of silver per ton, has been found at a depth of 700 feet, some blocks of which are shown. It would be interesting to know what the supporters of the infiltration theory have to say to this.

WYOMING TERRITORY.

Mr. G. E. Bailey, commissioner for this section, has very kindly furnished me with particulars from which I take the following:

First of all, this exhibit is the most tastefully arranged one in the building. Perhaps this is only to be expected, considering that its representative is a lady. In it, the varied resources of the territory are amply displayed. Specimens of its inexhaustible forests, its game, its pastoral products, its coal and iron ores, its minerals, its agates, fossils, marbles, and building materials, its native chemicals and mineral oils, are shown in rich profusion. In one corner, stands a splendid column of sulphate of soda as taken from the deposit. In another, a pyramid of the silver and copper ores worked in this part of the West. In still another corner, stands a pyramid of very rich iron ore, consisting of magnetite from Iron Mountain, Albany County, and hematite from Carbon County. The fossil fish are very fine specimens, some being nearly two feet long. The minerals are many of them very rich, especially in copper.

In the machinery department, the exhibit of Messrs. Lane, Bodley & Co. is worthy of notice. They exhibit a complete full-size smelter, which affords an excellent opportunity to study it in detail. They also show a hoisting-engine in motion. The Webster, Camp & Lane Machinery Company, Akron, O., also exhibits two hoisting-engines. Among the pumping machinery in action, Messrs. Blake show two different types, and there are two exhibits of the Pulsometer Steam Pump Company, New York. A Mack's patent injector is also shown on an ordinary working scale. Messrs. Nichols show a pair of their patent sharp-neck steam stamps on the Ball stamp principle, from which it differs, I believe, in some important details. They are working them successfully at their own place, and I believe at one or two other points now. Messrs. Abendroth & Root have a large stand of their hydraulic pipes on exhibit, and there is also a stand of the Allison patent socket and vanishing thread-pipe with upset ends, and a large assortment of screw-bolts for various purposes.

A. COPELAND.

Sept. 11.

NEW BRITISH STANDARD WIRE GAUGE.

The following has been issued by the Standards Department of the British Board of Trade. The new standard gauge has been duly approved by Order in Council, dated August 23d, 1883, which order will not, however, take compulsory effect until March 1st, 1884:

Descriptive number B. W. G.	Equivalents in parts of an inch.	Descriptive number B. W. G.	Equivalents in parts of an inch.
No.	Inch.	No.	Inch.
7/0	0·500	23	0·0240
6/0	·464	24	·0220
5/0	·432	25	·0200
4/0	·400	26	·0180
3/0	·372	27	·0164
2/0	·348	28	·0148
0	·324	29	·0136
1	·300	30	·0124
2	·276	31	·0116
3	·252	32	·0108
4	·232	33	·0100
5	·212	34	·0092
6	·192	35	·0084
7	·176	36	·0076
8	·160	37	·0068
9	·144	38	·0060
10	·128	39	·0052
11	·116	40	·0048
12	·104	41	·0044
13	·092	42	·0040
14	·080	43	·0036
15	·072	44	·0032
16	·064	45	·0028
17	·056	46	·0024
18	·048	47	·0020
19	·040	48	·0016
20	·036	49	·0012
21	·032	50	·0010
22	·028		

The following circular has been issued by the same department to the several local authorities under the "Weights and Measures Act, 1878:" "After consulting with the various institutions, local authorities, manufacturers, and others practically interested in the use of wire gauges, the Board of Trade has caused a standard measure for wire, etc., to be made and duly verified, which measure has now been approved by her majesty in council, to be on and after March 1st next, a Board of Trade standard under the act. I am directed, therefore, by this Board to transmit to you a copy of the sizes of this new standard measure, and to ask for the co-operation of your local authority in giving publicity to it in your district, so that by the common adoption in manufacture and trade of a uniform gauge, the annoyance and loss occasioned by the present variety of sizes in use, of which complaint has been made, may no longer arise. I would point out that by the above act it is provided that all measures in use in trade are to agree with the Board of Trade standards, and that it is the duty of the Inspector of Weights and Measures to see that the act in this respect is carried out."

REDUCTION OF ANGLESITE OR SULPHATE OF LEAD TO METALLIC LEAD

Written for the Engineering and Mining Journal by Carl Henrich, M.E., Denver, Colo.

While smelting at the Benson Smelting-Works in Arizona, for lead-silver bullion, I had to use, as a lead ore, ore from the Montezuma mine, which was mainly a sulphate of lead with occasional lumps of galena, and carrying about 60 per cent lead and 11 per cent quartz. The furnace used at the time was a circular water-jacket blast-furnace 10 feet in hight from the tuyeres to the feed-door; 45 inches diameter at the tuyeres; 54 inches diameter at the feed-door; seven 3-inch tuyeres at 10½ inches above the slag-hole. By smelting the above lead ores with dry silver ores and the necessary amount of hematite and limestone, to make a slag between a singulo and a bisilicate, in which the ratio of oxygen of the acid to the oxygen of the bases was as 4:3, besides adding enough iron ore to take all the sulphur of the anglesite and galena and form a matte of the type FeS, the furnace worked very nicely and freely, but of course made a large amount of matte, carrying along considerable silver, and being thereby a source of annoyance, as no roasting appliances were in existence, and it would have been doubtful, besides, whether roasting the matte and working it over would have paid under existing circumstances.

While this state of affairs continued, we received a lot of ore high in silver, carrying about 4 per cent galena, about 8 per cent oxide of iron, and about 25 per cent iron pyrites, the remainder being quartz or silicates. This ore, like all the rest, had to be smelted in its raw state; and smelting in the usual manner, I had to expect making a lot of matte rather high grade (in silver). To avoid this, I tried the following plan:

I thought of the reaction of galena on sulphate of lead in the reverberatory furnace when treating clean galena ores, and also remembered having read that in China anglesite lead ores are reduced to metallic lead by sulphur; and I concluded to try whether a substitution of pyrites for the galena and the sulphur would not work well in the blast-furnace with the additional help of silica, after the formula:

$$x\mathrm{SiO_2}+2\mathrm{FeS_2}+5\mathrm{PbO.SO_3} = x\mathrm{SiO_2}2\mathrm{FeO}+9\mathrm{SO_2}+5\mathrm{Pb},$$

and $\mathrm{PbS}+\mathrm{PbOSO_3} = 2\mathrm{Pb}+2\mathrm{SO_2}$

or that 120 pounds of pyrites would reduce 757·5 pounds of anglesite, and that 119·5 pounds of galena would reduce 151·5 pounds of anglesite, or 1 pound of pyrites would be in its reducing power equal to 5 pounds of galena.

Acting on this calculation, I found that, by putting together in round numbers 350 pounds of the anglesite ore (estimated to contain 15 per cent galena and 75 per cent anglesite) with 100 pounds of the silver ore carrying iron pyrites, both ores ought to reduce each other, and I should get rid of their sulphur in the form of sulphurous acid (SO_2) without producing any matte.

I made the charge accordingly, keeping a lot of scrap cast-iron in reserve, in case the charge should not work as anticipated

The result demonstrated the correctness of my calculation. The fur-

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nace ran very rapidly and got very hot, so that I had to reduce the ratio of fuel to charge from 1 to 8 to 1 to 9. The resulting slag was very little matte formed, only about 20 pounds in twelve hours, while the furnace smelted from 13 to 14 tons of ore in the same time. Care was taken to save all matte which should form, by letting the slag cool in the pots, and breaking the hardened slag afterward. Only one or two matte cakes of small dimensions were obtained in twelve hours. The pressure of blast was 1⅛ inches mercury. Fuel, coke straight.

I have had no occasion since of verifying this method of reducing anglesite by iron pyrites; but I thought it worth while to call the attention of other metallurgists to this matter, especially in New Mexico, Arizona, and Sonora, where anglesite and pyrites ore occur in great abundance. If any body in these regions has occasion to smelt such ores, I think it may be advantageous to try this method, as the old method of reducing anglesite to sulphide of lead and then precipitating the lead by metallic iron is a very unsatisfactory one, on account of the amount of silver-bearing matte produced, and the almost impossibility of making a slag free from lead.

THE MINING AND METALLURGY OF ZINC IN THE UNITED STATES.*

By F. L. Clerc.

(*Concluded from page* 169.)

CENTRAL ZINC-WORKS.

Works in Illinois.—Of the works at La Salle and Peru, Illinois, only a general description can be given. They produce at present considerably more than half the metal made in this country. The works at La Salle were started about the year 1860; they belong to the Mathiessen & Hegeler Zinc Company, and have a capacity of from 28 to 30 tons of metal a day. The most striking feature about these works is the patented furnace employed. This furnace is in the neighborhood of 100 feet long, and contains about 800 retorts, of the same general size and shape as in the old Belgian furnace, and set into the furnaces in the same general way, but only five rows high. The furnace is fired by gas produced by a blast in a producer outside of the furnace. The producer is set close to one end of the furnace, but on a lower level; is of square cross-section, and has an air-tight iron ash-pit raised from the ground, into which air is forced by a large iron fan. The front of the ash-pit is closed by planed iron doors, which are raised by counterpoises when the fires are cleaned and held closely in place by suitable clamps when the air is admitted. The producer is covered by iron doors, which open half-way across the top when the producer is being charged. The coal is mined under the works, and dumped directly into the producer from the mine cars. The gases are led hot into the end of the furnace, and are gradually burned as sufficient air is admitted. The air for combustion is brought from the opposite end of the furnace, through a flue running over the center of the furnace arch; from this flue, lateral branches are taken off, at right angles, to both fronts of the furnace, and carried down to the floor level at such intervals as to admit four retorts in a horizontal row between successive air-flues. All these flues are external to the furnace, and the air is admitted into the combustion-chamber through perforated fire-clay tubes, corresponding in size, position, and arrangement with the charged retorts. Dampers to regulate the supply of air are introduced at intervals in the flues; when once adjusted, they do not require to be often changed. Contrary to what might be expected, the heat is tolerably uniform throughout the length of the furnace, but slightly less at the end remote from the producer, where the charge is modified to suit these conditions. The first furnace built was provided with stoves to heat the air by burning the gases escaping from the furnace. These stoves are a combination of iron and fire-clay pipes, through which the air passes, while the gases burn on the outside, and are about as large as are required for a 50-ton iron blast-furnace. Later furnaces have not these stoves, but room is left for them in the furnace buildings. It would seem, therefore, that there is still a question as to their economy. Probably the same may be said of the whole furnace.

Except for the use of suspended retorts, several rows high, and some peculiarities in the producer, there is little essential difference between this furnace and the step-grate furnaces with blast, employed in Silesia. It certainly has many of the advantages due to the use of gas-firing, and special advantages due to mechanical devices for working it; but, on the other hand, without the effective heating of the blast, and the utilization of the escaping heat of the furnace, it can not be considered an altogether successful contrivance, and the construction involves points which seem to render maintenance and repairs very expensive. Among the inventions to facilitate working may be mentioned: cars for cleaning and charging the retorts, cars with swinging ladles for drawing the metal, derrick-cars for taking out and replacing the retorts, all provided with suitable screens for protecting the workmen from the heat, and all moving on a track laid close to the furnace. Also, two story bins for the charge, to follow close behind the charging-car; a car carrying moulds for casting the metal; and trays for the collection of the blue powder.

Of the roasting-kilns, there are many varieties. In most of them, the ore gradually falls from the top of the kiln upon a succession of inclined shelves, meeting the hot air or furnace gas passing up through the kiln. The latest mechanical kiln has more points of novelty, and some good features. It is worked in connection with sulphuric acid chambers. This kiln is something like 75 feet long, and has five or six flat hearths, one above the other, with lateral cast-iron doors, not ordinarily used, and working doors at the ends. The ore is charged on the several hearths at one end of the furnace, and is carried to the opposite end by mechanical means. The handle of a rake is rapidly projected through one of the hearths and out of the working-door at the opposite end of the furnace, where the head of the rake is quickly attached to it; the rake is then drawn back through the furnace by the reversal of the same machinery which projected the handle. When it reaches the discharging end, the rake-head is detached, and is received on a car with decks corresponding to the hearths of the furnace, and carried back to the far end by the car moving around the furnace. There are as many handles and rake-heads as there are hearths. The sliding doors are raised and lowered so as to admit as little false air into the kiln as possible. The form and dimensions of the rake-teeth determine the amount of ore discharged by each draw through the furnace. The whole operation is quickly performed, and the doors are open only a few seconds at a time. Two sets of sulphuric acid chambers, each of a capacity of about 240,000 cubic feet, with all modern improvements, have recently been added to the works.

In the large rolling-mill of the company, there are six pairs of rolls; and the same desire is shown here as elsewhere to supplement manual labor by machinery. With rapidly moving rolls, and three eight-hour shifts a day, the output is pushed to the utmost. The capacity of the mill is over 100,000 pounds of sheets in twenty-four hours. To keep these works running steadily, the company, which mines no ore, is obliged to always carry a large stock on hand, which often must represent several hundred thousand dollars of capital. The system of sampling and mixing the ore is good, as is also the preparation of the retort mixture of clay. The retorts are shaped by machinery, the clay being forced by a propeller-like screw through a die-plate and around a mandrel; a man below receives it in an adjustable mold, into which he allows it to be forced with all the pressure it will bear without bending; when it reaches the bottom, he stops the machinery, cuts off the retort, and turns it over to another man, who stamps in the bottom and smooths up the retort. This process is said to give as good retorts as can be made by hand; but certainly not so good as those made in Belgium by hydraulic pressure in molds. The condensers are stamped out by a drop-plunger of the required internal shape. Besides four large furnaces, this company has a number of common Belgian furnaces, which have, however, been altered from direct firing to gas-firing, by building a semi-detached fireplace against one side. In other respects, also, crude and obsolete constructions may be found working side by side with the latest perfected inventions; and it can scarcely be doubted that the preponderating influence of these works on the zinc industries of this country is due less to their economy in working, or the excellence of any of their furnaces, than to the peculiar advantages they have enjoyed in the past in the matter of cheap ores, their abundant capital made in the business, their extensive knowledge of the metal trade, and the monopoly they enjoyed for many years of the sheet-zinc market, during which time the price of sheets ruled about two cents a pound higher than the price of metal.

The Illinois Zinc Company, whose works are at Peru, across the river from La Salle, have the next largest works in the country, with a capacity of from 18 to 20 tons of metal a day. There are three gas-furnaces in use, in addition to eight ordinary furnaces. The gas-furnaces were built under license from the owners of Siemens's patents in this country, and present several improvements over the earlier designs of Dr. Siemens of several years ago. The bottom of the furnace chamber is a solid floor of brick, and the air and gas-ports are raised above it, and come through the back wall of the furnace under the lower row of retorts. Another improvement is the placing of an auxiliary gas-box with a simple two-way flap-valve over the ordinary reversing butterfly valves, by means of which either set of regenerative chambers may be run on gas or air. By an occasional reversal, deposits of soot in the gas-chambers may be burned out, and to some extent deposits of oxide may be removed; but as the only escape for the zinc when it gets from the retorts into the combustion-chamber is through the regenerators and valves into the chimney, the principal effect on the oxide must be to drive it from one place to another in the furnace. It is said, however, that, with the recent improvements, the trouble from oxide is not serious, and that the furnace never has to be shut down on purpose to clean the regenerators, and will run two years without needing repairs. The furnace is about 60 feet long, and contains about 144 retorts on a side, three rows high, 48 retorts in a row. The four regenerators extend the whole length of the furnace, are about 28 inches wide, and contain about 30,000 bricks. In these works, the furnace is charged only once in twenty-four hours, and the retorts in the bottom row are considerably the largest, and have an elliptical shape. The charge is 17,000 pounds of calcined ore for an ore yielding 8000 pounds.

The gas-producers are of the ordinary type, and the management of the valves is the same as with any Siemens furnace. A rolling-mill with three sets of rolls, driven by a large engine with great reserve of power, has been started within a year. The rolls, housings, and general equipment of the mill are of first-rate design and construction. For many reasons, a separate engine for "breaking down" the ingots would seem to be preferable.

Works near St. Louis.—There is another group of zinc-works in the neighborhood of St. Louis, using Illinois coal, and drawing their supply of ore from the southeastern and southwestern lead regions of Missouri. Of these works, only two, the one at Collinsville, Illinois, and the Glendale Works at Carondelet, have run at all steadily for the past year or two. The Missouri Zinc-Works and the Carondelet Zinc-Works have stood idle for some time. Of these four works collectively, it may be said that they have passed through many vicissitudes; they have been repeatedly started up under different managements, and have always been among the first in the country to shut down when ores are high or metal low. There is nothing noteworthy in their general construction. Until quite recently, they have been dependent upon a single road for their ore supplies, and the works on the Missouri side of the river have had to pay extravagant prices for fuel. Whether these two causes alone, or joined with the lack of sufficient capital, are enough to account for their irregular record, and to offset their natural advantages of location, it might be a matter of some difficulty to determine. Large retorts, large furnaces (for direct firing), and twenty-four-hour charges, seem to have been the prevailing practice. It may be mentioned, for the benefit of any one thinking of repeating the experiment, that there are two nearly new blocks of two furnaces, each furnace containing 198 retorts, nine retorts high, with 22 retorts in a row, to be seen at the works of the Missouri Zinc Company.

WESTERN ZINC-WORKS.

On the bituminous coal belt extending from the Indian Territory through Eastern Kansas into Northern Missouri and Iowa and on lines of railroad penetrating into the lead region of Southwest Missouri, is located another group of works. The oldest of these is at Weir City, Cherokee

* From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey, Department of Interior, Statistics. Albert Williams, Jr., Chief of Department.

County, Kansas, about twenty-five miles from Joplin on a branch of the Kansas City, Fort Scott & Gulf Railroad. The first furnaces were built in 1873, before railroad communication was established. Ore and coal were then exceedingly cheap, but the former had to be hauled from twenty-five to thirty-five miles in wagons, and came mainly from Jasper and Dade counties. The works were built on a stripped coal-bank, in the open prairie, and four miles from any town. Skilled labor was hard to get and high-priced, and the class of men first employed was very turbulent and unsatisfactory. The works have undergone many changes, and it is only recently, under the present management, that they have assumed importance as producers. Ten miles from here, on the same coal-field, at a point which has since become the town of Pittsburg, R. & S. H. Lanyon started two furnaces in 1878; the number of furnaces has since been increased to eight, each furnace containing 98 retorts. In 1880, the partnership was dissolved, and Mr. S. H. Lanyon began the erection of new works alongside of the old one; he has now four furnaces similar to the foregoing. In 1882, W. & J. Lanyon put up two similar furnaces in the same immediate neighborhood, which are now running. The Granby Mining and Smelting Company in the same year began the erection of works, using the Siemens gas-firing furnace, at this place, and is now engaged in smelting. The town of Pittsburg is twenty-eight miles from Joplin, and on branches of both the St. Louis & San Francisco and the Kansas City, Fort Scott & Gulf railroads; it has now a population of about 3000, and is the principal coal shipping station on the former railroad. The West Joplin Lead and Zinc Company has, within a year, built zinc-works at Joplin, which are now running with a capacity of six furnaces containing 644 retorts. Within the same period, the Southwestern Lead and Zinc Company has erected at Rich Hill, Bates County, Missouri, on the same coal-belt, about 80 miles from Joplin, with which it has connection by two railroads, a Siemens gas-furnace containing 288 retorts, which has been running some six months, and has just completed a block of direct-firing furnaces.

Economic Conditions of Zinc Metallurgy.—This unusual activity in furnace building is likely to produce considerable uncertainty in the zinc market for some time to come. All of these works possess advantages of cheap coal (about 50 cents a ton for slack and from $1 to $1.50 a ton for the run of the mine) and low freights on ore, from $1 to $1.50 a ton according to the shipping point; living is cheap for their men, and the country around them is rapidly filling up with new-comers; foundries, boiler and machine-shops at Joplin, Rich Hill, and Fort Scott supply castings at from 3 to 3½ cents a pound and machine work at reasonable rates; labor is abundant and wages moderate. There is little to be noted in the form of the direct-firing furnaces in use in this district. In the Lanyon furnaces, the four lower rows of retorts are charged twice in twenty-four hours; the retorts of the upper rows, which are charged with blue powder, are both longer and wider than the lower ones; the back wall of the furnace being made thinner at the top than at the bottom, to admit of this arrangement, which commends itself to reason, as the blue powder is easier to reduce than ore and the charge is longer in the furnace. The furnaces are built with the ash-pits above the ground and on a level with the rest of the works; a sloping bank of earth or cinder leads up to the furnace-floor. The buildings are all of the simplest and lightest construction possible, scarcely more than sheds, and are huddled together, with little regard to their mutual relations. In such works, at present, it seems that metal can be made as cheaply as in any works in the country. Their first cost is very inconsiderable; the flat ledges of Coal Measure sandstone in the neighborhood furnish cheap and serviceable material for building foundations and ash-pits; the peculiar mining systems of the district make small or second-hand engines, boilers, and crushing machinery comparatively inexpensive; cheap fuel renders economy in this direction unimportant; and cheap living causes ordinary yard labor to be easily obtainable at wages as low as prevail anywhere in the country. When the potteries are in operation, all refuse refractory material can be cheaply worked up into some sort of building material. The furnace walls are laid with the ordinary clay underlying the coal. The coke for the charge is jigged out of the cinders from the ash-pits. The general mildness of the winters enables most of the work to be done in the open air. The potteries are heated by stoves or by fires built in worn-out boilers. If the buildings do not blow up or burn down, as occasionally happens, the interest on capital is very insignificant. The works are usually owned by partners who do the work of salaried employés, buying the ore and selling the product, superintending the smelting operations, and occasionally taking a hand as mechanics, who consider as a profit what would only be the interest on their money and their wages at some other occupation. The furnaces, roughly constructed of inferior material, will not long sustain the heat required to exhaust the zinc from the cinder, and it is the accepted opinion that there is no economy in "butchering" the furnace for the sake of a small additional percentage of metal; it is preferred to increase the production of the furnace and reduce the smelting expenses of labor and fuel by increasing the charge of ore—in other words, to butcher the ore and save the furnace. Analyses of ores and cinders are entirely neglected.

But the most secure advantage these works have over those at a distance comes directly from the manner of buying the ore. It has been seen that ores are not sold on their contents of metal, and that the miners are absolutely ignorant of their value; ores differing 5 or 6 per cent are often held at the same price. A personal knowledge of the ores of particular diggings, and their behavior and yield in the furnace, often enables the smelters, by a slight advance in price, to pick up desirable lots of ore and at the same time raise the price of all the ore held in the neighborhood. The smelters at a distance, buying in very much larger quantities, through agents who are ignorant of other branches of the business, are placed at an evident disadvantage. This system of personal supervision of all branches of the business by the owners of works is clearly applicable only to very small works; while labor-saving machinery and facilities for handling the ore can only attain the maximum economy when large amounts of material are to be handled—consequently, when the works are large, and the machinery is constantly kept employed. On the other hand, under these favorable circumstances, in every prosperous owner of a mining lot and in every enterprising furnace brigadier are to be seen the possible proprietors of new smelting-works. It is from lack of sufficient capital and knowledge of the commercial part of the business to market their product advantageously that the weakness of such companies mainly arises. The accumulation of a few months' metal is sufficient to tie up all their capital and exhaust their available credit Sales are made through commission men, with orders to sell the metal for what it will bring. Large consumers, knowing the condition of affairs, are careful to get the lowest bids before making purchases. Large metal houses, who might otherwise dispose of the whole product, are not disposed to have much to do with it; for no price above actual cost price is safe to buy the metal at in order to sell it again. Occasional good sales, or cheap lots of ore, give uncertain profits; and a slight rise in the price of metal is sufficient to "fire in" new furnaces. Under such circumstances, no real advances in the metallurgy of zinc are to be expected.

Two companies controlling large bodies of mineral land—the Southwestern Lead and Zinc Company and the Granby Mining and Smelting Company—have been driven to undertake the smelting, in part, at least, of their own ores, in the hope of obtaining a certain sale for their ore product, which will enable them to pursue some definite policy in the management of their mines. The undertaking is not without its difficulties in the present state of the zinc industries. The strength of their position lies in their ability to supply their works with ore, without the risk of carrying a large stock on hand, and at the same time to develop their mines and increase the amount of their royalties and their profits from lead smelting.

Comparative Merits of Furnaces.—The advantages of a gas over a direct-firing furnace are briefly these:

1. A saving in fuel, which is plainly proportional to the extent to which the heating power of the gases escaping from the furnace is utilized. For heating the air or gaseous fuel, nothing is likely to supersede the Siemens regenerators.

2. A saving in wages, due to the simplification of the work and the less amount of labor required. The furnace can be built larger, without being above the reach of a man on the floor; and a man on a table exposed to the full heat of the furnace, with a man on the floor to wait on him, is no longer required. One set of men can fire for several furnaces at the same time.

3. A saving of metal and retorts; for the control of the heat is so perfect that the temperature of the furnace can be kept at the point needed to fully reduce the charge without running the risk of burning out the furnace or cutting down the retorts. But the full importance of such advantages, like the economy of building well and putting in the best devised labor-saving machinery, will only be realized when the cost of smelting at the different works affects their profits more directly than do their facilities for getting cheap ore and disposing of their products to advantage.

General Conclusions.—From the foregoing rapid survey of an extensive field, these conclusions may safely be drawn:

1. That we are rapidly exhausting the richest portions of our known ore-deposits.

2. That our methods of mining are reacting unfavorably on our furnace practice.

3. That the future of our zinc industries is uncertain and beset with many dangers.

When it is borne in mind that our production of spelter is less than one seventh that of Europe, while the average yield of the ores we treat is nearly twice as great as the average yield of the whole of Europe and nearly three times as great as that of the ore treated in Silesia, whose metal rules the price of spelter in the world's market, it will be evident that many changes must take place before it can be said that we are making the most of our opportunities. It is not within the scope of this article to discuss the policy of the smelters toward the ore-producers or toward each other, or the uses to which zinc is put, which determine the amount consumed or the price that can be paid for it; but it may be noted that, from the rapid extension of the use of galvanized iron and of telephone and telegraph lines and other applications of electricity, the market for zinc is rapidly extending, and that, except for purposes of roofing (which are almost unknown in this country, but absorb the bulk of the sheet-zinc rolled in Europe, where the zinc comes into competition with tinned iron), there are few uses for zinc in which the consumption would be materially lessened by a considerable increase in its price; and that, from the difficulties to be overcome in mining and smelting, it seems probable that, relatively to other metals, zinc is at present undervalued. It is not to be desired that any smelting company, so long as it can buy ores profitably, should engage in mining, or should pay any more than it is obliged to for ore, or buy any quality of ore but what it finds most profitable. Nor is it to be expected that any mining company should change from a system which it finds sufficiently profitable, or employ its capital in any way but the one which yields the greatest profit. But it is very desirable that some record should be kept of present mining operations, and such knowledge gained of the mineral regions as will justify the employment of greater capital and render possible the introduction of better methods of mining and utilizing the ore. The geological surveys of Wisconsin and Missouri have done good work; but the fields covered by them are very extensive, and much more yet remains to be done. The huckstering of the ore and the metal, however profitable it may be to the persons engaged in it, is unfavorable to the mines and to the development of manufacturing industries. The fluctuations in price attendant on it are alike injurious to the producer and the consumer—more so, in fact, than would be a low price to the producer and a high one to the consumer. The remedy can only come gradually and with time.

THE Bradford mines are to be saved from the dangers of flooding by the construction of a seven-mile ditch, thirty feet wide, from the coal-fields to the Kankakee River. The vast mining operations which for years have been carried out at Joliet have caused a general depression in the land, which was naturally flat and level, so that, whenever it rained, the waters were kept as in an immense basin, forming a great lake. The ditch will carry it off and prevent the annual damage done to the mines.

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THE SHELF DRY-KILN.*

By C. A. Stetefeldt, New York City.

In the dry-crushing of ores, either by stamps, rolls, or other machinery, it is essential that the material should be free from moisture. Hence a contrivance which effects this with economy, and is of durable and compact construction, is a great desideratum. It is claimed for the below-described shelf dry-kiln that it possesses these qualifications in a high degree.

The construction of the shelf dry-kiln† is based on the Hasenclever principle. That is to say, a number of inclined shelves are arranged zig-zag above each other in a vertical shaft, having openings or slits where they meet, on which the ore rests in a stratum, the thickness of which is governed by the width of the slits and the inclination of the shelves. If a portion of the charge is removed at the end of the bottom shelf, a sliding motion of the ore takes place on all shelves above, and the top shelf is replenished from a hopper set over it. It will be seen that the shaft is divided by the shelves into a number of triangular prismatic spaces. Through these, the hot gases from a fire-place are made to circulate, each space communicating with the next one by a flue arranged in the side-wall of the shaft. These flues being located on alternate sides of the shaft, a continuous passage is formed through the whole structure.

After thus stating the principle of construction, its details will be easily understood by reference to the drawings, Fig. 1 to Fig. 5. The drawings, Fig. 1 to Fig. 4, represent two kilns united into one structure. The cast-iron shelves *a* are 2 feet 4 inches wide and 5 feet long, with sides and a back 4 inches high, and are cast a full half-inch thick. How they rest on the brackets *d*, and interlock each other, is shown in Fig. 5. Three such shelves, with an inclination of 38 degrees, are placed in one row in a brick shaft 7 feet ½ inch wide and 4 feet deep. The ore-hoppers *g* rest on iron beams *f*. At the end of the bottom shelves are the discharge-doors *b*, with chutes projecting beyond the front wall. A swinging apron *c* keeps the ore in place. By dropping it, a car below the chute is filled with dry ore. A number of extra-large pieces of ore may cause a stoppage in the slits; for such an emergency, the openings *e* are provided, through which a poker can be inserted. The fire-place, with air-channels *h*, is located near the base of the kiln, but its hot gases enter below the top row of shelves, and move downward, finally escaping through the flue *k*, which is connected with a chimney. Such an arrangement is made for very good reasons. If the fire entered below the bottom row of shelves, which are filled with dry and hot ore, a careless laborer might overheat and warp them by too heavy firing. As it is, the greatest heat strikes those shelves which are filled with cold and moist ore, and overheating can hardly occur. With a downward draught, the temperature of the kiln is very uniform, and the evaporated moisture can not condense again by coming in contact with cold and wet ore. The opening *i* in the front wall is closed either by a brick wall or a sheet-iron door. The hight of the kiln from the discharge-floor to the top of the hoppers *g* is 21 feet, more or less, depending somewhat on the hight of the car to be used for transporting the dry ore to the crushing machinery. The brick-work is heavily anchored with beams, rails, bolts, and buck-straps, which are not shown in the drawings.

In constructing the kiln, none of the shelves is put in position until the shaft is finished to the level of the beams *f*, and the brick-work is fully anchored. In order to avoid difficulties in placing the shelves, it is best first to fit them, set after set, into an exact wooden model of the shaft (2 feet 4 inches wide), which is put up on the fireman's floor, not in a vertical but in a horizontal position.

Since a good draught is essential for drying the ore quickly, the chimney should not rise less than 30 feet above the top of the kiln. For one double kiln, a draught area of 3 square feet is required.

In case the kiln is used for drying salt, some remarks about its operation may not be out of place. The wet salt on the top row of shelves first bakes into a solid cake. By increasing the fire, decrepitation of the salt-crystals commences, and the whole mass is shaken loose, with exception of a crust on the top. This is broken up by means of a light poker with chisel end. If the fire is kept right, no rebaking of the salt takes place on the second row of shelves, but violent decrepitation continues here and lower down. The constant impact of the decrepitating salt-crystals has, in the long run, a destructive effect on the walls of the kiln, if they are built of ordinary soft brick. Hence it is necessary to line the salt-kiln with very hard-burnt common brick or with fire-brick. The drying of the salt is very perfect. Two double kilns for ore and one single kiln for salt have been in operation at the Lexington Mill, Butte City, Montana Territory, since September 1st, 1882. Mr. A. Wartenweiler, a member of the Institute, gives the following statistics as to the capacity and consumption of fuel and labor of this plant. The two double kilns put through 54 tons of ore, with about 4 per cent of moisture, and consume 2 cords of wood in twenty-four hours. In calculating the consumption of wood for several months, it is found that 0·039 cords of wood are used for drying 1 ton of ore. One single kiln puts through 8 tons of salt (dry weight), with about 6 per cent of moisture, and consumes 1 cord of wood in twenty-four hours. In calculating the consumption of wood, as above, it is found that 0·11 cords of wood are used for drying 1 ton of salt. The capacity of the salt-kiln is somewhat overtaxed, and a heavy fire has to be kept. In consequence, the upper shelves, next to the fire, warp after some time.

One man in each shift attends to the fire-places and the salt-kiln, and one man in each shift discharges the dry ore and salt, and transports it to the self-feeders of the batteries. All shifts in the mill are eight-hour shifts.

The weight of the iron plant for one double kiln, consisting of castings, wrought-iron work, beams, rails, buck-straps, and bolts, is about 25,000 pounds. The quantity of brick required is 30,000. It may be stated that every thing is constructed with a view to durability.

Compared with the revolving or cylindrical dry-kiln, the following advantages are claimed for the shelf dry-kiln:

1st. Greater compactness of construction and greater durability.

2d. Greater economy in fuel, since very little heat is lost by radiation, and the heat is better utilized by traveling through a much longer space.

3d. No power is required in its operation.

4th. It produces no dust, hence no necessity of erecting dust-chambers, and no loss in precious metals from this source.

* A paper read at the Roanoke Meeting of the American Institute of Mining Engineers, June, 1883.

† Covered by United States patent, granted to C. A. Stetefeldt, March 1st, 1881.

GOLD MILLING IN AUSTRALIA.

There is nothing more calculated, says the London *Mining Journal*, to insure energy and lead to careful manipulation on the part of mine managers than the publication of details as to the practice adopted and results obtained in various mines and mining districts. When one finds that he is obtaining better results than others in the same profession, he is naturally inclined to use his utmost efforts to maintain his pre-eminence; and should he be unfortunate enough to learn that his work displays carelessness and incompetency, he may be induced to attempt to improve. Such being the case, it is scarcely possible to attach too much value to the subjoined particulars with reference to Australian practice which have been collected by the mining surveyors and registrars relating to the weight and cost of the stamps made use of in some of the principal gold mines in the several mining districts, and which supply additional information connected with the process of crushing quartz during last year:

In the Ballarat Mining District, the stamps vary in weight from 3 to 9 cwts., and the cost is from 12s. to £1 per cwt. The fall of the stamp ranges from 7 to 14 inches. The number of strokes made per minute is from 50 to 83. The quantity of quartz crushed per head per diem of twenty-four hours varies from 1 ton 4 cwts. to 3 tons 17 cwts. The number of holes per square inch in the gratings used is from 75 to 256. The horse-power required to work each stamp is from 7-10ths to 1¼. The quantity of water used per stamp in crushing varies from 24 gallons to 770 gallons per hour. The quantity of mercury used in the riffles per stamp is from 2 pounds to 32 pounds. The quantity of mercury lost per per stamp per week is from a quarter of an ounce to 12 ounces.

In the Beechwort Mining District, the stamps vary in weight from 3 cwts. 3 qrs. to 13 cwts., and the cost is from 16s. to £3 per cwt. The fall of the stamp ranges from 5 to 20 inches. The number of strokes made per minute is from 40 to 90. The quantity of quartz crushed per head per diem of twenty-four hours varies from 1 ton to 2 tons 15 cwts. The number of holes per square inch in the gratings is from 80 to 260. The horse-power required to work each stamp is from ¾ to 2½. The quantity of water used per stamp in crushing varies from 40 gallons to 1200 gallons per hour. The quantity of mercury used in the riffles per stamp is from 9 to 56 pounds. The quantity of mercury lost per stamp per week is from half an ounce to 4 ounces.

In the Sandhurst Mining District, the stamps vary in weight from 6 cwts. to 8 cwts., and the cost is from 14s. to £1 10s. per cwt. The fall of the stamp ranges from 6 to 12 inches. The number of strokes made per minute is from 60 to 65. The quantity of quartz crushed per head per diem of twenty-four hours varies from 1 to 2 tons 10 cwts. The number of holes per square inch in the gratings used is from 80 to 200. The horse-power required to work each stamp is one. The quantity of water used per stamp in crushing is 255 gallons per hour. The quantity of mercury used in the riffles per stamp is from 6 to 36 pounds. The quantity of mercury lost per stamp per week is one ounce.

In the Maryborough Mining District, the stamps vary in weight from 5 cwts. to 8 cwts., and the cost is from 14s. to £1 12s. per cwt. The fall of the stamp ranges from 7½ to 12 inches. The number of strokes made per minute is from 60 to 76. The quantity of quartz crushed per head per diem of twenty-four hours varies from 1 ton 8 cwts. to 2 tons 14 cwts. The number of holes per square inch in the gratings used is from 81 to 290. The horse-power required to work each stamp is from 1 to 1½. The quantity of water used per stamp in crushing varies from 320 to 900 gallons per hour. The quantity of mercury used in the riffles per stamp is from 2 to 20 pounds. The quantity of mercury lost per stamp per week varies from 1 to 12 ounces.

In the Castlemaine Mining District, the stamps vary in weight from 6 cwts. to 8 cwts. 1 qr., and the cost is from 14s. to £1 12s. per cwt. The fall of the stamp ranges from 7 to 12 inches. The number of strokes made per minute is from 60 to 75. The quantity of quartz crushed per head per diem of twenty-four hours varies from 10 cwts. to 2 tons. The number of holes per square inch in the gratings used is from 81 to 200. The horse-power required to work each stamp is from ½ to 1. The quantity of water used per stamp in crushing varies from 240 to 666 gallons per hour. The quantity of mercury used in the riffles per stamp is from 4 to 20 pounds. The quantity of mercury lost per stamp per week varies from half an ounce to 18 ounces.

In the Ararat Mining District, the stamps vary in weight from 6 cwts. to 9 cwts., and the cost is from £1 2s. to £1 12s. per cwt. The fall of the stamp ranges from 6 to 10 inches. The number of strokes made per minute is from 70 to 75. The quantity of quartz crushed per head per diem of twenty-four hours varies from 1 ton 1 cwt. to 2 tons 10 cwts. The number of holes per square inch in the gratings used is from 120 to 342. The horse-power required to work each stamp is from 0·5 to 1·25. The quantity of water used per stamp in crushing varies from 528 to 800 gallons per hour. The quantity of mercury used in the riffles per stamp is from 20 to 75 pounds. The quantity of mercury lost per stamp per week is from 6 to 29 ounces.

In the Gippsland Mining District, the stamps vary in weight from 1 cwt. to 8 cwts., and the cost is from £1 2s. 6d. to £5 per cwt. The fall of the stamp ranges from 6 to 40 inches. The number of strokes made per minute is from 18 to 80. The quantity of quartz crushed per head per diem of twenty-four hours varies from 6 cwt. to 2 tons 16 cwts. The number of holes per square inch in the gratings is from 60 to 240. The horse-power required to work each stamp is from 1 to 2. The quantity of water used per stamp in crushing varies from 60 to 480 gallons per hour. The quantity of mercury used in the riffles per stamp is from 5 to 38 pounds. The quantity of mercury lost per stamp per week varies from half an ounce to 10 ounces.

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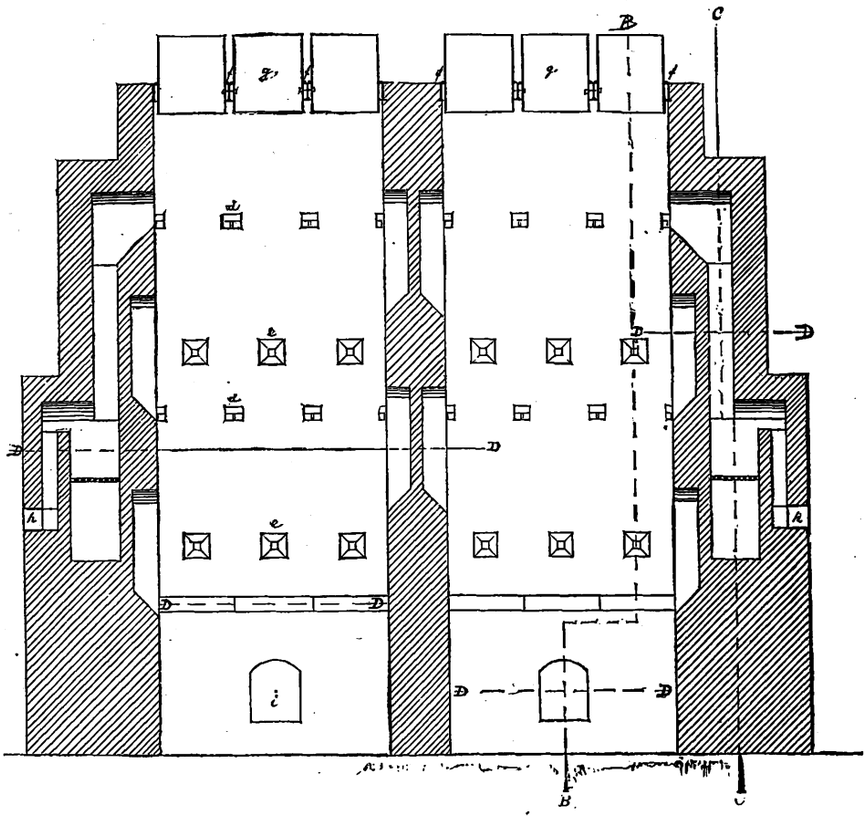


Fig. 1.—Section A A. Shelves *a*, *a* left out.

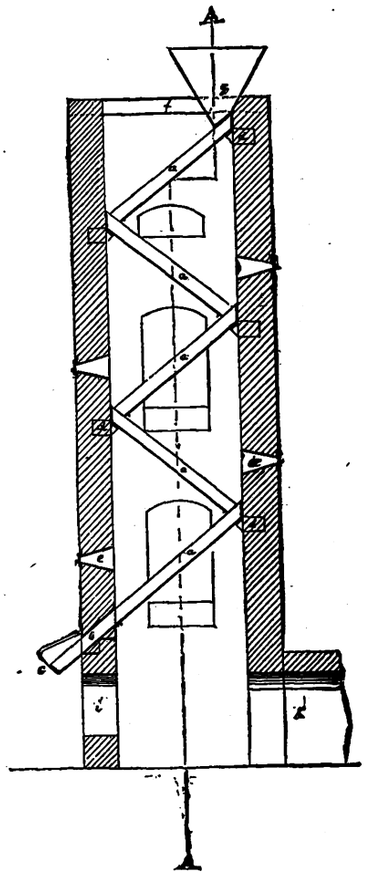


Fig. 2.—Section B B.

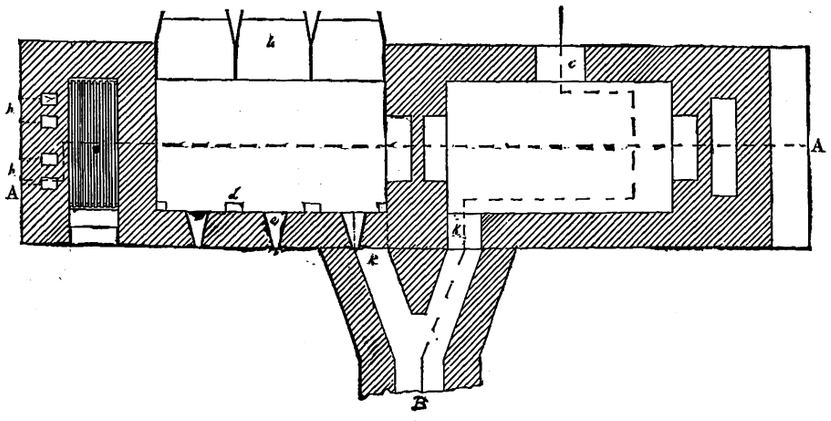


Fig. 4.—Section D D.

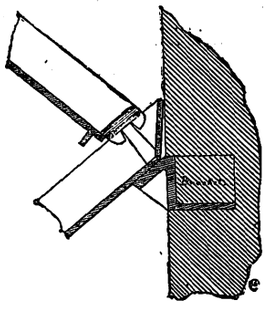


Fig. 5.—Bracket.

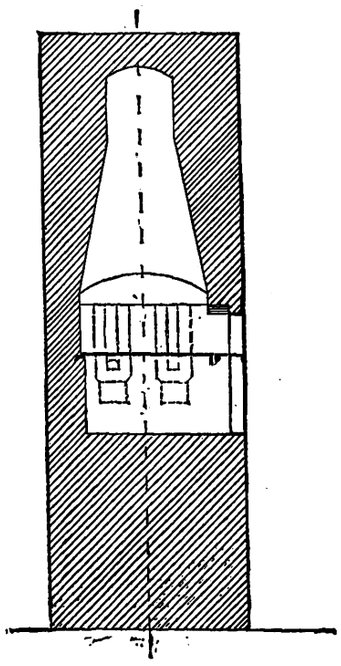


Fig. 3.—Section C C.

THE STETEFELDT SHELF DRY-KILN.

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THE CHEMICAL TRADE OF THE NORTH OF ENGLAND.

There are few industries, says the *Times*, that show in the past few years such marked changes as that of chemical manufacture. This is because the trade has been for some time in a state of transition. An old process is in course of being slowly supplanted by a newer one; and what in one process has been a by-product seems likely to change places with that which was the chief object of the carrying out of the process. Thus, there has been a fluctuation in the demand, and a response in prices. The chief articles produced by the chemical manufacturers of the north of England are soda ash, soda crystals, and bleaching-powder. Taking soda crystals first, at the beginning of each quarter of the year 1881 the prices were £2 16s., £2 14s. 9d., £3, and £2 16s. 9d., and at the same period of the past year the prices did not vary much above 2s. from these prices. But in the present year, the prices have varied in a considerable degree. Between the beginning and middle of the year, soda crystals rose from £2 12s. to £3 1s., and bleaching-powder from £4 to £5 10s. The former article has scarcely maintained its price, but the latter has risen still further, and is now £7 15s., so that in seven months the price has been nearly doubled. The cause of the change is largely the increased production of soda ash by the newer ammonia process, and the decay in the manufacture of that form of soda by the older Leblanc process. This decay has continued until, instead of twelve or fourteen alkali manufacturers on the north bank of the river Tyne, there is not one now. Bleaching-powder, which used to be merely a by-product—the hydrochloric acid being considered in some instances so worthless that it was wasted—has advanced in price so rapidly that the manufacturers are almost of opinion that it will be the chief product by the Leblanc process, and soda crystals the by-product, made not because of the profit, but made in the process of the manufacture of the more profitable article. Under the agreement of the makers of the bleaching-powder, the extent of the production is regulated till the end of next year; and as that article is only made by the old process, and as the latter is not extending, there is no probability of a large increase in the extent of production. The demand for paper making and for allied uses, as well as for sanitary purposes, is growing, and thus there may be a return to higher prices. These changes in price, and in the comparative cost of production, have materially altered the course and prospects of the chemical trade of the county of Durham; for by the dying out of the trade on the north bank of the Tyne the manufacture of chemicals in large quantities in the north is now nearly confined to that county. The utilization of the salt deposits of South Durham will before long introduce into South Durham the production of soda by the ammonia process.

GRAPHITE.*

By John A. Walker.

Occurrences.—As a mineral, graphite is widely distributed in the United States; as an ore, it is found in but few places in sufficient quantities and purity to be profitably worked. It is found in the older rocks of the Appalachian chain from Alabama to Canada. Several discoveries of it have been reported from Michigan. Mr. F. F. Chisolm reports its occurrence in "great purity in five different localities in Albany County, Wyoming Territory, in veins from 18 inches to five feet thick. In Colorado, it is found in different parts of the State. At Pitkin, in Gunnison County, it occurs in beds two feet thick, but very impure. In New Mexico, pure graphite is found in small quantities in the Coal Measures, where it is probably the result of metamorphism. Graphite occurs sparingly in the Black Hills of Dakota." It has been mined at the Sonora mine, Tuolumne County, California.

Of the Eastern deposits, those of Pennsylvania, New Jersey, New York, and Canada are of the crystalline or foliated variety, are the best known, and are the only ones which are at present worked. The deposits occurring in Alabama, North Carolina, and Virginia are of the amorphous variety. These are of such a nature that purification is economically impossible. They can be used only in the crude state and for but few purposes. The Western deposits are still undeveloped.

Origin and Characteristics.—Graphite is now generally conceded to be of organic origin—the result of the metamorphism of some of the products of destructive distillation of vegetable tissue. It occurs in veins, beds, and disseminated through strata (graphitic schists). The veins occur principally in New York, Canada, and the far West. They are true fissures in gneissoid rock. The vein graphite is usually associated with calcite and quartz. Pyroxene, mica, and apatite are sometimes found with it. Crystals of calcite are found which, on being split, show scales of foliated graphite along the planes of cleavage. Graphitic schists are found in the same regions as the veins, and also in New Jersey and Pennsylvania. These are metamorphosed sandstones with foliated graphite very evenly disseminated throughout in small flakes. The graphite found in beds is amorphous, and occurs principally in the South. It is in a sedimentary formation, is quite impure, and on account of its fineness can not be successfully purified. Geologically, graphite occurs from the Coal Measures back to the eldest rocks. (See article by Professor Frazer, Transactions American Institute of Mining Engineers, Vol. IX., page 732; also Prof. J. S. Newberry's pamphlet on *The Origin and Relations of the Carbon Minerals*, Annual Report New York Academy of Sciences, Vol. II., No. 9, 1882.)

Productive Localities.—The only place in the United States where graphite is now mined successfully is at Ticonderoga, New York. This property, owned originally by the American Graphite Company, now belongs to the Joseph Dixon Crucible Company, of Jersey City, New Jersey. The American Graphite Company worked the vein deposits to a depth of 600 feet. The Dixon Company now mines a graphite schist 15 feet thick, carrying from 8 to 15 per cent of graphite, practically an inexhaustible supply.

Numerous attempts have been made to work the similar deposits of Pennsylvania and New Jersey, with only partial success. The parties interested in these attempts are: The Pennsylvania Plumbago Company, the Eagle Plumbago Company, and the Phœnix Plumbago Company, all of which have worked deposits in the Pickering Valley, Pennsylvania; the American Chemical Manufacturing and Mining Company, of Rochester, New York, which has worked the deposits of Northern New Jersey; and Mr. A. Z. Ryerson, who in 1882 worked the deposit at Bloomingdale, New Jersey. Mines of merit are known in Georgia and California, but these can not now be worked on account of the expensive transportation.

Ore Dressing.—Several methods (both wet and dry) of dressing the ore have been attempted. In Vol. IX., page 732, Transactions, American Institute of Mining Engineers, Professor Frazer, of Philadelphia, gives a description of the process adopted in the Pickering Valley. The process used by the Dixon Company, at Ticonderoga, owes its success to careful supervision. It is a wet process in which the ordinary practice is reversed, the "tails" being the useful product, while the "heads" are thrown away. All attempts at dry concentration have failed.

Production.—In 1882, the output of the Ticonderoga mine was 400,000 pounds. The outputs from the other mines have been so spasmodic that it is impossible to give them accurately. Probably 25,000 pounds would cover them all, making a total output in 1882 of 425,000 pounds. For 1883, the Dixon Company has arranged to produce 500,000 pounds; and again estimating the product of the others at 25,000 pounds, we have for 1883 a total output of 525,000 pounds. The average spot value may be stated at eight cents per pound.

Kinds.—On account of the peculiar advertising it has had, graphite is commercially known as German black-lead, Ceylon plumbago, and American graphite. German black-lead is a product of Bavaria. It is of the amorphous variety, and is dressed chiefly by washing. Its price depends on its percentage of graphite and the nature of its impurities, varying from $1 to $10 per hundredweight in cargo lots. It is used in the manufacture of pencils, stove-polish, and foundry facings. Ceylon plumbago is mined at Travancore, Ceylon, and is shipped from Colombo to all parts of the world. It occurs in immense veins of great purity. Cobbing and sizing are the only preliminary operations it undergoes. It appears in the market graded according to size, as large lump, small lump, chip, and dust. Its price varies from $2 for dust to $10 per hundredweight for prime lump, in cargo lots. It is used for all the purposes of the trade, except the manufacture of pencil leads. American graphite, from the nature of its occurrence, appears in the market only in the dressed condition. Its price ranges from $2 to $10 per hundredweight wholesale, according to purity and fineness. Fineness exercises considerable influence on the price of graphite, on account of the difficulty of pulverizing it. American graphite is used for all purposes of the trade, and excels all kinds as a lubricant. It is the same geologically, etc., as the Canadian. Before the development of the American and Canadian mines, the Ceylon mineral was the standard.

Analyses.—In 1876, the Canadian government authorized an extended survey and investigation of the comparative merits of the Ceylon and Canadian varieties. The following table of analyses of carefully-prepared samples is from the report of the survey:

ANALYSIS OF CANADIAN AND CEYLON GRAPHITES.

LOCALITY.	Specific gravity.	Volatile matter.	Carbon.	Ash.
		Per cent.	Per cent.	Per cent.
Canada, Buckingham; vein graphite; variety, foliated	2·2689	0·178	99·675	0·147
Canada, Buckingham; vein graphite; variety, columnar	2·2679	0·594	97·626	1·780
Canada, Grenville; vein graphite; variety, foliated	2·2714	0·109	99·815	0·070
Canada, Grenville; vein graphite; variety, columnar	2·2659	0·108	99·757	0·135
Ceylon; vein graphite; variety, columnar	2·2671	0·158	99·792	0·050
Ceylon; vein graphite; variety, foliated	2·2664	0·108	99·679	0·213
Ceylon; vein graphite; variety, columnar	2·2546	0 900	98·817	0·283
Ceylon; vein graphite; variety, foliated	2·2484	0·301	99·284	0·415

These analyses prove the oft-repeated claim of the dealers in Canadian and American graphite that it is equal to the best Ceylon.

Manufactures.—The properties of graphite make it useful for the following general purposes: The manufacture of refractory articles, lubricants, electrical supplies, pigments, and pencil leads. A detailed table of the articles made from it is annexed, with an estimate of the percentage used for each purpose:

PROPORTIONATE AMOUNTS OF GRAPHITE USED FOR DIFFERENT PURPOSES.

MANUFACTURES.	Kinds of graphite used.	Per cent.
Crucible and refractory articles, as stoppers and nozzles, crucibles, etc	Ceylon, American	35
Stove-polish	Ceylon, American, German	32
Lubricating graphite	American, Ceylon	10
Foundry facings, etc	Ceylon, American, German	8
Graphite greases	American	6
Pencil leads	American and German	3
Graphite packing	Ceylon, American	3
Polishing shot and powder	Ceylon, American	2
Paint	American	1½
Electrotyping	American, Ceylon	¾
Miscellaneous—piano action, photographers', gilders', and hatters' use, electrical supplies, etc		¼
		100

The earliest use of graphite was for pencil leads. La Moine cites a document of 1887 ruled with graphite. Its use for this purpose has become so extended that in 1882 over 150,000,000 pencils were made in the world. Previous to 1827, black-lead crucibles were made only in Germany. In that year, the late Joseph Dixon began their manufacture in this country, using graphite from New Hampshire. He afterward saw samples of Ceylon plumbago, and, appreciating its value, he secured a shipment from Ceylon in 1829. This was the first importation of Ceylon plumbago into this country; since that time, its use has steadily increased. In the fiscal year 1882, 16,047,100 pounds of plumbago were imported, most of which was from Ceylon; the rest from Germany.

Graphite has long been used as a lubricant. This is one of its most use-

*From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey, Department of Industrial Statistics. Albert Williams, Jr., Chief of Department.

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ful applications, and one which promises most for the future. Formerly, it was offered to the engineer only in the form of a dry powder; now it is compounded, or mixed with fats and oils in many ways, some of which are patented. This use of graphite is attracting the attention of all interested in the problem of the reduction of friction, and promises to outstrip all others. The barriers which have prevented its extensive use in this direction have been the price and the difficulty of securing purity and freedom from all grit. These are now both overcome, the price being now less than 25 per cent of what it was fifteen years ago. The purity, which now is absolute, was then only approximate. For all heavy work, graphite is undoubtedly the lubricant of the future.

The growth of the graphite industry has kept pace with the age, each new development in metallurgy and engineering offering some new field of usefulness for graphite. For instance, it furnishes the pots for the manufacture of cast-steel, and the nozzles and stoppers used in the Bessemer process. It is used in the manufacture of electrical supplies, etc. Fifty years ago, graphite was little known and misnamed. Now, it is of constantly increasing importance. From an insignificant beginning in the present century, the industry has grown to its present proportions. The principal houses engaged in the graphite industry are as follows:

LIST OF AMERICAN MANUFACTURERS.

House.	Location.	Articles made.	Estimated number of hands.
Joseph Dixon Crucible Company	Jersey City, N. J.	Every thing for which graphite is used	500
Phœnix Crucible Company	Taunton, Mass.	Crucibles	20
Taunton Crucible Company	" "	" "	12
J. H. Gautier & Co.	Jersey City, N. J.	" "	25
R. Taylor & Co	Philadelphia, Pa.	" "	25
Seidell & Co.	" " "	" "	12
Koss & Co.	" " "	" "	10
A. W. Faber	New York City	Lead-pencils	150
Eagle Pencil Company	" " "	" "	500
American Lead-Pencil Company	" " "	" "	75
Cutter & Brown	" " "	Foundry facings	....
Variety Iron-Works	Cleveland, O.	Facings, etc.	....
S. Obermayer & Co.	Cincinnati, O.	Facings, lubricants	....
Morse Brothers	Canton, Mass.	Stove polish	40
J. L. Prescott & Co.	North Berwick, Me.	" "	25
American Chemical Manufacturing and Mining Company	Rochester, N. Y.	" "	15
Ransom & Co.	Albany, N. Y.	Facings	35
W. H. Colebrook	Syracuse, N. Y.	Stove-polish	5
G. A. Moss	New York City	" "	5
Lustro Company	" " "	" "	10
H. A. Bartlett & Co.	Philadelphia, Pa.	" "	....
Willard & Lane	Taunton, Mass.	" "	5
I. X. L. Stove Polish Company	Grand Rapids	" "	5
Phœnix Mining Company,	Philadelphia, Pa.	Stove-polish and lubricants (mining)	.....
A. Z. Ryerson	Bloomingdale, N. J.	(Mining)	....

NOTE.—In arranging the matter for this paper, I take pleasure in acknowledging the kind assistance of Mr. W. F. Downs, E.M., chemist of the Dixon Company.—J. A. W.

THE STEEL COMPANY OF SCOTLAND.—The directors' report to the shareholders for the year ended July 12th states that the profits of the year amount to £80,908 0s. 5d., from which fall to be deducted—depreciation, £17,000; interest, £15,525 14s. 6d.—£32,525 14s. 6d., leaving a balance of £48,382 5s. 11d., which, with £3686 0s. 8d. from the previous year, gives £52.068 6s. 7d. to be disposed of. The directors have decided to add £5000 to the reserve fund, which will then amount to £13,000. From the balance of profits, they recommend that £43,612 16s. be appropriated to the payment of a dividend on the paid-up capital of 11 per cent, free of income tax, payable one half on October 9th, and the other half on April 9th next; the balance, £8455 10s. 7d. to be carried forward. The Steel Company of Scotland is one of the largest and most successful open-hearth steel plants in Great Britain.

THE ELECTRICAL TRAM-CAR IN PARIS.—*La Nature* publishes an article from the pen of M. E. Rouby, engineer, in which he gives some electrical and mechanical details concerning the system adopted for propelling the electrical tram-car recently experimented with in Paris. It was one of the largest kind constructed by the Compagnie Générale des Omnibus de Paris, could carry 52 passengers, and was not specially made with a view to electrical traction. The mechanical details connected with the fitting of the dynamo and gearing under the car were designed and carried out by M. Raffard. Under the floor was fixed a Siemens D dynamo, the current being supplied by 80 accumulators placed under the seats. The dynamo was connected by means of a belt and pulley, with differential movement, to an intermediate spindle. Two pinions engaging the two ends of this spindle, two endless chains and gearing, completed the transmitting mechanism. On the day of the trial, the car made a journey of about 32 kilometers, at a mean speed of from 11 to 12 kilometers per hour. The total weight of the tram-car, including 80 accumulators of 30 kilograms each, was about nine tons. The average current was 35 ampères, with an electro-motive force of 165 volts. The electrical work supplied to the machine by the accumulators was therefore 7·7 horse-power for 2½ hours, the duration of the journey, and the accumulators were far from exhausted.

FURNACE, MILL, AND FACTORY.

The Fayette furnace, Michigan, was blown in September 10th, and made its first cast the following day.

Mr. W. S. Armitage, of Detroit, Secretary of the Eureka Iron Company, Wyandotte, Mich., announces that the property of the company, including two blast-furnaces and mills for the manufacture of boiler plate, tank, sheet, and bar iron, knobbling and puddling-furnaces, as well as the foundry cupolas, boiler, machine, blacksmith, and pattern shops, testing-machines, weigh-scales, docks, railroad tracks, locomotives, charcoal kilns, etc., will be sold at Wyandotte on the 10th of October, as the charter of the company expires by limitation on the 24th of that month.

Mr. John Birkinbine, Secretary of the Association of Charcoal Iron-Workers, describes the plant as follows: No. 1 furnace, now rebuilding, is an iron-tapered shell supported on ten tall columns; it will be lined to 12-foot bosh, and is 55 feet high. It will be fitted with fire tuyeres. Blast is supplied by a vertical blowing-engine—blast cylinder 60 inches, steam cylinder 24 inches in diameter, stroke 5 feet; one hot-blast stove, with 24 U pipes, will heat the blast, and three double-flue boilers furnish steam. A double-cage steam-hoist will be provided. The furnace will be fitted with bell and hopper, and be water-jacketed for 11 feet from the bottom. No. 2 furnace is a stone stack 45 feet high, lined to a bosh diameter of 9 feet, and is now in operation, producing 40 tons (2268 pounds) of forge iron daily. The furnace has four tuyeres, to which blast is supplied by a vertical engine; blast cylinder, 60 inches diameter, steam cylinder 20 inches diameter, stroke 5 feet. There is one Player hot-blast stove of 24 pipes. The furnace uses a water-balance hoist. It is operated with charges of 300 pounds of charcoal, with from 550 to 600 pounds of ore, and 25 pounds of limestone as "burden." The average pressure blown is 2¼ pounds per square inch. Casts are made four times daily, and during our visit a cast was run. The consumption of charcoal varies from 1960 to 2100 pounds per ton (2268 pounds) pig-iron. The average yield of the ore is 62 per cent. There are 14 bee-hive kilns of 25 cords each at the plant, but most of the coal is purchased and brought by special cars from the interior of Michigan and from Canada to the furnace, the haul being from 10 to 30 miles, and the freight charges are 1 cent per bushel (20 pounds). The company also obtains the coal from 16 Mathieu retorts at Luther, 250 miles from Wyandotte, the freight in railroad company cars being from 2 to 2½ cents per bushel. The coal is loaded from cars directly into charging buggies. The forge department consists of one run-out fire (6 tuyeres) and 14 single tuyere knobbling fires. These fires are run chiefly on raw pig-iron, although the "run-out" is occasionally used. The company finds it more advantageous to work the pig metal raw. The fires are placed in pairs back to back, and four of them are connected with a vertical tubular boiler. The loupes are shingled into blooms of 150 pounds, under a five-ton steam-hammer.

A dispatch from Chicago states that the North Chicago Rolling-Mill Company has decided to build a $100,000 nail-mill at Bay View, near Milwaukee, and will employ 600 men. The building will be put up at once, and the first nails will be made and delivered by January 1st, 1884.

The *Age of Steel* for September 8th, says that the Missouri Furnace Company is about to remove its blast-furnace from Carondelet, a district of St. Louis, to some point in Alabama or Tennessee. This company has been operating its own furnaces, two stacks, at Carondelet, besides two stacks belonging to the South St. Louis Iron Company. It also operated for several years the two stacks of the Meier Iron Company at East Carondelet. The cause given for the removal is the high freight charges on its raw material. The iron ore has been obtained for the most part from mines on the line of the St. Louis & San Francisco Railroad, fifty to seventy miles from St. Louis, but the freight charge of two cents per ton per mile has brought the cost of the ore to such a point as to leave no profit on the pig-iron.

H. A. Ramsay, proprietor of the Vulcan Iron-Works, of Baltimore, made an assignment September 19th. His liabilities are not known, but he states that his assets will be ample to pay all the debts.

The Atlas Engine-Works, of Indianapolis, Ind., have opened an office and sales-room at 1308 Union avenue, Kansas City, Mo., with A. M. Morse as general agent.

The Troy (N. Y.) *Standard* of September 8th says: The Bessemer Steel-Works will stop for repairs the latter part of this week. The works will remain idle for several weeks. The stoppage is only after a steady run of six months.

The new steel-mill of the Hartman Steel Company, at Beaver Falls, Pa., is completed and working to the entire satisfaction of its proprietors. This is considered a model mill, and has been constructed in the most perfect manner within the past five months. Special advantages are claimed in the economical features of working large sections of billets into various shapes and sizes, which is not feasible in other mills. Buildings are of iron throughout, and machinery, foundations, etc., of the most modern and perfect style. The company is not sparing expense to accomplish great results in the manufacture of low carbon steels. Its wire mill is running to fullest capacity, including the galvanizing department, which has but recently been completed. When it is remembered that these works have been erected within ten months and have already produce nearly ten thousand tons per month, it will be seen that no stagnation is permitted in the management. The capacity, when the works are entirely completed, will be two hundred tons per day of steel, wire rods, and finished wire.

The Lechner Manufacturing Company, of Columbus, O., manufacturers of malleable roller detachable chain belting, has furnished the Columbus & Hocking Coal and Iron Company, Columbus, O., with chain elevators for its four mines at New Straitsville, O. It has also made large shipments to the Ohio Central Railroad Company at Corning, O., these elevators being used for elevating coal. It has also furnished the Farmers & Merchants' Steamboat Company, New-Berne, N. C., and the Neuse River Navigation Company, Kinston, N. C., with its steel roller chain, which is used to propel stern-wheel steamboats, and has received a large order from William Watson, contractor, Chicago, Ill., for shipment to Cairo, Ill., and Charleston, S. C., for package elevators.

The success of the Gates patent pulverizer at the Portland mills, owned by the Portland Consolidated Mining and Milling Company, creates much enthusiasm throughout the Black Hills. The crusher which is manufactured by Messrs. Charles Kaestner & Co., of Chicago, was fully described in our issue of September 1st. We then stated that we would give results of a trial, which are now reported as follows: 2½ tons per hour through a 40-mesh screen; 2 tons per hour through a 60-mesh; and 1½ tons per hour through an 80-mesh screen. The machine shows no indication of wear, and is operated continuously. Mr. Gates, the patentee, is superintending. Messrs. Charles Kaestner & Co., manufacturers, report two sales as the result of the work done by the machine put in Portland mill, to parties in the Hills.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

CALIFORNIA.

STOCKTON DISTRICT.

Gagnere Mining Company, Gagnere quartz mine.

COLORADO.

CENTRAL CITY DISTRICT.

George W. Hall, Sumter lode. Thomas B. Early, Anamosa lode. William V. Edwards, Silver Link lode. Hal Sayr, Vidette lode.

DURANGO DISTRICT.

D. D. Gregory, Undine lode.

LAKE CITY DISTRICT.

Norfolk & Ouray Mining Company, Forest Bell lode. W. Weston *et al.*, Agnes lode and mill-site. E. L. Davis *et al.*, Mountain placer mine. Indian Chief Mining and Milling Company, Indian Chief lode. John J. Crooke *et al.*, Napoleon, Miner's Delight, Sarah Wood, and Superior lodes. W. Warwick *et al.*, King William lode.

LEADVILLE DISTRICT.

George J. Chaplin *et al.*, Jessie lode. S. W. Slayden, Emma lode. Louis D. Neerland *et al.*, Spotted Tail lode. Mary Murphy Mining Company, Fritz lode

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and mill-site. James K. P. Rogers *et al.*, Aztec lode. L. M. Bailey *et al.*, Bird's Nest lode. Abraham Jacobs *et al.*, Big Chicago lode. Abia G. Hooper, Great Northern lode.

PUEBLO DISTRICT.

Charles Denison *et al.*, Silver Point lode.

IDAHO.

OXFORD DISTRICT.

Robert C. Chambers *et al.*, Badger, American Girl, and Yellow Bird lodes. N. E. Linsley *et al.*, Little Giant lode.

MONTANA.

HELENA DISTRICT.

Hope Mining Company, Silver Chief lode and Durango mill-site. James R. Clark *et al.*, Brazil lode. James Larkin *et al.*, Carrie lode. Nathan S. Vestel *et al.*, Whip-poor-will lode and mill-site. William H. Hartman, Great Eastern lode.

NEVADA.

CARSON CITY DISTRICT.

Indian Queen Mining and Milling Company, Indian Queen No. 3 lode.

OREGON.

ROSEBERG DISTRICT.

William McMann, Kalamazoo placer mine.

UTAH.

SALT LAKE DISTRICT.

Climax Consolidated Mining Company, Climax lode. Robert C. Chambers, Goodell and Olive Branch lodes and mill-sites. P. Edward Connor *et al.*, Fairmount lode. Stanley Consolidated Mining Company, North Star No. 3 lode. William H. Burnison *et al.*, Victory lode.

WASHINGTON TERRITORY.

OLYMPIA DISTRICT.

Alfred L. Palmer, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

MOUNTAIN MAID.—It is stated that work will shortly be resumed. The drifts of this mine and the Vizina drifts are connected, and the intention is to work the Mountain Maid through the Vizina. This is a great convenience, as the limited area of surface ground at the main shaft of the Mountain Maid necessitates the hauling away of the rock as fast as taken out.

GRAHAM COUNTY.

From the Greenlee Gold Mountain District, about eight miles from Clifton, comes the news of a rich strike. The assays made of the ore found show twelve hundred ounces of silver and twenty-three ounces of gold. A new town-site has already been located. As great excitement prevails in the camp, allowance must be made in regard to the above statements.

YAVAPAI COUNTY.

DOSORIS.—Good ore has been found in the bottom of a shaft now down nearly 300 feet. The mine is pretty thoroughly prospected. Shafts, tunnels, drifts, and cuts have been made to test the size and permanency of the vein-matter. Thus far, the mine has showed mineral all through, and the proceeds from the ore extracted have paid all expenses. At present, high-grade ore is taken from the ledge and prepared for shipment to Pueblo, Colorado.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—During the past week, 137·485 tons of ore were sent to the mill and 156·625 tons were crushed. The average assay value of the pulp was $21.83 per ton; that of the tailings, $4.27 per ton.

STANDARD CONSOLIDATED.—The official report for the week ended September 8th shows that there were extracted and shipped to the mills 1343 tons of ore. The bullion shipment was valued at $19,843.99.

SIERRA COUNTY.

MARGUERITE.—The Downieville *Times* is responsible for the statement that work has been suspended and that attachments and mechanics' liens to the amount of several thousand dollars were served on the property recently. It states that the company owes ten thousand dollars in the county. It is also stated that an offer of $75,000 was made for the Marguerite property a short time ago.

CANADA.

PROVINCE OF NOVA SCOTA.

COXHEATH.—According to reports, work has been temporarily stopped at this copper mine. This is said to be in consequence of the large quantity of ore which has already been raised and banked, the company not having fully decided whether it will ship this ore away or have it smelted at Cape Breton.

PROVINCE OF ONTARIO.

Advices from Cleveland state that H. B. Payne, Stephenson Parke, William Chisholm, and a number of Cleveland gentlemen, have placed a large amount of capital in iron mines in Ontario. The iron range is 90 miles inland from Lake Ontario, and the area is supposed to be in the neighborhood of 60,000 acres, part of which, however, is owned by Canadian and New York capitalists. The mines will be reached by the Central Ontario Railroad, which is now in course of completion, and which will have the entire monopoly of the carrying trade of all the mines. The terminus of the railroad is on Weller's Bay, the best harbor on Lake Ontario, and only 60 miles distant from Oswego, and about 36 from Rochester. Extensive docks and ore-pockets have been constructed to facilitate the shipment of ore to the United States. The ore outcrops at considerable elevation, and, in order to secure a large output from the mines that have been started, it will not be necessary for some time to erect expensive plants. The mines have already been located, and the output the first year the road is completed will be somewhere in the neighborhood, it is thought, of 100,000 tons. The whole matter as yet is in such shape as to give very little idea of the resources of the beds. It will be some time before the Central Ontario Railroad is completed, and until then operations can not be commenced. Samples taken from a number of localities on the range show magnetic and Bessemer ore of the finest quality. The Cleveland syndicate starts out with a capital of $2,000,000.

Phosphate mining in the Ottawa District is vigorously carried on, and the output for the present year will in all probability be larger than that of any previous season. Very little change is noticeable in quotations, the latest being from $14 to $15 per ton delivered at the Canadian Pacific Railroad station at Ottawa.

According to the Montreal *Gazette*, a clumsy attempt to salt a mining property in the Gatineau Valley has recently been discovered. The owners had succeeded in transplanting several hundredweight of the mineral before their fraud was detected.

COLORADO.

CHAFFEE COUNTY.

The new smelting-works at St. Elmo are in successful operation.

CLEAR CREEK COUNTY.

INDEPENDENT TUNNEL COMPANY.—This company was recently formed at Idaho Springs. The property is in the Cascade District, and consists of the Port Jarvis, Boss, Reliable, Chance, Brochu, and Chloride lodes. A tunnel, now started and into the mountain twenty-five feet, will be continued to strike all of the named lodes. All of these lodes are but prospects from 12 to 30 feet in depth. Assays of from $75 to $150 have been made from selected pieces of ore. New buildings are to be erected at once.

CUSTER COUNTY.

BASSICK.—It is reported that this company has at last determined to erect two concentrators with a capacity of over a hundred tons daily. The mill will be located in the vicinity of Blackburn. The mine can produce without difficulty 200 tons of ore a day.

DOLORES COUNTY.

LITTLE MAGGIE.—In cutting through the supposed foot-wall recently, a second body of mineral was uncovered, making the vein 11 feet wide of solid mineral. It contains a body of sand carbonates, galena, and gray copper.

FREMONT COUNTY.

It is reported that the Standard Oil Company has purchased large tracts of land in this county.

ARKANSAS VALLEY OIL, COAL, AND LAND COMPANY.—This company has been incorporated with a capital stock of $3,000,000, in shares of $100 each, and will do business in this county. The directors are also the directors of the Denver & Cañon City Railroad Company, which has also been recently incorporated with a capital stock of $10,000,000. This company proposes to build a broad-gauge railroad from a point just below Colorado Springs to Cañon City. This road is to be run in connection with the Denver & New Orleans. The route has been surveyed, and is said to be shorter by eighteen miles than the Denver & Rio Grande via Pueblo.

GILPIN COUNTY.

BELLEVUE TUNNEL.—A meeting was recently held in Central City, for the purpose of discussing the question of driving the Bellevue tunnel, as proposed by Mr. B. H. Locke and others, from a point on Fall River in a northerly direction under Bellevue, Leavenworth, Quartz Hill, and Gunnell mountains, cutting all the principal gold-bearing veins in Gilpin County. For this purpose, it is proposed to organize a company with a capital stock of $1,000,000, divided into 100,000 shares of preferred stock and 200,000 shares of common stock of a par value of $10 per share, the preferred stock to represent the actual money to be paid into the treasury and expended in the construction of the tunnel, stamp-mills, and general plant, and to draw a dividend of seven per cent. To secure the accomplishment of this, Mr. Locke stated that the company will endeavor to secure the union of the separate mines of the various groups, thereby avoiding all legal trouble regarding the identity of veins and the boundary-lines, and at the same time securing the maximum output of ore from each mine for transportation through the tunnel to mills to be erected on South Clear Creek. The company did not propose mining as a business, but looked for a return for the amount of capital invested from a system of transportation and drainage. The tunnel in being driven three miles in length, will cross 180 patented mines, in addition to numerous unpatented properties and blind veins, or those not cropping out at the surface. The average depth to be attained in running the tunnel half a mile each side of the center of the tunnel is 1600 feet. The veins tapped will be developed and the ore removed by laterals from the tunnel. All blind veins found will be leased to individuals or pools. The tunnel is to be 14 by 12, with a water-conduit on the floor of the same, with double-track its entire length. Mr. Locke's proposition was, that the leading mine-owners should subscribe 100 shares of stock each, thus identifying themselves with the success of the enterprise, which be very justly claims was far preferable to having the scheme carried through by those whose interests might become inimical to them. Mr. H. M. Rogers, Superintendent of the Bobtail Mining Company, and familiar with the country traversed by the tunnel, said that the Bellevue was above comparison with other tunnels of similar magnitude, from the fact of its crossing such a large number of veins in its course.

PRIZE.—A lot of smelting ore was recently sold, which netted $1600. The mill-dirt for the month of August treated at the stamp-mills in Black Hawk yielded 231½ ounces of gold, which brought $16.50 per ounce, a total product for the month of $5413. The company has expended a large sum of money in getting its property properly developed.

HINSDALE COUNTY.

NEW YORK & LAKE CITY.—Work will soon be commenced by this company on the Lookout and Golden Eagle mines.

LAKE COUNTY.

The Leadville *Herald* says that, while several more of the smelters promise to be idle soon, and a number of workingmen are thrown out of employment, the miners of the district are profiting by the ruling low rates for smelting.

COLONEL SELLERS.—The owners have purchased the Little Hope, or, in other words, given the claimants of the Little Hope lode $4000 to quit-claim their alleged claim to the property.

DUNKIN.—The mine during August shipped 160 tons of ore, some of it being of very high grade. So far in September, the product of the mine has reached 65 tons, but the ore is of inferior grade to the yield of previous months. The mine exhibits no particular change, the workings running in and out of ore at irregular intervals.

LA PLATA.—The smelter has blown out four of its furnaces, and only two stacks now remain in blast. They will clean up the supply of ore on hand in from four to six days, and by September 16th the entire works will be shut down. The cause of this suspension is the absence of ore. The management has found it impossible to secure ore, the great output of the district having been secured by the competitive works at Pueblo and Denver. Ore could be obtained from those people who held the key to the situation, but not at figures that would permit the smelter to run at a profit. The sampling-works attached to the smelter will be kept in operation, and ore will still be purchased and received, if it can be got at a reasonable figure, and stored until the accumulations warrant the blowing in of the furnaces again. The product of the La Plata mine will receive a similar disposition, unless the competition for ores should create a price at which more could be made by selling than by reduction at the company's works. The manager stated that, while the outlook was very gloomy, he would continue the improvements just begun at the smelter, and put the establishment in a position where it would be able to compete successfully with any of the Leadville works. With the addition of efficient condensers and the other improvements contemplated, ore could be smelted far more economically than it has been in the past. The La Plata mine is looking and doing as well now as at any time in the past. The new shaft started six weeks ago has been connected with the lower ore-bodies of the mine. The shaft passes through the

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tunnel about twelve hundred feet from the mouth of the latter. Sinking was prosecuted both from the surface and tunnel level, and a rise was also made from the tunnel to meet the shaft.

LEO.—The owners of this claim, situated on the California Gulch slope of Breece Hill, a short distance east of the Moyer shaft of the Iron Silver Company, have decided to work their property. The shaft at present is down 60 feet, and it is calculated that an additional depth of 300 feet will carry it to the contact, with every probability of disclosing the same ore-chute recently opened in the Moyer shaft.

LIME LODE.—The lessee of this lode of the Iron Silver group reports shipping about forty tons of ore a day. The mine is showing extensive resources. A renewal of the lease for the next six months has been secured. A tunnel is now driving calculated to tap the lower ore-bodies and facilitate the working of the mine.

LITTLE DAISY.—The original Daisy property was located on the discovery of a mineral vein, near the base of the Mosquito range. This vein has a nearly east and west course, confined by granite walls, and was opened by a tunnel about ninety feet in length. The vein-material was found rich in silver existing as sulphurets. After the value of the vein had been determined at this point, a new tunnel was commenced higher up the mountain side, where the vein had left the Archæan rocks and cleft the overlying sedimentary formation. This tunnel has advanced 620 feet, and shows a strong vein the entire distance, with bold ore-chutes at regular intervals. The vein shows great strength, and its width has been determined in but a few places. The metallic minerals of the vein are silver sulphurets, free gold, galena, and iron pyrites, from which very high returns have been received. During the past month, the company erected buildings for the accommodation of its employés, and also to facilitate the workings of the property. During the past week, in making an excavation for an addition to these buildings, a new strike was accidentally made, which promises to eclipse the old property. The laborer engaged in the work had removed but a few shovelfuls of the surface soil, when he struck into a solid mass of decomposed mineral which, on investigation, proved equal in appearance to the ore in the tunnel. Prospecting for the extent of the vein was immediately begun, and in a short time a vein was opened up having a width between walls of about eight feet, with four feet of ore. Samples of the ore were brought to Leadville, and the select material returned 556 ounces of silver and two ounces in gold to the ton, in addition to 38 per cent in lead. Mineral of inferior appearance was also tested, and assays showed it to contain 206 ounces in silver to the ton. It is stated that next year the company will erect a stamp-mill and other necessary metallurgical works for reducing the product of the mine on the premises. In the mean time, the property will be thoroughly explored and developed, preparatory to a large production.

ROBERT E. LEE.—About fifty tons a day of dump material are shipped to the Leadville Gold and Silver Mining Company. The ore ranges in value from twenty to thirty ounces to the ton.

RUBY.—This mine, on Iron Hill, is shipping about twenty tons of ore a day. The product averages ten ounces in silver and sixteen per cent in lead. Drifting to the eastward from the bottom of the shaft is in progress.

PITKIN COUNTY.

The wages of the miners at work on the Porcupine group have been reduced to two dollars a day and board. The price was formerly two dollars and fifty cents. The Silent Friend has reduced wages also to that, and it is likely all other mines will.

CHRONICLE.—The vein is six feet and three inches from wall to wall, and the whole space is mineral. The shaft is down nearly eighty feet, and a drift will be started on the vein running south. Another drift running north will be commenced about the time the mill starts up. There are about five hundred tons of ore ready for treatment, which will occupy the mill about three weeks. The mine will produce forty tons per day, the amount necessary to keep the mill running.

GOLDSMITH.—An assay made on a new class of ore recently struck yielded $276.50 per ton, as follows, 13 ounces in gold and 15 ounces in silver.

TAM O'SHANTER.—It is reported that the miners of this mine, at Ashcroft, are on a strike, and threaten to burn the mine property because of the discharge of Eben Smith, late superintendent, and a number of miners.

SAN JUAN COUNTY.

SAMPSON.—The formation of the recent strike shows black sulphurets, though the ore itself is blue and white quartz, and in some places decomposed. It shows free gold, which is easily discerned, and is beyond all doubt rich throughout the entire vein.

DAKOTA.

GOLDEN SUMMIT.—The mill is to start up shortly. Developments at the mine continue, and it is stated that more extensive reduction-works will be erected this fall.

GREAT WEST.—Work is pushed vigorously at the mine; the twenty-stamp mill will be in operation before the end of the month.

SITTING BULL.—A number of men have been discharged until the litigation pending is settled.

STAND-BY.—The flume destroyed by the recent flood will be restored, and loose machinery and tools that have disappeared will be replaced. It is the intention to run the mill on Stand-by ore and for custom-work.

UNCLE SAM.—Fifteen stamps have been started up and the mill will shortly be in full operation.

GEORGIA.

Most of the mills driven by water-power at the mines in Lumpkin County have been obliged to close down for want of water. It is stated, on what authority we do not know, that the water has not been so low in fifteen years as it is at present. Work at the mines continues and the developments made show most gratifying results in some cases.

IDAHO.

The copper smelter of Bruner, Hennicke & Cranston, at Hailey, will be blown in very shortly. The stack is intended for three furnaces of six tons daily capacity each, but only one furnace of six tons will be erected and operated this year. The smelting firm owns two mines—one on Deadman's Flat and the other on Lost River—from which it expects to extract ore enough to keep the furnace going. Next spring, it will add another furnace to its plant.

BULLION CONSOLIDATED.—The last of the machinery for the concentrator of this company, in Little Smoky District, has been shipped. A strike in the north drift from the bottom of the 100-foot shaft on the Bullion mine is reported, and fine ore is said to be coming out of the other shaft on the same mine. Tunnels are running for the vein on both the Providence and Ophir mines, but they are not in far enough to cut the ledge.

POINT LOOKOUT.—This mine, in Bullion District, on a lode running at an angle and in contact with the Mayflower, was recently sold in Salt Lake City. The property is just west of the Mayflower, higher up the hill, on a ledge which has a good strong vein of galena, tapped in three places, covering a distance of 300 feet on the ledge. This vein has been tapped in one place by two tunnels, each in about sixty feet, and a shaft over sixty feet deep. A streak of galena eight inches wide goes over 400 ounces silver and 70 per cent lead. The ore is similar to the Mayflower ledge. The Point Lookout lies between the Mayflower and the O. K., the last named being a good producer of ore. Mr. Lipman, the purchaser, was one of the pioneers of the Wood River country, having been one of the locators of the Bullion, and was the first superintendent of the company, which he organized to take and work the property. He has sold an interest in the Point Lookout to some New York gentlemen who possess ample means to operate the property on a large scale, and it is the intention to push work on it. It is stated that about $75,000 were paid for the entire claim of 1500 feet in length, which has already been patented.

ROBERT EMMET & FOREST CREEK.—The five claims owned by the company are known as the Forest Creek Nos. 3 and 4, Robert Emmet, Buckeye, and Idaho. On the Forest Creek No. 3, the Buckeye, and Idaho, the holding work only is done; but on the Forest Creek No. 4, there is a tunnel 340 feet long, a shaft 200 feet deep, and about 80 feet of winze. The ledge has been cut at a depth of 150 feet, and bunches of galena found in it that promise much for the mine in depth.

MAINE.

Preparations are making for the extensive development of the iron mine discovered some years since at Webb's Mills, in the town of Casco. A stock company has been formed for the purpose, and a portion of the necessary machinery is already on the ground. Operations will be commenced shortly.

DOUGLASS.—Seven tons of refined copper were recently shipped to Boston.

ROSIER.—At this company's property, at Cape Rosier, they are troubled considerably by water, and will consequently increase the pumping capacity.

STEWART.—The ground in both east and west drifts continues to improve, and development-work is progressing favorably. The open cut is showing good ore and the entire mine is looking well. Both mine and machinery are in shape for future rapid work.

SULLIVAN.—The company has shipped a quantity of ore to Boston for treatment.

MEXICO.

THE ANGLO-MEXICAN MINING COMPANY (LIMITED).—This company has been incorporated in London, with a capital of £325,325, in shares of £5 and £1, to acquire the Yedras silver mine and the ranche known as Valgame Dios, in the State of Sinaloa. The consideration of purchase of the above is £280,325, of which £200 is payable in cash and the balance in fully paid-up shares.

MICHIGAN.

The following table exhibits, in gross tons, the total lake shipments of iron ore from upper peninsula ports the present season, up to and including September 12th, together with the amount shipped from the same ports during the corresponding period of last year:

Name of port.	1882.	1881.
Escanaba	1,274,067	975,811
Marquette	715,585	470,545
L'Anse	46,807	48,087
St. Ignace	33,600	27,564
Total	2,070,059	1,522,007

Showing a decrease of 548,052 gross tons.

ALLOUEZ.—The Houghton *Mining Gazette* says that there is no truth in the report circulating that the Allouez has opened an amygdaloid belt west of the conglomerate that is very rich. Exploratory work has led to finding two amygdaloid deposits west, but at points opened they show little or no copper. If the lodes are further examined, something may be found of value.

BERRINGER.—At this gold and silver location, a shaft will be sunk at least 50 feet, before any rock is taken out and sent away to the smelting-works at Chicago and Newark. This is for the double purpose of testing the question of depth and the quality of the vein-matter. Average analyses will be made as the shaft goes down, those already in hand showing from a trace to something over $300 in gold and silver.

DELPHIC.—The first shipment of ore was recently made.

NORTHWEST REPUBLIC.—No. 1 shaft is down 33 feet in ore, on the foot-wall side, having first passed through 42 feet of sand-drift. From the bottom of this shaft, a cross-cut has been made 21 feet north, all but three feet of which shows clean ore which gives by analysis 67·72 metallic iron, 3·76 silica, and ·052 phosphorus. The last three feet of the drift are in mixed ore, the true hanging-wall not having been reached. Another shaft will be put down some 300 feet farther east, with the view of testing the character and extent of the deposit in that direction. This property is near the Magnetic, and a two-mile extension of the Erie branch will give it the necessary shipping facilities.

MONTANA.

MADISON COUNTY.

The rapid development of the Tidal Wave District is shown by a correspondent of the Butte *Miner* as follows: In 1864, considerable work was done by prospectors who were looking for gold. As the cost of transportation was too heavy in those days, and any thing but gold was valueless to them, the consequence was, that silver, lead, copper, and other minerals were abandoned.. In 1881, working facilities being better, the camp was again prospected for silver, and with good success. At the present time, there are at least a hundred good paying prospects, and new leads are struck every day. The veins are all well defined. This summer, a twenty-ton water-jacket smelter was put up, and is running in full blast on galena and other smelting ores with which this camp abounds. There were also erected oscillating-works, to treat the gold quartz of the numerous gold leads. A ten-stamp gold mill and two arrastras are working in Wisconsin Gulch, and they have plenty of good quartz to keep them running for a number of years to come. The mines are all easy of access, and so far, there has been no trouble with water. The formation is principally granite and slate; and higher up the mountain, the formation is all lime and quartzite.

NEVADA.

CHURCHILL COUNTY.

The San Francisco *Stock Report*, speaking of the discovery of nickel in the northeastern part of this county, says that the location runs from the level ground up to the neighboring mountains, and is in a position that renders the vein easily accessible. The ore occurs in a series of parallel veins quite close together, and pitches at an angle of about forty-five degrees. But little has yet been done toward developing the property—a short tunnel run into the hillside being all the exploration that has been made; but already it has pierced seven distinct, well-defined veins, of an average thickness of 24 inches. This tunnel, together with the little surface exploration that has been made, has exposed to sight what is estimated as at least 1000 tons of the purest, richest nickel ore that has ever been discovered. In this discovery, there is the very unusual combination of large quantity with unusual purity and richness. The first discovery of the metal was made a year and a half ago. As soon as the value of the nickel discovery was realized, experts were at once sent by various would-be purchasers to report on the value of the property. These reports were so favorable that competition among buyers became active, and recently the owners of the property were considering an offer of a quarter of a million dollars.

ESMERALDA COUNTY.

NORTHERN BELLE.—From the very elaborate report presented at the annual meeting in San Francisco, we take the following facts: The mine yielded during the year ended August 31st 19,573 1920-2000 tons of ore, all of which has

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been milled, besides 504 80-2000 tons of our surplus, making a total of 20,078 tons, showing a gross bullion product of $763,939.32, or $38.05 per ton. An average force of 150 men was employed during the time. Nothing has been done in sinking the main shaft during the year, it having reached a total depth of 800 feet a few months before the last annual meeting. Though the production of the mine has fallen off very materially in the last two months, obliging the company to put mill No. 2 on half-time, still the new development above the seventh is now about 38 tons daily, which is more than sufficient for the requirements of the mill, and will enable a surplus to be stored in the chutes of the mine. Attention during the coming year will be devoted largely to the western part of the mine, which from the adit level down contains a large extent of virgin ground. All prospecting operations in this section, as well as in other parts of the mine, will be pushed with all energy possible, and, there is every reason to hope, with favorable results. The mills have sustained their usual excellent reputation, having performed as much work to the stamp and at a lower rate per ton than in previous years, as will be seen by reference to monthly reports. The low rate of working is partly due to reduced cost of supplies, which are furnished in part and transported by the Carson & Colorado Railroad Company. There has also been a material saving of fuel at mill No. 2 since the new cylinder was put in about three months ago. Mill No. 2 was running full-time up to the last few days, now on half-time, and has been engaged almost exclusively upon the company's ore. Mill No. 1 has been running half-time since March on ore for the Mount Diablo Company. There have been milled during the year 20,078 tons of Northern Belle ore, and 5632 785-2000 of custom ore; a total of 25,710 785-2000 tons, being about the same amount as was worked during the previous year. The Northern Belle ore has yielded 85·3 per cent of the assay value, including all allowances for salt and moisture. Both mills are in a good state of repair, and the amount and quality of the work show their condition and efficiency.

The secretary's statement of financial affairs shows:

RECEIPTS.

Bullion—463 bars, Nos. 5279 to 5741, gross value, $855,988.18, less deductions (which includes freight by express, mint charges, and discount on silver) $136,348.32	$719,639.86
Crushing ores for outside parties	77,453.11
Spring—sale of water	239.28
Drafts outstanding and unpaid September 1st, 1883, constituting our entire indebtedness	22,586.58
Cash on hand September 1st, 1882, $135,972.86, less drafts outstanding at that date, since paid, $23,719.60	112,253.26
W. V. Price, Superintendent, balance in his hands September 1st, 1882, since paid	54.59
Total	$932,226.68

PAYMENTS.

Dividends—eight—Nos. 64 to 71, of $25,000 each, equal to fifty cents per share	$200,000.00
General expense—salaries, insurance, etc	70,675 14
Mine expenses	229,210.53
Mills (two) expense	253,268.23
Ore tax for the quarter ended March 31st, 1883	6,998.19
Ore purchases	66,843.97
W. V. Price, Superintendent, balance in his hands September 1st, 1883	50.89
Supplies and materials forwarded	30,679.23
Taxes, Nevada and California	3,308.22
Cash on hand September 1st, 1883	71,192.28
	$932,226.68

INVENTORY AND VALUE OF PROPERTY AT MINE AND MILLS AUGUST 31st, 1883 (ALL PAID FOR).

Land at Bellevue (60 acres)	$200.00
Land at mine (5½ acres at shaft)	25.00
Improvements at Belleville (2 mills, furnaces, etc.)	358,650.00
Improvements at mine (hoisting-works, etc.)	25,050 00
Supplies at mills	17,408.30
Supplies at mine	10,969.86
Water-works	25,000.00
Oats and hay	107.25
Total valuation	$437,410.41

EUREKA COUNTY.

EUREKA TUNNEL.—The semi-annual statement to the stockholders shows that, since March last, the ore extracted from the mine for the six months ended August 31st amounts to 1425½ tons, of an average assay value of $63.87, giving us a net product at furnace of $52,113.99, approximating $36.57 per ton. The bulk of this was taken from the hard vein forming what is known as the Addison chamber, and called chloride ore; the less quantity from the soft vein, east of and running parallel with it, called carbonate ore. The exploration of the mine to a depth of 150 feet below the tunnel level proves the continuity of the ore-body first found in the south drift from the main tunnel. We have made connection between it and the Addison chamber, while, by drifts, winzes, uprises, and stopes through the carbonate vein, we prove its identity with the vein first found in the old north workings, about 850 feet in from the tunnel opening. Above the tunnel level, we are still following chloride ore, and have hopes of it making in larger deposits than now showing, and all signs known to miners indicate a greater concentration and stronger ore-bodies below. The necessity for revenue to meet the expense of prospecting and opening this valuable property compels the employment of a large number of miners in the ore at hand, which, existing in limestone irregular and scattering as it now is, makes its extraction slow and expensive, but when making in large chambers, such as the Addison, paying well. The financial statement shows the expenditures from March 1st to September 1st for sundry expenses to have been $53,365.64. The receipts were: Net product of ores smelted at furnaces—1425½ tons, $52,113.99; received from El Dorado Consolidated mine for hoisting and supplies, $662.60; received from tributaries for sundry supplies, $130.54. Showing in excess of expenditures, a balance of $460.51.

STOREY COUNTY—THE COMSTOCK LODE.

The outlook throughout the Comstock is more favorable than it has been in many months. In the Union Consolidated, during the past week, the south drift on the 3000 level has passed through a series of streaks of quartz, some of which contained good ore. The drift is now out some 60 feet, and the face again in vein porphyry. The joint Sierra Nevada winze below the 3000 level is down between 53 and 55 feet. It is passing through streaks of metal-bearing quartz that have a slight dip to the east. These streaks probably belong to the east side of the body of quartz cut on the 3000 level by the main west cross-cut. Owing to the presence of the quartz, the ground blasts badly, blowing out in pot-holes. At all points on the 3000, there is an increase of quartz, which makes its appearance in the main veins, and all these streaks contain more or less metal.

In the Gould & Curry, lying to the east on the 2500 level, is exposed a body of quartz of fine appearance that was 180 feet wide where cut through by east cross-cut No. 2. This quartz was also cut by east cross-cut No. 1. The cross-cuts show that the body of quartz is making in strength and width toward the south, and another cross-cut (No. 3) has been started at a point 200 feet south of No. 2. This is now out 25 or 30 feet.

At the Hale & Norcross, they are fast nearing their 2700 level, at which point a station will be made and cross-cutting begun. The ore-seams still hold quite strong in the bottom of the winze, and give promise of ore being found in the cross-cuts.

WHITE PINE COUNTY.

STAR.—The White Pines *News* reports that the old board was re-elected, and, it is presumed the old officers also, at the recent meeting held in San Francisco. It is further stated that L. M. Foulke was appointed superintendent, but this is mere conjecture. What they want of a superintendent just now is not easy to see. But what they are badly in need of is a vigorous and plethoric paymaster, to liquidate their indebtedness, which seems to increase as rapidly when the property lies idle as when it was in operation. Following is a summary of the liabilities and assets, taken from the books:

LIABILITIES.

Old pro rata indebtedness at mine	$17,606.95
Old pro rata indebtedness at San Francisco	3,483.92
Old pro rata indebtedness of B. S. Coffman, Superintendent.	4,906.06
Total pro rata indebtedness	$25,999.93
Indebtedness at mine, present year	34,406.57
Indebtedness at San Francisco, present year	2,285.17
Outstanding drafts of L. M. Foulke	13,112.85
Old overlying indebtedness at Wells, Fargo & Co.'s bank, secured by mortgage, with interest	12,237.85
Overdraft at Wells, Fargo & Co.'s bank, present year, secured by mortgage	40,476.63
Cash owing to Secretary, August 25th, 1883	16.50
Total indebtedness	$128,535.40

ASSETS.

Consists of property at mine and mill as per inventory of superintendent on August 25th, 1883, valued at	$82,594 61

NEW HAMPSHIRE.

CRANE.—A vein of native silver is reported to have been discovered recently at this mine at Dalton.

NEW JERSEY.

NEW JERSEY IRON COMPANY.—For some months past, prospecting for ore with a diamond drill upon the Port Oram property has been done with varying prospects of success. It is stated that the company has struck a very promising vein, the drill having gone through about twenty-five feet of vein-matter, of which fully fifteen feet is pure ore. The company is removing the drill and will prospect in another location.

NEW MEXICO.

BILLING SMELTER.—The smelter was recently started in Socorro, said to be the largest in New Mexico, and equal to those of Pueblo, Denver, or Leadville. A railroad track two and a half miles in length has been laid to the smelter, to connect with the Santa Fé road, and three thousand tons of ore have been hauled a distance of thirty miles from the Billing mine in the Magdalena Mountains to the smelter. Gustav Billing, the sole owner, has invested $290,000 in the construction of the works. Mr. Billing erected his smelter at this point because fuel was very accessible, the coke being drawn from the San Antonio coke-ovens eleven miles distant. The miners have a great deal of confidence, and are now sending in ores and samples. Four hundred bars of bullion were turned out in twenty-four hours.

CARNERO.—The main shaft is to be sunk to a depth of 300 feet. This mine has already produced a large quantity of ore, carrying from 50 to 100 ounces in silver to the ton. Two car-loads have been shipped. There are over 200 feet of underground work done in shafts and levels. As soon as work is resumed on this mine, regular shipments will be made to the Billing works.

MAYFLOWER & CLYDE.—A five-stamp gold mill is to be built at San José Creek, near the first crossing from Fort Bayard, in connection with these mines. The owner of the mines recently, while in the East, made arrangements with St. Louis capitalists, giving them a half-interest in his mines, in consideration of their putting in the mill as stated, giving him a half-interest in the same and furnishing sufficient means to properly develop the mines and take out ore with which to start the mill. Work is to be commenced at once.

UTAH.

BOX ELDER COUNTY.

TRUE FISSURE.—The company is making regular shipments. As the working tunnel gains in length and depth, the quality of the ore and size of the vein increase. The first-class ore now assays over 200 ounces. The company is about to put in a concentrator to handle the 4000 tons of second-grade ore on the dump. The design is to concentrate about three tons into one, which will give them a very handsome and salable ore.

JUAB COUNTY—TINTIC DISTRICT.

There are extensive iron mines in this district, which not only supply the smelters near Salt Lake City with fluxing iron, but at present are sending three car-loads daily to Hailey, Idaho, for use in the smelters.

MAMMOTH.—The Salt Lake *Tribune* says: It is hoped that the affairs of this company will soon be adjusted, and the extensive mines and reduction-plant will again resume operations. Mr. Goodhart, of London, is here for the purpose of arranging affairs with such end in view, and the books and papers are under examination, that he may come to a full knowledge of the situation; and some decision will probably be arrived at soon.

TOOELE COUNTY—CLIFTON MINING DISTRICT.

HAVANA.—Articles of incorporation have been filed by the above company. There are 300,000 shares, par value $10, of which $90,000 are treasury stock. The property consists of the Royal Havana, the More, and Castle, three locations making a plat 1500 feet square, about fifty acres, on the eastern slope of the Deep Creek Range, a thousand feet or so above the desert, near the old overland stage-road, perhaps 150 miles westward of Salt Lake City. The formation is granite. The ledge is in the Havana, strikes east and west, dips from the north about 45 degrees, crops out nearly the whole length of the location, is five feet thick, straight and regular, and has a true quartz gangue. The ore is a silver ore, and it has been found at several points on the surface rich enough to ship. A shaft has been put down 300 feet, and the water is beginning to come in. Levels have recently been started from the 160 and the 250-foot stations, each way. These are to be driven by double shifts. The shaft is expected to soon furnish enough water for a hoisting-engine. Water for reduction purposes is within ten miles of the mine, and mine timber within twelve miles.

UTAH COUNTY.

SPANISH FORK MARBLE COMPANY.—Satisfactory tests having been made of the mottled or concretionary marble from Spanish Fork Cañon, a company has been incorporated in New York by the above name, for the purpose of working the quarries and shipping the marble East. Hon. Samuel Foster, of Troy, N. Y., is President. It is the intention of the company to use machinery as soon as the quarries are opened enough to justify the expense. It is capable of fine polish, and it can be successfully used for various purposes. The cost of shipping to New York will be about $25 per ton. It is very probable that extensive marble-works will be erected in Salt Lake City before long for the purpose of sawing and polishing by machinery; but at present a number of car-loads will be sent to New York and Philadelphia to be thoroughly tested.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Sept. 21.

The Leadville stocks have been the main feature in the mining market this week, and they have been very actively dealt in at strong prices. Little Chief has shown the most strength, while Amie leads in the transactions. Outside of these stocks, Hall-Anderson was very largely dealt in, and at one time was quite strong, but declined at the close. The fancy stocks came in for a good share of the business, but they record no material change in price, being generally irregular. The total number of shares sold aggregates 236,335, as against 165,926 last week.

The Comstock shares were very quiet at steady prices. California sold to the extent of only 300 shares at 18c. Consolidated Virginia was moderately dealt in and was weak; it sold from 54@45@49c. Union Consolidated sold at $4.75. Ophir was quiet and steady at $3.25. Savage sold at $1.90. Sutro Tunnel was very quiet and was irregular, selling from 20@18@19c.

The Leadville stocks were quite active and strong. Amie was very actively dealt in and was irregular, selling from 23@18@20c. Regarding the prospects of the mine, it is stated that the northern portion of the claim is looking quite well and that there are prospects of the property opening up a strong ore-chute. Chrysolite was strong, with an active business, selling from $1.15@$1.35. Dunkin sold from 35@32c., with a business of 1200 shares. Breece was quiet and irregular, selling from 19@16@18c. Iron Silver was steady, under a small business, selling from $3.10@$3.05. Leadville was very strong, selling from 40@53@50c., with moderate transactions. Little Chief was very active and strong; it sold from 59@88@87c. Little Pittsburg was quiet and strong, selling from 60@67c. Climax was strong, with a small business, selling from 9@13@12c.

The Bodie stocks were very quiet at steady prices. Bodie Consolidated was weak under a small business, selling from 85@75c. Standard was quiet and steady, selling from $5.50@$5.75.

The Tuscarora stocks were almost neglected. Belle Isle sold at 22c. Navajo was very quiet at $2.80. Elko Consolidated was fairly dealt in and was steady, selling from 11@10c.

In the miscellaneous list, Alice was quiet and steady, selling from $2.25@$2.40. The future of the Alice is watched with unusual interest. The mine, we presume, must have paid its floating indebtedness and must be in a fair way to cancel the debt of $150,000 contracted to pay for the Magna Charta. The principal drawback in connection with the enterprise is the condition of the two mills, which must suffer frequent stoppages to make repairs. We understand that samples of ore have been sent to the Geddes & Bertrand mill, to test the leaching process, and that the results have been pronounced very satisfactory, particularly so far as the extraction of a high percentage of gold is concerned. The managers will probably have to accumulate funds to build a new mill with, to replace the old one, and probably Butte will then have its first leaching-mill.

Bassick was quiet and steady at $9. Eureka Consolidated suffered a decline from its strong prices of last week; it sold from $6.25@$6.13, with a small business. Green Mountain was quiet and steady at 70c. Hall-Anderson was very active and was quite strong at one time; it sold from $1.15@$1.30@$1.20. Horn-Silver was quiet and steady, selling at $7. Northern Belle was irregular, under a small business, selling from $5.75@$6@$5.63. Robinson Consolidated was very active at irregular prices; it sold at 37c. last Saturday, then up to 50c. on Monday, down to 46c. on Tuesday, up to 48c. on Wednesday, back to 42c. yesterday, and was steady to-day at 44@45c. Sierra Grande was quiet and steady at $1.10@$1.15.

Barcelona was fairly dealt in, and was weak, selling from 45@36c. Bashaw sold at 25c., with a small business. Decatur was quiet and steady at 2c. Eastern Oregon was moderately dealt in, and was steady, selling from 45@46c. Harlem sold at $1.15. Oriental & Miller was moderately active at steady prices, selling from 10@12c. Sonora Consolidated was very active, at irregular prices; it sold from 28@33@28c., with a business of 63,200 shares.

The reports from the Ontario mine are very encouraging. New ore-bodies have been opened out, and the prospect-work on the recently acquired Daly claim—a shaft now down 200 feet—has opened out very well.

It is reported, on what authority we do not know, that the Sierra Apache, Sierra Bella, and Sierra Grande companies will be consolidated, and that the new company will be formed on a basis of six million dollars, with six hundred thousand shares. The annual meeting of these companies will be held at Lake Valley, September 26th, and if such a proposition is to be presented, it will be then and there discussed. According to the reports made of the rich discoveries in the different mines, they were entitled to handsome profits. As yet, these expectations have not been realized. The Sierra Apache and Sierra Bella have paid no dividends, and but $600,000 have been paid to the fortunate investors of the Sierra Grande Company's stock.

MEETINGS.

Ophir Gold Mining Company, No. 30 Cortlandt street, New York City. Annual meeting of stockholders and election of trustees, October 2d, at twelve o'clock M.

Todos Santos Silver Mining Company, No. 18 Wall street, Room 10, New York City. Annual meeting of stockholders and election of trustees, October 3d, between 12 o'clock M. and one o'clock P.M.

DIVIDENDS.

The Crescent Mining Company, of Utah, has declared a dividend of five cents per share, or $30,000, payable September 30th.

The Hope Mining Company, of Montana, has declared its regular quarterly dividend of $1.50 per share, or $11,304, payable at the office of the company, No. 417 Olive street, St. Louis, on October 2d. This carries the amount of dividends paid to $113,035.50.

The Iron Silver Mining Company, of Colorado, has declared a dividend (No. 12) of twenty cents per share, payable October 5th.

The Mount Diablo Mill and Mining Company, of Nevada, has declared a dividend (No. 2) of twenty five cents per share, payable on the 25th day of September.

PIPE LINE CERTIFICATES.

Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

Last Friday, oil opened at $1.12, sold down to $1.11⅛, rallying late Saturday afternoon to $1.15⅝. Monday morning, it opened at $1.16⅛, but broke away to $1.13⅞ during the day. Tuesday, it sold up to $1.15⅛. Wednesday, it was down to $1.14, at which price it opened Thursday, rallying to $1.14⅞ at the close, with a strong undertone to the market. This (Friday) afternoon, at two o'clock, it is up to $1.17. The situation in the field is bullish. The increased number of wells in Balltown and Cooper tract adds very little to the aggregate production, showing that those pools are limited. The excess of deliveries over runs for the first eighteen days of this month was 222,000 barrels. This represents the decrease in stocks for this period, and shows the heavy accumulation of oil that has been going on in the past, which has been followed, for the first time in seven years, by an important decline. Refined oil is firm at 8⅝, and charters for export continue large.

The advance Thursday afternoon and Friday followed the announcement that Howe Oil Company's No. 5 and No. 7 wells were in the sand and making a good showing. Though the situation is bullish, large traders in Oil City sold freely on the theory that the several wells that were expected in this week would cause a break in prices, but they found that oil was too firmly held and the attempt to buy produced a sharp advance this (Friday) morning.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 15.....	$1.11⅝	$1.15⅝	$1.11⅜	$1.15⅛	3,256,000
17.....	1.15⅝	1.15¾	1.13⅞	1.14¼	3,566,000
18.....	1.14⅝	1.15⅛	1.13⅞	1.14⅜	4,153,000
19.....	1.14¾	1.14⅞	1.14	1.14⅛	1,732,000
20.	1.14	1.15	1.13⅞	1.14⅞	1,580,000
21.....	1.15¼	1.17¼	1.14¾	1.15¾	3,409,000
Total sales.					17,706,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, September 20.

The market for copper stocks the past week has shown a good degree of firmness as to prices, although not much activity, and good stocks are in demand at the quotations of last week, while, in one or two instances, a slight advance is noted. The firmness of ingot copper is one of the encouraging features, and there are indications of higher figures in the near future, and this, of itself, serves to impart confidence to buyers of such mines as Calumet & Hecla, Quincy, and others, which pay, or are on the eve of paying, dividends. At the same time, there is as yet no disposition to take hold of the speculative or non-dividend-paying stocks; but this will come by and by. In silver stocks, there is but little doing, and it would seem as if the public generally had about as much of these ventures as they care to hold; for there are more sellers than buyers, and prices do not improve under such circumstances. At the Mining Board, prices continue to decline, and the few specialties dealt in heretofore have nearly faded from sight.

Calumet & Hecla is very steady at $245, and orders for any considerable amount could not be filled at this price. There is a firmer tone to Franklin, with sales at $11@$11½, and but little offered in the market. It ought to sell at higher prices, in view of its prospects of becoming dividend-paying in the near future. Quincy was a little heavy early in the week, and sold at $51; but later, orders coming in freely, advanced the price to $54¼@$54½, with later sales at $54, closing at $54 bid. Osceola was very steady at $18. A dividend of 50 cents per share is announced. Pewabic sold at $3@$3¼, closing sale at $3. In the silver stocks, Bonanza advanced from $1⅞@$2¼, with later sales at $2⅛, at which it is offered, $2 bid. Catalpa declined to 35c. Harshaw, $⅝@$⅞, sales. San Pedro, 15c. At the Mining Board, Bowman Silver Company, which has ruled steady for the past few weeks at 16@17c., declined to 8c. on rumors of another assessment. Massachusetts & New Mexico was dull at 4@5c. Sullivan is quite firm at 90c. regular, to 95c., buyer's option. Dunkin firm at 30c. bid. The rest of the market is dull and featureless.

3. P.M.—There was nothing done in copper at the afternoon Board. Closing prices were: Calumet & Hecla, $244 bid, $245 asked. Atlantic, $10 bid, $12 asked. Bonanza, $1⅞ bid, $2⅛ asked. Franklin, $11 bid, $12 asked. Osceola, $17 bid, $18 asked. Quincy, $54 bid. Silver Islet $2½ bid.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Sept. 14.	Sept. 15.	Sept. 17.	Sept. 18.	Sept. 19.	Sept. 20.
Albion	.....	.....	.....	.....	.....	.....
Alpha	2¼	2⅛	2⅜	2⅜	2¼	2¼
Alta	1½	1⅜	1¼	1	1⅜	1⅜
Argenta	.....	.....	.....	.....	.....	.....
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	.....	1⅛	1⅛	1⅛	1⅛	1⅛
Belle Isle	.30	.....	.30	.30	.30	.30
Best & Belcher	3¾	3¾	3⅛	3⅜	3⅜	3⅛
Bodie	.95	.75	.70	.65	.65	.65
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
California	.20	.15	.15	.15	.15	.15
Chollar	3⅛	3	2⅞	3	2⅞	
Con. Virginia	.55	.50	.50	.45	.50	.45
Crown Point	1¼	.....	1¼	1¼	1¼	1¼
Elko Cons	.....	.....	.....	.....	.....	.....
Eureka Cons	8	6¾	7	.....	6	6
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	2¾	2⅝	2⅛	2⅜	2⅛	⅛
Grand Prize	.10	.10	.....	.....	.....	.15
Hale & Norcross	4	4	3⅞	3¾	4¼	4⅛
Independence	.....	.....	.....	.....	.....	.45
Martin White	.....	.....	.....	.....	.....	.....
Mexican	3⅛	3⅛	2⅞	2⅝	2⅝	2⅝
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	4⅝	4	4¼	4⅛	.....	4¾
Navajo	.....	2⅝	.....	2¾	2¾	2⅝
Northern Belle	6	6	6	6	6	.....
North Belle Isle	.....	.....	.....	.....	.....	.....
Ophir	3¾	3⅝	3½	3¼	3⅜	3⅜
Overman	.....	.....	.....	.....	.....	.....
Potosi	1¼	1¼	1⅛	1⅛	1⅛	1⅛
Savage	2	2	2	1⅞	2	2
Scorpion	.65	.60	.65	.60	.60	.65
Sierra Nevada	4⅛	4	4	3¾	4⅛	4
Silver King	.....	.....	.....	.....	.....	.....
Tip-Top	.....	.....	.....	.....	.....	.....
Union Cons	4⅞	4⅝	4⅝	4⅛	4⅝	4¾
Utah	2⅝	.....	2⅝	2	2	⅛
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	3⅜	3¼	3⅛	.....	3¼	3⅛

BULLION MARKET.

NEW YORK, Friday Evening, Sept. 21.

The moderate demand for silver in London, for remittance to India, with a limited supply for the time being, has stiffened prices abroad and here, with

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the chance, however, of an early decline in sterling exchange here, inducing some falling off again.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Sept. 15	50 11-16	110	Sept. 19	50¾	110¼
17	50¾	110¼	20	50 13-16	110⅝
18	50¾	110¼	21	50 13-16	110⅝

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of August.	Year from Jan. 1st. 1883.
*Alice, G. S.	Mont..	113,146	$681,587
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont	"	———	12,604
Bodie, G. S.	Cal....	12,273	161,728
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	47,533	426,967
*Boston & Montana, G.	Mont...	5,274	128,330
*Central Arizona, S.	Ariz..	.....	35,845
*Christy, S.	Utah...	.....	162,513
*Chrysolite, S. L.	Colo....	21,379	284,308
Consolidated Bobtail	Colo...	....	18,723
*Contention, S.	Ariz..	.....	635,413
Crescent, G.	Cal....	.....	13,000
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak..	.....	241,517
*Derbec Blue Gravel, G. S.	Cal...	16,212	88,482
Dunkin, S. L.	Colo....	.....	32,015
Evening Star, S. L.	Colo...	.....	47,061
*Father de Smet, G.	Dak....	.....	208,851
*Frisco M. and S. Co., G. S. L.	Utah...	.....	$77,084
Gunnell, S.	Colo....	.....	58,828
*Head Center Consolidated	Ariz..	.....	28,368
*Head Center and Tranquillity	Ariz.	8,910	89,108
*Hecla Consolidated, G. S.	Mont...	4,250	208,172
*Homestake, G.	Dak. ..	.....	586,674
*Hope, S.	Mont...	.....	62,447
Horn-Silver, S. L.	Utah...	.....	1,847,000
*Howell S. and Mg. Co.. G. S. L.	Ariz....	.....	41,361
Idaho, G.	Cal....	.....	88,642
*Independence, G. S.	Nev....	———	32,991
Iron Silver, S. L.	Colo....	.....	503,831
*Jocuistita, S.	Mex....	.....	‡258,959
*Kentuck, G. S.	Nev ...	1,454	16,866
*Lexington, S.	Mont..	112,147	856,703
*Little Pittsburg, S. L.	Colo....	12,414	54,505
*Marguerite, G.	Cal....	3,034	65,594
*Martin White, G. S.	Nev....	———	136,317
Morning Star, S. D.	Colo....	.....	84,428
*Moulton, G. S.	Mont...	.....	123,288
Mount Diablo	Nev ...	67,333	329,433
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	27,947	474,987
*Ontario, S. L.	Utah...	194,233	1,409,544
*Oxford, G.	N. S....	4,734	45,265
*Phœnix, G.	S. C....	.....	10,700
*Pinal Consolidated, S. L.	Ariz	.....	181,485
*Satemo, G.	N. S....	.....	2,500
*Silver Bow, G. S.	Mont...	25,616	203,946
*Silver Cord, G. S. L.	Colo...	.....	703,333
Standard, G.	Cal....	40,913	779,344
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah...	23,377	176,105
Syndicate, G.	Cal ..	7,957	46,385
Tintic M. and M. Co.	Utah...	.....	25,196
*Tip Top, S.	Ariz....	.....	37,868
*Tombstone, G. S. L.	"	51,574	548,764
Wyoming Consolidated.	Cal....	.....	31,541
Yellow Jacket, S.	Nev....	.....	265,885
Total amount of shipments to date.....			$14,322,991

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended September 21st, as compiled from various sources, amounted to $246,662, as against $181,300, reported for the previous week. The receipts from January 1st, 1883, to date are $8,234,936.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended September 15th	$166,300
Corresponding week last year	344,650
Since January 1st, 1883	9,995,066
Corresponding period last year	43,970,917

Imports.

Week ended September 15th	$262,357
Corresponding week last year	60,474
Since January 1st, 1883	10,729,328
Corresponding period last year	2,667,812

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3½ per cent. During the week, the bank gained £96,000 bullion, and the proportion of its reserve to its liabilities was raised from 46¼ to 46⅝ per cent, against 39¾ per cent a year ago.

Purchase of Silver for Coinage.—The superintendent of the Philadelphia Mint has been authorized to purchase 50,000 ounces of silver for coinage into dimes

METALS.

NEW YORK, Friday Evening, Sept. 21.

Copper.—We seem to be fairly entering the usual period of prolonged negotiation between the mines and the manufacturers. The former profess to believe 16c. the figure which the situation will warrant, while the latter insist that they will not pay more than 15c. This maneuvering will probably continue for some time. First hands are not selling, while consumers are buying only to cover immediate wants, and there is so little Lake in the market that what little is obtainable and is wanted brings slightly higher prices, 15¼c. being asked. The Lake mines are certainly in a much better position this year than they have been, in that there is no heavy pressure of outside copper. Consumption is fair, though it will not quite reach last year's total. Good authorities place it between 70 and 72 millions. In sympathy with Lake, other brands are firmer, the best kinds being held at 14¾c. We quote 14¼@14¾c.

London shows a slight weakening in Best Selected, which is cabled £68 10s. f. o. b., while Chili Bars remain at £63 5s.

According to the Board of Trade returns, the imports and exports of copper for Great Britain were as follows:

	Jan. 1 to July 31. 1883. Tons.	1882. Tons.	1881. Tons.
Imports:			
Pure in pyrites	11,002	11,151	9,558
" precipitate	14,733	12,072	13,266
" ore	10,110	9,903	10,504
" regulus	6,468	5,073	4,059
Bars, cakes, etc.	22,540	22,642	20,004
	64,853	60,841	57,391
Exports:			
Raw (English)	11,049	8,085	12,575
Sheets	10,149	10,113	9,048
Yellow metal at 60 per cent	7,779	7,395	5,847
Brass at 70 per cent	2,215	2,128	2,077
	31,192	27,721	29,547
Foreign	8,289	7,881	9,395
	39,481	35,602	38,942

Tin.—Arrivals continue on a liberal scale, 400 tons having come during the week. There is a fair jobbing demand. We quote spot, large lines, Straits or Malacca, 21@21⅛c., and Australian, 21@21⅛c. London cables £93 17s. 6d.

Lead.—Beyond jobbing sales of Common at 4·32½@4·35c. and a small lot of Refined at 4·35c., there is nothing to report. It is given out that one of the more important holders has sold to another. Otherwise, there is no change to note in the situation.

Messrs. John Wahl & Co., of St. Louis, report the following by wire on that market:

Our market is firm but quiet; 130 tons of ordinary Missouri have been sold here to Eastern consumers at 4c.; also, during the early part of the week, 200 tons of Refined at 4·05c.; and on Thursday, 130 tons of Refined at 4.05c., delivered at buyers' works.

Messrs. Everett & Post, of Chicago, send us the following dispatch:

Our market is dull and quiet, with prices unchanged, and nominally 4·10c. There has been an increased demand for spot lead during the past few days. There are, however, no large buyers in the market.

Spelter.—There is nothing new to report. The market drags along, with ordinary Domestic nominally 4⅛c.

Antimony.—Stocks here are limited. We quote 9⅛c. for Hallett's and 10¼c. for Cookson's. A circumstance which tends to restrict the sale of antimony is the increased quantity of antimonial lead which desilverizers and refiners of base bullion place in the market. The use of this antimonial lead avoids much of the waste attending the melting together of the pure antimony and the other metals entering into type-metal and other alloys.

Quicksilver.—From London, Messrs. French & Smith report, under date of September 6th:

A steady business at the lower quotations, namely, £5 7s. 6d. per bottle. The imports and exports January to July (seven months) were, by the Board of Trade returns:

	1883. Pounds.	1882. Pounds.	1881. Pounds.
Imports	3,927,270	3,149,240	3,438,467
Exports	2,244,205	1,608,353	956,718

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Sept. 21.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, publishes the following returns from 108 furnaces for the 1st of September:

Grades.	Stocks Aug. 1.	Stocks Sept. 1.	Prod. July.	Prod. Aug.
No. 1	20,741	21,840	19,700	20,025
No. 2	26,348	25,205	8,095	7,048
Bess., Forge, and lower grades	54,667	46,146	11,207	8,966
Not specified	11,378	12,372	7,155	11,832
Total	111,134	105,563	46,157	47,871

According to the Board of Trade returns, the exports from Great Britain to this country were as follows, for the first eight months:

	1881.	1882.	1883.
Pig-iron	265,887	241,780	198,175
Old iron for re-manufacture	59,461	64,581	37,324
Steel unwrought	74,814	112,825	24,598
Tin-plates	113,512	148,671	141,794
Hoops and sheets	23,782	24,065	22,820
Bar, angle, bolt, and rod	8,364	14,753	6,703
Railroad iron	216,125	155,408	49,827

American Pig.—The situation has, if any thing, grown worse, the transactions being on a very restricted scale. While it is true that the production is restricted and that the stocks in the hands of consumers are undoubtedly much lower than they have ever been known to be, the requirements of consumers are not alone artificially-reduced, but must be in reality considerably less than has been generally believed. As the majority of the dealers who supply this market are strong, and as many of them are probably delivering the bulk of their make on contracts, there are not many signs of weakness, but it is evident that this state of affairs can not continue long without carrying down or forcing the less favorably situated out of blast. The developments of the next few weeks will decide what pressure will be applied. Our quotations remain unchanged, with the market, however, in buyers' favor.

Transactions during the week have been on a moderate scale. We quote No. 1 Foundry, $21.50@$23; No. 2, $19@21, according to quality; and Gray Forge, $18.25@$19.50, all at tide-water. Bessemer Pig is lifeless, and Spiegeleisen is quiet at $30.50@$30.75 for 20 per cent. Low grades are dull at $25@$25.50.

At the Exchange, the following transactions were recorded:

Monday, 100 tons No. 1, October, $21.62½; 100 tons No. 1, November, $21.87½. Tuesday, 100 tons No. 1, January, $21.50; 300 tons No. 1, February, $21.50; 100 tons No. 1, December, $21.62½; 100 tons No. 1, December, $21.50. Wednesday, 200 tons No. 1, October, $21.87½; 200 tons No. 1, December, $21.62½; and 100 tons No. 1, February, $21.62½.

Scotch Pig.—There is very little that is new to report. Freights have advanced to 6s.@6s. 6d.

We quote ex ship and to arrive: Coltness, $23.25@$23.50; Langloan, $23@$23.50; Summerlee, $22.50@$23; Dallmellington, $20.50@$21; Eglinton, $20@$20.50; and Glengarnock, $22@$22.50.

At the Exchange, the following lower cable quotations were received: Coltness, 58s.; Langloan, 57s. 6d.; Summerlee, 56s.; Gartsherrie, 56s.; Glengarnock, at Ardrossan, 54s. 6d.; and Eglinton, at Ardrossan, 47s. Warrants to-day were 46s. 1d.

Rails.—There is no business to report, and the fact that at least one Eastern mill has few new orders for winter delivery is an indication of the fact that the productive capacity is considerably ahead of the demand. We understand that a willingness is shown to obtain orders even at very close figures. We quote $37@$37.50 at mill.

Old Rails.—The quantity of old rails available is slight, while there are a number of inquiries for round lots, with no tendency to business. We quote $23.25@$23.50.

Scrap.—Some business has been done in small lots. We quote, No. 1, $22.50@$23 ex ship.

Philadelphia. September 21.

The Eastern Pennsylvania iron trade has not yet escaped from the dull rut in which it has been confined for the past few weeks. Business continues of moderate proportions, and the efforts of makers of pig-iron to sell large quantities have not met with much success. The trouble is not with prices, but with demand, and the uncertainty as to its volume later on. Production keeps up to the average, but is not gaining. Stocks are slowly declining, and the supply in second hands continues very light. None of the inducements that have been offered during the past few days has led to heavy transactions, but there

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Sept. 15. H.	Sept. 15. L.	Sept. 17. H.	Sept. 17. L.	Sept. 18. H.	Sept. 18. L.	Sept. 19. H.	Sept. 19. L.	Sept. 20. H.	Sept. 20. L.	Sept. 21. H.	Sept. 21. L.	SALES.
Alice, Mon.					2.25				2.35		2.40		300
Amie Con., Co.	23	20	.23	.20	.22	.20	.20	.18	.20		.21	.20	32,825
Argenta, Ne.													
Bar & Walker, Ut.													
Bassick, Co.			9.00										50
Belle Isle, Ne.									.22				100
Bodie Cons., Ca.	.85	.75					.75		.18				680
Breece, Co.	.19		.17	.16									1,600
Bulwer, Ca.									.18				300
California, Ne.													
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Chrysolite, Co.	1.15				1.20		1.20		1.25	1.20	1.35	1.25	7,400
Cons. Va., Ne.	.54	.50	.50		.48	.47	.45		.50		.49	.45	7,040
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.	.33		.35	.33	.35	.34	.32				.28		1,200
Eureka Cons., Ne.			6.25	6.13									200
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.									.02				900
Green Mountain, Ca.							.70						90
Hale & Norcross, Ne.													
Hall-Anderson, N. S.	1.20	1.15	1.15		1.25	1.10	1.30	1.25	1.30	1.25	1.25	1.20	28,500
Hibernia, Co.													
Homestake, Dk.											17.50		100
Horn-Silver, Ut.	7.00		7.00				7.00						875
Hukill, Co											.05		100
Independence, Ne.													
Iron Silver, Co.	3.10	3.05			3.05		3.05						1,450
La Plata, Co.													
Leadville C., Co.							.40		.53	.40	.50		2,800
Little Chief, Co.	.60	.59	.64	.62	.65	.62	.77	.66	.85	.71	.88	.80	17,030
Little Pittsburg, Co.	.63	.62	.55				.64	.60	.65	.64	.67	.64	1,980
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.									2.80				300
Northern Belle, Ne.	5.88		5.75		6.00				5.75	5.63			660
North Belle Isle, Ne.													
Ontario, Ut.													
Opair, Ne.									3.25				200
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.	33.00												100
" Com., Ca.													
Rising Sun, Ca.	.03												500
Robinson Cons., Co.	.38	.37	.50	.38	.47	.46	.48	.46	.46	.42	.45	.44	17,100
Saint Joseph's Lead.													
Savage, Ne.							1.90						100
Sierra Grande, N. M.	1.10		1.15				1.10		1.10		1.15	1.10	1,100
Sierra Nevada, Ne.													
Silver King, Ar.					8.50								5
Spring Valley, Ca.													
Standard, Ca.					5.50		5.63		5.63		5.75		310
Stormont, Ut.													
Tip Top, Ar							5.00						200
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													
.....													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Sept. 15. H.	Sept. 15. L.	Sept. 17. H.	Sept. 17. L.	Sept. 18. H.	Sept. 18. L.	Sept. 19. H.	Sept. 19. L.	Sept. 20. H.	Sept. 20. L.	Sept. 21. H.	Sept. 21. L.	SALES.
Albion													
Alta										1.45			300
Am. Flag, s.													
Barcelona, G.	.42		.45	.42	.44	.43	.44	.42	.42	.39	.36		8,300
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'icher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.													
Buckeye													2,700
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G													
Clav'r's W. & M. Co.													
Cal., B. H., G.													
Central Ariz'na, S.			.26										200
Cherokee, G.													
Choliar													
Climax, Co.	.13	.09					.13	.12			.12		4,000
Cons. Imp'ri'l, G. S.												.13	.12
Crowell, G.													
Dahlonega, G.										.02			100
Decatur												.02	4,100
Dunderberg													
Durango, G.			.05										1,000
Eastern Oregon	.46	.45	.46				.46		.45		.46	.45	5,400
Elko Cons.	.11	.10	.11				.11	.10	.10		.10		9,600
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.			1.15										100
Hortense, S.													
Imperial													
Lacrosse, G.			.08										100
Lucerne													
Mariposa Prel., G.													
" Com., G													
Mexican, G. S.													
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S. L.													
Pri'nt'l & Miller, S.			.11	.10			.10		.12	.10			6,000
Parnell							.20						700
Quartz Creek													
Rappahannock, G.	.06												500
Red Elephant, S.					.16								1,000
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.30	.28	.33	.30	.33	.29	.30	.28	.30	.29	.28		63,200
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel			.19					.20	.18	.19	.18	.19	2,850
Taylor-Plumas													
Tioga													
Unadilla, S.													
Union Cons., G.										4.75			150

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 126,035. Non-dividend shares sold, 110,300.

BOSTON MINING STOCKS.

	Sept. 14. H.	Sept. 14. L.	Sept. 15. H.	Sept. 15. L.	Sept. 17. H.	Sept. 17. L.	Sept. 18. H.	Sept. 18. L.	Sept. 19. H.	Sept. 19. L.	Sept. 20. H.	Sept. 20. L.	Sales.
Allouez					1.75				1.75				200
Amie			.23						.21		.20		900
Atlantic													
Aztec													
Bodie Con.			.35										10
Bonanza D.	1.83		2.25		2.25				2.13		2.13		650
Bowman Sil.	.15	.12	.12		.12	.10			.09	.08	.08		7,600
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	245								245		244½		47
Catalpa	.35								.37½		.35		450
Central Ariz													
Climax													
Co. Virginia	.53												200
Copper F'lls													
Copperop													
Crescent									.10		.10		600
"Cust"													
Decatur													
Deer Isle									.05				1,000
Denver City													
Douglas													
Duncan													
Dunkin	.35				.33				.33		.27		1,200
Empire	.20		.20						.20		.19		2,100
Eureka Con.	7.75												20
Franklin			11.00		11.00						11.50		375
Gila County													
Harshaw					6 2½				.56¼	.50			400
Huron													
Independ'ce													
Indian Q'n													
Little Pitts.													
Mammoth	.02												1,000
Mass. & N. M.	.05		.05		.05						.06	.05	6,000
Milton													
Napa													
National													
North Belle													
Ontario					18.00				18.00		18.00		45
Osceola													
Penn-Breck.													
Pewabic					3.25				3.25	3.00	3.18	3.00	330
Pine Tree	.10	.09											4,000
Plymouth					.15								300
Quicks. com													
Quincy	51.00		52 00		52.50		54 50	53.50	54.00		54.00		346
Robinson			.39		.37								200
San Pedro	.17										.15		300
S'ra Nevada													
S'ra Grande													
Silver Islet													
Silver King													
Simpson Gd													
Sonora					.30								500
Standard													
Sullivan	.95	.90	.90		.95				.97½	.92½	.95	.90	181 1¼
Sutro Tun			.19		.19								300
Sycamore													
Twin Lead													
Vizina													
.....													

PHILADELPHIA MINING STOCKS.

	Sept. 14. H.	Sept. 14. L.	Sept. 15. H.	Sept. 15. L.	Sept. 17. H.	Sept. 17. L.	Sept. 18. H.	Sept. 18. L.	Sept. 19. H.	Sept. 19. L.	Sept. 20. H.	Sept. 20. L.	Sales.
Amer. Cons.													
Argent	.11		.11		.12		.13	.11	.14	.13	.14		12,200
Aztec													
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.07		.07	.06									
Comprom'e	.14		.15		.15	.14	.15	.14	.07		.07		2,200
Contention													15,400
Con. Virg.													
Dauntless													
Del Monte													
Denver City	.08				.08								1,900
Eureka													
Girard			.02		.02				.02				16,000
Governor	.03										.04		1,000
Grand Uni'n	.08		.03		.03		.01				.03		14,700
Green Mt.													
Gunnison					.25		.25		.25				300
Homestake													
Horn Silver													
Iowa Gulch	.03		.03		.03		.03		.03		.03		58,200
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.	.03				.07		.07						3,500
Little Maud													
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Lincoln										.01		.01	11,000
Mt. Sheridan													
National													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina										.11			500
Penn-Breck.	.12		.11	.10	.11		.10		.10	.11	.10	.11	10,800
Permanent													
Pizarro													
Pizarro Ex.			.02										1,500
Potosi													
Rara Avis							1		.14				400
Rara Avis E.	.10		.10		.15		.10		.10		.10	.09	19,400
Record													
Rico Pion'r													
Sierra Apac.	.16				.18	.17					.17		2,200
Sierra Bella.	.50						.52½						2,600
Sierra G'nde	1.10		1.10		1.10	1 07½	1.07¼		1.12½	1 07½	1.12½		3,530
Sierra Nev.													
Silver Cord							1.60						500
Silver King													
Silv'r Plume	.02		.02										5,000
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l													
Tombstone	.80	.75	.72½	.67½	.70		.75		.87½		.85		4,700
Victor							.01						2,200
Yale Mt.													

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are brokers who look for heavy business in a few days, especially in the inferior brands. Buyers are waiting for an improving tendency, before covering requirements, and it is probable that, when any impulse is imparted to the market, demand will assume a shape which will make prices better for the time being. Among the sales heard of this week, were a number of 50 to 100-ton lots at $22. Very little iron sells above this, and more below. In No. 1, the lowest sales heard of have been at $21. A fair amount of No. 2 was moved this week at $19.50 ; $20.50 represents selling prices for the best. A few lots were ordered at $19. The cheap makes of Gray Forge sell at $17 at furnace, but the special makes are bought at a little under $19. Fair inquiries are reported for standard brands of Gray Forge, but the actual business transacted is still below the average of the season. A few brokers are endeavoring to unload large stocks of mill irons, and expect to sell this week. Buyers of Bessemer iron have made inquiries for upward of 20,000 tons ; but no sales have been consummated, because of the refusal of sellers to meet buyers' terms. Offers are made at $20.50. A good deal of Spiegeleisen is wanted, but it is not probable that buyers will pay the prices asked ; $30 is the highest figure that will be willingly paid.

Muck Bars.—Sales of muck bars have been made at $33.50, with $34 asked for some makes.

Blooms.—A retail trade has been done in blooms at $57 for charcoal.

Merchant Iron.—An improving demand has been developed this week for merchant iron, but it is made up of small lots altogether, large buyers holding back for lower rates. Manufacturers are making no efforts to do business at the low prices offered, but are satisfied to sell iron in a small way at present prices. Ruling rates are 2·15c., with some business at 2·20c., and offers at 2·10c. for large lots. Common iron has sold at 1·90c., with some makes held at 2c. Inquiry is very active and large sales probable at the former figure. Lots of Western iron are offered, and are unsettling the market.

Sheet-Iron.—Card rates are unchanged, and shadings are reported on large lots which are taken for November delivery. Stocks are light, especially in thin sheets. Discounts on best galvanized, 40 per cent.

Plate and Tank Iron.—All manufacturers report an active demand in both retail and wholesale way, and mills are well supplied with orders for weeks to come. Prices are firm in all, excepting large lots, in which concessions are still to be had. Boat Plate, 2·35c. ; Ship Plate, 2·40c.

Structural Iron.—The favorable condition of the structural iron interests continues, and mills are busy with orders for future delivery at 2·40@2·50c. for Angles, and combination prices unchanged. Two or three inquiries have just been received for 100-ton lots.

Steel Rails.—No new business of importance has been reported, though negotiations are pending for large lots at $36@$36.50 offered. As soon as the present rush of small orders is out of the way, makers will talk business in a large way, and it is said, by the representatives of buyers, that steel rails will be placed at their prices, which are $35@$37 for winter deliveries. Ordinary lots are taken at $37@$38.

Old Material.—The same condition of affairs is to be reported in old material. Old rails are offered from the South at $23.50. Double-heads can be had at $26 for shipment. Buyers do not seem disposed to place orders at present prices.

Scrap.—Scrap iron is without change. Good selected yard lots are in active demand.

Pittsburg. September 21.

The Pittsburg iron market has not developed that improvement which was expected a week or two ago, and on the strength of which a number of large transactions took place early in the month. The supply of iron seems to be in excess of requirements, but competition is restricted by the fact that outside furnaces can not ship to this point and compete with home furnaces. The cutting which has been indulged in has been trifling, and very little outside iron has been bought, although, from all indications, the offers pending for supplies may be accepted. The dullness is attributed to the uncertainty of the demand for finished iron. All mills are running, but the local furnaces meet the requirements. Prices are slightly lower than last week. Neutral Mill Iron, $17.50 @$18 ; Red Short, $18 ; Foundry, $19.50@$22, according to ore; Foundry Charcoal, $26. A few manufacturers are buying heavily, while the greater number are purchasing for immediate requirements.

Sales of Muck Bar are made at $33.50@$34.

Manufactured Iron is 1·80@1·90c.; sales have been heard of at 1·75c., and efforts are made to sell iron in the interior of the State in competition with Eastern mills.

Plate Iron is 2·50@2·60c. Several large orders have been placed, and inquiries for this and structural iron are improving.

The sheet-iron mills are all busy, with orders for a few weeks to come, and demand seems to be equal to capacity. No. 24 sheets, 3·40@3·60c. card.

The demand for Nails is not active enough to prevent cutting of rates, and prices have been as low as $2.60 in heavy lots.

Discounts on Wrought Pipes are 75 per cent, and on Tubes, 60 per cent.

Merchant Steel, 11@12c. The demand is improving. Machinery, 6½c. Negotiations are in progress for large supplies of steel, but the prices are not named. Heavy sections of Steel Rails are selling at $37.50@$38. Inquiries for winter and spring deliveries at $36.50@37 ; Crop Ends, $24.50. Card rates for Spikes, 2·60c.; Splice Bars, 1·90c.; Bolts, 3@3·20c. A good deal of inquiry prevails for Old Rails. American, $24 ; Car-Wheels, $20 ; Old Axles, $33.50 ; Railroad Scrap, $23. The week has been dull, and the volume of business below the average for the season.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Sept. 21.

Anthracite.

The work of distribution of anthracite coal to individual consumers for domestic purposes in anticipation of the coming cold weather has begun, and is making itself felt in an increased inquiry for stove coal. The dealers will soon find inroads made on their yard stocks, and some of them will probably be forced to replenish before the time when, as usual, prices fall off, which is toward the end of November. October is looked forward to as the most active month in the year, and indications, so far as domestic sizes are concerned, give rise to the belief that it will be so this year. Other sizes are occasionally in excessive supply, and need active pushing to keep them from clogging the market.

Mr. John H. Jones, official accountant, has issued the following statement of the anthracite coal tonnage for the month of August, 1883, compared with the same period last year, this statement including the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines :

	August, 1883.	August, 1882.	For year 1883.	Compared with 1882.
Phila. & Reading RR.	1,317,954	694,410	5,989,690	I. 1,735,106
Central RR. of N. J.	*	412,370	1,745,399	D. 971,416
Lehigh Valley RR.	†615,612	576,511	3,962,052	I. 217,135
Del., Lack. & W. RR.	557,487	482,927	3,202,202	I. 258,882
Del. & Hud. Canal Co.	‡361,281	298,583	2,171,705	I. 212,819
Penna. RR.	266,533	243,940	1,716,111	I. 196,882
Pa. Coal Co.	107,685	160,979	942,465	I. 25,104
N. Y., L. E. & W. RR.	38,158	26,983	221,512	I. 56,849
Total.	3,324,711	2,894,702	19,951,165	I. 1,731,363

* Included in tonnage of the Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 5883 tons.

‡ In addition, there were 66,663 tons transported from the mines by the Delaware & Hudson Canal Company, during August, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, August 31st, 1883, was 576,132 tons ; on July 31st, 1883, 502,159 tons ; increase, 73,973 tons.

Bituminous.

It is reported that Sydney coal is offering in this market at a low figure, and that Cumberland coal is selling cheaply at Georgetown particularly, $2.50 being the price mentioned. The bulk of the coal coming forward is of course to cover old contracts ; and though the latter were at very low prices during the early part of the season, the fact that freights have ruled low has made them more favorable to the shippers than pessimists at that time predicted.

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended September 15th :

	Week.	Year. 1883.	Year 1882.
Coal for shipment at Coal Port (Trenton)	3,655	81,867	63,734
Coal for shipment at South Amboy	11,582	541,921	583,351
Coal for distribution	18,961	560,996	501,538
Coal for company's use	4,060	111,683	88,879
Total	38,248	1,296,477	1,237,502
Increase		58,975	
Decrease			

The Production of Bituminous Coal for the week ended September 8th was as follows :

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	63,809	1,676,614
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,090	215,227
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,049	126,391
East Broad Top	384	27,394
Clearfield Region, Pa.		
Snow Shoe	2,701	158,045
Tyrone and Clearfield	54,632	1,907,427
Alleghany Region, Pa.		
Pennsylvania RR.	5,025	293,798
Pittsburg Region, Pa.		
West Penn RR.	4,213	278,192
Southwest Penn. RR.	2,476	72,918
Penn & Westmoreland gas-coal, Pa. RR	37,074	949,831
Pennsylvania RR.	14,194	400,056
Total	193,647	6,105,903

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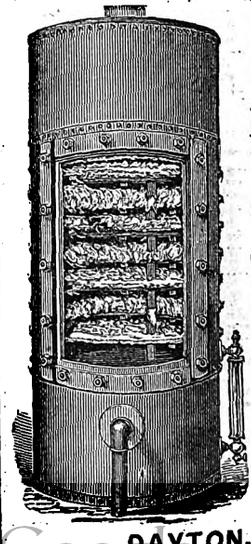
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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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JOHN C. TRAUTWINE, the eminent civil engineer, died in Philadelphia on the 15th inst., at the ripe old age of seventy-three, full of honors.

MR. ANDREW CARNEGIE, the great Pittsburg iron and steel manufacturer, is credited with the opinion that there is no hope for a revival of the manufacturing industries before next spring. So far as the iron and steel trade is concerned, Mr. CARNEGIE, we fear, is right. The prospects of an improvement are slight indeed, and it looks as though lower prices must prevail unless there is a further restriction of the make.

THE programme of the Troy meeting of the American Institute of Mining Engineers has just been announced. The opening session, held on Tuesday evening, October 9th, will be followed by a reception at the Troy Club. Wednesday will be spent in excursions to the stove-works of FULLER & WARREN, and to the iron and steel-mills of the Albany & Rensselaer Iron and Steel Company, there being a session in the evening. Thursday will open with a few visits to adjoining works, and there will be a morning and afternoon session, the evening being set aside for the subscription-dinner. Friday, the party will be taken to the property of the Hudson River Ore Company. The headquarters of the Institute will be at the Troy House, Mr. R. W. HUNT, President, being chairman of the local committee, and Mr. HENRY BURDEN, Secretary.

FROM Dr. HERMANN WEDDING, of Berlin, the well-known German metallurgist, comes a suggestion which may possibly be developed into a working process. While low phosphorus pig is suitable for the Bessemer and open-hearth processes, and iron carrying about 15 per cent of phosphorus is used for the basic process, the large quantities of pig which do not meet the specifications for either method of manufacture must go to the puddling-furnace. Dr. WEDDING points to the fact that, when melted cast-iron is allowed to chill, the first crystals forming are nearly pure iron, and, by repeatedly crystallizing the iron, a metal of high grade may be obtained from poor pig. The process would, therefore, be similar to that of PATTINSON in the desilverization of pig. Dr. WEDDING suggests that a battery of three open-hearth furnaces might be used for the purpose, but evidently has his misgivings as to the practicability of the scheme, which can only be tested on a large scale. We imagine that it will be difficult to impress any one with its merits to the point of putting up a plant, which can not fail to be costly.

THE autumn settlements of the prices paid for mining coal in the West have thus far passed over very peaceably, and there seems little fear of a contest between the miners and their employers. In Ohio, there will be a general advance of 10 cents per ton. In Illinois and Indiana, there has been some uncertainty, but there is reason to believe that slightly higher wages will be granted. In the railroad pits of the Pittsburg District, the winter rate has been fixed by arbitration by JOHN R. MCCUNE, the umpire of the arbitration tribunal, at 3½ cents a bushel, an advance of ¼ cent, and a compromise between the demands of the men, who asked 3¾ cents, and the views of the operators, who professed to be unable to pay more than 3¼ cents. This decision is, of course, not acceptable to the extremists of either party, but the conservative element will probably carry the day. This is, therefore, the second test of the Wallace act, and the fact that it has stood the strain of contending interests, and has avoided conflicts, is certainly an encouraging sign. We have stated our objections to it on former occasions, and as it has not been put to the supreme test which an aggravated situation would subject it to, we have no reason to change our views. It is a matter for congratulation, however, that it is giving more confidence in the efficacy of arbitration. The Wallace act may, therefore, become the forerunner of more decisive legislation.

In the river pits of the Pittsburg District, there is a disagreement in regard to the wages to be paid in the different pools. It is claimed by the operators of the third pool that, because they are paying the same price, 3½ cents per bushel, as the employers in the first and second pools, they can find a market for their coal only in the busiest season. They call attention to the fact that in the fourth pool only 3 cents are paid, and insist that in fairness to themselves and to their men they are entitled to a 3¼-cent basis.

There has been disaffection in some of the other Pennsylvania bituminous districts; but the situation being such that there is little hope for the successful issue of a strike, the men have not pushed their demands vigorously.

THE College of Mechanics of the University of California, at Berkeley, is giving evidence of a new life which promises well for the future. It has issued the first of what we trust will be a series of bulletins; and if the high standard aimed at in the one before us is maintained, the mining interests of the State, and of the country in general, may look to valuable original researches on important subjects. The bulletin before us is a modest pamphlet of fifteen pages, containing experiments with a partial turbine or tangential wheel, by Messrs. J. AHERN, E. LOUISSON, J. NEWMAN, and A. D. SCHINDLER, of the class of 1883, under the instruction of Prof. F. G. HESSE, in hydraulics, and ROSS E. BROWNE, in construction, and a number of experiments with the hurdy-gurdy wheels and a comparison of the efficiency of a Pelton wheel with that of a partial turbine, by ROSS E. BROWNE. The latter's investigation is one that is timely. He has plotted the results of a number of experiments with a hurdy-gurdy having flat and curved buckets, and with a Pelton wheel in which the amount of power lost by "carrying" the water is reduced by a special form of bucket, by the introduction of a wedge. With a flat bucket hurdy-gurdy, the best efficiency with a three-eighths inch nozzle and at 50·2-foot head was 40·4 per cent, the speed then being very nearly one half of the velocity of the water as issuing from the supply-jet. The wheel carrying curved buckets showed an efficiency of 65·6 per cent under similar conditions, though Mr. BROWNE expresses the belief that it

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might have been raised 2 to 3 per cent, by attending more carefully to the curve and the size of nozzle used. The first experiments made with the Pelton wheel referred to seven different settings of the nozzle. The efficiency, when the nozzle was elevated toward the outer edge of the bucket, was 78·4 per cent, and to the inner edge 68·1 per cent. The maximum efficiency at a position approaching the former was found to be 80·5 per cent. As to the size of the nozzle, a three-eighths inch gave 82·5 per cent; a quarter-inch, 75·6 per cent; and a seven-sixteenths nozzle, 82·6 per cent efficiency, or the best result. When working the wheel with a three-eighths inch nozzle under various heads from 50 feet down to 8 feet, a gradual decrease in the useful effect was observed, although, with a head of 8 feet only, the efficiency remained as high as 73 per cent. For the best effect, the Pelton bucket should have one half the speed of the supply-jet. Mr. PELTON himself claims a higher average efficiency, and Mr. BROWNE does not dispute the claim, because the wheel he used did not precisely in all particulars conform to Mr. PELTON'S standard. So much, however, is proved, that hurdy-gurdy wheels, well designed, possess a high efficiency, under a wide range of conditions, and its best form, the Pelton wheel, shows a better effect than a partial turbine, which showed only a useful effect of 75·1 per cent as a maximum. Mr. BROWNE justly protests against the term "impact" wheel as applied to the hurdy-gurdy, which is a far better machine than it is generally given credit for.

THE tariff discussion is going on at a lively rate in Germany, and the iron trade is among the most energetically attacked industries. Compared with our own neat percentages of duty, the figures for the justification of which the German iron-masters are so earnestly writing are a mere pittance, and yet they are able to marshal an array of figures to prove how much better their workmen are doing. The Association of German Iron and Steel Manufacturers has, through its secretary, Dr. RENTSCH, gathered statements from 325 firms of producers of pig-iron, steel, and wrought-iron in all its forms, founders and machinists. In January, 1879, before the passage of the present German tariff law, these 325 firms, which included 107 incorporated companies, employed 153,979 men, to whom 9,383,396 marks of wages were paid during the month. In January, 1883, the same works had a working force of 206,150 men, the monthly pay-roll footing up to 14,754.350 marks. This shows an increase in the number of men employed of 33·9 per cent, an increase in total monthly wages of 57·2 per cent, and an improvement in the average workman's earnings per month from 60·94 marks to 71·57 marks, or 17·4 per cent.

So far as the improved returns to the employers are concerned, the following summary of the returns of 107 incorporated companies will clearly show to what extent they benefited by the mild form of protection granted the industry:

RETURNS FROM FIFTY-ONE IRON AND STEEL-WORKS.

	1879.	1882.
Capital, marks	263,654,908	266,021,678
Profits, "	5,924,157	15,113,547
Losses, "	1,289,611	1,272,211
Excess of profits over losses, marks	4,634,546	13,811,336
Excess of profits over losses, per cent	1·75	5·20
Dividends, marks	4,032,178	11,702,304

RETURNS FROM FIFTY-SIX MACHINE-WORKS.

	1879.	1882.
Capital, marks	131,169,027	130,231,512
Profits, "	4,014,327	7,315,213
Losses, "	788.206	709,370
Excess of profits over losses, marks	3,226,121	6,608,843
Excess of profits over losses, per cent	2·46	5·07
Dividends, marks	3,014,424	5,503,217

It will be noted that the manufacturers of the cruder products, the iron-mills, did relatively better than the machine-works, the former nearly trebling their returns, while the latter doubled them only. It must be remembered, however, that while the year 1879 was a very poor one, both as to prices and output, the year 1882 was fairly good and in some branches exceptionally active. Still, with due allowance for this fact, the result is certainly encouraging, and it proves that, while the profits on capital are by no means more than reasonable now, the wages of labor are very largely bettered. How far the latter point is modified by the higher cost of living due to the duty imposed on breadstuffs, we have no means of ascertaining. Candor commands that we decline to accept, save with reserve, the figures collected by the German iron-masters, and to which they point with so much pride. They exaggerate the points they are brought forward to prove. Still we believe that even the sharpest critics of the policy which they are intended to justify will concede that they prove that, by the introduction of the tariff, the workmen in German iron-mills and machine-shops have gained, and that their employers are reaping only fair profits as a return on their investment.

A PATENT-OFFICE RULING.—The Commissioner of Patents has ruled that the Patent-Office, after having adjudicated certain subject matter patentable as a design, and granted a patent therefor, can not register as a trade-mark substantially the same design, and give to another and different person the right to use it as a trade-mark.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Gjers Soaking-Pit at the Works of the Scranton Steel Company.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: At the request of my friend, Mr. John Gjers, of Middlesborough, England, and as marking a distinct advance in our American rail-mill practice, I take great pleasure in informing you that Mr. Gjers's soaking-pits have been in constant use at these works since September 3d. During that time, we have rolled about 80 per cent of our ingots directly from the pits, without other heating, into 120-foot flange rails, weighing mainly 67 pounds to the yard. We are at present rolling about 85 per cent and upward of our ingots directly from the pits into 120-foot rails, weighing 70 pounds to the yard. With the pits, we run one heating-furnace, most of the time days only, to work up cold ingots, etc., which may accumulate from any of the ordinary causes. We find that, with four-rail ingots, six pits are easily good for about 150 tons of rails per turn. We are informed that what we are now doing has not yet been done, as regular work, anywhere else, either in Europe or here. Respectfully yours,

W. W. SCRANTON, President.

The Alluvial Tin Mines of Banca.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the article of Prof. W. P. Blake, printed in your issue of September 15th, I find the following:

"According to Davies, at the alluvial tin mines of Banca, a miner, with the aid of water, removes from 350 to 530 cubic feet of earth in nine hours," etc.

Curious to compare these figures with my own experience at Banca, I was rather surprised to find the same figures, and nearly the same words, at page 12 of a little book entitled "*Banca and its Tin-Stream Works.* By P. Van Diest. Translated from the Dutch by C. le Neve Foster. With two Geological Maps. Truro: Heard & Sons. 1867."

Not knowing the address of Prof. William P. Blake, I would be much pleased to find out, through you, whether a work on Banca or on tin ores has been written by a certain Davies; and if so, where I can get it.

I would also mention that I can provide parties interested in the tin-stone deposits in the Black Hills of Dakota with complete drawings and description of the portable boring apparatus used at the islands of Banca and Billiton for determining the depth, the extent, and the value of stream-tin deposits, recommended by Prof. W. P. Blake as useful in the small valleys of the Black Hills. Respectfully, P. H. VAN DIEST.

DENVER, COLO., Sept. 20.

[The work of Davies, referred to by Professor Blake, of New Haven, Conn., is on metalliferous mining in general. We presume that Mr. Davies quoted the figures alluded to from Mr. Le Neve Foster's translation.—EDITOR ENGINEERING AND MINING JOURNAL.]

Taxation of Inventors and Use of Patent Fund.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Is not the present opportune for renewing the subject above indicated, with the object of approaching honorable members of our legislature *through their constituents?* Your readers well know that congressional attention has been yearly invited to these and kindred questions affecting the rights of intellectual property, with inadequate results. It is now evident that Congress can only be induced to give that attention to the subject which its importance justifies by personal appeal to its individual members by their constituents, supplemented by a numerously signed memorial to Congress itself. In view of the assemblage of so many of those more especially interested in such questions at the present time at the various exhibitions and conventions, and the near approach of the congressional session, it is suggested that you continue the good work, by giving publicity to a draft of memorial such as now inclosed, and by urging the personal attention of your readers.

CINCINNATI, Sept. 17. G. H. KNIGHT.

MEMORIAL.

To the Honorable the Senate and the House of Representatives of the United States in Congress assembled:

The undersigned, manufacturers, inventors, and other citizens interested in the progress of the useful arts, respectfully represent:

That to the law granting to inventors for a limited period the exclusive use of their discoveries, the country is indebted for much of its pre-eminent prosperity.

That the surplus to the credit of the patent fund (amounting on the first of July, 1883, to $2,500,000 in round numbers) remaining unappropriated to any of the ostensible purposes of its exaction constitutes a special tax upon a useful class of citizens (mostly "poor but making many rich") without constitutional sanction and neither expedient nor just.

That the fees for granting patents of invention should not (as they have done for many years past) greatly exceed the expenses incurred in examination and other procedures called for in such grants.

That the surplus could and should be applied (under proper safeguards) to means for increasing the usefulness of the Patent-Office both to inventors and the public.

That among these means are adequate digests and indexes of improvements in the various useful arts, for the use of the examining corps and of inventors and others in the principal industrial centers; increase of the working force of the Patent-Office on salaries that shall secure and retain competent service; and enlargement of its present cramped and inadequate accommodations.

Under the present law, previous grant of foreign patents operates to limit the term of one granted here for the same invention to that of the

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earliest expiring foreign one, possibly because it was thought that the American public should not be called on to pay for what was free elsewhere. The provision, while oppressive to inventors of the more important improvements, fails to accomplish the ostensible object of its enactment in the great majority of American inventions; which (because of this clause) are never patented outside of the United States, and are therefore free abroad from the first. We ask the repeal of this worse than useless clause.

Legislation is asked that shall enable amendment (after due public notice and within reasonable time after grant) of a defective specification, without on the one hand bringing into subjection machines already constructed or (on the other hand) releasing previous trespasses on claims remaining unchanged in the amended specification.

It is submitted that a commission be established with authority to order such Patent-Office expenditures not in excess of receipts as such commission may (from time to time) deem fit.

It is requested further that the President be authorized to enter into arrangements with other powers for the international protection of rights of inventors; such a movement having already been made by the English government in the Patents, Designs, and Trade-Marks Act of 1883.

The Montana and Arizona Commissioners at the Denver Exhibition.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Inasmuch as some prominence has been given by the Denver daily newspapers to the attempt of the Arizona and Montana commissioners to remove their exhibits from the building of the Denver Exhibition Association, we have deemed it advisable, through the medium of your columns, to give an explanation of the reasons by which we were actuated, to the end that your many readers in those territories may fully understand the questions at issue. The commissioners of the other territories would join in this statement, were it not for the fact that they long ago foresaw the uselessness of remaining, and therefore went home. Professor Clayton, of Utah, returned two weeks after the opening; and Mr. Onderdonk, of Idaho, followed his very sensible example one week later. Nevada, the mother of silver mining, refused to send an exhibit here, as did also California. Mexico is represented by only one case of ore, and New Mexico did not show up until eight weeks after the opening. No other State or territory in the Union was represented, and only six of the counties of Colorado appointed commissioners to represent them. They are as follows: Clear Creek, Gilpin, Chaffee, Fremont, Gunnison, Summit, and Garfield. Lake County, where the greatest mining camp in the world is located, and which last year produced two thirds of the State output, refused to appoint a commissioner, and is represented only by a portion of last year's exhibit, with no one in attendance. Large additional mineral exhibits were promised by the management, but they never came. The thousands of Eastern tourists and capitalists whose coming was positively promised in the flaming and high-sounding prospectuses did not put in an appearance. Local exhibitors refused to occupy the spaces previously engaged. Machinery Hall remained a barren waste. The attendance, which for the first two weeks had been quite good, fell away to almost nothing. The mining papers of the State began ridiculing the enterprise, and the Denver *Tribune*, a fearless and outspoken journal, pronounced it a transparent fraud, a cold-blooded real estate speculation, an insult to the intelligence of the country, and a calumny on the great mineral industry of the West. The truth of these statements was evident, and an opposition and apathy were engendered which, within a month after the doors were open, virtually concealed the enterprise from public view and consigned it to the oblivion of the past. The propriety of closing the show was canvassed by the board of directors, and openly advocated by the assistant-secretary, on whose shoulders most of the burdens fell; but the probability of damage suits by the few private exhibitors resulted in the determination to keep the doors open until the close of the time specified. It was a knowledge of these facts that induced the Arizona and Montana commissioners to make a move in defense of the great territories they represent; and though they had previously uttered no complaint and exhibited a most commendable charity and patience, they determined to move, and notified the management of their intention. Then uprose the general manager, a very estimable gentleman, and vetoed the proposed movement. The matter was taken to the courts, and Judge Elliot restrained the commissioners from removing their ores, but did not restrain them from packing the same, which was accordingly done by the Arizona representative. The Montana ores had been already boxed.

Since that time, the matter has remained in *statu quo*, the management refusing to allow the removal of the ores, and the commissioners, with equal pertinacity, refusing to unbox them for the entertainment of the few women and children who visit the Exhibition. As a last desperate resort, to increase the attendance and relieve the painful solitude of the almost empty building, the management has hit upon the novel and business-like expedient of getting up a pumpkin-pie festival, as you see by the inclosed programme.

Now we respectfully submit that this whole business has been a farce and an outrage on every mining district in the West. Lured here by shameless misrepresentations, never intended to be carried out, we were compelled, in simple self-defense, to move our ores if possible to some point where their merits would be seen and understood by men of capital: and having received invitations to send our ores to Chicago, Cincinnati, and Boston, we made the attempt to leave the Denver Exhibition cemetery. The people of Colorado do not indorse it, the business men of Denver repudiate it, the mining population ridicule it, and the press, with few exceptions, denounces it. It is not a national mining exhibition in any sense, and the wisely deserted exhibit of the great territory of Utah, which will soon be removed to Salt Lake, is the only territorial exhibit in the building.

The object of this article is to give the miners of the various districts of the West a plain, unvarnished tale concerning an enterprise which is the very opposite of what it is represented to be. Respectfully,

DENVER, COLO., Sept. 20.

DOUGLAS GRAY,
Commissioner from Arizona.
JOHN B. READ,
Commissioner from Montana.

NOTES ON THE EXHIBITION AT DENVER.—IV.

Special Correspondence of the Engineering and Mining Journal.

PARK COUNTY.

The exhibit of this county is both varied and excellent, containing in some instances very rich specimens. The largest exhibit is that from the Fanny Barret mine, which occupies the center of the pavilion. This mine is situated in the Alma District, and the ore assays from 40 to 196 ounces of silver and half an ounce of gold per ton, with 50 per cent of lead. It is one of the largest mines in the county.

A number of mines from the Montgomery District have exhibits here this year, among which is the Ellen Bayne, which shows a fine block of ore. The Illinois is represented by ore containing 1·43 ounces of gold and 15 ounces of silver per ton. The Rob Roy has ore worth $250 per ton, and the Centennial shows some very good specimens, its ore averaging from 2 to 5 ounces of gold and from 5 to 30 ounces of silver per ton, in a kind of brown iron oxide. One small box contains ore estimated to yield 310 ounces of gold per ton.

The Buckskin District has perhaps the largest number of representatives, many of which show very rich specimens. The Golden Queen shows a fine specimen of ochreous ore, containing 60 ounces of silver per ton. The White Quail shows a large block of ore, containing 7½ ounces of gold and 60 ounces of silver per ton. The Earnest has ore which is said to contain from 300 to 13,000 ounces of silver per ton. The Lizzie Abington exhibits ore freely stained with carbonate of copper, worth from $100 to $130 per ton. The Parole shows some very rich ore, containing 1028 ounces of silver per ton. The Criterion has a very beautiful specimen, made up of large acicular crystals of cerussite, mixed with rich steel galena. A heap of specimens of sulphuret ores from the Red Lion mine, assaying from 500 to 1000 ounces of silver per ton, is also shown, and the Ten-Forty mine has even richer ore than this. The J. G. Blaine, also in this district, shows a curious specimen of copper glance imbedded in carbonate, the whole being disseminated through quartz rock. Among these rich exhibits, no district has a finer display of copper silver ores than Hall's Gulch and Valley. One mine, the Copper King, shows two splendid lumps of green carbonate of copper. The vein is 32 feet wide and the pay-streak 30 inches. The Missouri mine shows a large block of bismuth silver ore. But the most notable exhibits are two cases containing exhibits from the Whale mine and the properties of the Hall's Gulch Mining and Tunnel Company respectively. The former's case contains specimens of an ore which is chiefly galena, but mixed with copper glance, assaying on an average 90 ounces of silver, 25 per cent of lead, and 8 per cent of copper. The latter exhibits some very rich specimens, one being a nugget of silver and another a piece of pure silver glance. They also show a quantity of peacock ore and silver glance mixed, and some bismuth silver. The mines represented are the Great Eastern, the Manhattan, and the Kalamazoo. The Kansas City, on Democrat Mountain, shows a peculiar porphyritic-looking ore.

The Mosquito District is also well represented. The Orphan Boy shows rich gold ore, containing 12 ounces per ton, besides some silver. The London shows a piece of ore containing immense crystals of iron pyrites containing from 5 to 10 ounces of gold, from 7 to 10 ounces of silver, from 3 to 6 per cent of copper, and from 8 to 10 per cent of lead per ton. The Sunny South has a specimen showing wire silver. The Sacramento, in the district of the same name, shows a splendid block of galena assaying 1300 ounces of silver per ton. The Dunderberg (head of Platte) has ore containing 0·7 ounce of gold, 25 ounces of silver, and 73 per cent of lead per ton. There is also a specimen of ochreous carbonates from the Carbonate mine, Silver Heels District.

CHAFFEE COUNTY.

The biggest mine in this exhibit, so far as the future is concerned, is undoubtedly the celebrated Mary Murphy and its adjuncts, worked by the Murphy Company, on the Murphy spur of the Chrysolite Mountain, in Chalk Creek District. The vein is said to be traceable for miles. Several large blocks of ore associated with quartz rock, and consisting of steel galena, are shown. There are about 3000 feet of development on the mine. Last year, little ore was shipped, on account of the extortionate rates exacted by the Union Pacific Railroad. The Quincy is another mine in this district which has a 5-foot vein with 2 feet of pay ore per ton. The Mollie, which is located on the same vein as the Murphy, shows ore containing free gold and sulphurets of silver. This ore is mixed with a large quantity of silicate of manganese. An immense block of ore from the Tiger lode is shown, weighing 3700 pounds. The Tressa C. shows some fine ore. It is a copper and lead ore bearing gold and silver as follows: $136 gold, 60 ounces of silver, 9·5 per cent of copper, and 5 per cent of lead per ton. It has 200 feet of development, and was sold last week for $75,000. The Iron Chest, also on the Murphy vein, shows specimens of its ore.

In the Monarch District, which is one of the richest in the county, the following mines are noteworthy, both as to value and exhibits: The Ben Hill has galena and carbonates mixed. The vein is 6 feet wide, with pay-streak 35 inches. The Monarch, the first discovered in the district, has some splendid ore, with a most curious formation. One specimen shows it well. The piece is divided in the center by a well-marked line, the top being fine galena, and the lower portion carbonate rich in silver. The mill-runs give 1000 ounces of silver and 60 per cent of lead per ton. The Mountain Chief, in the same locality, shows ore also. The vein is four feet wide, and the pay-ore from 1 to 2 feet, carrying carbonates, galena, and sulphurets of silver. The Lost Wonder has 450 feet of development on a six-foot vein, with from 16 to 36 inches pay-ore, chiefly galena. Just below it, is a mine which produces rich molybdenite, some beautiful specimens of which are shown. The Madonna is a large mine, with ore very similar to that found at Leadville, consisting of carbonates and galena, some sand carbonates, and large masses of an ore rich in sulphate of lead. It ships from 50 to 70 tons a day; and when the railroad is completed, as it is expected it will be in a few weeks, it will send off about 100 tons a day. The Cottonwood District is well represented by specimens; but the mines have generally only a small development, and have not as yet shipped much ore, so that the assays are delusive. The Gladstone mine is an exception, as it has shipped a considerable amount of ore. Its first grade runs from 65 to 100 ounces of silver and from 18 to

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27 per cent of lead; and the second grade, from 30 to 40 ounces of silver and from 7 to 14 per cent of lead per ton. The ore consists of carbonates and galena, and its development is 400 feet. The Hortense, on Mount Princeton, has also shipped a considerable quantity of $75 ore lately. Among other mines worthy of mention in this district, are the La Plata, which shows a specimen with native silver upon it; the I.X.L.; the Black Prince; and the Tilden, in Alpine District. The Black Prince is an instance of the folly of trusting to assays of small quantities. The assays gave 240 ounces and 936 ounces of silver per ton, while the mill-run gave only 73 ounces per ton. The Longfellow is a new strike of last spring. Its ores are dignified with a show-case. The bulk of the ore is carbonate and galena, the silver being in the form of chlorides.

Hinsdale and Custer counties both have excellent exhibits, but they are not labeled, and have no one in charge of them. This is a great want this year, and the counties which have refused to provide for the expenses of commissioners have pursued a very short-sighted policy.

DOLORES COUNTY.

In the center of this compartment, is a large four-sided pyramid, carrying a very interesting exhibit from the comparatively new camp of Rico, which, on no less authority than that of Senator Hill, is likely to become another Leadville. Certainly the appearance of the bulk of the ore shown reminds one of the Lake County exhibit very much. At the top of the pyramid, are some fine blocks of iron pyrites and galena, mostly from the South Park mine, a small lot being from the Nora Lilly. Lower down, are large blocks of the hard carbonates so plentiful in the Lake County exhibit; one block from the Puzzle mine being said to assay 500 ounces of silver per ton. Around the lowest two tiers, are a number of sacks full of sand carbonates and milled ore from the Puzzle, Pigeon, Parole, Leila Davis, and the Newman group worked by the Marrs Consolidated Mining Company, including the Swansea Extension, Chestnut, and Newman mines. The mines of this group turn out carbonates and sulphides chiefly. There are two upright cases which also contain many rich ores. One has many splendid blocks of ore from the Newman group. The Hope & Cross, a carbonate, assays on the mill-run 350 ounces of silver per ton, and the C. B. & Q. shows a quartz yielding from 2 to 6 ounces of gold. The Rico, also a carbonate ore, runs from 115 to 800 ounces of silver per ton. The Rico No. 2, a galena, gives from 50 to 222 ounces of silver, and the Rico Carbonate Tunnel, from 25 to 600 ounces of silver per ton. The Johnny Bull has some extraordinary ore of a dark color, and showing sulphides containing, so it is said, 280 ounces of silver and a large quantity of gold per ton. The Uncle Ned ore runs 240 ounces of silver, and the Round Up and Little Hattie, both in the Trout Lake District, show ore assaying 334 ounces and from 140 to 600 ounces of silver per ton respectively. The Bancroft has a large show of fine-looking ore running 80 ounces of silver and 40 per cent of lead. Among the others of the same class, the richest are the Little Sadie, Alleghany, Ah! Joy, Little Emma, Black Hawk, Grand View, and Golden Fleece. The Blue Cloud seems to be promising well. It shows rich copper ore containing carbonates. It is also stated that it has 1000 tons on the surface. The Sinbad exhibits a quartz assaying 3000 ounces of silver and 29 ounces of gold per ton. There is also a most beautiful specimen of large aggregations of crystals of carbonate of lead. Some specimens of coal are shown from Grand View Banks, seven miles from Rico, and therefore very convenient for the smelters; and in one corner is an immense heap of yellow carbonate ore from the Wabash mine, which has a forty-foot vein. It is stated that there are 4000 tons on the dump.

SUMMIT COUNTY.

This exhibit has many large and fine specimens representing chiefly the silver-bearing sulphides, though there are carbonates from some notable mines. The Washington mine, on Nigger Hill, eclipses all other exhibits so far as weight and size are concerned. It shows 14 tons of pure galena in immense lumps. The Snake River District is well represented by a number of rich mines. The St. John mine shows a large piece of fine ore consisting of steel galena, and showing ruby silver worth $900 a ton. The Ericsson also shows galena worth $120 a ton. The Lancaster shows gray copper and galena containing 90 ounces of silver a ton; and the Cashier, a gray copper containing $500 worth of silver per ton. The Delaware, in the Peru District, exhibits steel galena. The Decatur has a free-milling gold quartz, the metal sometimes being visible to the naked eye. The Fredonia shows a rich specimen, and the Governor (Blue River District) is represented by a fine specimen of silver-lead ore. The Gold King, from the Swan River District, shows a free-milling gold ore. One of the richest mines in the county is the Argenta, on Fletcher Mountain. There is a large and handsome case of fine ores from the mines owned by the Colorado & New Mexico Consolidated Mining and Smelting Company. The Queen of the West, in the Ten Mile District, exhibits silver ore; and there is a fine block of galena and pyrites from the famous Robinson mine. The Coley lode, Montezuma, said to be the first discovered silver vein in the State, having been located July, 1863, shows a lot of ore. The North Swan has a gold and silver ore on exhibit. There is a quantity of ore from the Brooks silver mine, Breckenridge; the Wellington mine, Blue River District, shows an immense block of very rich ore; and the Sankey Tunnel, ore containing gold, silver, and copper.

UTAH TERRITORY.

This territory has certainly a very splendid collection of ores and some remarkable curiosities. The ores are well arranged in neat cases, and, though there are not many mines represented, the exhibit leaves nothing to be desired so far as it goes. The minerals exhibited are not merely confined to those containing the precious metals. There are some excellent iron ores, some of which are smelted at Ogden; also coal, fire-brick, marbles, gypsum, salt from the Great Salt Lake, and a large collection of native sulphur ores. The beds represented are the Cave mine beds, Bradshaw, running from three inches to 12 inches in thickness, and associated with a curious porous carbonate of iron; the Morgan District bed, which shows some large pieces of rock covered with fine crystals of sulphur, as are also the specimens from the Cave Creek District, Millard County. Among the splendid exhibits of silver ore, the following are well worth mentioning: The Eureka Hill, Tintic District. The Rebellion, has a series of most beautiful specimens of blue and green carbonate of copper, besides sulphides. It is owned by the Crescent Silver Mining Company, and is located at Pifion Hill, Uintah District. Carbonate mine has a splendid exhibit of sulphides. There also some rich sulphides from the celebrated Emma mine. The Flagstaff is represented. The Cactus has a grand lot of specimens of peacock ore with 30 per cent of copper, and some gray copper ore running high in silver. The celebrated Ontario mine, with its enormous output, comes out strongly. There is also a splendid exhibit of stibnite from the mines of the American Antimony Company; and, of course, a lot of rich specimens from the Horn-Silver mine. The Barbee & Walker sends some curiosities in the shape of large specimens of petrified wood containing silver. The Comet mine shows specimens of copper pyrites. There are some large pieces of a silver-bearing sandstone rock worked by the Christy Mill and Mining Company, and some rich ore from the Old Hickory mine, consisting of copper glance and carbonate. There are also many specimens of the wonderful cerite or mineral wax, a crude form of paraffine; and some bituminous shale and oil rock. The mines for these are the Covington, Stoddart, Rose, and others. There are some curious sandstones in which the cerite appears in fossil-like forms resembling the sigillaria and stigmaria of the coal-beds. With this exhibit is a case of copper and lead ores from the Wood River District, Idaho; but there is nothing very noteworthy about it.

NEW MEXICO.

The principal counties represented in this exhibit are Grant, Santa Fé, Dona Ana, Taos, and Socorro. The ores are chiefly gold, silver, and copper, and, though they are generally inferior in appearance to the Utah exhibit, they are certainly among the richest in the exhibition. It would be an injustice to attempt to describe them in the space at my disposal, as there are at least 350 mining properties represented, some of which are well known; for instance, such mines as the Sierra Grande group in Lake Valley, and the Homestake mine, with its rich gold ore. Some grand specimens are shown from the Cañon del Agua and San Pedro mines, which work a contact vein with a 37-foot face at the surface, and which contain an 18-inch gold-bearing streak. There are also specimens of an excellent anthracite coal, mica, and a micaceous silicate from which good china can be made. Judge Sloan, the Commissioner, has also an elegant collection of his own on exhibition, representing all the different kinds of ore worked in the territory. It is much to be regretted that the Arizona exhibit should, like that from Montana, have been hidden from public view soon after it had appeared. The commissioners from these territories wished to move their exhibits to some of the Eastern exhibitions. This was declared contrary to the rules of the management, after they had once entered. The case was taken to the law courts, and it was decided that they must stay as stipulated until the close of the Exhibition; but they were not obliged to show; therefore the exhibits were packed up. It seems a pity that this action should have been taken; for, being obliged to stay, it was surely judicious to make the best of it.

In machinery, there are a few things which have not been mentioned yet. The Hendrie & Bolthoff Manufacturing Company exhibits a hoisting-engine by the Lidgerwood Manufacturing Company, and a high-speed Westinghouse engine, both in motion. Among pulverizers are two on the iron ball crushing principle, one made by S. P. M. Tasker, and the other called the Tenderfoot pulverizer, which when driven, as it requires to be, at a high speed, must wear very badly, though the work is well done. This also has another disadvantage, namely, that the ore must be crushed before it can be treated.

In conclusion, it may be said that the attendance this year has not been good at all—probably not more than half that of last year; but all who have come, especially those from a distance, have expressed their delight and astonishment. Indeed, Denver, strange to say, has been the worst enemy of the Exhibition, partly by not sufficiently patronizing it, and partly by giving it a bad name. The mineral exhibit is quite up to that of a year ago, so far as it goes, though several counties will be missed by those who read last year's report. But the space occupied by the Denver merchants last year is unfortunately very bare. This is said to be due to jealousy of the promoters of the Exhibition. Though a private concern, it is undoubtedly for the public good, and what benefits the surrounding country must surely be advantageous to Denver merchants. Indeed, there never was a clearer case of "cutting off the nose to spite the face," and it deserves the unqualified censure of the press.

Sept. 22. A. COPELAND.

PROGRESS IN THE SAN JUAN COUNTRY.

Special Correspondence of the Engineering and Mining Journal.

Since my last letter, many important developments have been made in San Juan County, and ore-shipments have increased amazingly. At present, the weekly output averages over 500 tons, and such preparations are making that there is little doubt of an equivalent production during the winter months. Competition between Denver, Pueblo, and Durango has at times been very brisk, each smelting point endeavoring to pick up the most desirable and least refractory ores. To some extent, Salt Lake City has entered the market as an ore-buyer in the northern section of the country, but as yet with but limited success, on account of the cost of transportation to the railroad at Montrose. The rivalry existing between Silverton and Ouray has given a decided impetus to mining business, which will not culminate until each town has exhausted its resources in the way of energy and enterprise. Otto Mears, with his nearly completed wagon-road and tramway from Ouray to Red Mountain, Poughkeepsie Gulch, and Mineral Point, is boldly tapping the very sources of supply at Silverton, in the very moment of her confident boasting of her own impregnable position. So it happens that our denizens have learned a noble lesson, and that they are now opening their eyes gradually to the fact of the existence of "greater things than were dreamed of in their philosophy." Nature has favored this locality, and so long as Ouray was content to idly view the scene and wait, Silverton was secure. The outlet of the Red Mountain District, Poughkeepsie Gulch, and the upper Animas country was via Silverton, and only trained engineers were aware of what art might do to overcome the obstacles in the way of shipment westward and northward. Ouray and her General Mears have outwitted us while we were apparently asleep. But this view

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of the situation is not wholly just. Within the past few years, Silverton has grown and prospered less by the importation of capital and the increased output of ores than by the introduction of more competent and skillful managers of mines, who have been trained for their work. These men have taken in hand the problems before them in mining and metallurgy, and the results are due more to their knowledge of the situation than has yet dawned upon the minds of the general public. Their task has been a trying one, because performed in the face of all the combined power of envy and prejudice, but the result is here at last. Some of our best mines are still worked by men who know not the first principles of their business; but natural selection is gradually displacing these, and sending them back to the farms and groceries where they belong. This feature of progress alone is beginning to tell upon our industry in the most favorable way; and if the lesson be well heeded, we here have nothing whatever to fear from Mr. Mears or any of his laudable enterprises. In fact, his very projects, carried to a successful issue, will become the greatest boons this district could desire.

Free access to the Red Mountain District from Ouray means better facilities than we now have for reaching there from Silverton. We have the advantage in distance, the choice of two short routes with very easy grades, over which railroads can be cheaply constructed. And what is of very great importance, our means of access are practically unobstructed in the most severe winters. By the construction of an outlet via Ouray (or Montrose, rather), we shall be placed in direct communication with Salt Lake City, and our connection with Pueblo and Denver will become more intimate on account of the saving in the distance to those points. If these advantages do not immediately compensate us for the possible harm done by deflecting some of the business from Silverton, there will accrue much greater good by the stimulus thus given to our energies by reason of such losses of business. This will induce us to protect ourselves by improving our facilities, building roads and railroads, cheapening local transportation in various ways to compete with the necessarily heavy charges over this expensive route now in course of construction. Again, it will cause a great reaction in favor of Durango, and of necessity link our interests more closely with that locality and with Rico, giving us the very thing we most need, namely, vigorous competition on all sides. This very move will be the making of Durango, and now will come the event which, as engineers and metallurgists, we have been long predicting—railroad connection between Durango and Fort Wingate, thus placing the former town in an enviable position, equidistant between the best markets of the East and the Pacific slope. These prospects are but the beginning, and it is as certain as any known fact that this region is soon to be the scene of a great commercial struggle. Wise indeed will he be who rides ahead and calmly surveys the field before engaging his forces. Little things will decide most momentous questions in political economy, and only he who has mastered every detail of metallurgical practice will be a safe guide to investment in any enterprise of magnitude in any way connected with the economical raising and after-treatment of ore. The little experiments in mining and milling now under way in this section are but as drops in the bucket compared with what we shall see in the next decade, and the citizens of our little towns will give place to quite another population, whose whole business is that of mining and the reduction of ores.

Until now, the less one knew of the principles and practice of our profession, the better was he qualified to succeed in the accumulation of money from the handling of mines in this region. From this on, the more thoroughly one has mastered the details of the mining engineer's calling, the more will he be appreciated here and the more successful will he be in acquiring fortune in the legitimate work of his profession. Within the past few years, hundreds of worthy young men have applied to me for advice as to a field for the exercise of their talent and training while gaining a familiarity with the practical part of their calling. Such men would have been invaluable in the development of our resources, if not given too much responsibility until they had proved of what stuff they were made; but I felt compelled to take counsel from the experience of the very few really competent engineers in this section, and to advise all applicants to choose more mature fields for their early career. Now I do not hesitate to urge young aspirants who have been well trained to come this way, if they can afford a few months of unremunerative employment; for the time has come when the application of economic principles is necessitated by the competition which has reached us. And more than ever before does this region stand in need of competent surveyors, skilled chemists, and capable engineers, who will show the people the real necessity of accurate work in these departments. We are practically over the period of the rule of the mining shark, and even the most unreliable local newspapers, which have not gone beyond the stage of windy puffs and wordy head-lines, vainly used to conceal the editor's ignorance, are now obliged to condemn their own methods in their editorial columns. Here, it is a source of pleasure to be able to point to one honest effort to build up a journal without resort to this reprehensible practice of exaggerating every new discovery and reporting each prospect-hole in terms beyond the power of the best mine on earth to fulfill. I refer to the employment of a competent mining editor upon the staff of the *La Plata Miner*, published weekly at Silverton. The principle is a good one, and if Mr. Ingersoll does not perform the duty as it should be, it will be very easy to put the blame just where it belongs, and the credit of his good work will be given to the one who deserves it. In two or three years, such a paper will have a recognized place throughout the country as a truthful exponent of the resources of this district, while other sheets which adopt a different plan will be valued only by those who thrive by sales based on wild statements of ignorant and irresponsible parties; and the day for such transactions is past, never to return, let us hope. There is full enough of glory to be got out of a bald statement of actual facts, so far as San Juan County is concerned, without need of resorting to fabulous reports which these same facts do not warrant. Nay more, it is true that some of these very statements, made through ignorance of vein structure and metallurgical principles, have, to my certain knowledge, actually prevented the sale of really good properties to those whose investment here would have been of untold value to our district.

As some compensation for this long letter, I promise to send you soon a series of the bald statements above referred to, which will be well worthy of the careful perusal of intending investors. San Juan County now has no need of Denver Exhibitions or newspaper head-lines to proclaim her prowess; for is it not written in indelible characters in the statistics of production, which already place her high in the list of the mineral counties of Colorado?

THEODORE B. COMSTOCK.

SILVERTON, COLO., Sept. 17.

"COLONEL PAINE AND HIS GRIP."

The following neat poem appeared in the New York *Times* of September 24th. It is worth reading, although we are sure it does injustice to an eminent engineer:

Colonel Paine was an engineer,
Only one such, far or near.

Knitting his brows with look intense,
He swore, by the god of experiments,

The public might foot it to and fro,
The bridge might lie in a sheet of snow,

The press might howl and the people swear
From now to the crisp December air;

But as for him, he would ne'er let slip
A chance to experiment on his grip.

For the Colonel had planned a wonderful thing,
With a wasp-like body and wheel-like wing,

With a crank, and angle, and elbow, and joint,
And a pulley, and wheel at every point,

With a sidelong motion and downward swoop
And an awful and terrible backward scoop,

And all the fevered and wild ideas
That came in seventeen weary years,

Until at last his grip is able
To do all things—save clutch the cable.

But the Colonel is not downcast with fears;
He will labor for seventeen other years.

So, day by day, as the months go by,
And the people's hard-earned dollars fly,

Two things, of the fleeting world, remain,
The grip, and the gripper, Colonel Paine.

At each new hitch in its parts internal,
The blame he lays on some hot journal;

'Tis the wires, the engine, the rails, the brakes,
All being tried to avoid mistakes.

And æons hence, when the trumpet sounds,
And the dead men answer the silent rounds,

The angel will pause, as once again
Is called the name of Colonel Paine,

To hear response from a hopeful lip:
"Here! Experimenting with my grip."

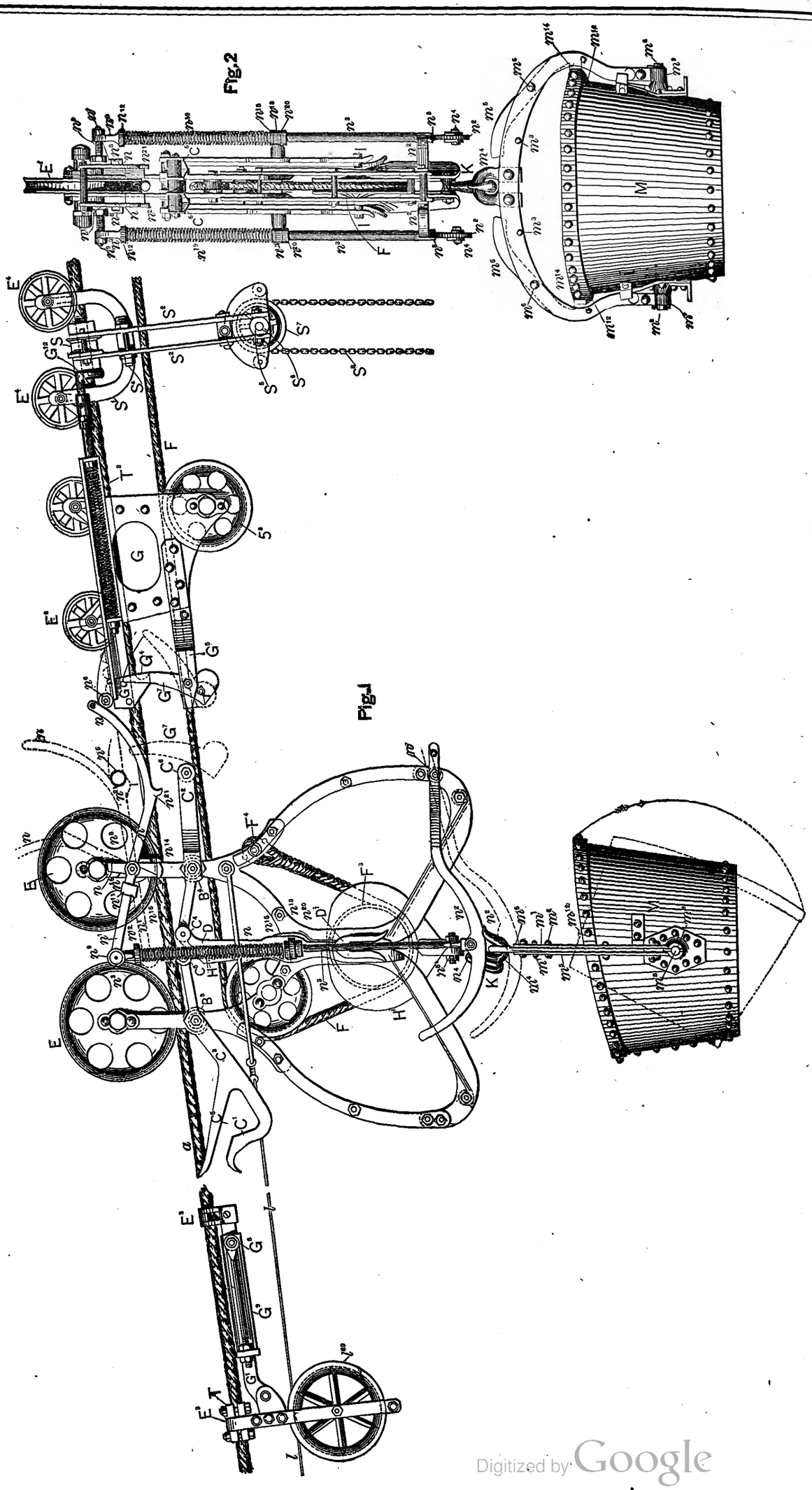
PONS ASINORUM.

INTERESTING PROPERTIES OF METALLIC SALTS.

At a meeting of the Physical Society of London, Prof. J. H. Gladstone performed an experiment, showing the crystallization of a metal upon itself from a fused salt. In the course of some investigations into metallic replacements, he observed that some sheet silver placed in fused chloride of silver became quickly studded with crystals of the metal. The displacement of a metal by itself seemed so anomalous that he at first supposed the silver employed to contain impurities; but such was not the case: and he further found that iodide of silver could be substituted for the chloride with a like result. Moreover, when copper was immersed in fused cupreous chloride, zinc in melted zinc chloride, or iron in fused ferreous chloride, crystals of each of the several metals separated out. That this remarkable phenomenon was not due to different physical condition of the rolled metals was proved by putting crystals of the pure metal, separated by electrolysis, instead of the rolled metal, when fresh crystals were formed as before.

Subsequent experiments went to prove that the effect is really due to an electric current set up in the cell by the unequal heating of different parts of the metal plunged in the salt. This contact current was proved to exist by means of a galvanometer, and the two following experiments intensified the electrolysis. Some silver chloride was fused in a hard glass tube, and a rod of silver placed in it. On heating the under side of the lower end for ten minutes, a considerable crop of silver crystals was found in the cooler part of the liquid. Again: some silver chloride was fused in a crucible, and one side more strongly heated than the other. Two rods of silver were connected, one in the hotter, and the other in the colder, part of the salt. At the end of fifteen minutes, the latter was found studded with crystals, while the former was clean. Copper wires immersed in cupreous chloride gave a similar result.

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THE BROWN HOISTING AND CONVEYING MACHINE.

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THE BROWN HOISTING AND CONVEYING MACHINE.

During the visit of the American Society of Mechanical Engineers to Cleveland, they had occasion to inspect the working of an improved method of handling material at the ore-docks in that city. The apparatus there used was employed in hoisting iron ore from ships, and conveying it to the dumping ground on the docks. It worked with such precision and such speed that, although the party was fatigued after a day's hard work, it excited a good deal of interest and was commented on most favorably. We are pleased to be able now to give the necessary illustrations which place us in a position to describe in detail the working of the Brown hoisting and conveying machine, the invention of Mr. Alexander E. Brown, of Cleveland. A model on quite a large scale was also shown at the Chicago Exhibition of Railroad Appliances.

In his own language, Mr. Brown has set out to design machinery that will fill the following requirements: The machine must be adapted to be applied to and perform successfully all the operations required of it while supported upon any one of the cheap forms of tramway, such, for instance, as a suspended wire cable or rail track. It must perform its functions by means of motive power derived from a source located at a greater or less distance from the machine, and beyond its limits of travel, and at the same time effect the transference of the load to its place of final deposit with the least possible changes in the direction of motion of the motor. It must be capable of hoisting, carrying the load to some distant locality, and either discharging or first lowering and then dumping the material, being all the time under the perfect control of the operator. It must be strong and simple, avoid the use of spring-bumpers to take up the momentum of a suddenly shifted load, and its action must be positive and automatic. The trials witnessed at Cleveland confirm the impression which a perusal of the description of the working of the machine will convey to an engineer.

In Figs. 1 and 2 we show all the essential parts of the machine, and further details are accessible to those interested in minutiæ of

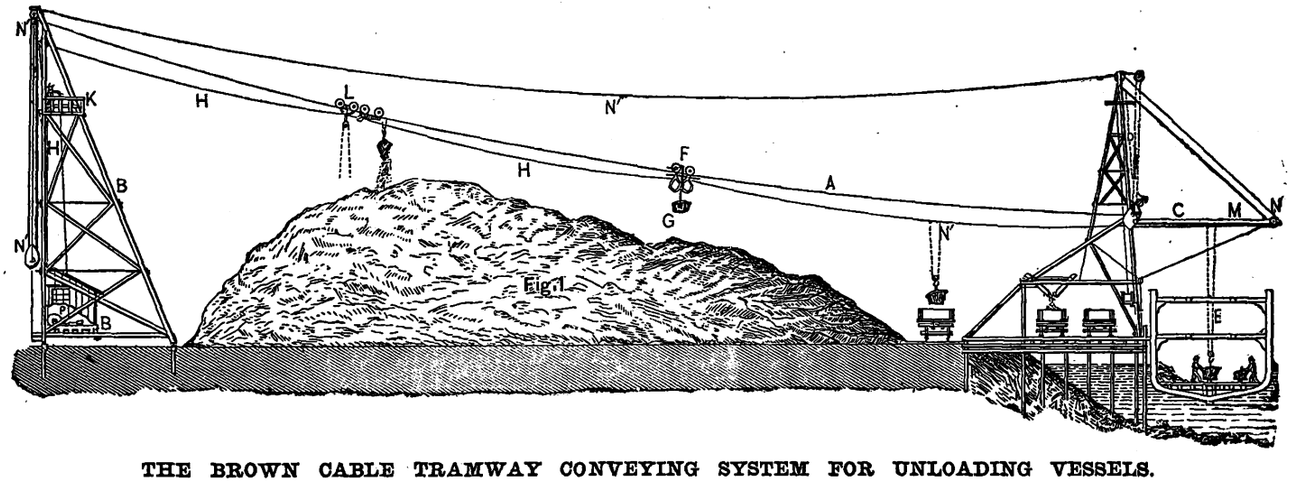


Fig. 1.

THE BROWN CABLE TRAMWAY CONVEYING SYSTEM FOR UNLOADING VESSELS.

design and construction in the very full and elaborate patents granted to Mr. A. E. Brown, No. 232,236, September 14th, 1880; No. 281,446, July 17th, 1883; and No. 281,011, July 10th, 1883. In Fig. 1, F is the hoisting-rope, one end of which is attached to a projecting portion of the carriage-frame F^4. The carriage-frame C B is provided with traveling sheaves E E running on the cableway a. The hoisting rope is wound around the sheave F^2 of the hoisting-block and over a sheave F^1 journaled in the carriage-frame, and thence over the sheave F to the hoisting-engine. Turning first to the mechanism for automatically hoisting and lowering the load at both ends of the route, it will be noted that there is attached to each part of the carriage-frame, bearing the two sheaves E E, two levers, the one to the left C^1 C^5 C^3 turning on the pin B^3, and the other C^2 C^4 on the pin B^4. Between them they grasp the upper end of a lever H (hidden in the drawing), which terminates at its lower end in a hook, which, in the position of C^1 C^3 and C^2 C^4 in the drawing, catches under the pin I (Fig. 2), passing through the hoisting-sheave, and holding it. The upper end of the lever hook H, which turns on a pin near its center, has the form ⌐. A depression of the points C^5 C^4 causes C^5 to strike the incline, and moves the upper part of the lever to the right, and disengages its lower hook end. The points C^5 and C^4 are connected also by a part D, which is provided with a downwardly-extended portion D^1, shown in the engraving, bifurcated at its lower end to straddle the pin I, and which thus serves to laterally retain that pin in the proper position. This part D^1 is also slotted near its middle, in order to allow it to pass freely by the pin around which the hook lever turns.

In raising the load, the pin I passing through the hoisting-sheave is guided by the bifurcations of D^1 against it until it strikes the upper end of the bifurcation, and by moving upward the part to which the bifurcation is attached, raises the points C^5 and C^4, and thus forces back the hook-lever H to the point where it will catch behind the pin I and thus hold the load.

The whole lever system is actuated at either end of the route by the stops G and G^1, the former being the up-grade and the latter the down-grade stop-frame. At the end of the stop-frame G, which runs on sheaves E^3, is pivoted a lever G^7, the normal position of which, by its gravity, is nearly vertical, and the extent of the oscillation of which is limited by the stop G^8. The longer area of this lever forms an inclined plane, up which the roller C^6 of the part C^3 has to ride as the carriage-frame approaches its uppermost destination, and which serves to effect the proper manipulation of the part C^2 to operate the hoist-block releasing devices. G^4 is a hook-like projection which catches the carriage should it tend to start down grade before the hook has taken hold of the bucket. In order to be able to secure the stop-frame G at any point of the cable a, a clamp mechanism is provided, connected with it by means of a buffer arrangement T^8 to take up any jar in stopping the carriage-frame. The clamping apparatus is worked by a chain S^9 and wheel.

The stop-frame G^1 is somewhat differently constructed. The inclined portion C^5 of the carriage lever system rides on the roller G^8, and is forced upward, the end C^1 meanwhile being carried up in the rear of the roller. It is designed to prevent any backing up of the carriage up grade when the weight of the hoist-block and load comes on to the hoist-rope.

Such are the devices for releasing and taking hold of the empty or loaded bucket at the stations marked by clamping on of the stops at any part of the tramway cable. The arrangements for automatic dumping are as follows:

The projecting lever n, suitably bent or curved at one end, as shown, is pivoted to the frame of the machine by a pin or bolt n^8, and is connected at its other end by means of projecting portion n^{16} of the lever n and the adjustable collar n^{11} to the lever-arm n^1, which latter is also pivoted at n^8. The lever n^1, at its other end, is in pivotal connection, by means of pin n^9, with rod n^3, which rod passes through the stationary slotted guide-nut n^{13}. The lower end of rod n^3 is connected to a lever n^2, by means of pin n^4 and adjustable screw-bolt n^5. This lever n^2 is pivoted to the machine-frame at the point n^7; n^{12} is a collar fastened to the connecting-rod n^3.

n^{19} is a suitable spring on guide-rod n^3, arranged to butt against the collar n^{12} and washer n^{15}, so as to counteract the tendency of the parts n^3 n^2, etc., to drop by their own weight from the positions shown in the full lines to that shown in the dotted lines, and which spring also serves to return the parts n^3 n^2, etc., to their normal positions after the load is dumped and the carriage is on its return down grade. n^{14} is a projecting lug from the carriage-frame, to prevent the lever n and its connecting parts from dropping lower than shown in drawings. n^{20} is a collar on the connecting-rod n^3, that serves to check undue rising of the rod n^3 and levers n^1 and n^2. n^6 is a roller or rollers suitably constructed and applied on the upgrade-stop G.

It will be seen from Fig. 1 that all those parts described are in duplicate or in pairs—one part on each side of the machine—for the evident purpose of balancing the machine or making the same symmetrical with respect to the cable tramway on which it travels. M is a tub or bucket suspended from the machine by the hook K of hoist-block F, which enters the eye or loop m^4, riveted to the bail m^1, the latter being secured to the bucket by trunnions m^9 in eyes m^9, riveted to the bail.

m^5, Fig. 2, are catch-levers pivoted to the bail, on each side of its center or middle, by the bolts or rivets m^6, Fig. 2. The catch-levers m^5 are so shaped and pivoted that when free to act by gravity or a spring the upper portions of them project some distance above the edge of the bucket-bail, as shown in the engraving, while the head m^{14}, formed on the lower portion, will project inside of the bail and in front of the stop-lug m^{12}, thus locking the bucket in carrying position. The tendency of the lower portion of the catch-levers m^{14}, either by gravity or a spring, is to drop or close, so as to lock the bucket in the position shown in Figs. 1 and 2. The shape of the bucket M is such that when fully loaded it has a tendency to turn on its pivots m^6 and dump in the direction shown by the arrow in Fig. 1. This is prevented when the catch-levers m^5 are in their normal positions—that is, with their heads m^{14} in front of the lugs m^{12}, preferably riveted to the bucket. It will be seen from this that if the upper portion of m^5 be pushed down, the bucket, if loaded, will be free to dump, as in that position the head m^{14} of the catch-lever is out of contact with the lugs m^{12}. The bucket is so hung on the trunnions that when it is empty the weight of the bottom of the bucket is such as to cause it to right itself; and when the bucket is full, the tendency of the load is to tip it over and dump the load. The bail m^1 is constructed of two pieces of iron separated from each other a suitable distance, to allow the eye of the trunnions m^9 being riveted between them. This construction also allows the catch-levers m^5 to be pivoted between the two riveted bail-pieces, thus holding the catch-levers m^5 in position and protecting them nearly their entire lengths (excepting the projecting portion of the upper end of catch-lever). The catch-levers m^5 may be made either to act by gravity by making the lower portion or head m^{14} heavier than the portion above its pivot, and thus always secure a tendency of the same to drop into locked positions with respect to the buckets. An equivalent action may be produced, without making the head m^{14} heavier than the upper part, by means of a spring or springs,

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secured by rivets to the bail, and bearing against the under side of the catch-lever.

From the foregoing, it will be plainly seen that the action of the bucket and catch-levers will be such that, whenever the upper portions of the catch-levers m^5 are pushed down, the lower portions or heads of the catch-levers will be out of locking position with the bucket, and the same will be free to dump.

It will be further seen that if the levers n^2 of the dumping device, which, when not in action, always stand directly over the upper portion of the levers m^5, are pushed down, they will depress the upper portions and elevate or unlock the lower portions of the catch-levers, and dump the load contained in the bucket.

Having decided the relative arrangement of the hoisting and lowering and dumping devices, and the general construction of the various parts composing the same, we shall now proceed to describe their operation in detail.

Assuming the bucket to be loaded and suspended from the machine, as shown at Figs. 1 and 2, and pulled along by means of the hoist-rope to a position on the cable in respect to the upgrade-stop as shown, the projecting end of the lever n comes in contact with the rollers n^6 on upgrade-stop. Through the further pull of the hoist-rope, the lever n moves upon the roller n^6, and, turning on the pivot n^8, pushes down the connecting-rods n^3 by reason of their pivotal connection at n^9 with the same, which in turn forces down the levers n^2, bringing them in contact with the projecting portions of the catch-levers m^5 of the bucket, and pushing them down and the lower end up and out of locking position, when the bucket by its load freely dumps. The levers n are prevented from rolling upon n^6 farther than the required distance to open the catch-levers m^5 of bucket by means of the projecting lug n^{21}, which comes in solid contact with the roller n^6, as shown by dotted lines. This also serves as a stop or abutment for the machine, and prevents the lever C^2 of the machine from coming in contact with the swinging piece G^7, and thereby preventing the opening of the hooks that suspend the hoist-block and the lowering of the load. On the return motion of the carriage down grade, after the load is dumped, the springs n^{19} lift the levers n^1 and n^2 to their former positions, and as the lever n rolls down and off, the upgrade-stop roller n^6 and the levers n^2 are raised; the bucket catch-levers are again left free to lock the bucket as soon as it rights itself.

In practice, it is found that it is not necessary always to clamp the upgrade-stop tightly when it is desired to use the automatic dumping-device; and in fact, it is ofttimes better to leave this stop loose on the cable tramway, and only held in position by a tail-rope from running down grade. The weight or the tendency of the stop G to move down grade is sufficient to work the automatic dumping device, so that, as soon as the dumping-levers n come in contact with the upgrade-stop, the load will be dumped before it comes in solid contact against the lugs n^{21}, and when the latter do come in contact with the rollers n^6 of the upgrade-stop, the motion of the carriage is communicated to the stop itself until the carriage is returned in the reverse direction down grade. This allows considerable leeway in the operating of this dumping mechanism, as it relieves the same from any severe or sudden shocks that might be produced if the dumping-levers were brought into forcible contact with the upgrade-stop clamped to the cable. If it is desired to lower the load without dumping it—or, in other words, if it is desired to throw the dumping attachment out of operative condition—it is only necessary to slip the collar n^{11} along lever n^1 off from n^{16}, or the prolonged end of n. In this position of the collar detached from n^{16}, the lever n is free to turn on the pivot n^8, independently of n^1, to the highest dotted-line position shown in the drawings, up against the projecting hub of the carriage-wheel E^1. This will bring the other projecting end n^{10} of lever n (located about at right angles thereto) in line with n^1, when the collar n^{11} may be slid over the same, and so hold the lever n in this upright position. In this position of the lever n, it will readily be seen that the whole of the dumping attachment is out of operative position, as the lever n can not now come in contact with the upgrade-stop. It will further be seen that in this position of the dumping device, the lever c^2, that operates in opening the load-suspending hooks of the machine, is free to engage with or roll upon levers G^1 of the upgrade-stop, and thereby release the load without dumping.

The general arrangement of a plant for the use of a Brown hoisting and conveying machine is shown in the accompanying engraving. The steel wire rope A is secured by a tightening screw and ball and socket arrangement to the top of the back pier B and at the lower front pier by an apron C, which is so hinged to the front pier D that it may be lowered over the vessel E to carry the cable railway across the center of the vessel's hatch. By this method, the machine F can run out on the tramway over the hatch and lower the tubs G, holding one ton, in and out of the vessel. The hoist-rope H of the machine passes over a sheave on the back pier B to the drum of a hoisting-engine P, which is separated by means of levers on the platform K. N^1 N^1 is a counterweight and sheave-block with small wire rope so arranged and connected to the machine as to render it capable of returning light to the vessel at a speed of from 20 to 35 feet per second. This counterweight arrangement, which Mr. A. E. Brown has patented, overcomes the difficulty caused by the sag of the rope at the lower end. Both front and back piers are movable along the line of the docks on large wheels worked by gears.

The New York, Pennsylvania & Ohio Railroad Company has already stocked 60,000 tons of iron ore on its Cleveland docks, with the wire rope tramway apparatus shown, which it is claimed is three times as much as could have been stocked in any other way. One hundred thousand tons may be piled in one vessel length, the span of the tramway being from 360 to 375 feet. A second plant is finishing for the same parties, this, however, being of the trestle bridge type, a truss taking the place of the wire cable. These bridge trusses have 180 feet span each. The Brown Hoisting and Conveying Machine Company has also a cable system in use in France at Varangéville, of 350-foot span, used for unloading canal-boats and stocking coal in a yard. They are also building a shed tramway for Coxe Brothers & Co., at their transfer agency at Milwaukee, for storing and handling Cross Creek anthracite from vessels and in cars. The building will be 400 feet deep and 150 feet wide, and 50 feet high, and three tramways will have together a capacity for handling over 1000 tons of coal per day. For mining purposes, the machine is particularly adapted over open pits or for stripping or quarry work.

THE PRODUCTION AND MOVEMENT OF TIN ORES AND TIN.

Written for the Engineering and Mining Journal by William P. Blake, F.G.S., New Haven.

The apparatus for prospecting the deposits in use by the Chinese miners of Banca is described in the Report of Commissioner Hague on the Mining Industries as represented at Paris in 1878, from data furnished by Mr. De Groot. This information was drawn in part probably from an article by Van Diest in the *Berg- und Hüttenmännische Zeitung*, where probably more details respecting the construction of the apparatus can be found, as well as other interesting data on the tin deposits of the Dutch colonies.

STATISTICS OF TIN PRODUCTION.

The Mineral Statistics of the United Kingdom contain full details respecting the production in England, and also some valuable data respecting the supply of tin from the chief centers of production in other parts of the world. The following figures are drawn chiefly from that source, and show approximately the aggregate annual production and general movement of tin.

The East Indies have long been celebrated for the quantity and fine quality of the tin exported from there. Banca furnished the chief supply, in addition to the product of Cornwall, until the discovery of the mines of the island of Billiton in 1851, followed, in 1873, by the development of the tin deposits of Australia.

Banca tin is sent to Holland in slabs which average about 64 pounds in weight, 1000 weighing about 32 tons. This tin is sold by the Dutch Trading Company. In 1881, the sales amounted to 135,592 slabs, at prices ranging from 53 to 64 florins per kilo. In the same year, 78,000 piculs of Billiton tin were sold in Batavia at prices ranging from 60·33 to 75·42 per picul. The following figures give an idea of the production of tin at the tin regions and the exportation from them:

	Tons.
Banca sales in 1881	4,339
Billiton	4,735
Straits shipments to London	5,795
" " to the United States	5,680
Exports from Penang and Singapore	11,475
Exports from Sydney, Melbourne, and other ports	9,000

The production of tin ore in the United Kingdom in the year 1881 amounted to 12,898 tons 300 pounds, valued at £697,444 5s. 3d., yielding 8615 tons of metallic tin, worth £839,680. This was produced in Cornwall and Devonshire, from a total of 95 mines or workings on veins, in streams, rivers, and foreshores.

In the year 1881, there were 396 tin-plate works in the United Kingdom, of which 298 were working, and produced, by estimate, over six millions of boxes of tin, terne, and black plates. The average weight of a box of plates is 3 quarters 16 pounds, and the total weight, based on the estimate, is 280,988 tons of iron.

For the year 1881, the price of tin in the London market fluctuated between £90, the lowest, and £115 per ton, or a mean average price of £97 9s. 3d. per ton for the English block tin. The prices for the imported tin range somewhat lower. The Australian and Straits tin averaged £92 15s. 6d. per ton.

The average prices of tin ore and metallic or common block tin in Great Britain, for a series of years, are shown by the following:

Year.	Tin ore. £ s. d.	Metallic tin. £ s. d.
1876	43 18 0	79 10 2
1877	40 10 0	73 3 6
1878	35 5 6	65 12 3
1879	40 0 0	72 6 0
1880	49 0 0	91 5 0
1881	54 0 0	97 9 3

The yield of tin ("white tin") from the black tin as dressed and smelted in Cornwall, in 1877, was about 70 per cent. This, of course, depends upon the extent to which the impurities are removed by the washing or dressing process. In the Mining Records of 1853, Mr. Robert Hunt gave the average produce as about 65 per cent. In the mineral statistics of Great Britain, the metallic contents of imported black tin ore are taken at 64 and 65 per cent, and even as high as 70 per cent. The following shows the average for the years named:

1860	64	1870	67
1865	64	1875	66½

In making an approximate estimate of the total production of tin in the world, the best figures attainable are those collected at the last great Paris Exhibition in 1878, by Commissionet Hague, who was also a member of the international jury for Class 43, including ores and metals. The following table is compiled chiefly from his report, and shows approximately the world's production of tin annually at the period preceding the Exhibition, or for parts of 1876 and of 1877, and aggregates, it will be seen, over 28,000 tons.

WORLD'S PRODUCTION OF TIN 1876-1877 (APPROXIMATE).

Country.	Tons of tin.
England	9,500
New South Wales	6,505
Queensland	2,800
Victoria	60
Banca } Billiton }	6,600
France	1,000
Austria and Hungary	207
Saxony and Bohemia	200
Russia	10
Peru and Bolivia	1,500
Tons	28,382

Messrs. Crookes and Röhrig, in their Treatise on Metallurgy, com-

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sidered the world's product of tin, about the year 1868, to be approximately 16,430 tons, distributed as follows:

	Tons.
Great Britain	7,200
Southern Asia and East India	7,500
Bolivia and Peru	1,500
Saxony	130
Bohemia	60
Spain	40
	16,430

But these figures are far below those reported, but from sources not stated, in the Government Report on Mineral Resources, prepared under the direction of Albert Williams, Jr., for the United States Geological Survey, which figures are as follows:

Year.	Tons.	Year.	Tons.
1878	35,597	1880	36,294
1879	37,539	1881	38,123

We know very little of the production of tin in the interior of China and in Central Asia. It is well known, however, that there is an important tin-bearing district up the Yellow River in a granitic region. The principal localities are those of Laos and Yan, described or noticed in a report to the French Government by Fuchs and Saladin, and translated by Charles Smith, Inst. Civil Engineers, London. See also *Annales des Mines*, 1882, ii., 185–298. At Yan, it is said that tin and salt are bartered evenly, weight for weight. In consequence of the "Black Flags," the quantity of tin now annually brought to Ha Noi is only 1000 tons, instead of from 3000 to 4000 tons, as before the year 1874.

A large quantity of tin in slabs or pigs is imported annually by Japan, but no statistics are accessible.

IMPORTS OF TIN—UNITED STATES.

The United States import annually from five to six millions of dollars' worth of tin in bars or pigs, and from sixteen to eighteen millions of dollars' worth of tin plate and manufactures of tin, as shown by the statistical tables of the United States Bureau of Statistics, Treasury Department, Washington, from which the following figures are drawn:

IMPORTS OF BAR TIN.

Year.	Pounds.	Value.
1882	18,661,600	$4,953,538
1883	23,781,400	6,106,250

MANUFACTURES OF TIN.

Year.	Pounds.	Value.
1882	393,686,900	$16,599,264
1883	432,177,400	17,699,239

The years indicated are the fiscal years ended June 30th.

COAL-CUTTERS IN THE PAN-HANDLE FIELD.—Mr. Robbins, the well-known operator of the Pan-Handle field, is busy preparing for the most extensive application of machinery to coal-digging that has yet taken place in this vicinity. His tract, recently purchased near McDonald station, embraces 400 acres of untouched coal. He is placing air-compressors in position for furnishing the motive power to Lechner and Harrison coal-digging machines, which will be used exclusively. Mr. Robbins and W. P. Rend are the owners of the right to use these diggers in the regio n named, and the latter's success with them induced Mr. Robbins to engage in their use on a bigger scale. The Lechner machine "bears in" by operating cutting knives, while the Harrison machine operates a reciprocating drill. Both machines are to be run day and night when preliminary operations are finished. One of the oldest Pan-Handle operators in the tract estimates the advantage Mr. Robbins will have through the use of mechanical diggers, over other operators, as at least 50 cents a ton in open market. He also stated that the causes operating against the general use of the machines were threefold, the objections of the miners, the first cost of the air-compressing and other machinery, and the unfitness of pits opened in the usual way for occupancy by the machines. This last objection will be done away with in the present instance.

FORT COLLINS, COLO., AS A RAILROAD CENTER.—A correspondent of the Denver *Tribune* writes as follows from Fort Collins: There have been railroad rumors of every description floating around of late, and many of them have the appearance of reliability. This has long been the coveted spot of several railroad corporations, from the fact that the Union Pacific does more business here than at any other point in Colorado, possibly barring Denver. This company can utilize all its East-bound freight cars, which are sent back to the East empty on some of the roads, by hauling grain, vegetables, and produce, but more especially stone. This article is taken out in great quantities at the quarries just west of the city, and finds an excellent market, principally in Omaha, Lincoln, Kansas City, and St. Louis. The stone is used for both paving and building, for both being superior to any stone in the Western country. The paving and curbstone is the finest that can be obtained in any locality. Thus the Union Pacific can take back to the East trains loaded with stone and with produce, while the other roads have to take their freight trains back mostly empty. For this reason, several of the different roads have cast a longing look in this direction, and have had surveyors in the field locating and running lines to Fort Collins, and over into the great mineral fields of North and Middle Park.

It is understood that the Burlington & Missouri has been trying to purchase several stone quarries east of this city, of parties, and that the sale will be consummated in the near future. This looks very probable, for numerous reasons. First, the company wants necessarily a large amount of stone for bridges and railroad work; secondly, it would then be able to run as heavily-loaded freight trains East as West; thirdly, there is an immense amount of grain, hay, flour, and produce of all descriptions shipped from this section to outside points. The company has had surveyors in the field who have located lines with good grades, up through the Poudre Cañon, and another by the way of Long Pine Creek over into the great mineral fields of North and Middle parks, and finally out on the Pacific slope.

FURNACE, MILL, AND FACTORY.

The Chicago Rawhi de Manufacturing Company received an order on the 17th inst. for 4400 feet of its rawhide belting, to go to Sydney, New South Wales.

The Lechner Machine Company, Columbus, O., has recently shipped ten of its coal cutting machines to Alabama, for use in the Pratt mines, near Birmingham. The company has removed to its new quarters, where, with better facilities and plenty of room, it is better prepared to attend to its growing trade for the Lechner mining-machines and also the company's patent detachable chain-roller belting, which is gaining a good reputation and is extensively used at mines, mills, and reduction-works. The following are some of the many companies now using them: The Columbus & Hocking Coal and Iron Company, at six of its Hocking Valley mines; the Upson Coal Company, Shawnee, O.; the Ohio Central Coal Company, Corning, O.; the Nelsonville Coal and Coke Company, Nelsonville, O.; W. P. Rend & Co., McDonald's, Pa.; the Witch Hazel Coal Company, Youngstown, O.; the Illinois Central Coal Company, St. John's, Ill.; the Boston & Colorado Smelting Company, Argo, Colo.; and the Millen Mining Company, Coppersville, N. H.

The new machine-shops of Messrs. H. N. Nichols & Co., Denver, Colo., are quite completed. The machinery will be in place and every thing be ready to move in a couple of weeks.

It is probable that the Roane Iron Company will equip a mill for the manufacturing of nails. A good many near-by enterprises are talked of, and some are under way. Kenton, Tenn., is to have a steam flour-mill. Sparta, Tenn., a planing-mill. Mayville is to have a woolen-goods mill. The Tennessee Coal, Iron, and Railroad Company, at South Pittsburg, will build 200 additional coke-ovens. The Dade Coal Mining Company, at Elberton, Ga., is enlarging its facilities for mining. The Central Iron-Works, of Helena, Ala., are changing rolling-mill machinery, and replacing it with machinery to manufacture rails.

Monocacy Furnace, in Berks County, Pa., has been repaired and was to go into blast this week.

Vulcan Furnace, at Newberry, Mich., has gone out of blast, and will be overhauled and repaired.

Eliza Furnace, in Jackson County, O., has been rebuilt, and will go into blast in about two weeks.

Milton Furnace, in Jackson County, O., is undergoing repairs and improvements, and will go into blast as soon as it can be made ready.

The Colorado Iron-Works, Denver, Colo., recently shipped a ten-stamp mill to McKitrick & Co., Gold Park, Holy Cross District; also roasting-cylinder with rolls, concentrator plant, etc., to the Kate Mining Company, Saguache County.

The Colorado Machinery Company, of Denver, Colo., reports the sale of a 40-ton water-jacket smelter complete, to go to Ogden; also a 1¼-mile Houson wire rope tramway for a mine near Silverton, and a Houson tramway for the Belden mine, Red Cliff.

The French Spiral Spring Company, which is building a large mill between Twenty-fifth and Twenty-sixth streets, below Penn avenue, Pittsburg, is drilling a well for gas. This will be one of the largest spiral spring works in this country, and will be provided with the most improved machinery.

Messrs. Hendey & Meyer, Denver, Colo., have just received an order for a mammoth engine to be shipped to Kansas City. They have also made one of their automatic cut-off engines, 110 horse-power, for the American smelters, at Leadville, also another for Durango in Mexico.

The Linn Iron-Works, at Birmingham, Ala., have just completed an enormous plate shears. It weighs 40 tons, and has two knives 75 inches long, which will cut a sheet of iron 75 inches wide and 1½ inches thick, making 20 cuts a minute. Auxiliary shears are attached for cutting the smaller scraps. One of the housings, a solid upright piece of iron made in one cast, weighs 17,000 pounds. Every particle of the machine was designed and made by the Linn Iron Company. It is the largest machine of the kind made in the South.

The Clymer Iron Company has been reorganized. Hon. Hiester Clymer is elected president, and Abraham Sweitzer treasurer. The board of directors is now composed of Hon. Hiester Clymer, George E. Clymer, William H. Clymer, George F. Baer, and Abraham Sweitzer.

The Thomas Iron Company has elected the following directors: Benjamin G. Clarke, Samuel Thomas, William W. Marsh, John T. Knight, Charles Stewart, Daniel Runkle, and Samuel Drake.

The Laclede rolling-mill, at St. Louis, which suspended operations several months ago, will be started up again during the present week.

In reply to a letter of inquiry, the *Bulletin* has obtained from Messrs. Anderson, Du Puy & Co. a complete description of their new crucible steel-works at Chartiers, a few miles from Pittsburg. The works are known as the Pittsburg Steel-Works. They were built in the winter of 1882–83, and the first steel was melted on April 11th, 1883. The works contain twelve heating-furnaces; ten trains of rolls (one 20-inch roughing, one 3-high 16-inch and one 3 high 20-inch bar, one 2-high 16-inch and one 3-high 16-inch sheet, and one 3-high 20-inch, two 10-inch, and two 12-inch plate); three hammers; and two 33-pot Siemens gas-furnaces and eight 16-pot steel-melting holes, allowing 194 pots to be used at each heat in the steel-works. The works have an actual capacity of 12,000 net tons of best tool, machinery, sheet, hammer, and agricultural steel, forgings, etc.

The Danville Nail and Manufacturing Company has completed and put in operation its new rolling-mill and nail-works at Danville, Pennsylvania. The building of the works was begun on February 1st, 1883, and on July 2d the puddle-mill started and on August 31st the first nails were made. The works consist of four double puddling-furnaces, one heating-furnace (capacity 300 tons), one 18-inch puddle and one 18-inch plate train of rolls, and 15 nail machines in place on August 31st. The nail-mill has an annual capacity of 60,000 kegs of cut nails and spikes.

The New Haven Rolling-Mill, at Fair Haven, Conn., was burned September 25th. Loss, $40,000.

The Cambria Iron-Works, at Johnstown, Pa., are engaged upon a contract for the United States government to manufacture steel bombshells of a tensile strength of 90,000 pounds.

The rod-mill of John A. Roebling's extensive wire-works, at Trenton, N. J., closed September 25th, and about ninety men are thrown out of work. The cause is the dullness of the wire trade. There is little doing in the wire department of the Trenton Iron-Works either, and many hands are idle.

The Norfolk & Western Railroad Company has had recorded contracts for building nine powerful engines, seven first-class passenger coaches, 100 box cars, and 700 coal cars, involving an outlay of several hundred thousand dollars. The Baldwin Works, at Philadelphia, are to build the engines, and W. C. Allison, of Hagerstown, and Bowers, Dure & Co., of Wilmington, the coaches and cars.

Reports from Conshohocken, Pa., state that the iron workers complain of receiving but few orders, and also the low price offered for iron. Still all the mills are running, making iron so as to be ready for any future demand.

Alan Wood & Co. are running all their mills on full-time, and employing 550 hands in the manufacture of plate, flue, and sheet-iron. About 300 tons per week of sheet and flue-iron are produced and 50 tons of muck bar.

J. Wood & Brother, manufacturers of sheet and plate-iron, also complain of a falling off in orders during the past three weeks, but still they have all their mills in operation and give employment to about 250 hands.

The establishment of John Wood, Jr., for the making of boilers, rolling-mill machinery is running with its full complement of men. The same may be said of Bates & Son, who manufacture patent boilers.

The Conshohocken Pipe-Works Company has nearly completed its new mill for gas and other pipes by a newly patented process. Experiments in the manu-

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facture have been made here for some time. The pipes are made of uniform size, and then drawn out to the various sizes needed.

After an idleness for some time, owing to repairs, the Terre Haute Iron and Nail Company has signed the $6 scale for boiling (Fifth-District scale), and the mill has again resumed operations.

The Lake Superior Iron-Works being the lowest bidder, have received the contract for building 184 iron jiggers, which are to replace the wooden washers in the Calumet & Hecla stamp-mills. The Eureka Iron-Works being the lrwest bidder, has received the contract for furnishing a number of Evans's slime-tables, ten heads of small cam stamps to crush coarse sand, and some other iron work required in the contemplated enlargement and improvement of the company's dressing-works.

GENERAL MINING NEWS.

ARIZONA.

GRAHAM COUNTY.

In the Greenlee Gold Mountain District, about 150 claims have been taken up and the work of developing some of the richest claims has already begun. Several shafts are sinking.

PARKER GROUP.—The mines situated about three miles from the new silver strike, in Placer Gulch, between the San Francisco River and Chase Creek, one mile east of the Metcalf Mountain, comprising 37 claims, are very rich properties. These are principally copper prospects, carrying also a good per cent of gold and silver. The ledges are large and well-defined, and in width from 10 to 14 feet. About $1500 have been expended in developing these claims during the past two months.

SHOT.—On this copper claim, a tunnel has been driven 60 feet, having cut a good galena silver ledge. On the surface of this claim, there are six feet of loose dirt, carrying considerable shot copper, which can be panned out.

PIMA COUNTY.

GUNSIGHT.—A circular issued to the stockholders states that the mining properties sold at sheriff's sale recently at Tucson have been purchased by Hudson & Co., creditors of the company, and that the property may be redeemed on payment of Hudson & Co.'s debt. The result of the special meeting held at Camden, N. J., recently, for the purpose of considering the redemption of said property, has not yet been made known.

CALIFORNIA.

PLUMAS COUNTY—GREENVILLE DISTRICT.

EMERALD.—This mine improves steadily as it is opened up. The ledge is now developing from points distant from each other between six and seven hundred feet, and the ore prospects equally well at each point.

GREEN MOUNTAIN.—The old mill has been shut down. This change reduces the number of stamps in use to sixty, the entire capacity of the mill. This part of the milling capacity is fully supplied with ore. Work in the big tunnel goes on. The drift has now been run on the ledge a long distance, and though the rock shows gold, yet it is hardly rich enough to mill. The Blake chimney is yet about seven hundred feet distant, and the drift is progressing at the rate of eight and a half feet per day. The body of ore in the chimney is large, and there is some talk of adding forty stamps to the new mill when it shall be reached, and leave the old mill, with its thirty-two stamps, entirely unused. When the Blake chimney shall be opened, all of the ore from the upper levels can be sent down that way, and worked to better advantage in the new mill than in the old. The greatly increased fall would give a more economical use of the water, and there would also be a gain in labor from having all the work done in one building.

SIERRA COUNTY.

COLUMBO.—This ledge, located west of the old Independence claim, was recently purchased by an Eastern company for $27,500. Operations are pushed vigorously and various buildings are erecting. The twenty-stamp mill now building 800 feet below the tunnel will probably be in running order by November.

MARGUERITE.—Reference to our last issue will show that the Downieville *Times* had given very unfavorable statements regarding this property. In the latest number of this paper, it is stated that the property had a bright outlook, and that it was self-sustaining.

SIERRA BUTTES.—No. 9 tunnel, which was started last year, is on a level with Sierra City, and will eventually be run 9000 feet. At 6000 feet, it is expected the pay ledge will be struck, which is now worked 1000 feet below the upper tunnel. Three thousand feet of iron pipe are laying in tunnel No. 6, for the purpose of conveying water to furnish power for running hoisting-works between Nos. 7 and 8 tunnels. The ore will be hoisted from No. 8 to No. 7 tunnel, where the mill is located, until such time as connection is made with No. 9 tunnel and the mill is built at that point. The foundation for the sixty-stamp mill at this tunnel is already laid. The mill will not be completed before next season.

CANADA.

PROVINCE OF NEW BRUNSWICK.

BELLIVEAU.—Boring is progressing at these mines, with good prospects of success. At 266 feet depth, a deposit of a light colored shale was met. It burns as brightly as albertite and leaves a soft black residue, looking like black lead.

ONTARIO.

An unusually large amount of capital is investing in the development of minerals in the county of Ottawa. This season, the output of phosphate will exceed by a very large percentage last year's operations. Active preparations are making for the immediate working of extensive iron deposits.

EMERALD.—A half-interest in this phosphate mine, owned by the estate of the late E. W. Murray, has been sold for $40,000.

UNION.—This company, composed of American capitalists, intends to ship 4000 tons of phosphate from its mines in Ottawa County this season. The price of phosphate ranges from $15.60 to $16 per ton.

QUEBEC.

From Montreal, it is reported that a large amount of phosphate has been shipped from that port since the opening of navigation, probably larger than for any corresponding period of former years; and from present appearances, the export of phosphate this year will exceed any thing before experienced in the trade. Although the market can not be called active, a fair volume of business is reported on the basis of from $15.50 to $16.50 per ton, the sale of a lot of 200 tons being mentioned at $16.50 ex cars for about 75 per cent ore.

COLORADO.

CHAFFEE COUNTY.

An important gold strike made in the vicinity of Granite has created a good deal of local excitement, though the exact whereabouts of the find has not been divulged.

CLEAR CREEK COUNTY.

BONANZA.—The tunnel which is running to intersect the Fred Rogers mine has attained a length of 600 feet, and the work goes ahead uninteruptedly. It is 300 feet beyond the crossing with the Jordan lode. There yet remain over 300 feet to go before the Fred Rogers is reached. It is expected in that distance to open up two or three other lodes.

CHAMPION & DONALDSON.—For the month of August, the mines yielded $6000 from eighty-five tons of smelting ore. In addition to this, the bulk of the concentrating ore from both mines, pending the completion of the mill at Fall River, has been saved. At the Champion, 150 tons of concentrating ore are ready for shipment.

FREELAND.—In the west lower level, three feet of solid mineral were struck. Assays were 21½ of gold and silver 22 ounces. Colonel Osbiston states that this is the largest body of ore ever found in the mine and the highest grade mineral.

NEW YORK MINING AND MILLING COMPANY.—The 150-ton stamp and concentrating mill is inclosed. Half the machinery has arrived, including a 120 horse-power Corliss engine, two seventy-five horse-power boilers, ten batteries, etc.; the remainder is hauling from Lawson as fast as possible. The ore is dumped into the top of the mill from a 500-foot tramway leading to the Big Chief tunnel, now 120 feet in and gaining depth foot by foot. Ore carrying $5 per ton will pay, the company asserts. All tests so far show the ore to carry $40. It is crushed, carried by gravity to the ten batteries, each of which has five stamps, and thence to the plates. The tailings are to be concentrated by twenty Frue vanners.

SEVEN-THIRTY.—During the month of August, the shipments, largely from development-work, aggregated 53½ tons of smelting ore, netting $126 to the ton, or about $6700. At present, the main shaft is 390 feet deep from the surface, with four levels below and three above the cross-cut tunnel. These levels are driven at intervals of from sixty to eighty feet, and together measure over 6000 feet. Just below the tunnel, a rich body of ore was stoped for fifty feet, returning $50,000. Adjoining this, is a reserve of equal length and apparently the same value. In driving this level 900 feet, mineral in paying quantities was encountered the whole length. Work is progressing in three of these levels day and night, in two by day only. In the second level below the tunnel, the most recent mill-runs have made returns of over $700 per ton. On the east, in the third level, there is a reserve of 175 feet, the ore-body being continuous the whole length of the drift, varying in width from six inches to two feet. No stoping has been done on this ore-body, which, although at first of low grade, has now improved, showing increased value in the breast. The last extracted gives 61 per cent in lead and 61 ounces in silver. The machinery is all on the ground and is in running order.

SILVER GLANCE.—The hoisting machinery has arrived, and will be in operation in a short time. This property is producing large quantities of ore at present, and, with the aid of machinery, will able to ship much more.

SILVER PLUME.—The mill runs steadily, treating from 12 to 18 tons per day.

SNOW-DRIFT.—This mine is said to be paying handsomely. The property is worked under a lease. On the level east of the Snow Drift tunnel, drifting and stoping are prosecuted with flattering results. This level is 550 feet in length, and shows up a six-foot crevice with a pay-streak averaging all the way from one and a half to fourteen inches of solid mineral, carrying sulphurets, galena, and gray copper, which averages over 200 ounces silver per ton to each mill-run. A distance of 70 feet below the tunnel level, another party of lessees have started a drift east. They have a continuous body of mineral of the same character as that above named. At a point fifty feet above the tuunel level, there are four parties of lessees at work drifting and stoping on a superior quality of ore, and taking out splendid pay. In the Good Hope level, sixty feet above, a lease has been let to drift east.

GILPIN COUNTY.

CALIFORNIA.—In the 1400-foot level, the pay-streak has widened out from two to six feet. The grade of this new body of ore is higher than any heretofore obtained. The smelting ore in the new streak is two feet in width. Tests of the ore just struck give returns of two ounces of gold to the ton. Thus, the present output of $5000 a week will be still further increased. The California is the deepest mine in Colorado.

GREGORY.—This stamp-mill, in Black Hawk, has been closed down by the California Mining Company, whose mill-dirt from the California mine will hereafter be crushed at the Hidden Treasure mill. It is understood that Central parties are negotiating for a lease of the Gregory mill, which will resume work immediately.

LAKE COUNTY.

ANTIOCH.—The gold mill is to start up shortly on ore from the Mosquito range.

AZTEC.—Shipments from the ore accumulated have been received. The property is worked through the old Kennebec shaft, and the mineral is found at a depth of about 180 feet from the surface.

CHRYSOLITE.—The Muldoon shaft has been re-leased. The parties holding the new lease have put up a Joplin whim, and are working vigorously.

CROWN POINT & PINNACLE.—These mines, situated at Rock Hill, have been sold for $40,000.

ELGIN SMELTING-WORKS.—The two furnaces in Big Evans Gulch are working very successfully. The establishment reduces from fifty-five to sixty tons of ore daily. Charges are run on twelve to fifteen per cent of lead, and eight to ten tons of bullion of very fair grade in silver are turned out daily. The ore-bins at the mine are all filled with ore, and the receipts at present are much larger than the regular consumption. In order to meet the increasing business of the establishment, the Manville Smelting Company, operating the works, has decided to erect another furnace immediately, and preparatory grading has been commenced with this object in view.

LITTLE CHIEF.—The company has received $22,500 from its mine since September 6th. The present output is about fifteen tons a day, running quite well in silver and gold, and averaging from fifty to one hundred dollars a ton. The mine, it is stated, shows no material change, but is thought to be rather improving in character. It is still an open question whether the ore mass is a reliable, permanent chute or body of mineral, on which some dependence can be placed, or only an aggregation of pockets and seams which may play out at any time. The development of that portion of the mine likely to show a continuation of the pay mineral is advancing rapidly, and the probable future value of the new strike can soon be more definitely determined. A new shaft, designated as No. 6, was started some days ago, and is down about ninety feet. The No. 6 shaft is situated about forty-five feet from the north end line of the claim. A drift is also driving from the old north workings of the mine, to connect with this shaft.

MAID OF ERIN.—The lessees who have a lease on portions of the Maid of Erin not in conflict with the Vanderbilt lode have begun taking out considerable rich ore. The property is worked through the Big Chief shaft. From all that can be learned, the Maid of Erin shows a very large and solid body of sand carbonates, from which twenty to fifty tons of ore can be extracted daily without any effort. The mineral ranges from forty-five to sixty per cent lead, and much of it is literally covered with chloride of silver.

NEW PITTSBURG.—All the company's shafts, except the Keene, Bates, and Loomis, have recently been leased.

STONEWALL JACKSON.—This mine is worked ou a lease. The mineral produced is a carbonate of lead, with some iron, and shows chloride of silver. No shipments have yet been made, but assays show the ore to run from 20 to 300 ounces in silver to the ton, and to carry as high as sixty per cent in lead. The ore-streak as yet is small, but it has at times opened out to a hight of six feet, with a width of from six to ten inches.

LA PLATA COUNTY.

SOUTH PARK.—Of two shipments of ore to the Grand View smelter, one lot was paid for at the rate of 410 ounces of silver to the ton and 80 per cent lead;

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the other lot at 990 ounces of silver and 14 per cent lead. The ore is sulphuret, wire silver, and galena.

OURAY COUNTY.

Ground has been broken for a thirty-ton concentrator on the San Miguel River, opposite Telluride. Most of the machinery is on hand, and with no serious delay the mill will be in operation on November 15th.

CROOKE MINING AND SMELTING COMPANY.—The output of the Ute and Ulé for August was 600 tons. Both mines promise well for the future. The new shaft from 3d level of Ute is 60 feet deep. Vein, four feet. The quartz is stratified with 10-inch streaks of mineral. The prospects for the opening out of the level below are good, and should the width of the vein continue in the level below as above, it will open stoping ground for two years at an output of 300 tons a month. The stopes in the mine are producing the usual quantity of ore. The Ulé drift west in 7th level continues its usual production of ore. This level has been drifted 250 feet over a fine body of ore. The stopes above are producing largely and give great encouragement for the future of the mine below. Up to September 1st, there were 2400 tons of concentrates stored in Lake City by this company.

PARK COUNTY.

NESTOR.—This company has made arrangements to build immediately a stamp-mill and concentrator at its mines, near the old town of Mosquito, and thus treat its own ores at a nominal expense. This will make the fifth mill and concentrator built in Mosquito Gulch in the past year.

PUEBLO COUNTY.

The oil excitement has reached Pueblo. A meeting was held there recently for the purpose of considering the subject of forming a company to put down a well in or near Pueblo. The greatest unanimity and enthusiasm prevailed. A committee was appointed to receive subscriptions, and another to secure leases. Ten thousand dollars will be raised to work a well 3000 feet if necessary.

SUMMIT COUNTY.

CABLE.—A streak of ruby silver ore has been struck in this lode. The streak appears from top to bottom of the tunnel. Further developments will be vigorously pushed to open up this extremely valuable streak of mineral. This ore has been struck after a "pinch" of 250 feet, with nothing but the walls to guide, through the hardest kind of gangue matter. The breast of the tunnel is now softening and a soft gangue streak coming in. The Cable was last year shipping ore, but has not shipped for six months.

MARK TWAIN.—The mine is shipping ten tons per day, but the superintendent reports that he has had to reduce this force this month one third, on account of a lack of shipping facilities by rail. If the facilities are furnished, or a track continued to Montezuma, the output could be made twenty-five tons per day.

IDAHO.

MORTON.—This mine, situated about five miles from Hailey, has been sold for $20,000.

MEXICO.

GUANACEVI MINING COMPANY—Mr. J. J. Downing writes us the following from Denver, Colo.: Guanacevi, a little mining town of a thousand souls, lies isolated from the world at an elevation of 8000 feet above sea-level, among the foot-hills of the Sierra Madre range, some 200 miles north of Durango City, and 75 miles south and east of the famous Batopilas mines. It is accessible only by bridle-paths over a low mountain pass. No wheeled vehicle was ever seen in its streets, nor, so far as known, an American before last summer. In the month of July, 1882, Messrs. I. W. Gift and B. N. Curtis, accompanied by Mr. Alfred R. West, a well-known mining expert and metallurgist, visited Guanacevi, and made a thorough examination of its silver mines. They discovered there an astonishingly rich mining district, which had been worked in the rude and indifferent manner peculiar to that country for two hundred years or more. It was not a region of prospects, but of actual mines, well developed after the Mexican system, with considerable working, large quantities of rejected low-grade ores on the dumps, and a number of native reduction-works of the arrastra and patio style. The inhabitants are a mining community, and have lived off the mines for generations back. Their large cathedral, built years ago from tithes on the product of the mines, and the thousands of tons of ore lying in sight, rejected by the arrastra process, which can not profitably work ore of less value than 40 ounces to the ton, are visible evidences of the richness and permanence of the ore-bodies; and yet to an American miner, the development of the mines seems only to have fairly begun. The Mexican workings are hardly more than shafts sunk vertically into the veins not to exceed generally from 150 to 200 feet. Hoisting-works are seldom used, and pumping machinery is unknown. They are dry mines; but if the water runs in during the rainy season, it has to be taken out by hand in buckets, or left to dry out, or the shaft is abandoned for a new one. The natives lack enterprise and resources. They think God is unjust to them because he does not make the water run out as well as run in. The assays herewith given were carefully made in duplicate by Messrs. West and Gift from a very large number of samples of ore selected by themselves from all parts of the old workings of the several mines. They are believed to be below a fair average. Messrs. Gift, Curtiss, and West descended into and examined all the mines except two, and those two, according to local reports, are the most valuable in the group. Want of ropes and ladders prevented access to them. But from old miners who had worked in the mines, they learned that at the death of the former owner they were taking ore from a chimney averaging 100 marks to the carga, equal to $800 for each 300 pounds of ore. The other had been abandoned since the death of its former owner, and had gradually filled with surface water. But the assay of ores from the adjoining extensions of the mine, north and south, show 340 ounces to the ton. These facts are a meager summary from the report made by Messrs. Gift and Curtiss on their return, upon which was based the purchase of the entire group of seven mines and the organization of the Guanacevi Mining Company. The veins are well-defined, from ten to thirty feet between walls, and are capable of producing large quantities of rich ore. One of them, the Santa Cruz, has an ore-body sixty feet wide. The mines have all been worked more or less by the former Mexican owners, in their rude way, and have produced large amounts of bullion. I think there is sufficient ore in sight in these old workings, and in the pillars left standing, to more than pay for the entire property. The Mexican manner of working takes from fifteen to seventeen days, and costs from $27.50 to $28 per ton. But I think that any good metallurgist will bear me out in saying that a good American mill would extract the silver from a vastly greater quantity of ore in twenty-four hours, at a cost not exceeding ten dollars per ton. Miners' wages are from seventy-five cents to one dollar a day, and wood and water are plentiful on the mountains.

MICHIGAN.

AGOGEBIC.—The shaft is down fifty feet, it having gone through the slate into good clean ore, samples of which are said to be very pure. A drift has been started north from the bottom of the shaft.

AHMEEK.—An examination of a fissure-vein on this mine is going on, and the developments so far are satisfactory to a degree. At the point attacked, the deposit is not very wide, but is exceedingly rich in copper, some two tons of barrel work having already been taken from a limited space.

ROPES GOLD AND SILVER MINING COMPANY.—The production of a brick of bullion, the result of the first hundred tons run at this company's stamp-mill, has created great excitement at Ishpeming. The official report made by the stockholders regarding their first run shows: Products from amalgam: Gold, weight, 34·073 ounces troy; value, $704.62. Silver, weight, 89·83 ounces troy, value, $98.81. Concentrates: Gold, weight, 6 ounces; value, $126.14. Silver, weight, 68 ounces, value $74.80. Total product, $1004.37. Value of tailings: In first part of run—gold, $9 per ton; silver, $2.72 per ton; total, $11.72 per ton. In last part of run—gold, $6 per ton; silver $1.92 per ton; total, $7.92 per ton. The value of the product of the first 60 tons, as shown by assays of both amalgam and concentrates, gave an average of only about $6.50 per ton, and the last 40 tons about $14.85 per ton. This was caused partly by working rock rather below the average on the start, partly by the absorption of the amalgam by the plates and battery, and also largely by the too limited use of mercury. This is shown conclusively by the increase of the product of the last 40 tons, which was almost entirely from the free-milling product.

MISSOURI.

At a depth of about sixteen feet, a body of mineral was struck in a prospect-shaft recently sunk near Jericho. The parties interested in the mining operations selected about five or six hundred pounds of the ore containing the sulphurets, and sent it to Kansas City for treatment. The returns were so favorable that they immediately proceeded with work, and it is said have sent for a crusher to reduce the ore, and are making active preparations for work on a large scale. The men engaged in the mining operations claim to have struck the right ore in five or six different places in the vicinity.

MONTANA.

BEAVERHEAD COUNTY.

VIRGINIA CITY.—The object of the company is to open up and operate, by bed-rock flume, an extensive claim in Grasshopper Creek, below Bannack. Representatives of the company who have prospected the ground say that good pan prospects were obtained, and that there is no doubt but the enterprise can be made to pay. Nothing more than preliminary work will probably be undertaken this fall, as the season is now so far advanced that but little could be accomplished before the setting in of winter.

DEER LODGE COUNTY—FLINT CREEK MINING DISTRICT.

GRANITE MOUNTAIN.—Work will be commenced on the lower tunnel as soon as the air-compressor can be got to work. The buildings are near the mouth of the lowest working tunnel. This adit, when completed, will tap the mine at a vertical depth of 800 feet. Burleigh drills will be used to drive the heading. The company has made no arrangements to build a mill yet, deeming it safe and proper to thoroughly and systematically explore the mine first. The Algonquin mill, at Hasmark, is running steadily on Granite ore.

HOPE.—The diamond drill has struck a fine body of high-grade ore. A two-compartment shaft is to be sunk to explore the new prospect.

JAMES G. BLAINE.—Clark, Merrill & Co. are sinking on this lode, west of the Granite Mountain. Some very high-grade ore has been taken out of the vein. The shaft is down 80 feet, with plenty of water in the bottom.

SILVER BOW COUNTY.

ANACONDA.—It is reported that this mine is opened up for a length of 1400 feet. On the 400 level, it is 45 feet wide at one point. It has 60,000 tons of ore on the dump. It has just contracted for the sale of 5000 tons of 50 per cent copper ore in the old country, where it is to be shipped. The rich copper ore occurs in bunches and chutes, and carries but little silver.

NEVADA.

EUREKA COUNTY.

LIMESTONE No. 1.—A Philadelphia company, which recently acquired interests in the Limestone district, has let a contract to sink a shaft 100 feet deep on an extension of the Limestone No. 1, which is owned principally by railroad men. The original location on the Limestone lead has been prospected to a depth of 100 feet by a shaft. The lead shows 10 inches of galena ore that assays over $100 to the ton in silver and carries 60 per cent of lead from the sagebrush roots down. In sinking the shaft, some 25 tons of ore were extracted that will pay the expenses incurred in prospecting the mine. The company continues to work steadily, and the trustees have ordered the shaft sunk another hundred feet.

ONONDAGA.—The company has decided to put up reduction-works on the Humboldt. The nature of the works will be determined by the nature of the ore as found in further explorations. The prospect-shaft, sunk on an incline of about 30 degrees from the perpendicular, is now down 135 feet in ore. Iron continues to be the gangue, but in this formation occur yellow carbonates, also native silver, which was not to be seen near the surface. The proposition is, to sink about 100 feet farther, and then complete the tunnel which was started to strike the shaft at the proposed depth. This tunnel is now in 200 feet, and will have to be run in 300 feet farther. It is calculated that it will cost 25 cents per ton to dump the ore through this tunnel into the cañon. About five feet are made per day, and it is expected that in about twenty days the shaft will be sunk to the proposed depth.

ZANOLI.—On the 50-foot level, the ledge has been stripped 45 feet northwest and 45 feet southeast on a body of high-grade yellow carbonate ore. The same work has been done also on the 80-foot level, on which the ledge, perfectly defined and with smooth walls, varies in width from one to seven feet. The mine has been prospected to the depth of 112 feet, the ore going all the way to the bottom in quantity and quality as above; but water has come in and stands 50 feet deep in the incline. The ore is piled on the dump without making any shipments. It is proposed to run a tunnel in to strike below the incline at a depth of 300 feet from the surface to drain the mine. It is expected, if the mine holds out, to erect works.

STOREY COUNTY.

ALTA.—Very rapid progress in the work of draining the mine is made. They will now soon have won their way to a foothold on the 1450 level, when there will remain but 700 feet to be freed of water.

BRUNSWICK.—The expensive improvements making to this mill, on the Carson River, says the Eureka *Sentinel*, would indicate that some one still has faith in the Comstock. The mill has received a thorough overhauling, and many thousands of dollars have been spent in the way of new machinery and repairs. Steam power is being placed in the mill: therefore, in the future, there will not be a total cessation of ore extraction upon the failure of the water in the river.

NEW MEXICO.

A recent dispatch from Las Vegas says that the placer mines, discovered near Silver City years ago by a man named Adams, whose party were massacred by Indians with but one man escaping, have again been found and are creating considerable excitement. The placers are noted for their large and plentiful nuggets of gold, and years have been spent by prospectors in searching for the lost fields whose history has become an almost everyday story, and but little confidence has been placed in the truth of the statements of the surviving party who has devoted all this time to scouring the mountains in his unrelenting energy to discover the diggings once so well known to him. At last, the lost fields are reported found, and parties started on horseback heading for the White Mountains, where the placers are supposed to be. Word has come in from Camp

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Fleming that one of the lucky finders arrived in camp with a half-pound of gold nuggets. The excitement spread with the report, and the town is nearly depopulated.

CARLTON.—The stamp-mill at Silver City has been purchased by J. Fleming, who will start up the works after a long idleness.

CINCINNATI.—This mine is making a good showing, and 100 tons of ore have been shipped which ran 120 ounces in silver and over 30 per cent lead per ton, and there is still on the dump as much more ore of lower grade, waiting for the completion of the new smelter at Deming.

SANTA RITA.—The copper-works have been shut down since last April. It is understood that there are to be some important changes in the machinery which have been found necessary. Cornish rolls will probably take the place of the stamps now in use, and every thing will be overhauled generally and put in complete order for a permanent business. Tons of leaf and kidney copper and concentrates may be seen in different parts of the mill, which will be utilized as soon as things are in thorough condition for steady working. The company owns 56 patented claims, and now has apparently a large body of ore in the immediate vicinity of the mill at the depth of 300 feet from the surface. In many of the properties, considerable prospecting has been done with a diamond drill, and in one instance, at 800 feet, a body of water was reached which will rise 100 feet above the surface. The company has an abundant supply of mineral and water within easy reach upon which it may begin operations as soon as its arrangements are completed.

PENNSYLVANIA.

The people of Canaan Township, Wayne County, are considerably worked up over the alleged discovery by a Colorado miner of a vein of silver ore on the farm of Stevens Delaney. The man who discovered the ore is an experienced prospector, having worked a long time in Leadville and Denver, and he says the ore is rich enough to pay a large interest on the money that must necessarily be invested in order to properly mine the ore. A stock company and a stamp-mill are in contemplation.

AMERICAN IRON MINING AND GAS COMPANY.—This newly organized company, with a capital stock of $1,000,000, intends to work the iron ore veins of Plum Creek District, and bore for gas. If there is sufficient inducement, the Alleghany Valley Railroad Company will build a branch road through the district. Mr. John Kaiser, of Pittsburg, is president, and Mr. R. H. Harris, of Philadelphia, secretary and treasurer.

SOUTH CAROLINA.

A report states that Mr. J. W. Seacrest, who has had considerable experience in developing gold mines, has taken a new departure in gold mining, and will shortly begin tapping the rock bottom of the Broad River, at Smith's Ford, in York County, for the precious metal. There is an old river-bed at that point which has been dry ever since the war, and Mr. Seacrest proposes sinking shafts through the soil to the rock bed, where he will find the gold. This is called the river washing. The gold is found under the sand, on the rock, where it settles by gravitation.

UTAH.

CACTUS.—An important strike has been made. The body of ore tapped is said to be large and much richer than any thing heretofore found in the mine. The concentrating-works at the Cactus have been lately improved and are doing excellent work. Shipments of ore are made, the ore going to Colorado for reduction.

SALT LAKE COUNTY.

EMMA.—Work progresses satisfactorily. The shaft sunk 1700 feet from the mouth of the Bay City tunnel has attained a depth of 200 feet. From this shaft a cross-cut was run at the 135-foot level, a distance of 200 feet, cutting the vein. On the vein, drifting has been done both east and west, each drift at present having gone 100 feet on the vein. These drifts are 200 feet vertically below the old workings of the mine, from which so much wealth was taken a few years ago. Ore is taken out and sent to the smelters, but the most of the work is done for the purpose of developing and getting the property in condition for extracting the ore easily. The east drift is in very interesting ground, which is looking better and better as progress is made. The shaft is to be sunk 200 feet deeper, where it is expected to cut the vein at a point 550 feet vertically below the old workings and 800 feet on the dip of the vein. Twenty-eight men are employed on the property, and as large a force will be worked all winter. The Denver & Rio Grande is taking up to Alta enough coal to operate the machinery and for other purposes till next June, so that work will not have to be suspended should the tramway become blocked, as is usual in the winter. The pumps keep the mine free from water, the discharge being from 15,000 to 18,000 gallons per hour.

SILVER MOUNTAIN.—The appearance of the mine has shown a decided improvement recently. The shipments of ore have begun. The ore is hauled to Sandy, a distance of twenty miles, at a contract price of $20 per ton. As it is worth $100 per ton, there is a large margin left for the company. The ore assays seventy-five ounces silver, $15 in gold and 45 per cent lead. Work will be done during the winter running drifts and opening up the ore-bodies, so that the extraction of ore next season can be rapid.

WAHSATCH COUNTY.

SOUTHERN TIER.—This company has been formed by Eastern capitalists with a capital of $2,000,000. The mines are in Snake Creek District. Work will soon begin on a new tunnel designed to tap the vein at a depth of between four and five hundred feet, which will take several months for completion.

WASHINGTON COUNTY—TUTSAGUBIT DISTRICT.

This new mining district has been located midway between the Santa Clara River and Beaver Dam Wash and on both sides of the old California road. Fifteen claims have since been located. These claims are situated, some on the side and some on the crest of one of the Santa Clara Mountains. A vein of carbonite ore, bearing lead, silver, and gold, crops out in all these locations, which extend along the mountain two miles or more.

MOUNTAIN CHIEF.—This company owns the following claims: Mountain Chief, Black Warrior, Whip-poor-will, Black Hawk, Red Warrior, Mammoth, Cherokee, and Gray Eagle. The first-named claim has been worked since May. A tunnel 38 feet long has been run in the side of the mountain to tap the vein, which dips at an angle of 90 degrees. At the Black Warrior, a vein of carbonate ore crops out. The ore among the grass-roots assays from 72 to 80 per cent lead, from 12 to 38 ounces silver, and some gold. Two or three hundred feet are cleared off and exposed to sight, and a 40-foot tunnel run into the mountain. Since the formation of the company, all work has been transferred to this claim, it being the most accessible. A road to within half a mile was easily made; the remaining portion, though difficult and expensive, will soon be completed. A tramway, 200 feet long, will deliver ore on this road. At the Santa Clara River, twelve miles distant, ground and water have been purchased, and a smelter will be soon put up.

WYOMING.

BOSS.—This mine at Cummins is worked night and day. It has been developed by a shaft some fifty-seven feet. The general trend of the lead is north and south, shows a well-defined foot-wall, and vein-matter of the width of fifteen feet, no hanging-wall as yet having been reached.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED AUGUST 7TH, 1883.

282,480. Speed-Governor for Steam-Engines. David E. Adams, Pittsburg, Pa., Administrator of James D. Willoughby, deceased.
282,487. Speed-Indicator. Thomas Blanchard, Stoughton, Mass.
282,512. Blast-Furnace. James J. Fronheiser, Johnstown, Pa.
282,518. Core for Casting Steel. James A. Herrick, Cleveland, O.
282,531. Apparatus for Cleaning Oil-Wells. William E. Karns, Parker's Landing, Pa.
282,543. Coal, Iron Ore, and Merchandise Derrick. William E. Ludlow, Sandusky, O.
282,555. Unloading and Handling Coal. John R. McPherson, Seabright, N. J.
282,556. Hoisting Apparatus. George E. Newell and Loren G. Ladd, Pawtucket, R. I., Assignors to Smith Grant & Co., same place.
282,565. Furnace-Grate. John A. Price, Scranton, Pa.
282,575. Draught-Equalizer. Benjamin C. Shaw, Toledo, O.
282,586. Regenerator-Furnace. William Swindell, Alleghany City, Pa.
282,604. Apparatus for the Manufacture of Bituminous Coal Coke. John F. Bennett, Pittsburg, Pa.
282,632. Mining-Machine. Martin Hardsocg, Avery, Iowa.
282,686. Rock-Drilling Machine. Thomas Threlfall, San Francisco, Cal., Assignor to James Watson, same place.
282,687. Rock-Drilling Machine. Thomas Threlfall, San Francisco, Cal., Assignor to James Watson, same place.
282,728. Process of Annealing Chilled and other Iron Castings. Edwin Jenkins and Alexander Law, Melbourne, and William Price, Carlton, Victoria.
282,750. Drilling-Machine. James Miller, New York City, Assignor of one half to Cornelius H. Delamater and George H. Robinson, same place.
282,751. Coal-Car. James A. Millholland, Cumberland, Md.
282,803. Ore-Roasting Furnace. Robert L. Thompson, Boulder, Colo.
282,845. Steam-Boiler Furnace. Edward Clark, New York City.
282,863. Process of Grinding and Apparatus for Amalgamating Ores. Charles H. Dow and William H. Chandler, Virginia City, Nev., Assignors of one half to William A. Shreves, Bordentown, and Myron L. Justin, Jersey City, N. J.

GRANTED AUGUST 14TH.

282,982. Machine for Amalgamating the Gold and Silver in Pulverized Ores. William E. Harris, New York City.
283,064. Steam-Pump. James H. Blessing, Albany, N. Y.
283,074. Manufacture of Wrought-Iron. Lucius D. Chapin, Chicago, Ill.
283,075. Metallurgic Furnace. Lucius D. Chapin, Chicago, Ill., and Lebeus C. Chapin, Kalamazoo, Mich.
283,077. Process of Treating Lead to Impart to it the Property of Adhering to other Metals. Francis J. Clamer, Philadelphia, Pa., Assignor of one half to Joseph G. Hendrickson, same place.
283,098. Water-Jacket for Metallurgic Furnaces. Charles E. Gore, Lafayette, Ind., Assignor of one half to Samuel E. Ogden, Columbus, O.
283,101. Steam Vacuum-Pump. Georg A. Greeven, Bruehl, Prussia, Germany.
283,107. Tuyere for Blast-Furnaces. Gustav Hilgenstock, Hoerde, Germany.
283,136. Method of Bending Angle-Iron. Moses Mosler, Cincinnati, O.
283,141. Process of Manufacturing Crucible Cast-Steel. Jacob Reese, Pittsburg, Pa.
283,153. Rotary Pump. George W. Sharp, Buffalo, N. Y., Assignor to Augustus M. Westfall and Edgar A. Gay, same place.
283,156. Apparatus for Washing and Delivering Coal, etc. Charles Sheppard, Bridgend, County of Glamorgan, England.
283,180. Ore-Feeder. William E. Wild, San Francisco, Cal.
283,184. Brick-Machine. William Woodward and Abel B. Woodward, Nashville, Tenn.
283,198. Machine for Cutting and Punching Metal. Joshua Edwin Lane Bradeen, South Berwick, Me.
283,234. Process of and Apparatus for Manufacturing Water-Gas. William W. Gibbs, New York City, and J. Y. McClintock, Malden, Mass., Assignors, by Direct and Mesne Assignments, to the United States Gas Improvement Company, of Pennsylvania.
283,241. Process of Purifying Iron and Condensing the Products. James Henderson, Bellefonte, Pa.
283,262. Dumping-Wagon. William Leonhardt and John H. Leonhardt, Baltimore County, Md.
283,286. Mine Air-Regulator. James Sawyer, Freeburg, Ill., Assignor of one half to Washington de Bolt, St. Louis, Mo.
283,296. Ore-Separator. Charles St. Charles, New York City.
283,336. Attachment for Boiler Furnaces. George S. Gilbert, Baltimore, Md., Assignor of one third to Thomas M. Broderick, same place.

REISSUE.

10,367. Mode of Plating Iron and Steel. Hermann Reusch, Dillingen-on-the-Saar, Prussia, Germany, Assignor to Carl Reusch, New York City.

GRANTED AUGUST 21ST.

283,366. Brick-Machine. James C. Anderson, Highland Park, Ill.
283,419. Furnace-Grate. Harry Rogers, New York City.
283,435. Tuyere for Forges. Nils O. Swenson, Lead City, Dak.
283,461. Process of Roasting and Disintegrating Gold and Silver Ores. David W. Birmingham, Clifton, N. Y.
283,483. Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
283,484. Art of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
283,488. Machine for Perforating Sheet-Metal. John W. Hyatt, Newark, N. J.
283,509. Drill. John H. Pendleton, Brooklyn, Assignor to himself and Nelvil W. H. Hix, New York City, and Alexander H. Tiers and Cornelius Tiers, Madison, N. J.
283,540. Amalgamator. Henry T. Vanderhoof, New York City, Assignor, by Mesne Assignments, to the Hamilton Lead Bath Company, same place.
283,577. Bessemer Converter. Thomas Crowe, South Chicago, Ill.
283,600. Smoke-Consuming Device. William Perry Hall, Piqua, O.
283,604. Dumping-Cart. Thomas Hill, Jersey City, N. J.
283,643. Charcoal-Kiln. Charles S. Nellis, Chittenango, N. Y., Assignor of one fourth to Thomas P. Hull, same place.
283,708. Boiler-Furnace. William P. Hall, Piqua, O.
283,735. Manufacture of Steel. John Gjers, Middlesborough-on-Tees, County of York, England.

GRANTED AUGUST 28TH.

283,783. Basic Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
283,809. Steam-Jet for Smoke-Consuming Furnaces. Sidney Parker, Chicago, Ill.
283,830. Apparatus for Pulverizing Grain, Ores, etc. Francis Taggart, Brooklyn, N. Y.
283,857. Radial Drilling-Machine. Alfred Box, Philadelphia, Pa.
283,858. Mining-Machine. Andrew Brandenburger, William Tirre, and Hermann Barditzky, St. Louis, Mo.
283,901. Apparatus for the Manufacture of Oxide of Zinc. Mark Lambert, Newark, N. J.
283,937. Dump-Wagon. George M. Wallace, Yuba City, Cal.
283,943. Brake and Truck for Mining-Machines. Benhard Yoch, St. Louis, Mo.
283,955. Device for Operating Air-Compressor Valves. Charles A. Bennett, Dover, N. J., Assignor of one half to the Morris County Machine and Iron Company, same place.
283,999. Process of and Apparatus for the Treatment of Iron and Steel. Joseph Pearson Gill, New York City.
284,000. Process of and Apparatus for Producing Non-Corrodible Surfaces on Iron and Steel. Joseph Pearson Gill, New York City.
284,001. Surface of Iron and Steel. Joseph Pearson Gill, New York City.
284,004. Making Steel Castings. William Hainsworth, Pittsburg, Pa.
284,005. Bessemer Plant. William Hainsworth, Pittsburg, Pa.
284,006. Process of Manufacturing Steel. William Hainsworth, Pittsburg, Pa.
284,059. Process of Manufacturing Charcoal and Kiln therefor. Henry M. Pierce, Chicago, Ill.
284,063. Process of Extracting Metals. Isaiah L. Roberts, Jacksonville, Fla.
284,067. Diamond Drill and Well-Sinking or Boring Safety-Machine. Gilbert McM. Ross and Daniel Grant, Virginia City, Nev.
284,074. Iron Wheel. James L. Schruben and William F. Leonard, Lafayette, Ind.
284,101. Bacasse-Furnace. Daniel Wilde, Washington, Iowa.
284,123. Process of Reducing Ores. Joseph Pearson Gill, New York City.
284,135. Roller-Mill. John Livingston, Dayton, O., assignor to Stout, Mills & Temple, same place.

REISSUE.

10,374. Air-Pump. Charles Moore, Philadelphia, Pa., Assignor, by Mesne Assignments, to Hydro-Pneumatic Pump Company, New York City.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Sept. 28.

The mining market this week has been very dull and almost featureless. The Leadville stocks, which attracted so much attention last week, were very quiet and showed signs of weakness, owing to most of them selling ex dividend. The fancy stocks were also neglected very much this week, although prices suffered no material change. Below will be found a full summary of the market. The total number of shares sold aggregates 107,890 shares, as against 236,335 last week.

The Comstock shares were very quiet at steady prices. California was quiet and steady at 18@20c. Sierra Nevada was irregular, with a small business, selling from $3.85@$4.10@$3.90. Union Consolidated was quiet and steady, selling from $4.75@$4.90. Consolidated Imperial was irregular, selling from 6@4@5c. Sutro Tunnel was very quiet at very irregular prices ; it sold from 20@18@25@20c.

The Leadville stocks were moderately dealt in and were steady. Amie was very active at steady prices, selling from 21@20c., dividend unpaid, and from 13@17@15c. dividend paid. Chrysolite was quiet and steady, selling from $1.30@$1.25. Dunkin sold from 27@25c., with a small business. Breece sold at 18c. Iron Silver was moderately dealt in at strong prices ; it sold from $3@$3.20. Leadville was weak, under a small business, selling from 50@42c. Little Chief was moderately dealt in at irregular prices ; it sold at 75c. dividend unpaid, and from 66@55@60c. dividend paid. Little Pittsburg was weak, under a small business, selling from 70@60c. Climax sold from 12@11c., with moderate transactions.

The Bodie stocks were very quiet at steady prices. Bodie Consolidated sold at 60c. Standard was quiet and strong, selling from $5.63@$6. Bechtel sold at 7c.

The Tuscarora stocks were also quiet and steady. Belle Isle sold at 30c. Navajo records but one small transaction at $3. North Belle Isle was quiet and steady, selling from 40@45c. Elko Consolidated was moderately dealt in at steady prices, selling from 10@9c.

In the miscellaneous list, Alice was stronger, with a small business, selling from $2.40@$2.70. Eureka Consolidated was quiet and steady, selling from $5.25 @$5.63. Hall-Anderson was moderately dealt in and was a little weak ; it sold from $1.20@$1.10. Horn-Silver was quiet and steady, selling from $6.88 @$7. Hukill was irregular, selling from 5@7@6c., under a small business. Northern Belle was quiet and steady at $5.63. Robinson Consolidated was but moderately dealt in and was steady ; it sold from 43@40c. Sierra Grande was quiet and steady, selling from $1.15@$1.20.

Barcelona was moderately dealt in and was weak ; it sold from 39@32@33c. Bradshaw was irregular, with a small business, selling from 25@20@23c. Central Arizona was quiet and steady, selling from 30@ 39@35c. Decatur was quite active at steady prices, selling from 2@4@3c. Eastern Oregon was actively dealt in at steady prices ; it sold from 46@48c. Harlem was weak, under a small business, selling from $1.25@99c. Hortense sold from 9@10c., with small transactions. Oriental & Miller was quiet and irregular, selling from 11@ 9@10c. Rappahannock sold at 6c. Sonora Consolidated was but moderately dealt in, at steady prices ; it sold from 26@28c.

MEETINGS.

The Mount Pleasant Mining Company, No. 18 Wall street, Room 47, New York City. Annual meeting of stockholders and election of trustees October 3d, at twelve o'clock M.

Wahsatch Iron and Coal Company, No. 42 New street, New York City. Annual meeting of stockholders and election of trustees, October 4th, at half-past three P.M.

DIVIDENDS.

The Mount Pleasant Mining Company, of California, has declared a dividend (No. 3) of fifteen cents per share, payable September 28th.

The Osceola Mining Company, of Michigan, has declared a quarterly dividend of fifty cents a share, payable October 1st.

The Sierra Grande Mining Company, of New Mexico, has declared a dividend (No. 7) of one hundred thousand dollars, or twenty-five cents per share, payable on and after October 3d, to stockholders then of record.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF SEPTEMBER, AND FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of September.	Since January 1, 1883.
Atlantic, C.	Mich.		$80,000
Bassick, S.	Colo.		200,000
Black Bear, G.	Cal.		6,000
Boston & Montana, G.	Mont		10,000
Bulwer Consolidated, G.	Cal		35,000
California, G.	Colo.		65,000
Calumet & Hecla, C.	Mich		1,500,000
Carbonate Hill, S.	Colo.		60,000
Castle Creek, G.	Idaho	3,000	27,000
Catalpa, S.	Colo.		30,000
Central, C.	Mich.		60,000
Christy, S. L.	Utah		6,000
Colorado United, S.	Colo.		16,750
Contention, S.	Ariz.		375,000
Con. Gold M. Co. of Ga.	Ga.		32,000
Copper Queen, C.	Ariz.		375,000
Cosmopolitan	Utah		50,000
Crescent, C.	"	30.000	60,000
Deadwood-Terra, G.	Dak		20,000
Evening Star, S. L.	Colo.		50,000
Father de Smet, G.	Dak		80.000
Gem, S.	Colo.		7,500
Glen, S.	"		3,000
Granite, S.	"		3,750
Hecla, S.	Mont	15.000	135,000
Henriett, S	Colo		27,000
Holyoke, G.	Idaho	4,000	36,000
Homestake, G	Dak	50,000	450,000
Hope, S.	Mont		33,912
Horn-Silver, S. L.	Utah		900,000
Howell S. & M. Co., G. S. L.	Ariz.		3,750
Idaho, G.	Cal.	7,750	69,750
Indian Queen	Nev.		3,750
Indian Spring Drift	Cal.		1,000
Iron Silver, S. L.	Colo.		200,000
Jocuistita, S.	Mexico		150,000
Kentuck, S.	Nev.		21,000
Leadville Consolidated, S.	Colo		40,000
Lexington, S	Mont.		200,000
Morning Star, S. L.	Colo		25,000
Mt. Diablo, S.	Nev.	12,500	25,000
Navajo, G. S.	Nev.		125,000
Northern Belle, S.	"		100,000
Ontario, S. L.	Utah		75,000
Osceola Consolidated, C.	Mich.		75,000
Oxford, G	N. S.		30,000
Plymouth Cons, G.	Cal.	50,000	200,000
Prussian, S. L.	Colo		15,000
Quincy, C.	Mich		380,000
Richmond, S. L.	Nev.		270,000
San Francisco, C.	Cal		2,500
Shoshone, G.	Idaho.		6,000
Sierra Buttes, G.	Cal.		30,625
Sierra Grande, S.	New Mex.		400,000
Silver Cord, G. S. L.	Colo		180,000
Silver King, S.	Ariz		150,000
Smuggler, S.	Colo		36,000
Standard Cons., G.	Cal	25,000	225,000
Total Wreck	Ariz.		50,000
True Fissure, G. S. L.	Utah.		75,000
United Gregory, G.	Colo.		12,000
		$197,250	$7,910,287

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson report as follows on the petroleum market :

One week ago to-day, the oil market was exceedingly strong, selling up to $1.17¼, with the appearance of going higher. The bulls were triumphant, but their hopes were dashed to the ground on Saturday by the announcement that Howe No. 5 was a large well, that Howe No. 7 was good, and that Porcupine No. 11, which is three quarters of a mile away from frontier developments in Balltown, was in and showing well. This extended the area of productive territory, and under these influences oil sold down to $1.12⅜. A strong effort was made to hold it, otherwise it probably would have declined more. Monday, Porcupine No. 10 came in, and prices remained weak and the market dull. Wednesday, the market was advanced to $1.16½ on the report that Porcupine Nos. 10 and 11, Grandin No. 15, and Howe No. 7, were declining, but yesterday the market gave way to $1.14¼. The fact now appears to be that the statement of development-work, which will be out October 1st, will be bearish, as it will doubtless show that the new wells in September have added more to the production than those of August.

Exports continue rather large, refined oil is firm, and the shipments from the oil regions exceed the "runs" so far this month by over 300,000 barrels. This is bullish, and besides this, the point to buy oil has been industriously circulated during the past few weeks, and the consequence is, the trade here is generally long. The oil regions are more bearish. It is more than probable that oil will sell down to $1.13 or $1.12 before any important advance takes place.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange :

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 22	$1.16	$1.16⅝	$1.13½	$1.14¼	3,797,000
24	1.13⅞	1.14⅝	1.12⅝	1.13¼	2,743,000
25	1.13⅛	1.15⅝	1.13⅛	1.15⅝	3,274,000
26	1.16	1.16½	1.15½	1.15⅝	3,443,000
27	1.15½	1.15½	1.14⅝	1.14⅝	2,241,000
28	1.14⅞	1.15¾	1.14¾	1.15⅝	2,379,000
Total sales					17,877,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, September 27.

There is very little change to note in the market for the past week. Prices are quite firm ; but there is not much doing either in copper or other mining stocks, and the transactions for the whole week would not be more than a fair day's business in active times. In copper stocks, Calumet & Hecla is steadily held at about $245, with only a few shares offered at that price. Franklin continues to improve, and sales are reported at $12, a gain of $¼ from last week. Quincy advanced on the 14th to $55, and was very firm for a few days ; but later, sales were made at $54 ; to-day, $54⅛ was bid, and none offered better than $54¼. Pewabic sold at $3, same as last week, closing $2½ bid, $3 asked. Allouez sold at $1⅛, a decline of 25c. since last sale (August 28th). This comprises all the dealings in copper stocks at the Boston Stock Exchange for the week, showing how little interest is manifested in this class of securities.

In silver stocks, there is even less doing than usual, and prices have a tendency downward. Bonanza declined from $2⅛@$1¾. Catalpa, steady at 35c. Silver Islet, from $3@$2½. Sullivan, to 87½c. At the Mining Exchange, an unusual dullness prevails. Bowman Silver Company declined to 7c. An assessment of 5c. per share has been levied, payable October 1st. Massachusetts & New Mexico, steady at 4@5c. Sullivan has been quite active at this Board at 78@95c., mostly at the latter figure, buyer's option.

3 P.M.—There was no feature to the market this afternoon, and prices remain unchanged.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Sept. 21.	Sept. 22.	Sept. 24.	Sept. 25.	Sept. 26.	Sept. 27.
Albion						
Alpha	2¼	2¼	2¼	2	2¼	2¼
Alta	1¼	1¼	1½	1⅝	1½	1⅝
Argenta						
Bechtel						
Belcher		1		1	1	1¼
Belle Isle			.30	.30		
Best & Belcher	3⅝	3½	3⅝	3⅝	3¼	3¼
Bodie	.60	.60	.60	.60	.55	.55
Bullion						
Bulwer						
California				.15	.15	.15
Challar	3	3	2⅞	2¾	2¾	2¾
Con. Virginia	.50	.55	.50	.50	.45	.45
Crown Point	1¼	1¼	1¼	1⅛	1⅛	1¼
Elko Cons						
Eureka Cons	6		5¾	5¾	5¾	6⅛
Exchequer						
Gould & Curry	2⅝	2⅝	2⅛	2⅝	2¼	2⅜
Grand Prize		.15	.20		.20	.25
Hale & Norcross	4⅛	4⅛	4	3¾	3½	3⅝
Independence						
Martin White			.10	.10		
Mexican	2¾	2⅝	2⅝	2½	2⅜	2¼
Mono						
Mount Diablo			4¾	4¼		
Navajo		2⅝	2⅝			
Northern Belle			6			
North Belle Isle						
Ophir	3⅝	3½	3⅝	3⅝	3¼	3¼
Overman						
Potosi	1⅛	1⅛	1⅛	1	1	1
Savage	1⅞	2	1⅞	1¾	1¾	1¾
Scorpion	.60	.65	.60	.60	.55	.60
Sierra Nevada	4	4¼	4	3¾	3⅝	3¾
Silver King						
Tip Top						
Union Cons	4¾	4⅞	4⅞	4½	4¼	4½
Utah			2¼	1¾	1⅝	1⅞
Wales Cons						
Yellow Jacket	3¼	3⅛	3⅛	3⅛	3⅛	3

BULLION MARKET.

NEW YORK, Friday Evening, Sept. 28.

The advance in the London market the past week has improved the rate for silver here, and leaves our market firm at the figures of annexed table :

DATE	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Sept. 22	50 13-16	110¾	Sept. 26	50 15-16	110¾
24	50⅞	110⅝	27	50 15-16	110¾
25	50⅞	110¾	28	50 15-16	110¾

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BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of August.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	113,146	$681,587
*Alta-Montana, G. L. S.	"	.....	10,625
*Belmont.	"	——	12,604
Bodie, G. S.	Cal....	12,273	174,001
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	47,533	426,967
*Boston & Montana, G.	Mont...	5,274	128,830
*Central Arizona, S.	Ariz..	.....	35,845
*Christy, S.	Utah..	.....	162,513
*Chrysolite, S. L.	Colo....	21,379	284,308
*Consolidated Bobtail, G	Colo....	4,898	47,986
*Contention, S.	Ariz...	——	635,413
Crescent, G.	Cal ...	....	13,000
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak..	42,163	283,680
*Derbec Blue Gravel, G. S.	Cal ...	16,212	88,482
Dunkin, S. L.	Colo....	.....	32,015
Evening Star, S. L	Colo ..	.....	47,061
*Father de Smet, G.	Dak....	.....	208,851
*Frisco M. and S. Co., G. S. L.	Utah....	.....	$77,084
Gunnell, S	Colo....	.....	58,828
*Head Center Consolidated	Ariz..	4,250	32,618
*Head Center and Tranquillity	Ariz.	8,910	89,108
*Hecla Consolidated, G. S.	Mont..	.....	291,922
*Homestake, G.	Dak..	99,298	685,972
*Hope, S	Mont...	.....	62,447
Horn-Silver, S. L.	Utah...	324,200	2,171,200
*Howell S. and Mg. Co.. G. S. L.	Ariz....	38,452	90,520
Idaho, G.	Cal	.....	150,642
*Independence, G. S.	Nev....	——	32,991
Iron Silver, S. L.	Colo....	.....	751,062
*Jocuistita, S.	Mex....	.....	‡258,959
*Kentuck, G. S.	Nev ...	1,454	16,866
*Lexington, S.	Mont...	112,147	856,703
*Little Pittsburg, S. L.	Colo....	12,414	54,505
*Marguerite, G.	Cal	3,034	65,594
*Martin White, G. S	Nev ..	——	136,317
Morning Star, S. D	Colo...	.....	84,428
*Moulton, G. S.	Mont...	.....	123,288
Mount Diablo	Nev ...	67,333	329,433
*Navajo, G. S.	"	——	411,642
*North Belle Isle.	"	——	2,153
Northern Belle, S.	"	27,947	474,987
*Ontario, S. L.	Utah...	191,288	1,400,544
*Oxford, G.	N. S....	4,734	45,265
*Phœnix, G	S. C...	.....	10,700
*Pinal Consolidated, S. L.	Ariz ...	.....	181,485
*Plymouth Consolidated, G	Cal ...	79,105	227,218
*Satemo, G.	N. S....	.....	2,500
*Silver Bow, G. S.	Mont....	25,616	203,947
*Silver Cord, G. S. L.	Colo....	.....	703,333
Silver King, S.	Ariz...	.....	367,802
Standard, G.	Cal	40,943	779,344
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah...	23,377	176,105
Syndicate, G.	Cal ..	7,957	46,385
Tintic M. and M. Co.	Utah...	3,920	29,116
*Tip Top, S.	Ariz....	.....	37,868
*Tombstone, G. S. L.	"	51,574	548,764
Wyoming Consolidated.	Cal	.....	31,541
Yellow Jacket, S	Nev....	.....	265,885
Total amount of shipments to date			$15,775,246

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended September 28th, as compiled from various sources, amounted to $254,111, as against $246,662, reported for the previous week. The receipts from January 1st, 1883, to date are $8,489,047.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended September 22d	$560,723
Corresponding week last year	25,884
Since January 1st, 1883	10,555,789
Corresponding period last year	43,996,801

Imports.

Week ended September 22d	$782,262
Corresponding week last year	40,124
Since January 1st, 1883	11,511,590
Corresponding period last year	2,707,936

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, reduced the bank's minimum rate for discount, from 3½ to 3 per cent. During the week, the bank gained £137,000 bullion, and the proportion of its reserve to its liabilities was raised from 46⅝ to 47⅝ per cent, against 39½ per cent at this date last year. September 27th, the bank made a further gain of £280,000 bullion on balance. The weekly statement of the Bank of France shows a gain of 1,225,000 francs gold and a loss of 1,600,000 francs silver.

METALS.

NEW YORK, Friday Evening, Sept. 28.

Copper.—The situation in this metal is practically unchanged. It is firmly held, and inquiries from abroad for small lots can not be filled. A few hundred thousand pounds have been placed at 15¾c. for Lake, and it would be impossible to get any copper for less, though on the other hand it should be noted that there are few buyers. Other kinds remain 14¼@14¾c.

England cables Chili Bars lower, namely, £62 15s. to-day.

Tin.—The arrivals of last week have been pretty well distributed on the trade in jobbing lots, and our market continues firm at 21½c. for spot Straits and Malacca, and 21¼c. for Australian, which is scarce. Banca is quoted 22c. England cables Straits to-day £95 7s. 6d.

Lead.—There has been a sale this week of 200 tons of Nevada lead at 4·30c., under special circumstances, however, as 100 tons of this favorite brand among our smaller consumers brought 4·37½c. Besides this, there have been jobbing sales at 4·32½c. for Common.

Messrs. John Wahl & Co., of St. Louis, wire to us as follows:

The market is a little easier. We quote sales of 600 tons of Refined at 4·03c. The demand is only moderate, and there is but little doing in Common, which we quote nominally 3·97½@4c.

From Chicago, Messrs. Everett & Post send us the following dispatch:

Business has been quiet and transactions limited in amount, with quotations at 4·05, 4·07½, and 4·10c. Buyers are apparently anxious to purchase, but do not want to pay more than the ruling figures. Sales will scarcely foot up to 500 tons.

Spelter.—The market continues firm at 4·45@4·50c.

Antimony.—There has been no change.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Sept. 28.

American Pig.—The market for pig for foundry purposes has been extremely dull. Makers profess to be unable to go any lower, and if the fall trade goes on at this very unsatisfactory rate, many will probably decide to blow out rather than go on exhausting their ore lands, etc. The blast-furnace men using anthracite as a fuel are very indignant at the fact that they are forced to pay such high prices for fuel. Labor is as low as it should be allowed to go in any case; ore is so cheap that many banks have stopped working; freights on raw material and finished product are a little lower this year than they were; and yet anthracite coal costs the furnacemen as much to-day as it did when iron was selling at $28. Furnacemen in the Lehigh Valley are paying $3.25 for their coal. They claim that, with every item in the cost reduced in some instances to the lowest limit, they are made to suffer from an artificial upholding of the price of coal. Coke is not available to more than a limited extent, the haul being too long from the Connellsville region. They urge that, if they are not assisted by a reasonable reduction in the cost of fuel, they will simply stop.

Transactions during the week have been on a very moderate scale. We quote No. 1 Foundry, $21.50@$23; No. 2, $19@$21, according to quality; and Gray Forge, $18.25@$19.50, all at tide-water. There have been sales of round lots of Bessemer Pig at $20, and Spiegeleisen is quiet at $30.25@$30.50 for 20 per cent. Low grades are dull at $25.

At the Exchange, the following transactions were recorded:

Monday, September 24th, 200 tons pig, No. 1, February, $21.37½; 200 tons carbon pig, No. 1, spot, $20; and Wednesday, 100 tons No. 1, December, sold at $20⅝; 500 tons No. 1, February, sold at $20⅝.

The sale of Carbon at $20 was attended by special circumstances. It was apparently made for effect at the Exchange, after attempts to place it on the trade failed.

Scotch Pig.—There is very little that is new to report. Freights have advanced to 8s. 6d.

We quote ex ship and to arrive: Coltness, $23.25@$23.50; Langloan, $23@$23.50; Summerlee, $22.50@$23; Dallmellington, $20.50@$21; Eglinton, $20@$20.50; and Glengarnock, $22@$22.50.

At the Exchange, the following lower cable quotations were received: Coltness, 57s. 3d.; Langloan, 57s.; Summerlee, 56s.; Gartsherrie, 55s.; Glengarnock, at Ardrossan, 54s.; and Eglinton, at Ardrossan, 47s. 6d.

Rails.—Business is very dull, and a number of the mills have no engagements beyond the first of December. It is likely that the most unfavorably situated will have to stop temporarily, unless orders come forward more liberally, and prices are maintained at the present quotation, $37@$37.50 at mill.

Old Rails.—There is very little doing at lower figures. We quote $22.50@$23 for Ts.

Scrap.—Scrap is dull at $22 ex ship.

Philadelphia. September 27.

Pig-Iron.—Another week has passed with comparatively few large transactions, but the usual number of inquiries. Negotiations which, it was thought, would be brought to a close last week, for large lots of forge iron, are most of them hanging fire, with no immediate probability of their resulting in business. Large transactions could be closed at any time, if brokers or makers would accept the offers in hand. The chief reason why so little is done is, that the demand for finished iron is irregular, and prices are declining. An upward tendency in the finished product or an improved demand will change the entire situation in pig-iron. A careful investigation of mill yards shows stocks generally light, and the same is true of the foundry yards. Eastern consumers are following the same cautious policy, and are waiting more for an upward tendency than for lower prices, which they admit are not likely to be reached. Sales were heard of this week in 100-ton lots at $17.50@$18, at which most of the business is done. Some of the standard brands are held at $18 and $18.50, and the stronger companies are determined to adhere to these prices, whether they sell or not, thinking that an accumulation of stocks will be the safer and wiser plan in the long run. Sales of Foundry have been made in small lots at $21.50 and $22, with an average of $20 for No. 2 Iron.

Foreign Irons.—From 7000 to 8000 tons of Bessemer have sold at $21, and a good deal more could be sold at $20.50. Spiegeleisen is under negotiation at $30@$30.37½, with $30.50 asked. Large sales could be made at $30. A few small lots were heard of at $30.50.

Blooms.—The usual business was done in blooms, and prices show a little weakening from the average quotations of $58 and $48 for charcoal and anthracite. Several bids are in, and buyers think that prices will weaken still further.

Muck Bars.—Muck bars have weakened to $33 in some cases, with $34 asked for the better makes. The demand has been moderate.

Merchant Iron.—The merchant iron market has been rather quiet, and mill owners report indifferent inquiry for delivery after November 1st; but a good deal of iron is contracted for, for delivery during October, and the output will be easily marketed up to the end of that month. Prices for large lots are 2@2·10c.; 2·10@2·20c. is asked for small lots, but the tendency is unfavorable to manufacturers. Common iron has been sold as low as 1·85c., but 1·90@2c. are the average figures.

Nails.—The largest transactions are in car-load lots at about $2.90@$2.70 offered; and with the threatened competition from the West, a downward tendency exists, aided by the falling off of the active demand which lasted all summer. Retail lots sell at $3.10@$3.15 in some cases. Jobbers are not buying heavily, though ready to do so when bottom prices have been reached.

Plate and Tank Iron.—Several inquiries have just come to hand for Plate and Tank for November delivery, and manufacturers are hopeful of obtaining better prices, especially for small lots. Large consumers are disposed to do business, if the desired concessions can be had. Average quotations are 2·40@2·50c. for Common Plate, with Shell, Flange, and Fire-Box at old figures.

Structural Iron.—No special points of interest have been developed this week. The general activity continues, and the negotiations which have been in progress are on the point of closing for heavy lots for delivery in November and December.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Sept. 22.		Sept. 24.		Sept. 25.		Sept. 26.		Sept. 27.		Sept. 28.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.			2.40		2.50	2.45			2.60		2.70		500
Amie Con., Co.	21	.20	.18		.14	.13	.16	.13	.17	.15	.16	.15	11,750
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.			.30										100
Belle Isle, Ne.					.60								100
Bodie Cons., Ca.					.18				.16				900
Breece, Co.													
Bulwer, Ca.			.18		.20								400
California, Ne.													
Cal. & Hecla, Mich.													
Carbonate Hill							.07		.06				700
Caribou Con., Co.											1.25		2,000
Chrysolite, Co.	1.30	1.25	1.25										
Cons. Va., Ne.													
Crown Point													
Deadwood-Terra, Dk.					.27	.25							300
Dunkin, Co.													485
Eureka Cons., Ne.	5.50	5.25	5.25		5.63		5.63						
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.	.08								.08				3,000
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.									.02				100
Green Mountain, Ca.													
Hale & Norcross, Ne.													
Hall-Anderson, N. S.	1.20		1.20		1.20		1.15		1.15		1.15	1.10	5,900
Hibernia, Co.													
Homestake, Dk.													
Horn-Silver, Ut.	7.00		7.00	6.88	7.00		7.00						975
Hukill, Co	.05		.07	.06	.07		.06						2,150
Independence, Ne.													
Iron Silver, Co.	3.05	3.00			3.20				3.20	3.15			1,570
La Plata, Co.													
Leadville C., Co.	.50				.44				.45	.42			725
Little Chief, Co.			.75		.66	.60	.6	.55	.56		.60	.57	6,700
Little Pittsburg, Co.	.63		.70						.64	.60			450
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.									3.00				50
Northern Belle, Ne.					5.63				5.63				75
North Belle Isle, Ne.											.45	.40	600
Ontario, Ut.													
Opair, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.									33.50				100
" Com., Ca.													
Rising Sun, Ca.			.02						.03				200
Robinson Cons., Co.	.43	.42	.41		.41		.41	.40	.40				5,500
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.			1.15				1.20						200
Sierra Nevada, Ne.	3 85		4.10				3.90						230
Silver King, Ar.													
Spring Valley, Ca.													
Standard, Ca.			5.75	5.63	5.63		5.75		5.75		6.00	5.75	570
Stormont, Ut.													
Tip Top, Ar													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Sept. 22.		Sept. 24.		Sept. 25.		Sept. 26.		Sept. 27.		Sept. 28		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H	L.	
Albion													
Alta													
Am. Flag, s.													
Barcelona, c.	.39	.35	.38		.37		.38		.37	.35	.35	.32	5,100
Bear Creek													
Bechtel Con., c.									.07				100
Belvidere													
Best & Belcher, c. s.													
Big Pittsburg, s. L.													
Bradshaw, s.					.25	.20	.23						1,800
Buckeye													
" pref.													
Bull-Domingo, s. L.													
Bye and Bye													
Calaveras, c.													
C'lav'r's W. & M. Co.													
Cal. S. H., c.													
Central Ariz'na, s.	.31	.30	.39	.35			.35						3,000
Cherokee, c.													
Chollar													
Climax, Co.			.12	.11									900
Cons. Imp'r'l, c. s.	.06	.04	.05		.05						.05		3,200
Crowell, c.													
Dahlonega, c.													
Decatur			.03	.02	.03	.02	.03		.03		.04	.03	12,600
Dunderberg													
Durango, c.	.05												100
Eastern Oregon	.46		.47		.47		.47		.47	.46	.46		9,500
Elko Cons.	.10				.10		.10				.09		3,300
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, c.													
Goodshaw, c.													
Granville, c.													
Harlem M. & M. Co.			1.25	1.10	1.00				.99				1,200
Hortense, s.			.09								.10		400
Imperial													
Lacrosse, c.													
Lucerne													
Mariposa Pref., c.													
" Com., c.													
Mexican, c. s.													
Miner Boy													
Mono													
North Standard, c.													
N. Horn-Silv'r, s. L.													
Pri'n't'l & Miller, s.			.11	.10	.10		.10		.09		.10		4,800
Parnell					.25								400
Quartz Creek													
Rappahannock, c.					.06		.06						1,200
Red Elephant, s.													
Ruby, of Arizona													
Silver Cliff, s.			.10										1,000
Sonora Con.	.28		.27	.26	.28	.27	.28				.28		7,500
South Bodie, c.													
South Bulwer, c.													
South Hite													
South Pacific													
State Line, 1 & 4, s.													
" Nos. 2 & 3, s.											.06		200
Sutro Tunnel			.20		.19		.19	.18			.25	.18	4,800
Taylor-Plumas													
Tioga													
Unadilla, s.					.02						.02		1,10
Union Cons., c. s.			4.75				4.90						16

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 46,030. Non-dividend shares sold, 61,860.

BOSTON MINING STOCKS.

	Sept. 21.		Sept. 22.		Sept. 24.		Sept. 25.		Sept. 26.		Sept. 27.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez									1.50				100
Amie			.21		.20						.16		600
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.			2.00		2.00	1.63			1.75		1.88		1,270
Bowman Sil	.08		.07		.07						.12		5,800
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	245	244½							245		245		30
Catalpa	.37½		.37½	.35					.35				1,300
Central Ariz													
Climax													
Co. Virginia					.50								200
Copper F'lls													
Copperop.													
Crescent	.12				.10								300
"Cusi"													
Decatur													
Deer Isle					.05								1,000
Denver City													
Douglas													
Dunican													
Dunkin	.27				.27						.27		500
Empire	.19	.16	.16								.19		2,300
Eureka Con.					5.50								20
Franklin	11.25				11.75	11.50	12.00				12.00		460
Gila County													
Harshaw													
Huron													
Independ'ce													
Indian Q'n.													
Little Pitts.													
Mammoth													
Mass. & N. M.	.06	.05	.05		.05						.04		5,700
Milton													
Napa					2.88								50
National													
North Belle													
Ontario													
Osceola													
Penn-Breck													
Pewable	3.00												325
Pine Tree											.10		1,000
Plymouth													
Quicks., com													
Quincy	55.00	54.50	55.00		55.00		54.75		54.00		54.75		256
Robinson					.42								100
San Pedro													
Sierra Nevada													
Sierra Grande													
Silver Islet							2.50				2.50		55
Silver King													
Simpson Gd													
Sonora													
Standard													
Sullivan	.92½	.90	.93	.80½	.90	.87½					.9)		2,55)
Sutro Tun.	.19										.19		300
Sycamore													
Twin Lead.													
Vizina													

PHILADELPHIA MINING STOCKS.

	Sept. 21.		Sept. 22.		Sept. 24.		Sept. 25.		Sept. 26.		Sept. 27.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.15	.14	.15		.17	.15	.16		.15	.14	.14	.13	22,300
Arizona So.	.20								.18				3,500
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.08	.07	.08								.10	.09	6,500
Comprom'e	.14	.12											600
Contention													
Con. Virg.													
Dauntless							.02				.02		1,300
Del Monte	.06										.06		4,000
Denver City	.09								.09				3,100
Eureka													
Girard													
Governor							.04		.05	.04	.04		11,000
Grand Uni'n					.03				.03				4,000
Green Mt.													
Gunnison	.27½				.27½	.25	.25		.25	.22	.20	.15	4,200
Homestake													
Horn Silver													
Iowa Gulch	.04	.03	.04		.04	.03	.04		.04		.04		60,400
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd			.07		.06				.06				6,700
Little Maud													
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Lincoln													
Mt. Sheridan													
National													
North'n B'l													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck			.12	.11	.10		.11	.10	.12	.11	.12	.11	20,100
Permanent													
Pizarro													
Pizarro Ex.							.02						1,100
Potosi													
Rara Avis									.18				200
Rara Avis E.	.10		.10		.10		.10		.09				12,700
Record													
Rico Pion'r													
Sierra Apac.	.18						.20		.25	.23	.25	.24	5,600
Sierra Be la.	.57½	.52½				.65	.60		.60				3,600
Sierra G'nde	1.17½	1.15	1.16		1.17½	1.12½	1.20	1.17½	1.20	1.17½	1.17½	1.15	14,950
Sierra Nev.													
Silver Cord							1.60		1.60		1.65		3,500
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l													
Tombstone							.80						100
Victor													
Yale Mt.													

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Steel Rails.—Quotations are given to-day at $37@$38, but business has been done at less, though particulars are withheld. Sales covering 20,000 tons have been heard of in the Pennsylvania mills in the past week.

Old Material.—$22.50 and $23 have been bid this week and $23.25@$23.50 asked. Bridge rails are quoted at $24. Several thousand tons are wanted.

Wrought Pipes and Tubes.—The demand for wrought pipes and tubes has been inactive this week, and heavier discounts can be had on large lots. Bids for several million pounds of cast pipe were made at 1·53c. per foot for 36-inch piping.

Scrap.—The yard men report moderate activity for the best scrap, and quote $24.50@$25. Inferior stuff is not wanted. Cargo lots, nominally, $23.50.

Pittsburg. September 26.

The depletion in the stocks of pig-iron which has been going on in the mills of the city for several months past has resulted in a movement on the part of consumers to cover for the next sixty to ninety days, and a number of large requirements have already been placed with that view. A number of offers have been made, some of them below current quotations. There is a general disposition to buy more freely, because of the fact that prices have reached the lowest possible limits, and for desirable irons the possibility of an upward tendency is admitted. The local furnaces are producing to full capacity, and are selling stocks as soon as made. Bridge Iron has sold freely at $17.50@$18; Extra Red Short, $19; Bessemer, $21.50; C. B. Charcoal, $32; Muck Bars, $33@$33.50. Offers have been made at $32.50 and $32.75. Bar Iron is held nominally at 2c., but assorted orders have been filled at 1·80c. Shipments have been made to the interior of the State, and sold at 2c. and less. Competition is increasing, and buyers are holding back, expecting that the surplus capacity will result in a still further reduction of prices. Mills working on specialties are coming out even, but the sales of plain bars are almost at cost. The expected restriction in the production of the 2500 nail mills in the West for one month will check the downward tendency which is in progress. Nails have sold under $2.70. Demand is not heavy, owing to this tendency. Wrought Pipes are 75 per cent off list; Tubes, 60 off. Old Rails are offered at $24.50. Offers have been made at $24. Sales are light.

November and December deliveries of steel rails can be had at $38. Inquiries for large lots are still coming to hand, but very little business results. The demand for merchant steel is said to be light, but the mills are working to nearly full capacity. Wrought Scrap is quoted at $21@$22 for Common, and $23 for Best.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Sept. 28.

Anthracite.

The slight improvement noted in the beginning of this week is showing indications of slackening up a little. The domestic sizes are the most active, as they generally are during this time of the year, and as the larger sizes are broken up to meet the demand, by some of the companies, broken coal, too, is in comparatively light supply and is stiffer. Egg and chestnut, however, are in over-supply. As these are pre-eminently manufacturing sizes, it is evident that they are held at too high a price. The anthracite operators are simply driving the trade into the arms of the bituminous coal miners. So far as our local market is concerned, there is every evidence that it may continue to worry along until the close of navigation puts a stop to shipments by water to many distant points. That our market will be unable to stand up under the flood of coal that will then come to it seems to be generally conceded, and New York interests will then strongly urge a restriction of work.

There has been the usual cry on the part of some for an advance of the circular, but even those who are usually the most urgent among the large companies to call for this quack remedy are not now in favor of it.

The manufacturers of anthracite pig-iron are growling about the high prices of coal which they must pay. They claim that their interests deserve some consideration.

Bituminous.

From Clearfield shippers, comes the usual autumn complaint of scarcity of cars; but with supplies of coal coming from the Cumberland region sufficient to cover current requirements, there seems little prospect of a material advance in prices, which still rule low. The Cumberland companies report an improvement in the demand, probably traceable to the above cause. They have also secured a contract for supplying the Fitchburg Railroad with 15,000 tons of coal.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended September 22d, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
). & H. Canal Co..	96,023	2,828,536	91,896	2,459,359
). L. & W. RR. Co.	103,035	3,527,739	116,034	3,203,752
Penna. Coal Co.....	33,796	1,026,007	38,244	985,198
L. V. RR. Co.....	49,211	1,005,019	19,336	898,269
P. & N. Y. RR. Co..	4,837	151,261	3,706	139,392
O. RR. of N. J.....	*	1,202,078	55,403	1,659,523
Penna. Canal Co....	17,818	334,832	14,438	352,751
North & West Br. RR.....	†	308,950	.....	.....
	304,720	10,384,422	339,057	9,698,244
Lehigh Region.				
L. V. RR. Co.....	112,349	3,541,079	112,848	3,395,950
C. RR. of N. J.....	*	1,126,889	56,511	1,575,287
S. H. & W. B. RR..	†	31,127	1,833	37,667
	112,349	4,699,095	171,192	5,008,904
Schuylkill Region.				
P. & R. RR. Co.....	300,116	6,456,909	172,563	4,789,018
Shamokin & Lykens Val.....	*	950,363	28,824	906,894
	300,116	7,007,272	201,387	5,695,912
Sullivan Region.				
St Line&Sul.RR.Co.	1,784	46,690	1,668	41,237
Total.....	718,969	22,137,479	713,304	20,444,997
Increase.....	.....	1,692,482	.....	.....
Decrease.....	.....	.....	.....	.....

* Included in tonnage of the Philadelphia & Reading Railroad. † Reports have not been received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878.....11,723,079 tons.
" " " " 1879.....18,589,681 "
" " " " 1880.....16,134,269 "
" " " " 1881.....19,891,642 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 616,250 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended September 22d:

	Week.	Year. 1883.	Year 1882.
Coal for shipment at Coal Port (Trenton)	2,513	84,380	67,107
Coal for shipment at South Amboy.....	10,558	552,489	601,920
Coal for distribution.....	20,059	581,055	519,870
Coal for company's use.....	3,429	115,111	92,829
Total.....	36,559	1,333,055	1,281,726
Increase.....	.....	51,309	.....
Decrease.....	.....	.....	.....

SUPPLIES.

CORDAGE.

The manufacturers of cordage have adopted a revised price-list, under date of the 23d inst., showing an advance of ¼ cent per pound on Manila. The following are the present prices, subject to the regular trade discount of 1 cent per pound:

	Cents per pound.
Manila Rope.	
1¼-inch cir. and upward	16
12 thread, or ⅜-inch diameter	16½
6 and 9 thread, or ¼ and 5-16-inch diameter	17
Hay rope, 2, 3, 4, or 5 thread	16
Bolt and point rope	17½
Tarred rope and lath yarn	15½
Stave, leather, and hop twine	16½
Sisal Rope.	
1¼-inch cir. and upward	10½
12 thread, or ⅜-inch diameter	11
6 and 9 thread, or ¼ and 5-16-inch diameter	11½
Hay rope, 2, 3, 4, or 5 thread	10½
Tarred rope and lath yarn	10
Russia Hemp.	
White rope	17
Tarred rope and ratlin	11
Spun yarn	10½
Bolt rope	18
Marline, houseline, rounding, and hambroline	15
Packing	16
American Hemp.	
White rope	18
Tarred rope and ratlin	12½
Spun yarn	12
Lath yarn	12½
Packing	17
Marline, houseline, rounding, and hambroline	16
Sash and bell cord	25@35

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to September 24th.

PORTS.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnson, South Amboy, Perth Amboy, and Weehawken.
Alexandria	.60	.....	.....
Annapolis	.....	.....	.....
Albany	.....	.....	.....
Baltimore	.50§	.....	.....
Bangor	1.25	.....	.....
Bath, Me	1.15@1.25	1.35	1.00
Beverly	1.20	.....	1.05
Boston, Mass	1.15@1.25	1.35	1.00
Bristol	1.15	.....	.....
Bridgeport, Conn.	.....	1.25	.65
Brooklyn	.....	2.20	.....
Cambridge, Mass.	1.20@1.25	.....	1.00‡
Cambridgeport	1.20@1.25	.....	1.00‡
Charleston, S. C.	.70@.75	1.00	.....
Charlestown	1.15@1.25	1.35	1.00
Chelsea	1.15@1.25	1.35	1.00
City Point	.....	.....	.....
Com. Pt., Mass.	1.25	.....	1.00
E. Boston	1.15@1.25	1.35	1.00
East Cambridge	1.20@1.25	.....	1.00‡
E. Gr'nwich, R. I.	1.15	.....	.85
Fall River	1.05@1.10	1.30	.80@.85
Galveston	2.75@3.00	3.00	.....
Gardiner, Me	.....	.....	.....
Georgetown, D.C.	.60	.....	.....
Gloucester	1.25	.....	.....
Hartford	.....	.....	.....
Hackensack	.....	.....	.....
Hudson	1.00§	.....	.....
Lynn	1.35@1.40	1.60	.....
Marblehead	.....	.....	.....
Medford	.....	.....	.....
Milliville, N. J.	.....	.....	.....
Milton	.....	.....	.....
Newark, N. J.	.....	1.35	.....
New Bedford	1.05@1.10	.....	.90
Newburyport	.....	1.65	1.15
New Haven	.....	1.25	.65
New London	.....	1.25	.70
New-Berne	.....	.....	.....
Newport	1.10	1.50	.80@.85
New York	.....	1.15	.....
Norfolk, Va	.60@.65	.....	.75@.80
Norwich	.....	.....	.65
Norwalk, Conn	.....	.....	.....
Pawtucket	.....	1.30	.....
Philadelphia	.....	.....	.....
Portland	1.00*	1.35	.....
Portsmouth, Va.	.60@.65	.....	.....
Portsmouth, N.H.	1.25	1.45	1.15
Providence	1.05@1.10	1.25	.80@.85
Quincy Point	.....	.....	.....
Richmond, Va	.85@.90	.....	.....
Rockland, Me	.....	1.40	.....
Rockport	1.50	1.40	.....
Roxbury, Mass.	1.15@1.25	1.40	.....
Saco	1.30¶	.....	.....
Sag Harbor	.....	.....	1.05
Salem, Mass.	1.15@1.40	.....	.....
Saugus	.....	.....	.....
Savannah	.....	1.25	.....
Somerset	.....	1.30	.85
Staten Island	.....	.....	.....
Trenton	.....	.....	.....
Troy	1.00§	.....	.....
Wareham	.....	.....	.....
Washington	.60	.....	.....
Weymouth	.....	.....	.....
Williamsbg, N.Y.	.....	1.20	.....
Wilmington, Del.	.....	.....	.....
Wilmington, N.C.	.....	1.10	.....
St. Thomas, W. I.	.....	.....	.....

* And discharging. † And discharging and towing. ‡ 3c. per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. ** Below bridge.
Tonnage ample. GEORGE W. JONES & Co.
BALTIMORE, Sept. 24, 1883.

The Production of Bituminous Coal for the week ended September 15th was as follows:
Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs	61,420	1,738,034
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	5,175	220,413
Broad Top Region, Pa.		
Huntingdon & Broad Top RR	4,360	130,751
East Broad Top	412	27,809
Clearfield Region, Pa.		
Snow Shoe	4,427	142,472
Tyrone and Clearfield	46,422	1,953,849
Alleghany Region, Pa.		
Pennsylvania RR	6,450	300,248
Pittsburg Region, Pa.		
West Penn RR	5,219	283,411
Southwest Penn. RR	2,301	75,219
Penn & Westmoreland gas-coal, Pa. RR	23,636	973,467
Pennsylvania RR	13 522	413,573
Total	173,344	6,279,247

Horsford's Acid Phosphate,
For Alcoholism.

DR. C. S. ELLIS, Wabash, Ind., says: "I prescribed it for a man who had used intoxicants to excess for fifteen years, but during the last two years has entirely abstained. He thinks the Acid Phosphate is of much benefit to him."

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THE ENGINEERING AND MINING JOURNAL

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CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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THE competition between the Colorado "mountain and valley" smelters is growing more severe, and those in the vicinity of Leadville are one by one ceasing to purchase new supplies of ore. They urge that the present freight on base bullion to Denver, $12 per ton, is too high, compared with the low charges on ore, $5 per ton. The advantages possessed by the works at Pueblo and Denver in the way of cheaper labor and cheaper fuel seem to make the transfer of the bulk of the business to the valley works only a question of time.

THE protracted dullness in pig-iron, at a season which should be one of the busiest of the year, has culminated in an open cut in prices. Our weekly market reports have closely reflected the growing disappointment felt by the trade during the month of September, which no attempts at glossing over could hide. As usual, the managers of the Thomas Iron Company have taken the lead. In the past, their course has been the butt of sharp criticism by other makers, who were doing quietly what Mr. B. G. CLARKE was doing openly. The experience during the past year has proved the wisdom of this course, and the trade now generally acknowledges it. The temptation is great on the part to furnace-men to pile up iron, in order to avoid the cost of blowing out, and the future expenditure of blowing in again. This protracts the period of depression and makes a crisis, when it does come, all the more disastrous. Prompt reductions, openly made, give confidence to the buyer and precipitate a remedy by forcing the weaker producers to stop.

A VERY serious accident occurred during the meeting of the Iron and Steel Institute at Middlesborough, which painfully illustrates the danger incident to the visit of a large number of persons to industrial establishments. A number of members of the Institute visited the Northeastern Steel-Works before the time appointed for their reception. When on the platform, on a level with the cupola top, one of the ladle-buggies filled with molten metal stuck fast as it was pushed by a locomotive. The engineer backed up and tried to force the buggy over the obstruction by running against it. The shock broke the clutch, and the ladder began to swing around, slowly emptying its contents on the platform in the direction in which the visitors and a number of men were standing. All of them were covered with a spray of molten metal, a number were more or less injured, and one gentleman, Mr. SAMUEL DAVISON, of the Horbury Bridge Iron-Works, near Wakefield, was so seriously burnt that he expired a few hours afterward. While none of the visitors was directly responsible for the accident, their presence possibly might have had something to do with it indirectly. It is certain that, in a mill, the visit by a large number of strangers increases the danger of accidents. Often, unconsciously and unintentionally, they stand in the way of the men, whose attention is only too often diverted from their work, and who frequently take extra risks in order to make a special show of activity. We have repeatedly observed instances, too, where the visitors unconsciously, placed themselves in positions of danger. The gentlemen who act as guides to their visitors can not watch personally over the safety of all, especially as there are generally, in every party of the kind, a number of persons who prefer to ramble off by themselves.

THE UTILIZATION OF THE WASTE PRODUCTS IN COKING.

Probably no subject affecting alike the coal and iron interests has deservedly attracted so much attention as the utilization of the waste products in coking. The developments during the current year have advanced the question far beyond the preliminary stage when the principal amount of work done is to compile appalling figures of the loss to nations by the failure or neglect of their coke-makers to gather the oil, tar, and ammonia escaping in the gases issuing from their ovens. It is now generally admitted that "there is something in it," and all efforts are now directed to ascertaining how much. When, some time since, we presented to our readers the leading designs now before the technical public, we repeatedly had occasion to remark how comparatively meager were the actual figures of results obtained on a working scale, and how striking was the absence of trustworthy testimony on some vital points. The accumulation of experience on such a subject is, of course, slow, but the facts brought out at the Middlesborough meeting of the Iron and Steel Institute prove that those engaged in working out this important subject can not be accused of inactivity. Two papers were read before the society, one by Mr. ROBERT DIXON, of Peases's West, Darlington, on the Simon-Carvès ovens, and a second by Mr. J. JAMESON, of Newcastle-upon-Tyne, on his plan. Both gave the results of actual working and both were subjected to a close criticism, in a long and animated discussion, in which many points of interest were brought out. Together, papers and discussion would fill an entire issue of the ENGINEERING AND MINING JOURNAL, and we must therefore content ourselves with a summary of the evidence presented.

Turning first to the working results of the Simon-Carvès system at Peases's West, with a coke plant of 25 ovens, Mr. DIXON reports that in 215 working days they coked 7042 tons of coal, produced 5424 tons of coke, a yield of 77·03 per cent, and furnished 43,164 gallons of tar and 195,076 gallons of ammoniacal liquor, or 6·12 gallons of tar and 27·70 gallons of liquor, from 6 to 7 degrees Twaddell, per ton of coal. Against a claimed increase of 15 per cent in the yield of coke over bee-hive ovens and the value of the by-products, stands an extra cost for labor, inclusive of that of collecting the latter, of 1s. 3·31d. per ton of coke, the total cost being 2s. 3·96d. per ton. The average value of the tar and the ammoniacal liquor is placed at 3d. and 1d., respectively, per ton, making the returns from this source £1351.

The Jameson system has been only used on an experimental scale apparently, at Bell Brothers Page Bank colliery at Fellwig, and at the Weardah Iron and Coal Company's colliery at Tudhoe Grange. It will be remembered that it is merely a modification of the ordinary bee-hive oven. The most efficient plant is that at Fellwig, where the coal that yielded at its best 5·12 gallons of oil and 1 pound of ammonia per ton of coke gave on an average 5·63 gallons of oil and 3·16 pounds of ammonia, the yield of coke being 67·5 and 68·5 per cent in both cases, in excess of the returns from ovens before being converted into the Jameson type.

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Mr. JAMESON estimates the profits from a plant of 100 ovens, coking 1100 tons of coal per week, and yielding 5 gallons of oil per ton at 2½d., and 3 pounds of sulphate of ammonia, valued at 13s. per cwt., at £3536 per annum, on an outlay for the conversion of 100 ovens of £1750. It will be noticed that while, in the former system, the aim is to make tar, the object of those working the latter is to produce oils.

The Simon-Carvès ovens labor under the disadvantage of being more costly, the actual outlay for the first battery of twenty-five being £226 per oven, which would probably be reduced to £180 in building a set of 100 ovens. The capital required for putting up twenty-five 11-foot ordinary bee-hive ovens is stated to be £58 per oven, while the cost of converting the latter into Jameson ovens is given as from £17 to £18 per oven. Other things being equal, the Jameson oven, or the earlier Aitken oven, differing from it only in certain details, would have by far the advantage. So far as the values of the by-products are concerned, they are not directly comparable, because of the difference in the character of one of them and the absence of a definite statement in the case of the Simon-Carvès oven concerning the amount of ammonia in the liquor.

Turning to the experience had in working the different ovens, it is reported that, in the Simon-Carvès system, there in the danger of pitch collecting in the gas mains, which Mr. DIXON claims to have overcome. It is proposed to heat the air for burning the gas for coking in a "recuperator," fired with the waste gas after the extraction of the liquid by-products. This system, by increasing the temperature of coking, will, it is argued, make the yield of coke larger still, and reduce the time of coking from 72 to 48 hours. It is now in use at Bessèges, at the coke-works of the Terre Noire Company. It was found, too, that the form of the floor of the Simon-Carvès oven was not adapted to Durham coal, and a new plant at the Peases's West works will be modified in this respect.

The Jameson system has also had its troubles, some of which appear to be inherent in the design. Mr. JAMESON extracts the gases from the distillation of the coal by applying suction at the bottom of the charge. He himself says:

"It is clearly possible by excessive suction to diminish the yield of coke by driving air through the charge and so burning it; and it is as clearly possible by too slight suction to make a recovery of products of almost no value; but the range between these limits is very wide, and by due proportioning of the suction in reference to the circumstances of the case, it is possible to effect a large recovery of oil and ammonia, with a full yield of coke of the highest quality. In this regulation of suction lies the whole secret of the success of the process; and doubtless, to insufficient attention to this point are due in large measure the varying results which have occasionally been obtained.

"Sometimes differences in yield of products are observed with the same coal in different ovens, and sometimes even with the same coal in the same oven; and it may be regarded as the one essential requisite to obtain the best results, that the process be conducted (in regard to the amount of suction) alike in accordance with the quantity of coal treated, the peculiar character of the coal, the progress of ignition, the shape of the oven, the amount of chimney draught pulling in the opposite direction when the oven is more or less closed, and perhaps other circumstances as well.

"The necessity for the observance of the conditions last named will be apparent at a glance. In regard to the quantity of coal contained in the oven, and its depth and the progress of ignition, it is manifest that under various and varying circumstances a mass of closely packed coal is interposed between the measured suction in the oven bottom and the stratum of coal in which the gas is forming, and that, to produce an equal suction at this point, the applied suction outside should vary in the ratio of the resistance of the interposed mass of coal. The character of the coal and its condition, whether ground or otherwise, also of course affects this, and the chimney draught is of much importance. In regard to the latter, there can be no doubt that at the early stages of the coking operation, while there is access of air over the charge, the actual suction due to the chimney is diminished by that access of air; but when the oven is nearly or entirely closed, the pull of the chimney is thereby increased, and therefore increased suction externally is required to produce an equal effect. With a single oven, worked by a blower of its own, it is of course easy to regulate the suction as may be desired; but with a range of ovens exhausted through one main pipe, it has not been found easy. In order to avoid suction much in excess of the requirements in some ovens in a range, it has been usual to fix the suction for the whole range at much less than would be advantageous for other ovens, and to work at a mean, which thus sacrifices efficiency in two ways. Another disadvantage to the process has arisen from the fact that, even if the speed of the blower be kept uniform (which is not always practicable), the shutting off more or less of any ovens connected with it, which may have become coked throughout, causes a variation in the pull by the blower, and the coke-maker, with this in view, usually errs upon the side of too little suction. To obviate the difficulty stated, it was proposed to work ranges of ovens with several main pipes exhausted to different degrees, and to one or other of which each oven could be connected in turn through a sluice-valve, so as to give different suction at stated times during the progress of the coking; but the increased expense involved has prevented the application of this plan. By a recent improvement, however, the suction of the blower has been made uniform automatically, independently (within limits) both of the speed of revolution and the number of ovens connected to it; and with a single range of pipes, the suction to each oven can now be varied and adjusted as efficiently and as simply as if several ranges of pipes were used."

It appears, from remarks made by Mr. JAMESON during the discussion, that this improvement consists merely in providing the suction pipes of every oven with valves, the suction being diminished gradually as the process of coking continued toward its end.

The evidence is conflicting on the principal point, so far as American coke-makers and iron-masters are concerned, the question whether the quality of the coke made in ovens from which the products of distillation are gathered suffers. As to the increase in the yield claimed by the Simon-Carvès oven, as by all ovens of the Belgian type, there is some doubt, as the amount of water in the coke was not given, though stated to be about the same as in the coal from which it had been made. The coke from the Simon-Carvès ovens is conceded to be dense and heavy, without the strong luster of the product of the ordinary bee-hive. Experience in this country, at least so far as it refers to the Connellsville coal, is against the Belgian oven, so far as iron smelting is concerned. There seems little doubt that this inferiority, which is certainly not imaginary, depends entirely upon the structure of the coke. Mr. G. E. STEAD, of Middlesborough, the well-known metallurgical chemist, stated, in the discussion following the papers, that he had tested chemically, the coke made in the bee-hive and in the Simon-Carvès ovens, to see whether there was not a greater proportion of volatile hydrocarbons left in the coke from the latter. He reports that the difference was extremely small, being about one per cent in the latter to from one half to three quarters of one per cent in the former. From a chemical point of view, he therefore declared them practically the same. The burden of proof lies with the makers of the denser fuel. If they can show that, other things being equal, the dense fuel will do as good work in the blast-furnace as the standard product of the bee-hive, the Simon-Carvès and other ovens of that type will receive recognition in the great Durham District in England, as well as in the Connellsville region in this country. Mr. THOMPSON, the manager of Bell Brothers, Clarence Works, spoke in the most emphatic way against it. He stated that he had used 300 tons of the Simon-Carvès coke, and although he started by reducing his burden by 5 per cent, the grade went down to Forge 4, and he came to the conclusion that, if they had gone on another week with the same fuel, there would have been a difference of 12 per cent to get the same quality of pig which they were producing before using it. The maker of the coke, Mr. DAVID DALE, on the other hand, explained that the fuel used during the experiment at the Clarence Works had been exposed to snow and sleet for a long time, and that it was therefore exceptionally wet. At the works of the president of the Institute, Mr. B. SAMUELSON, the new coke did as well as bee-hive coke.

The coke from the Jameson oven is generally conceded to be the same in appearance, and in the furnace it proved to work as well as ordinary bee-hive coke. Thus far, we can not escape the conclusion that the Simon-Carvès oven labors under the disadvantage of producing a fuel that is not as well adapted to the blast-furnace process, ton for ton, as the bee-hive coke. Whether the increased yield, due allowance being made for any larger quantity of water in it, will fully or more than compensate for any decrease of efficiency due to its structure, remains to be seen. It is certain that the Jameson and Aitken systems, with their slight outlay for alterations of existing plant, and with the absence of any appreciably injurious effect upon the quality of the fuel, will be more attractive to American coke producers and more acceptable to our iron-masters.

Here it may be well to call the attention of English metallurgists to a paper read by Mr. F. P. DEWEY, of Washington, before the American Institute of Mining Engineers, in which he gives his methods for determining the porosity and specific gravity of coke, and the results of a series of tests on cokes from Connellsville, West Virginia, Tennessee, Colorado, and Ohio.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Debris Controversy Boiled Down.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Woodruff *vs.* North Bloomfield Mining Company *et al.* is the title of a case pending in the Circuit Court of the United States for this State, which involves the right to mine by any method, although the defendants are sued as hydraulic miners. As it affects the prosperity of thousands of people and the value of many million dollars' worth of property, I shall endeavor to present impartially both sides of the controversy, and for convenience will suppose both parties presenting their case.

Plaintiff (representing the owners of lands and town lots near the valley-rivers): You are pursuing an unlawful occupation, whereby you have covered with mining *débris* thousands of acres of productive lands, and threaten destruction and damage to other lands, and to structures erected in towns, the safety of which is imperiled by your operations. You are filling the navigable streams of the Sacramento Valley with sediment, impeding navigation and causing us great expense in the erection and maintenance of levees for protection from the floods which result from the filling of the rivers during periods of high water; and you are injuring the bay of San Francisco. The continuance of your operations will be detrimental to the best interests of the people of the State, and fatal to the prosperity of hundreds of farmers owning lands near the valley-rivers. Your business is a public nuisance, and we ask that you be perpetually enjoined from the further use of water as an agency in removing dirt, and from the sale of water to others for such a purpose.

Defendant (representing the mining interest): We are engaged in a legitimate and lawful business, sanctioned by special laws of the United States, and by custom and usage for more than thirty years, whereby we have acquired an easement and prescriptive right. We have purchased our lands from the United States government as mineral lands, and paid for them double the price of agricultural lands, with the full knowledge on the part of the government of the method to be pursued in extracting the gold, as is apparent by the inspection of the heading and vignettes of United States mineral patents, representing hydraulic mining as at pres-

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ent prosecuted. Confiding in the validity of our title and easement or franchise, we have expended many millions of dollars in driving long tunnels to tap our auriferous deposits, and in building reservoirs and digging canals to convey water to our mineral lands. In the prosecution of these works, populous communities have grown up; and thousands are dependent upon our industry. We have added to the metallic wealth of the world nearly 1200 millions of dollars, and, if undisturbed, will continue to add thereto at the average rate of $18,000,000 per annum for an indefinite period, estimated at not less than one hundred years. Gold is the great lubricator of commerce. In the present age of progress, it purchases all necessaries; and the nation which produces it can want for nothing. Our country is the great storehouse of gold; our auriferous ancient rivers are the only known large deposits of the metal, and these mines are the only available source of large production. The equities of our tenure of lands and public policy alike forbid suppression of our business. The breaking down of dirt by projected water is an incident of our business, without which it can not be pursued. The mountain cañons are the natural receptacle of the material washed from the mines. In them, the heavier or coarser matter becomes impacted near the mines, the lighter going gradually downward, but susceptible of being restrained by dams. You have endangered your towns in periods of high water by a defective and unscientific system of levees, and you have obstructed the efforts of the government to protect the navigable rivers by measures recommended by government engineers. The bay or harbor of San Francisco has in no manner been affected by our operations. We ask that your bill be dismissed.

The above is substantially the case to be presented to the Circuit Court of the United States, and thence appealed to the Supreme Court; for it is admitted that the losing party will carry the case to the final court. The taking of the testimony had been in progress on September 1st more than ninety days, during which some 210 witnesses had been examined. The testimony so far covers more than 20,000 pages of two hundred and fifty words each.

JUSTITIA.

SAN FRANCISCO, Sept. 20.

REMARKS ABOUT LEAD-SILVER BULLION SMELTING IN THE WEST.

Written for the Engineering and Mining Journal by Carl Henrich.

The object of lead-silver bullion smelting in the West is the extraction of lead and silver combined from the argentiferous lead and dry ores. The lead takes the same *rôle* in smelting which the mercury takes in the amalgamation or "stamp-mill" process, only that the lead is generally not used in its metallic state, but in the form of its various ores. Sometimes metallic lead in the form of base bullion has been used, when lead ores were scarce; but doing this has proved faulty, a large loss of lead and silver being the invariable result. Lead-silver smelting consists in the proper mixing of the different argentiferous lead and dry ores, the addition of the necessary fluxes, and the smelting of all this in the proper furnaces with the proper fuel.

There may be some hearths or reverberatories in the West for lead-silver smelting. If there are, I do not know of them, and can not say any thing about them. I shall restrict my remarks to the smelting in blast-furnaces, and shall consider the best smelting mixture to be made under different conditions, the best style of furnace adapted to the smelting of the charges, the quantity and quality of the fuel to be used, the best and most serviceable fluxes, the blast-pressure and amount of blast employed for the different fuels and furnaces, the impurities of the ores and their treatment, and the flue-dust and its treatment.

In making these remarks, I shall simply give the results of my experience and experiments in smelting, together with some conclusions I have arrived at, but without going too much into details. I shall not advance any theories, except those which I have actually tested and found to work correctly in practice.

In making a charge, that is, the right mixture of ore and flux, we want a certain per cent of lead as a minimum in the charge. With pure ores, containing no zinc, arsenic, or antimony, we may go as low as 8 per cent of lead in the charge; while with ores containing the above impurities in appreciable quantities, the percentage of lead in the charge should not be less than 14 per cent. Then, if not absolutely forced to do so, we should not make a higher grade bullion than one containing one per cent silver, or about 300 ounces to the ton. Higher grade bullion will lead to larger losses of silver, while, with not over half of one per cent silver, or 145 ounces to the ton, in the resulting bullion, the results in good smelting will agree very closely with the assay results of the ores, and with good and pure ores will even surpass the assay results of the ore a trifle. With these considerations, it remains for us to find a mixture of these different ores which will require as little flux as possible, a mixture which will flux itself, if possible. It has been the general custom of metallurgists in the West to find some slag which would work well in their furnace, and to adjust the mixture of the ores and fluxes to the requirements of this slag. This method is a very convenient one, and will, as a rule, give good results so far as making a slag free from lead and silver is concerned. Whether this method is always conducive to the best or even to good financial results, is another and altogether different question.

Slags are silicates, and it is unnecessary here to explain the difference and the characteristics of sub-silicates, singulo-silicates, and bisilicates. It is sufficient to point out the fact that singulo-silicates contain twice as much, and bisilicates four times as much silica to the same amount of bases as the sub-silicates. It is claimed almost universally that a singulo-silicate as slag is an essential factor in good lead smelting. And it has further been claimed that, of all singulo-silicates, that one will be the best in which the ratio of ferrous oxide (FeO) to calcic oxide (CaO) is approximatively as 2 : 1, or as

$$6FeO : 4CaO.$$

In smelting pure ores, containing no undesirable ingredients, such as arsenic, antimony, or zinc, there is no doubt that such a slag will give splendid metallurgical results, especially if the precaution is observed to keep the percentage of silica a little higher than the bases would strictly need to form a singulo-silicate. This slag is easily fusible, requires little fuel and blast, and, with good ores, will keep the furnace open. But from an economical stand-point, it is, even with good ores, not always desirable to make this slag. In case we have to deal, as is frequently the case, with very siliceous ores and siliceous iron and lime fluxes, an attempt to make this slag would often result in using a disproportionate amount of flux, in lowering the lead contents of the charge below the desirable minimum, and in making smelting an altogether unprofitable business.

Now the question arises: Is it necessary in lead smelting to make a singulo-silicate slag? I answer No; we can obtain just as good metallurgical results and just as clean slags by making higher siliceous slags—slags forming mixtures of singulo and bisilicates, or being even true bi-silicates, if we only construct the right furnaces to do it in, use the proper fuel and blast, and do not attempt to make a bisilicate slag in furnaces constructed for the formation of a singulo-silicate slag. Bisilicate slags, or slags which are a mixture of bisilicate and singulo-silicate, demand a higher furnace and a higher temperature in the smelting zone of the furnace, without necessarily requiring a larger amount of fuel. The making of such higher grade silicate enables us to smelt profitably ore mixtures which we should be totally unable to smelt if we attempted to make singulo-silicate slag.

The temperature at which a slag forms or smelts will be the approximate temperature of the smelting zone of the furnace in which the slag is made. This is obvious. No matter how high a temperature we might be able to get by using a certain kind of fuel and pressure of blast, as soon as the temperature rises to the point at which the slag is formed, this slag will run down in liquid form in the space of the furnace (from 11 to 13 inches high) between the lead-bath of the crucible and the tuyeres, and colder yet unmolten material will take its place. No matter, as a rule, whether other products of a furnace, like matte, speiss, even metallic iron, have different formation or smelting temperatures, their temperatures will very soon be either raised or lowered to the neighborhood of the temperature of the liquid slag, because the slag forms as a rule by far the larger bulk of the molten products of the furnace. The temperature at which a slag first forms, I have no doubt, is higher than the temperature at which the already formed slag will be remelted.

This fact that the formation temperature of the slag is also the approximate temperature of the furnace, above which temperature no increase in the fuel or blast-pressure will be able to raise it, has not received enough consideration in ore smelting. Most speisses, for instance, require for their fusion a higher temperature than that of the commonly made singulo-silicate slags. "Hinc illæ lacrimæ"—therefore these speiss-sows.

Unfortunately, we have very few reliable statements of the different temperatures necessary to the formation and melting of the different silicates and other furnace products. But we do know that higher slags containing percentages of silica, as a rule, are hotter than the singulo-silicate slags. It will be desirable and advisable on this account to make a higher silicate, when we have to deal with an ore-forming speiss.

What kind of slag to make will depend on local circumstances and on calculations and experiments in each separate case. It will be a severe test and show the ability of the metallurgist, to make the right slag in the right place, and not try to make one so-called standard slag do the work in all cases, and say where this slag will not work lead smelting will be a failure. If the furnaces commonly built at present will not do for the slag which he will have to make, then, to achieve success, the metallurgist ought to be able to design and build a furnace which will do the work. One great factor of success in smelting is, to use as little flux with the ores as possible. This will also reduce the cost of fuel necessary for smelting the same amount of ore. It generally costs more to smelt a ton of flux than it costs to smelt a ton of ore.

The form of the blast-furnace used in lead-silver smelting ought to depend upon the quantity of ore to be treated and upon the nature of the most desirable and profitable slag to be made. For smelting small quantities of ore, the circular water-jacket furnace of not over 66 inches diameter will be the most convenient, and as good as any. A furnace designed for more siliceous ores and slag might have a diameter of 42 inches; but even with 2½-inch mercury pressure of blast, I should not advise any further increase in diameter, as the blast will then not reach the center of the furnace in a sufficiently effective manner. Furnaces for larger consumption of ore ought to be made oblong, with the tuyeres at the long sides, and of a width of from 32 to 36 inches at the tuyeres. I should prefer 32 inches for furnaces not over 11 feet high above the tuyeres. The length varies with the amount of ore to be put through a furnace. The amount of charge smelted with 2-inch blast pressure, coke, and ten 3-inch tuyeres will constitute as much as a single set of furnace hands will be able to handle with twelve-hour shifts. The hight of the furnace is determined by the rule to keep the mouth of the furnace cool. Therefore, if we smelt with a higher blast pressure, we want to increase the hight of the furnace, else we shall get the mouth of the furnace blazing; and this will lead to a great loss in lead and silver by volatilization, which forms the kind of flue-dust hardest to condense.

More siliceous slags will require a higher furnace. The general hight at present is from 10 to 12 feet from the tuyeres to the feed-door. For siliceous ores, the hight ought to range from 14 to 18 and 20 feet. Every blast-furnace ought to be provided with a proper dust-chamber, or at least with a flue leading to a common chamber, where many furnaces are used. According to the experiments made at Ems, and described by Professor Egleston, as much surface as possible ought to be given in these dust-chambers, which may be done in a comparatively limited space by hanging in numerous sheets of iron in a vertical position.

The best fuel, and almost the only one fit to use in the West, is coke. Charcoal made from the local light woods, as pine, aspen, or cottonwood, is hardly worth putting into the furnace, and is doubtless put into many furnaces more from old prejudice than for any real benefit which the furnace derives from it. The pifion charcoal is good, if it can be got burnt thoroughly, which generally is not the case, a large amount of bitumen being kept back in it. Mesquite wood makes a splendid charcoal, but is hard to get in large enough pieces. Fine charcoal is not worth any thing for smelting, and it is of more benefit to the furnace to keep it out than to put it in. It will be found best generally to smelt with coke alone, using only very little, and only good charcoal as a sprinkling along the walls of the furnace. Good fuel ought to carry from 7 to 9 times its weight of charge. At least, I have found no difficulty in smelting with this amount of fuel even very refractory ores. This would

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be from 11 to 14 per cent of fuel. Fourteen per cent of good fuel, like coke (Trinidad or El Moro with 22 per cent ash), ought to be enough for any charge, after deducting the lead contained in the charge from the weight of it. For instance, if we have a charge of 1200 pounds with 150 pounds lead contained therein: $(1200 - 150) \times \cdot 14 = 147$ pounds of good fuel = 130 pounds coke and 17 pounds good charcoal, which ought to be sufficient for smelting that charge. Where good charcoal as described above (pifion or mesquite) can not be got, it will be best to use coke alone. Of course, there may be places where neither good charcoal nor coke can be had. The best thing to do in such an emergency will be to try quite low and small furnaces, in which the weight will not be very heavy on the soft coal. It will be at least a very unsatisfactory and primitive smelting, and the waste products will afterward form the basis of renewed metallurgical treatment.

The blast will vary according to the kind of fuel used and the hight of the furnace, and it will be a safe rule to give as much blast as possible without getting the top or mouth of the furnace in a blaze. The blast generally used at present varies from half an inch to 1¾ inches mercury.

The impurities most frequently met with in the ores are zinc, arsenic, and antimony. About the proper treatment of zinciferous lead ores, I have almost nothing to say. I have never had any trouble on account of the zinc, but I have never smelted charges with more than 5 per cent of zinc in the charge. I smelted such charges with coke alone, and with a slag between a singulo and bisilicate, the ratio of oxygen being as 4 : 3 and 3 : 2. The only difficulty which showed itself was a rapidly growing accretion at the upper walls of the furnace, diminishing seriously the clear section for the passage of the charges. At first, I thought this accretion to consist mainly of zinc oxide and sulphide, but I found it afterward to be nearly pure artificial galena, with only about 2 per cent of zinc. But I always noticed a faster growth of these accretions during the presence of zinc ore in the furnace. The slag only contained traces of zinc, and most of the zinc doubtless went up the chimney, as the bluish-white zinc color of the smoke showed. With the zinc went also considerable silver.

Arsenic and antimony in the ore will go partially into the bullion, to which they give a very white and clean appearance, easily recognized. But the largest part of the arsenic and the antimony combine with iron and form speiss varying in composition. I always allow one and a half parts of iron to one part of arsenic, which would correspond to Fe_4As. I do not find any difficulty in keeping the furnace clear of speiss-sows, by simply maintaining a hot temperature in the furnace, which can only be done by making a slag which requires for its formation a higher heat.

Formerly in Leadville, I endeavored, like most other smelters, to make a singulo-silicate slag, and with this slag, as soon as I got arsenious ores, I was sure to get a speiss-crust in the furnace. This crust, however thin at first, cooled the lead in the crucible, as it kept it from contact with the hot slag, and the speiss-crust grew gradually thicker, until it grew into a formidable sow and necessitated the blowing out of the furnace.

Acting on the prescription of metallurgical hand-books, that the speisses of the composition Fe_4As, Fe_6As, Fe_7As, etc., were more easily fusible than those containing less iron, I applied, like others, metallic iron, especially old castings, as a remedy. The iron melted down well, but I never succeeded in removing a speiss-crust by these means, and I have yet to learn of the first speiss-sow removed in that way. I have for this reason grown skeptical in regard to the easier fusing of these more ferrugineous speisses. The only safe way to deal with speisses in the blast-furnace, according to my experience, is to keep the furnace hotter than a singulo silicate slag will make it. As speisses carry away considerable silver and gold, it will be prudent to make as little speiss as possible, that is, to use for one part of arsenic as little iron as possible. The speiss Fe_4As will be found to work very well with a slag of the oxygen ratios 4 : 3 or 3 : 2, the latter if there is a large amount of speiss forming in the furnace.

It has been almost everywhere the custom to mix the flue-dust with burnt lime and water to a kind of mortar. This was left to harden in the air, either in heaps or in the form of bricks. This is a very unsatisfactory proceeding, as, when put in the furnace, this mass almost immediately crumbles to a fine powder, only to be, to a large percentage, converted again into flue-dust and part of it probably blown out through the chimney. As this flue-dust contains a large amount of fine coal and bitumen, and as, besides this coal, there will be found in it a large amount of arsenic, antimony, zinc, and other undesirable volatile substances, it might be a good plan to burn a large pile of it over, and possibly thereby sinter the dust together, besides getting rid of some undesirable elements in it. If burning over will not sinter the dust enough to use it in the furnace, it ought to be slagged in a reverberatory furnace, either by itself, or together, with some suitable flux (powdered lead-slag, for instance), before it is put into the furnace again.

A proper regard to all these different considerations is necessary to a successful smelting of lead-silver bullion in the West. The one factor, however, on which financial success mainly depends is to smelt any different given ore mixture with as small a quantity of flux as possible. Doing this, we shall lower the cost of treatment of the ores; for by diminishing the flux used, we shall increase the ore used at the same time. In this way, we shall expend less labor, less flux, and less fuel—the three main items of expense—on each single ton of ore. But we can only use a minimum of flux, if, instead of adjusting our smelting mixture to our slag, as is mostly done now, we adjust the slag we want to make to the requirements of the ore mixture which we have to smelt. To show that we are able to do this was the object of the above remarks. It may be more convenient to follow the first method. It will be surely more profitable, and also metallurgically more correct, to follow the second method.

DENVER, COLO., Sept. 11.

IRON WATCHES.—Messrs. Crowther Brothers & Co., of Kidderminster, in order to prove the malleability and ductility of their iron, have constructed a watch entirely of iron, which keeps excellent time. Claudius Saunier, on reporting this fact in the *Revue Chronométrique*, adds: There is nothing new under the sun. We have a watch upon which is engraved the date of 1504, and in which all the wheels and pinions are made of iron.

A LETTER FROM MEXICO—EL PASO.

Special Correspondence of the Engineering and Mining Journal.

The seeker after mines in Mexico, if he does not always find what he is looking for, is at any rate rewarded by a taste of travel so altogether novel that he suffers less disappointment than he does when returning with an empty game-bag from a fruitless hunt in our own West. The railroads now building will soon put the principal cities north of the capital within rapid reach of one another; but even when they are completed, saddle-horses and pack-train will still be indispensable to reach most off-lying localities. The two principal cities in North Central Mexico are Chihuahua and Durango, capitals of adjacent States; and yet there is no public vehicle plying between them. The Central Railroad will next year supply a passage, but meanwhile a composite mode of conveyance must be resorted to by rail to Jimenes, by coach to Parral, and by private ambulance or horseback to destination, unless a conveyance can be found in Jimenes for Durango directly. Such being the absence of facilities now between two such important centers, it is certain that for many a day, even after the impulse of railroads has been felt, conveyance by quadruped will still be the only one available.

Some hints therefore on the subject of travel may not be amiss. When a journey can be completed by coach, by all means take the coach. It is not more uncomfortable than the average Concord coach, which at best is designed, one would think, by builders who had never seen a human being, so utterly unconformable are all the curves to the curves of our bodies. The clumsy vehicle is drawn by a cavalcade of horses, mules, or donkeys, strung together by dilapidated harness, itself being hung together by raw-hide. The stages are unconscionably long, being from 30 to 60 miles; yet these unfortunate little rats reach the end of their journey by dint of blows, stones, and perpetual haranguing on the part of driver and whipper-up, aided, likewise, by a peculiar but very efficacious plan of shuffling the whole team when it becomes very tired, and turning it out to graze when it becomes hopelessly exhausted. A stage journey begins but does not always end on schedule time. It, however, is well for the traveler and prospective miner to learn at the outset that our maxim about never putting off till to-morrow what can be done to-day, is reversed in Mexican practice, and that nothing is ever done to-day which can, on any plea, be deferred till to-morrow, or, better still, the day after. But, as I have already hinted, stage routes are few, and you have generally to provide conveyance for yourself. If there be a carriage-road to your destination, you may be able to hire an ambulance; but if your journey is to be long, it is better to buy a vehicle and mules, and trust to selling your outfit at your journey's end. For instance, if going from Parral to Durango, you are advised by printed placards in Chihuahua and elsewhere that Ruperto Enriquez runs what the pictures at the head lead you to suppose are coaches from and to all principal points. But the most inquisitive inquiry failed to ascertain even where Enriquez's headquarters were—a fact the posters omitted to mention. Both in Parral and Jimenes, after wearisome delay, a wagon can be hired to deliver you in Durango, 200 miles due south, but nearly 300 miles following the road by way of Mapimi, for about $100 and in about ten days' time. If returning at once, no charge will be made for carrying you back to Parral. Many important points, even outside of the Sierra Madre, can, however, be reached by trail only. The equipments for a horseback journey should be purchased in the nearest large city to destination, even when a coach-road permits of the use of a conveyance for part of the journey; for though Mexico is the home of horses, mules, and donkeys, the chances are many to one against your being able to buy or borrow an animal of any kind in a small mining town or at a *hacienda*. And in making your time calculations, allow a wide margin for loss while negotiating for the purchase of horses and equipments. First you must find a *mosso*, and if he succeed in finding *one* horse a day, he does well; and while doing that, his limited power of combination probably prevents his finding saddles, pack-saddles, saddle-cloths, etc.; therefore more days pass in collecting these. Then the horses have to be shod and provisions collected, all which eats up more time and more money; for the Mexican, once engaged, keeps strict count of his wages.

The subject of provisioning is there and everywhere one of moment. Even if journeying through a settled country, do not count on supplying all your wants by the way. It often happens that even at a populous *hacienda*, especially if the family be absent, you can not buy an egg, a chicken, or a pound of butter or meat. All you can be sure of finding are onions and *tortillas*, thin cakes of unleavened bread, made of corn-meal, previously steeped in lime-water. Some fastidious stomachs resent the infliction of such food; and therefore it is well to take either flour or cabin biscuits. Wheaten flour, but unbolted, can generally be had at the large *haciendas* and country villages; but it is unsafe to rely on getting fine flour except in the large towns. Bacon and canned meats must be taken from the States; for untainted bacon is almost unprocurable in a provincial town, and canned meats are costly beyond the limits of the longest purse. A two-pound can of tongue in Parral was offered as a bargain at a heavy discount at $3.50. Bacon should not be omitted from the stores. It is unnecessary to say that it contains the maximum of nourishment in the minimum of space, and can be substituted almost always for the lard which otherwise enters as invariably and repulsively as the dirt into your *mosso's* cooking.

A good *mosso* is an indispensable requisite, especially to those unacquainted with the language and the habits of the country. It is not customary for a householder, male or female, to do his own marketing. This always falls within the province of a confidential servant; and travelers therefore intrust all purchases to their *mosso*. Silver money sufficient must be taken, and this it is well to distribute in belts or wrapped in girdles to the different members of the party, and to dole it out a few dollars at a time to the *mosso*, who should be required frequently to render a strict account of his stewardship. Reading and writing in that class are much more frequent than is supposed. Your *mosso*, with the assistance of a boy, attends to the horses, keeps the commissariat supplied, cooks, prepares camp, and generally combines in his single person the functions of all the offices of a household, from the scullery boy to the valet. He usually provides his own horse, and receives $1.50 per day, and provisions and provender.

As the baggage has to be packed, it should include no cumbrous pieces

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but should include plenty of blankets; for on the central plateau—except during the heat of summer, before the rainy season sets in, and often even then—the nights are cold. A pillow makes the head more comfortable than a portmanteau, and it should be provided. Warm clothing may be needed at any time—even a heavy overcoat being a comfort sometimes in the month of July. Buckskin trousers and jacket are made very reasonably in Chihuahua, and make a fitting riding-suit, except in wet weather, the jacket being tailless and the trousers not given to wrinkling. But no trousers, however faultless in fit, will make an ill-shaped saddle any thing but an instrument of torture. However suitable a good Mexican saddle may be for a long journey made at a slow speed—most of them are modeled after the letter V, and the thongs which adjust, or rather do not adjust, girths and stirrup-straps are knotted precisely under the knee—it is as necessary to take a test-ride on your saddle as on your horse before setting out on a journey of a few hundred miles; for the sum of the misery in actual pain and nervous irritation excited by straddling a rack strapped to a jerking-machine is beyond computation. Although for two or three days even a good horseman used to easy horse exercise reaches his camping ground, after a ten hours' ride, glad to lie down, and yet is uncomfortable even in a recumbent attitude, his limbs soon accustom themselves to their work, and he camps with a good appetite, and just enough of easiness to make rest welcome and his sleep sound. And you enjoy, under the open heaven, such sleep as nature never vouchsafes to the dwellers within plastered wall. On this point you and your *mosso* are sure to come to issue. If he can reach a *hacienda*, he delights to shut you up in some dreary abandoned room, with blank windowless walls and a single door. The immediate neighborhood of a village, with its biped and quadruped thieves, is not a camping ground to be preferred, and therefore you may be forced to take refuge within doors; but beware of a whitewashed room. Mexican cleanliness among the populace is confined to wearing spotless white cotton shirts and trousers, and whitewashing the walls and ceilings. How the animalcula that frequent the Mexican person resent the clean clothing is a matter for speculation; but very short experience teaches the traveler that whitewashing the walls simply drives all the flees on to the floor.

Unfortunately for his pleasure, the measure of the traveler's fatigue does not determine the length of the day's ride, but the presence of water, wood, and fodder. Hence it is not possible to cut up the journey into so many equal parts. But an average of forty-five miles a day can be got out of good animals without inflicting injury to the horse or his rider.

It is not many years ago since traveling was dangerous from robbers and murderers, and blood-curdling stories are told of the atrocities committed at certain favorite spots. But with the decline of State and federal political revolutions of late years, has declined the prevalence of crime, partly because the commission of one form of crime being repressed, the criminal classes, political and other, are deterred from indulging their propensities in other directions by desuetude; partly because there has really been exercised of late that function of government that consists in punishing wickedness and vice. It is refreshing to see the jail-gang, a good many dilapidated Yankees among them, sweeping the Chihuahua streets. As a result, robbery and murder are rare, remarkably rare, considering the opportunity which the scantiness of the population offers for their commission with impunity. Nevertheless, it is not well to go unarmed. A display of fire-arms undoubtedly excites reflection in the mind of the evil-disposed. But it is not conducive to prompt action in case of danger to so encumber one's self with weapons of offense and defense that one looks like a peripatetic armory. The most useful fire-arm to carry is a combined rifle and shot-gun. A good shot can keep a party in game almost everywhere. Partridges and wild turkeys are by no means scarce. Rabbits abound, and a small red deer every now and then faces you, apparently less alarmed at meeting you than you are astonished at seeing him.

J. D., JR.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

THE CONDEMNATION OF NON-MINERAL LAND FOR MINING PURPOSES.

The decision of the Secretary of the Interior, confirming that of the Commissioner of the General Land-Office in the case of the Overman and Caledonia silver mining companies *vs.* John Maxwell *et al.*, applicants for patent for the Yankee mining claim, Carson City, Nevada, is of sufficient importance to warrant its publication entire. The Secretary says:

Said Yankee mining claim was duly located and recorded April 21st, 1876, as containing fifteen hundred (1500) by six hundred (600) feet, situated in Gold Hill Mining District, Storey County, Nevada. The application for patent was filed in the office of register and receiver, December 10th, 1878, and within the period of publication of notice, namely, February 6th, 1879, two adverse claims were filed by said Overman and Caledonia companies respectively. Said companies are owners of certain mining claims upon the Comstock lode; and for the purpose of working the same at great depths, found it necessary to sink a deep shaft at a point about four thousand feet to the east of their said claims, whereby they could reach the lode on its dip at the requisite depth. For this purpose, they desired to obtain possession of three certain tracts of land. Two of these tracts were in conflict with the said Yankee mining claim. In order to obtain possession of said tracts, the plaintiffs, on the 17th day of September, 1878, commenced proceedings under an act of the Legislature of said State, on behalf of said Overman Silver Mining Company *vs.* John Maxwell, Philip Corcoran, and divers other persons, but including all the persons who were afterward made defendants in the said suit, brought upon filing adverse claim. Said petition alleged the non-mineral character of the land; and the defendants, in their answer to the petition, set forth and asserted its mineral character. Upon that question, at the trial, a large amount of testimony was taken, and it was found and decided by the court that the land was non-mineral; and upon further finding the necessity for the use of the land, judgment was rendered in favor of the petitioner. Upon appeal by the defendant to the Supreme Court of said State, the judgment of the court below was affirmed.

In the suit brought upon filing said adverse claims, the complaint sets forth at length the proceedings in the condemnation suit, and insists that the determination in that suit in respect to the mineral character of the land is binding upon the defendants. In their answer, the defendants aver the mineral character of the land. When said adverse suit came on to be tried, the defendants offered to prove the mineral character of the land; but upon objection, the court held that the determination of that question in the condemnation proceedings was conclusive between the parties, and excluded the testimony. Thereupon the jury, upon instructions from the court, rendered a verdict for the plaintiff, and judgment was duly entered thereon. The judgment-roll in that case, and also in the condemnation suit, are filed as exhibits in this case. In your letter of March 23d, 1881, you review these proceedings, to show that the land in controversy was subject to exploration and purchase, and that you "must hold that the law has cast upon the executive department the duty of disposing of the public land, and, as a necessary incident, the authority of determining whether certain tracts are subject to sale under certain laws." You therefore directed the register and receiver to notify all parties in interest that a hearing would be had before them to determine the following points, namely: First. "Whether the land is valuable for its mineral deposits?" Secondly. "If so, whether the Yankee location is a legal one?"

The respective parties were duly notified, and appeared, and a hearing was had before the register and receiver. Upon such hearing, all the testimony taken in the condemnation trial was given in evidence under a stipulation to that effect between the parties, together with all the proceedings had at such trial and in the Supreme Court of the State on appeal, and also the proceedings in the trial upon the adverse claims; and in addition to such testimony and proceedings, further testimony was taken at said hearing. Such being the situation of the case as presented to me for my decision, I do not deem it necessary to discuss the questions presented by the record and briefs as to the legal effect of the condemnation proceedings, or of the ruling of the court excluding the defendants in the suit upon the adverse claims from giving evidence of the mineral character of the land in dispute. The parties have acquiesced in the order made by you, and the question of fact as to whether the Yankee mining claim contains a vein or lode bearing minerals is the only one necessary for me to determine. In considering this question, it is undoubtedly competent to take into consideration the decision of the district court. The present case, however, does not require me to decide whether or not that decision is conclusive or binding upon this department; and upon that question I express no opinion. A large part of the testimony upon both sides in the condemnation suit was directed to the question of mineral character. The testimony seems to have been carefully considered in the case, and the Supreme Court of the State, upon a review of the facts and the law, affirmed the decision of the district court. Upon the hearing ordered by you, the judge who presided at the trial of the condemnation suit was called as a witness, and testified that he had had a large experience in trying mining cases in that district; that he went upon the ground and into the shaft, and made a personal examination of the claim in respect to its mineral-bearing qualities, before rendering his decision in the case. Upon the hearing so ordered by you, the applicants gave little or no testimony on their part, but rested their case on the questions of fact upon the testimony adduced by them in the trial in the condemnation proceedings. The decisions of the district court and of the Supreme Court, of the register and receiver, and of your office all agree in the conclusion that said Yankee mining claim contains no valuable minerals or lode. I have also arrived at the same conclusion. In addition to the testimony given upon the trial of the condemnation suit, the protestants examined a number of witnesses upon the hearing ordered by you. Since the Overman Company entered upon the land in 1878, a shaft has been sunk to a great depth upon the ground in controversy, at an expense of some half-million of dollars, and no mineral-bearing rock has been disclosed in sinking such shaft. The testimony given at the hearing very strongly corroborates that given by the protestants upon the trial of the suit. Taking into consideration all the testimony in the case, and giving it due weight, it clearly establishes the conclusion before stated. Your decision dismissing the applications for patent is therefore affirmed.

Very respectfully, M. L. JOSLYN, Acting-Secretary.

NEW BATTERY SCREEN.

A new form of battery screen for quartz-mills has just been patented by Mr. Andrew S. Hallidie, the well-known wire manufacturer of San Francisco. Ordinary screens are made of a single sheet of punched metal, or piece of wire-cloth of the desired size of mesh. These screens are secured on a frame which is held in place in the grooves in the battery front by means of wedges. Whether of punched metal or wire-cloth, the screens are always of flat pieces. Mr. Hallidie, according to the *Mining and Scientific Press*, branches out with the new idea of constructing the screen with angles or corrugations, so as to give more screen surface to the given size of battery opening. In the construction of the improved screen, he employs woven wire, punched metal, or any other suitable screen material, and bends or corrugates the material into angular faces or flutings. Supporting rods or bars are fixed in the screen frame, so as to pass down in the angles of the corrugations and give any desired degree of stiffness. In order to retain these screens in position, they are fixed in frames which are shaped to fit the openings in the mortar in which the screens are to be placed. The top and bottom rails of these frames have corrugated slots or grooves formed in them, corresponding with the shape of the corrugations of the screen, so as to hold them firmly in place. The screen made in this way, instead of presenting a vertical flat surface to the splash of the water, presents a series of V-shaped faces, the screen surface being thus relatively increased, and the screen stiffened and strengthened. Mr. Hallidie is confident that this construction will make the screens last much longer, as they are not so apt to "bulge" and become broken as those of ordinary construction.

THE Lechner Manufacturing Company, Columbus, O., manufacturer of elevating and conveying machinery, has received an order from the Columbus & Hocking Coal and Iron Company for a chain elevator for elevating coal at its mines at Sand Run, O. It has also made a shipment of a steel roller chain to P. D. Pugh, Yazoo City, Miss., for propelling steamboats.

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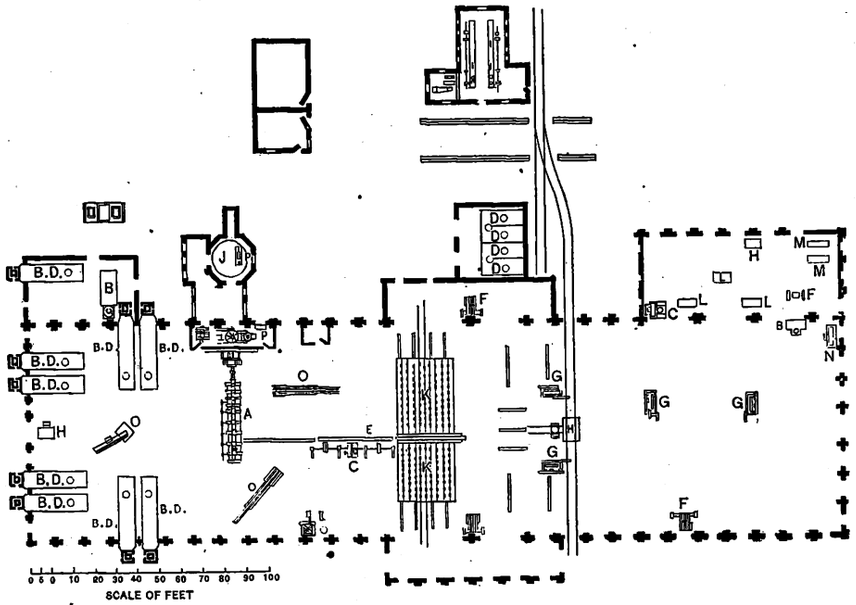


Fig. 2.—The Rail Mill.

A. 21′ Rail Train.
B. Furnace.
C. Engine.
D. Boiler.
E. Hot Saw.
F. Press.
G. Punch.
H. Scales.
I. Drill.
J. Tank.
K. Hot Bed.
L. Shears.
M. Lathe.
N. Grindstone.
O. Crane.
P. Pump.

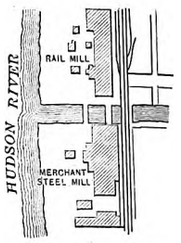


Fig. 3.—The Rensselaer Works.

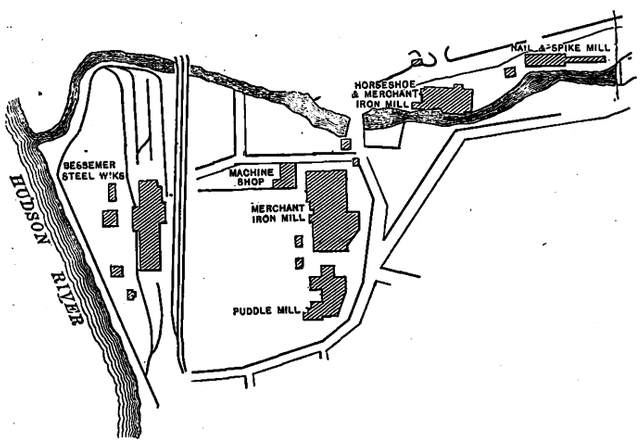
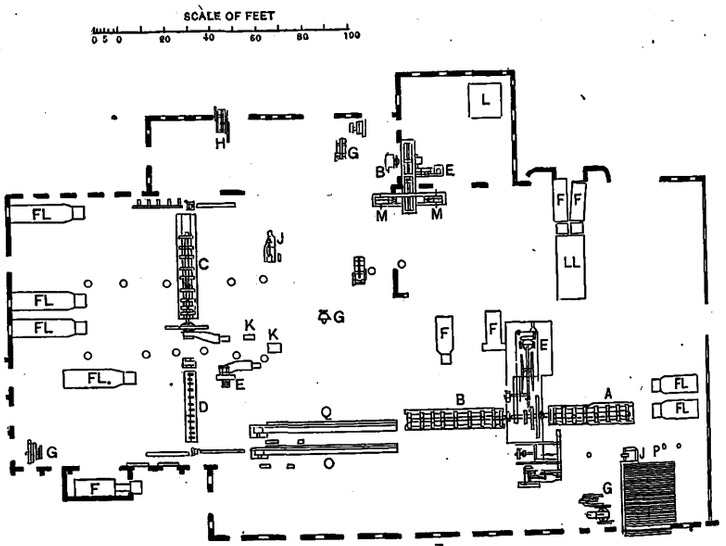
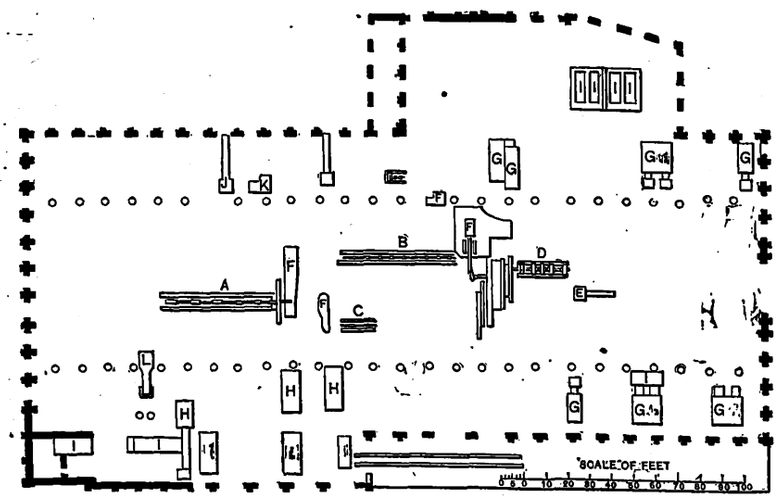


Fig. 4.—The Albany Works.



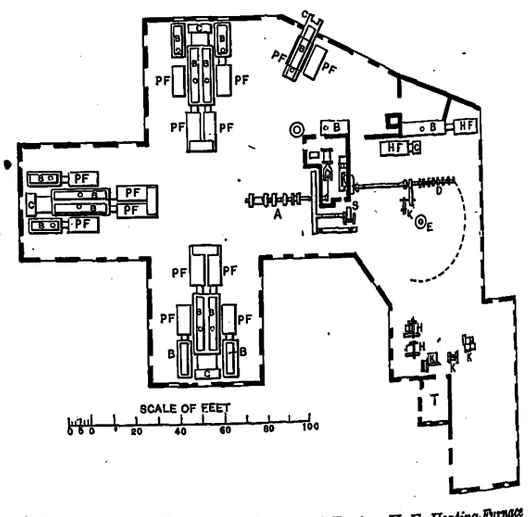
A. 18″ Merchant Train.
B. 18″ Plate Train.
C. 18″ Merchant Train.
D. 9″ Merchant Train.
E. Engine.
F. Furnace.
G. Shears.
H. Drill.
I. Fish-Bar Punch.
J. Hot Saw.
K. Pump.
L. Boiler.
M. Fan.
N. Lathe.
O. and Q. Rod-Straighteners.
P. Hot Bed.

Fig. 5.—The Merchant Steel Mill.



A. 18″ Merchant Train.
B. Wire Rod Train.
C. 12″ Roughing-Rolls.
D. Puddle-Ball Train.
E. Squeezers.
F. Engine.
G. Puddling-Furnace.
H. Heating-Furnace.
I. Boiler.
J. Shears.
K. Straightener.
L. Hammer.

Fig. 6.—The Albany Merchant Mill.



A. 16″ Puddle-Rolls.
B. Steam-Boilers.
C. Chimney.
D. 14″ Merchant Train.
E. Crane.
P. F. Puddle-Furnace.
S. Stone-Crushers.
H. F. Heating-Furnace.
H. Fish-Plate Punch.
K. Shears.
T. Tool-Room.

Fig. 7.—The Star Forge.

THE WORKS OF THE ALBANY & RENSSELAER IRON AND STEEL COMPANY.

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THE WORKS OF THE ALBANY & RENSSELAER IRON AND STEEL COMPANY, TROY, N. Y.

The works of the Albany & Rensselaer Iron and Steel Company, which the members of the American Institute of Mining Engineers will visit during the course of the next week, is a group of establishments formerly owned by independent firms. The Albany Iron-Works grew up under the ownership of Corning & Winslow; the Bessemer Works, the oldest of the plants now at work in this country, were started by Winslow, Griswold & Holley in 1865. The Rensselaer Works, a mile farther up the Hudson River, after upward of thirty-seven years' growth, were joined to the Bessemer Works. These different establishments are now consolidated into one large company, the Albany & Rensselaer Iron and Steel Company, of which Robert W. Hunt, the President of the American Institute of Mining Engineers, is general superintendent. The visitors will, in some departments, in some of the oldest works, find portions of the plant that remind them of the long period since which they have been at work; but they will be more struck in every direction by the evidences of a prudent desire to substitute the most modern machinery, plants, and appliances for those of an older type. These changes have been and are now gradually made, and it will not probably be long before the oldest features of the plant disappear as they become unserviceable. The disadvantages incident to the distance between some of the establishments, though closely allied in their work, as, for instance, the Bessemer mill and the rail and merchant steel mill, have been as much as possible overcome by a system of narrow-gauge railroad which connects these works, situated a mile apart. Being located on the banks of the Hudson, they have special facilities for receiving raw materials, including foreign Bessemer pig, and for shipping; cheap water transportation, too, to some extent modifying the disadvantage of being located at a great distance from the coal regions. The railroad facilities are exceptionally good, and give access especially to the adjacent New England markets.

The Bessemer Plant.—Before work was begun at this, the first Bessemer plant doing more than experimental work, a number of different American irons were experimented with at Sheffield in 1864, and a Lake Champlain iron, the Crown Point, was found especially good. A 2½-ton single vessel plant was started in February, 1865, and run until 1871, when it was changed into an ingot mold foundry. The present works were started in 1867 with two 5-ton vessels. They were partially destroyed by fire in 1868 and were rebuilt in 1869, work beginning in 1870. More recently larger cupolas and 7-ton vessels were put in. Since A. L. Holley's description of the works in *Engineering*, to which we are indebted for many details and drawings, kindly corrected to date by Mr. H. W. Shaw, four spiegel cupolas and a ferro-manganese pre-heating furnace have been put up. The Bessemer building, a plan of which is shown in Fig. 1, is 148 feet by 98 feet, with a cupola-house 80 feet by 39 feet. The vessels are set high side by side and with three ingot cranes over a shallow pit. The 7-ton vessels have 6 feet internal diameter, and 15 tuyeres with 12⅝-inch holes. They receive an average charge of 18,000 pounds. The vessel bottoms, which on an average stand 14 blows, are interchangeable, and are removable by means of lifts and of cars which carry them laterally, for repairs, under the two-side ingot cranes. They are baked in adjacent ovens. The blowing-engine and pump-room are conveniently placed on the right of the vessels, and the blooming-mill (formerly a hammer-shop for cogging ingots) comes next. As the departments grew gradually and experimentally, and were not expected to exceed 60 tons of product per day, the buildings are not of the size and arrangement that would now be made; but by means of convenient transporting apparatus, as high as 600 tons of hot ingots per twenty-four hours are delivered by power into the blooming-furnaces, and are rolled, cut up, and chipped, under a 7-ton hammer, and loaded hot on the rail-mill cars with reasonable facility.

The Bessemer blowing-engine has a pair of 54-inch diameter by 5-foot air-cylinders. It had a pair of 42-inch steam-cylinders, but a 72-inch low-pressure steam-cylinder has been substituted for one of them, and, with an improved condenser, the engine now gives a good economy of fuel. The valves of the low-pressure cylinder and a similar change of the high-pressure valves is contemplated. It indicates 500 horse-power at from 24 to 26 revolutions, with 70 pounds boiler pressure, while blowing 7 tons of metal through 180 ⅝-inch tuyere-holes at 20 pounds pressure. The four cupolas, which running together melt the iron for 600 tons of steel per twenty-four hours, are driven by two No. 7½ Baker rotary (revolving piston) blowers. They deliver air at 14 ounces pressure, and can blow 1½ pounds. A third is being put in. Blast for the spiegel cupolas is provided by a Sturtevant fan. The iron cupolas, of the ordinary deep bottom type, are 21 feet high and have a 5½-foot minimum internal diameter. They have eight 5 by 8-inch tuyeres, and melt 12 pounds of iron per pound of fuel. The latter consists of 65 per cent of anthracite and 35 per cent of coke, which keeps the charge loose and allows the blast to penetrate it freely. Four spiegel cupolas furnish the required quantity of spiegel, which is run into a ladle so arranged that, in tipping over, the ladle is slightly advanced, so as to pour out the charge quickly and completely. The materials for the two sets of cupolas are brought up to the charging-floors by two Otis hoists. There are two large Worthington compound duplex pressure pumps. The larger one is illustrated by Figs. 4 and 5, Plate I. It has a pair of 21-inch and a pair of 36-inch steam-cylinders, and four 9½-inch plungers, with 3-foot stroke. The smaller has 33⅜-inch and 19½-inch steam-cylinders, 9-inch plungers, and 24tinch stroke.

The average production of the Bessemer plant is 12,000 tons of ingots per month. It has a record of 604 tons in one day, 3150 tons in one week, and 13,693 tons in one month.

The three-high blooming train was the first started in America, running for the first time in January, 1871. It is driven by a direct condensing-engine, with 36-inch cylinder and 4-foot stroke, and, running at 40 revolutions per minute, rolls the product of the converting-works from 15-inch ingots to 7-inch four-rail blooms by the labor of four men and boys. There are in the blooming-mill five reheating furnaces, all of them being charged and discharged by power. They are heated with bituminous coal. One of them, the last built, is to be provided with a boiler, the setting being a new type, the outgrowth of the experience at the works. The last furnace has also an arrangement for cooling the doors and frames with water, which the visiting engineers will do well to examine more closely. The water is first carried around the door-frame and then into the door, which is open at the top. The other furnaces in the mill are also to be provided with these water-doors and frames, which experience has shown work satisfactorily.

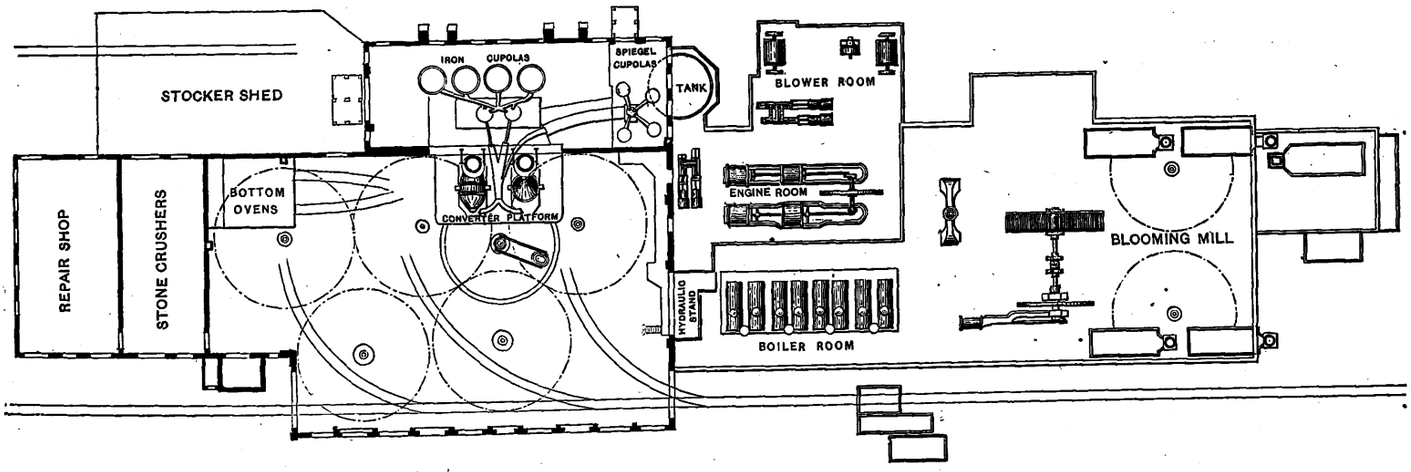


Fig. 1.—The Bessemer Mill.

The blooms rolled on the blooming train are cut into lengths by a hammer. Those not immediately carried by train to the rail and merchant mill are stored, and are subsequently handled by traveling cranes.

The Rail-Mill, a plan of which is shown in Fig. 4, is a brick building 375 by 98 feet, with the wings as shown. There are thirteen heating-furnaces *B D*, fired with bituminous coal, all but one having a horizontal over-head boiler with return flues. Ten are shown in our engraving. The train *A* is 21 inch, three-high, with three stands of rail rolls next the engine and two stands of merchant rolls arranged to deliver to the rail-sawing and finishing apparatus. The whole mill can thus be utilized as a merchant mill for medium and heavy work when this pays better than rails, or both rails and merchant steel can be produced in different turns when there is not demand enough for either product to alone fill the mill. The train has a conveyer, designed by Max Supper, for carrying off sideways automatically the scale accumulating below the rolls. When running on rails, the average output of the train is 1800 tons. It has, however, a record of 2350 tons per week. The rail-train engine is vertical condensing, with 3-foot stroke, a 44-inch cylinder, and Corliss valve-gear. With a boiler pressure of 70 pounds, it runs at a speed of 80 revolutions. The mill is provided with a Gustin hot curving apparatus and a double hot bed and finishing machinery. In one of the wings, are a number of punches and shears for cutting steel into the many shapes used for agricultural machinery.

Particular attention should be given to the press designed by S. Baldwin, of New York, for utilizing rail crop ends. The object is to press the foot of the rail into such a shape, similar to that of the head of the rail, that in afterward rolling down the crop ends sideways, it will make a plate. The difficulty is to remove the tendency of the thin foot to bend over instead of gathering together in a body having approximately a round form. Unless that form is attained, seams are created by doubling up of part of the material, and these can not be got rid of in any subsequent rolling. For some sections, the press appears to do its work admirably, so that the plate rolled from it can be used for nail plate, etc.

The Merchant Steel Mill.—The main brick building of this mill is 338 by 187 feet. This mill has an 18-inch three-high merchant train *A*, for rolling a general run of 18-inch train sizes of billets and merchant steel. It is also used for iron fish-plates. The sheet-train *B* is 18-inch, three-

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high, and produces ten tons out of one furnace and an annealing furnace. Both trains are driven by a 60-inch by 10-foot beam-engine, which formerly belonged to the steamboat Swallow, which was burned thirty miles below, forty years ago. It has been recently overhauled by the Delamater Iron-Works, and is likely to see many more years of service.

A particularly interesting feature of the mill is two fast trains driven by Porter-Allen engines, which are specially adapted to work of this kind, as their use avoids the gearing. The fast 18-inch three-high train *C*, making 125 revolutions, produces per turn 50 tons of 1¼-inch 20-foot wire-rod billets from 7-inch blooms. The 9-inch three-high train *D*, also driven by a Porter-Allen engine, has been working until now only for one furnace. A second furnace, now building, will bring it up to full capacity. The mill has two Baldwin hot straighteners, improved by the engineers of the works.

The Albany Iron-Works.—These works are situated some distance from the Hudson River, at the back of the Bessemer works. The building is brick, 329 by 156 feet, with wings, and a roof with cast-iron trusses, cast in sections, one of the few probably of this design still standing. The mill contains a modern 18-inch merchant train, three-high, of the Fritz type. The train has three stands of rolls, and is driven directly at from 80 to 100 revolutions by a handsome Corliss horizontal engine, with 24-inch cylinder and 4-foot stroke, and a Bulkley condenser. This train is used for making a general run of merchant sizes, finger-bars, fish-plates, angle iron, etc. For straightening the latter, there is a machine designed by Louth, which, however, to judge from its appearance is little used. The Belgian train *B* is driven by a Porter-Allen engine, being bolted to it two to one. The same engine, having a 22-inch cylinder and 3-foot stroke, drives a stand of 12-inch roughing rolls. The engine has seen some very hard service, and yet has stood up very well under the work, running for days at a speed of 200 revolutions, and occasionally obtaining a piston speed of over 1300 feet. Note may be made in passing of a curious accident which happened to it some time since. The engine had been carefully overhauled one day, and yet within twenty-four hours broke down. An examination proved that one of the springs of the piston had worked its way through three quarter inches of metal. The Belgian train is used for rolling wire rods and small sizes of merchant iron and special shapes, such as hexagons, octagons, half-rounds, etc. The train has rolled wire at the rate of from twenty to twenty-five tons per turn, the engine running at a speed of 200 revolutions and the finishing-rolls 400 revolutions. Behind the train stands a wire reel, designed by one of the engineers of the works, which deserves careful examination. It is simple, compact, and easily handled, and has, we understand, stood the test of very rapid work admirably. These two trains are supplied by four Swindell regenerative gas heating furnaces. The mill contains besides a Cuyahoga helve-hammer for axles, an 18-inch puddle train *D*, geared to a 44-inch by 6-foot engine, a Winslow squeezer, and a 3-ton hammer. A fly-wheel has recently been placed on the train-shaft, and by having the engine run faster, a large gear-wheel and shaft could be thrown out.

The puddling-furnaces in the mill have been considerably changed. They are double furnaces provided with a small hearth for preheating the pig. The result of this and other improvements has been, that 2200 pounds of Blossburg coal and from 750 to 800 pounds of Lake Champlain ore suffice to the ton of 2240 pounds of puddle bar. They enable two puddlers and two helpers to produce 6000 pounds of bar in five heats of 1200 pounds each. Some of the furnaces are furnished with boilers, the setting of which is the design of Captain J. H. Maes. The setting is gradually finding its way into all of the puddling and heating-furnaces in the mills.

The Star Forge.—This mill, shown in Fig. 7, is an irregular building containing a number of puddling-furnaces, some of them of old design, and a scrap furnace. It has a 16-inch puddling train *A*, and a 14-inch merchant train *D*, recently moved and equipped with a modern hot-bed. These trains are driven by a 30-inch by 4-foot condensing Corliss engine.

The Horseshoe Building is 212 feet by 90 feet, with wings. It contains two modern trains for small sizes, one of them driven by an old overshot water-wheel. The nail and spike factory has a large number of machines, its principal point of interest being that cut steel nails are manufactured in it.

The maximum production of the different establishments of the Albany & Rensselaer Iron and Steel Company is reported to us as follows, in gross tons per week:

	Tons.
Ingots	3,000
Rails	1,800
Merchant steel	900
Merchant iron	1,000
Pig-iron, Fort Edward furnace	210
Pig-iron, Port Hudson furnace	225

The works employ about 2500 men, to whom wages amounting to approximately $28,000 per week are paid.

THE BASIC PROCESS IN EUROPE.—From the *Bulletin du Comité des Forges de France*, we take the following statistics of the production of steel by the basic process, during the first six months of the present year:

	Number of converters.	Product. Tons.
England	1	57,900
France	2	5,960
Belgium	1	12,786
Germany	9	152,479
Austria	3	37,476
Russia	1	12,786
Total	17	279,387

In 1882, 6½ million tons of ingots were produced in the whole manufacturing world. As will be seen from the above figures, this process has met with the greatest favor in Austria and Germany; in the former country, it produces 28 per cent of the steel made, and in the latter 25 per cent, while it is only adopted to the extent of 5 per cent in England. In this country, it is in use only at one mill, that of the Pennsylvania Steel Company, near Harrisburg.

THE DUTY ON WIRE RODS.

The Secretary of the Treasury Department has issued the following circular, dated September 21st, transmitted to us by our Washington correspondent:

Several questions have been presented to this department as to duties on iron and steel under Schedule C of the Tariff of March 3d, 1883, and for the information and guidance of all concerned, the instructions below are promulgated. The fifth paragraph of Schedule C (T. I., new, 148) is as follows:

"Bar-iron, rolled or hammered, comprising flats not less than one inch wide, nor less than three eighths of one inch thick, eight tenths of one cent per pound; comprising round iron not less than three fourths of one inch in diameter, and square iron not less than three fourths of one inch square, one cent per pound; comprising flats less than one inch wide, or less than three eighths of one inch thick; round iron less than three fourths of one inch and not less than seven sixteenths of one inch in diameter, and square iron less than three fourths of one inch square, one and one tenth of one cent per pound: *Provided*, That all iron in slabs, blooms, loops, or other forms less finished than iron in bars, and more advanced than pig-iron, except castings, shall be rated as iron in bars, and pay a duty accordingly; and none of the above iron shall pay a less rate of duty than thirty-five per centum *ad valorem*: *Provided further*, That all iron bars, blooms, billets, or sizes or shapes of any kind, in the manufacture of which charcoal is used as fuel, shall be subject to a duty of twenty-two dollars per ton."

Provision is made in the same schedule for sizes and shapes of iron other than those named in the paragraph above cited; and the first question presented is, whether the last *proviso* cited above applies to any iron other than that named in the paragraph which precedes it. On this point, the department decides that the provision for charcoal iron applies only to the iron otherwise dutiable under the paragraph in which it is contained.

The same schedule contains the following provisions:

(T. I., NEW, 150.)

"150. Round iron, in coils or rods, less than seven sixteenths of one inch in diameter, and bars or shapes of rolled iron not specially enumerated or provided for in this act, one and two tenths of one cent per pound."

(T. I., NEW, 180.)

"180. Iron or steel rivet, screw, nail, and fence, wire rods, round, in coils and loops, not lighter than number five wire gauge, valued at three and one half cents or less per pound, six tenths of one cent per pound."

The department decides that paragraph 180 contains the provision which must govern the rate of duty on the merchandise specially described therein.

This leaves round iron in coils and loops, not lighter than No. 5 wire gauge, valued at 3½ cents or less per pound, not rivet, screw, nail, and fence wire rods; round iron in coils or rods, lighter than No. 5 wire gauge, or which is valued at more than 3½ cents per pound, and bar iron, round, less than $\frac{7}{16}$ of an inch in diameter, which is not enumerated in paragraph 148, liable to duty under paragraph 150.

It is borne in mind that section 2499 of the new tariff provides that, if two or more rates of duty shall be applicable to any imported article, it shall be classified for duty under the highest of such rates, but it is held that this provision does not affect the rate of duty on articles comprised in paragraph 180, which are specially provided for.

DIAMOND MINING IN THE PROVINCE OF MINAS-GERAES, BRAZIL.

The discovery of the first deposits of gold in the province of Minas-Geraes, the most productive in Brazil, led to the search for diamonds as early as the close of the seventeenth century, the first being found at Serro. The fever spread, and, moving northward into virgin country, founded the village of Tijuco, the Diamantina of to-day and the center of diamond mining in Brazil now. M. A. de Bovet, professor at the School of Mines of Ouro-Preto, Brazil, has recently, in the *Annales des Mines*, Paris, printed an exhaustive and highly interesting account of a visit to that section, and from his paper on the history and present status of the industry we have gathered the following notes.

At Diamantina, as elsewhere, the river-beds were first worked for gold, and tradition says that, while the miners had noticed the existence of bright stones in their pans, and had collected them as curiosities, it was only when a passing traveler revealed to them their value that they began to gather them. All that is definitely known is, that in 1729 the Portuguese government was informed of the existence of diamonds in the vicinity of Tijuco. The government at Lisbon promptly ordered the authorities of the province to issue ordinances designed to secure to the government the largest possible share of this new source of wealth. Compared with others which followed, the first laws were liberal. They simply withdrew the titles to all claims for gold washing already allowed, permitted only mining for diamonds, distributed the ground anew, allowing no one person to hold more than 86 feet square for every hand employed, and levying a sum of 28 francs for each person at work. Contradictory orders followed one another in quick succession, and the impost per hand was rapidly run up to 224 francs per man. In 1734, the government ordered the entire cessation of work until it had devised such methods as promised to yield it the largest returns. After five years of suspense, the government finally decided to farm out the mining of diamonds. An administration was created at Diamantina, at the head of which was a functionary, bearing the title of "intendant of diamonds," whose duties were to carry out the laws and hold the contractors working the mines to their agreement. The contractors, who were assigned a certain territory, had to employ a given number of slaves, usually six hundred, and could not under any circumstances employ more. Between 1740 and 1761 six such contracts were let, and the contractors had to pay for each man employed, whether he was working or not, a sum which was gradually raised from 1288 to to 1844 francs. The contractor had to send his diamonds to Lisbon, where they could alone be sold. While such were his obligations, he had,

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on the other hand, the exclusive right to mine. The intendant had to guard his right and carry out the laws enacted for his protection, among which the following may be quoted to show how severe the restrictions were. No person was allowed to buy, sell, or export diamonds under heavy penalties. Accusations from informers, even if secretly made, were received by the authorities, and where they led to conviction, one half of the confiscated articles belonged to the informer, who, besides, if he was a slave, was given his liberty. No person was allowed to enter the diamond district without special permission of the intendant. If a merchant, he had to state the character and value of his goods, and on leaving the district prove an equal quantity of value. No one was allowed to possess any tools except those required for his work. With all these safeguards, there was a large class of men, called garimpeiros, who did mining on their own account, their principal difficulty being to get tools. It is stated that slaves who had escaped made them from the chains around their necks. Both the government and the contractors had bodies of men in their employ whose sole occupation was to hunt down this class of men.

Some of the contractors did an enormous business, in certain cases very lucrative. Two of them had all or a part of their possessions confiscated under trumped-up charges.

After the sixth contract, the Portuguese government, which had adopted the system mainly to ascertain the results that regular working of the mines would lead to, decided to work them on its own account, and in 1772 the administration at Diamantina was charged with it.

The intendant became all-powerful. He was the executive who carried out the laws, and was the only judge, having no tribunal to aid him. There was no appeal from his decisions, and, as the regulations put it, he was to judge as rapidly and with as little formality as possible. Some modifications were made of previous laws. Two of them are curious enough to be mentioned. The first absolutely prohibited the entrance into the territory of any one who had ever studied law. The second referred to informers. Any informer could carry his statement, written, but not signed, to the intendant, who dated and indorsed it, and gave it back to the one who had submitted it. From this moment, this slip of paper could be transferred to any body, could be sold and bought. It was a bill to bearer. When the process against the person accused had been decided, and the confiscation had been made, the bearer, whoever he might be, had the right to claim his share of the amounts confiscated. If the bearer was a slave, he obtained his freedom besides. This new system, begun in 1772, was carried out more or less rigorously according to the individuality of the ruling intendant, until the year 1845, when it was officially abolished, although after 1822 it languished, from the absence of funds.

The administration bought a certain number of slaves from the last contractor and hired others throughout the country. When it paid well for them, their owners hired them gladly; but when the mines were not doing well and they could not pay much, the government generally succeeded in getting the slaves by threatening the owners. Thus it generally had a good force, and at times employed more than 4000 slaves in the mines.

Little is known as to the quantities of diamonds obtained during the period when the contractors had charge of the mines. For the time when the government worked them, accurate figures are available. From 1772 to 1845, the produce was 269,870 grams of diamonds, there being 80 stones exceeding 3·5 grams in weight. In twenty-three years, from 1772 to 1795, 174,842 grams of diamonds were mined at a total expense of 38,706,090 francs, besides 3,169,460 francs worth of gold. The average cost declined from 208 francs per gram during that period to 195 francs between 1796 and 1801, and 162 francs between 1801 and 1806.

THE DIAMOND DEPOSITS.

Diamonds are found in Brazil in the provinces of Minas-Geraes, Bahia, Parana, Matto-Grosso, and Goyaz. In Minas, they are mined at Diamantina, Grao-Mogol, Bagagem, Conceicao Cocaes, and other points, the first named, however, being the most important. Diamonds are found in a rounded gravel having peculiar characteristics, which is called by the miners "*cascalho.*" It is a mass of small pebbles, chiefly quartz, mixed with very little clay. If examined with care, it will be found to contain a large number of minerals, many of which are present in the cascalho from all the districts. At Diamantina, Gorceix has discovered rutile, anastase, arkansite, tourmaline, titanite, fibrolite, klaprothine, psilomelane, disthene, pyrite, magnetite, garnet, talc, mica, staurodite, sphene, euclase, and gold.

The cascalo, itself occurs in the form of deposits in the river-beds, on the river-banks, sometimes at a considerable altitude, and in high plateaus. The existence of the diamond gravel in the river-beds explains itself. It is generally rich, and contains a greater number of large diamonds near the sources, and finer diamonds at a greater distance from them. The gravel is pretty irregularly distributed in the river-beds, and generally reaches its greatest richness in what is called a *caldeirao*, or kettle. The caldeirao is an almost spherical excavation, becoming cylindrical when it is deep, cut into the bed-rock. It has smooth sidewalls, as though it had been drilled out. Such caldeiraos are found when the character of the ground has tended to produce eddies, and it will be understood how the stones carried about by this movement, and for long periods turning on the bottom, should have ended in making these excavations. They are even found in rivers which do not carry diamonds. The diamonds, of course, not only cut the bed-rock, but also the pebbles moving with them, until they were reduced to such a state of fineness that they were carried off. By this action, the diamonds accumulated and the cascalho was enriched. The miners well know this, and consider those points of the river which tend to produce eddies particularly favorable. Nowadays, this indication has lost much of its significance, because the rivers have been worked over so often that there is the greatest uncertainty as to whether the ground is virgin or not. The diamond gravel is covered with a layer of boulders of considerable size, which must be generally blasted to be removed. Above it is generally sand of recent origin which is absolutely barren. The thickness of the latter varies a good deal. Sometimes it is only from 5 to 15 feet; sometimes, at points where the river-bed has been much deepened, or where a picao or pit has been formed, in the shape of an enormous caldeirao, the bed of barren sand reaches a thickness of from 75 to 100 feet. These, of course, are rich spots, but they are very difficult to work.

The bank deposits, at least those not high above the river-bed, may have been formed in the same manner as the river deposits when the streams carried a much greater body of water. They are also covered with a layer of barren material. As for the plateau deposits, their origin is more doubtful. They consist of a coarse cascalho gravel scattered over the surface without being covered, so that the miners say, that diamonds may be found at the grass-roots.

THE Murphy Champion Ventilator has now been in successful operation for ten years, and its merits as a ventilator for mines and tunnels are well established. Messrs. Fraser & Chalmers, sole manufacturers of this ventilator, have issued an illustrated catalogue fully descriptive of the machine. The ventilators are made from 3 feet to 10 feet diameter. The sizes generally used are as below: 4-foot fans, all complete, including all wood-work, without engine or main belt, weight 3300 pounds, costing $450; 6-foot fans, including all wood-work, weighing 6000 pounds, costing $650; and 8-foot fans, including all wood-work, weighing 13,000 pounds, costing $1000. The cost of belt for driving ventilator depends upon its length, the location of engine to pulley on the ventilator determining this. Generally, the steam for the engine driving the ventilator is taken from the hoisting-works boilers at the coal shaft. If power is wanted for driving ventilators, the builders advise: Engine 5 by 6 for 4-foot ventilator, weight 1200 pounds, cost $225. Engine 6 by 10 for 6-foot ventilator, weight 1800 pounds, cost $300. Engine 8 by 12 for 8-foot ventilator, weight 2800 pounds, cost $450.

FURNACE, MILL, AND FACTORY.

Messrs. Fraser & Chalmers, of Chicago, have just concluded a contract for a 40-ton copper smelting-furnace all complete with blast-pipes, water-pipes, Baker blower, crusher, engines, boiler, etc., for the Concordia Mining and Smelting Company, Mexico.

The Solid Steel Casting Company, Alliance, Ohio, an outgrowth of the Morgan & Williams heavy engineering business, is now in full operation. The works are established for the purpose of supplying heavy steel parts of mechanical appliances and machinery in place of iron, and have a process for casting steel which has been thoroughly tested.

The plate and sheet-mill of the Laclede Rolling-Mills, St. Louis, has been started up, and other departments of the works will probably be put in operation later on.

The Johnstown *Tribune* reports that, in accordance with notices posted throughout the buildings, the Gautier wire-mill closed down on Saturday evening, September 22d, and will remain idle for one week, or until repairs that are necessary have been made. The temporary stopping of the works will also afford an opportunity to reduce stocks, which are large, and somewhat greater than the actual demand.

In the suit in equity brought by the Mount Hickory Iron Company, Limited, Sharpsville, Pa., against James B. Pierce, manager of the Mount Hickory Furnaces, with the object of ousting him from the position, Judge McDermitt has filed his opinion refusing the injunction asked.

The Calumet Iron and Steel Company, of Chicago, has just finished experiments which have resulted in the perfection and erection of a plant for the manufacture of steel nails.

Messrs. Fraser & Chalmers, of Chicago, are now erecting at the works of the Eckstein White Lead Company, Cincinnati, O., a Corliss engine 26 by 48, with a large amount of shafting, pulleys, etc.; for the Bismarck Elevator Company, Bismarck, Dakota, a 12 by 26 Corliss engine, two boilers 44 by 14 feet, and other machinery; for the Miltimore Car-Wheel Works, just organized, about to be built at Garfield, one of the suburbs of Chicago, a Corliss engine 22 by 48, with two tubular steam-boilers 60 by 16 feet; and they have recently completed at the brewery of John F. Betz & Sons, Philadelphia, Pa., two Corliss engines 18 by 42, with air-pumps and machinery of the Boyle Ice-Machine Company's design. They are also building for the Boyle Ice-Machine Company two 15 by 30 Corliss engines, for Ohio, with ice-machines complete, and two of the same size for Texas.

The Linden Steel Company, Limited, Pittsburg, has completed the erection of a 20-inch plate-mill, and has every thing ready for sheet and plate of tank and boiler qualities. This makes two plate and sheet-mills (one of 18 inches and the other of 20 inches diameter), one bar-mill (18-inch), one rod-mill of 10 inches diameter, one universal mill, and three hammers; showing that the company has increased its capacity very greatly.

An axle made of the "Refined Bessemer" produced by the Pittsburg Steel Casting Company, stood what is considered an extraordinary test: Three blows at 10 feet, two blows at 15 feet, two blows at 20 feet, and five blows at 27 feet, with a drop weighing 1640 pounds, reversing axle each blow. The operation was continued until those testing decided that, if they continued hammering all day it would not break. A round of soft steel was hammered while cold, with a steam-hammer, water being poured on the faces of the anvil to keep them from heating. This was continued until the round was flattened out, not the slightest crack appearing. This same steel pulled 71,400 pounds, showed a reduction of 80·6 per cent at point of fracture, elongation in 8 inches of 28·7, limit of elasticity 49,400 pounds.

The Gates Iron-Works, Chicago, have just shipped one of their No. 5 crushers with elevator and screens to the Philadelphia & Reading Railroad, to be erected at Hopewell, New Jersey. They have also consigned a number of smaller crushers to towns in Illinois, Indiana, and Pennsylvania for breaking rock for street-paving, and also a No. 3 crusher to Blairsville, Pa., for use on the Pennsylvania Railroad.

The Harrisburg *Patriot* of a recent date says: The largest run ever made at the Pennsylvania Steel Company's works, Harrisburg, was that of Thursday, and it is pretty safe to say that it has never been equaled in any part of the world. In twenty-four hours, three turns were put to work, each being employed for eight hours. The first turn, known as "C," started on Wednesday at two o'clock in the afternoon, and quit at ten o'clock at night. In that time, 53 heats were made and 954 rails turned out. The "A" turn relieved the "C" men, and continued until six o'clock the next morning. Fifty-four heats were made and 972 rails. The last turn, "B," eclipsed each of the others by making 57 heats and 1026 rails. During the entire twenty-four hours, 164 heats were made and 2952 rails turned out, being an average of 2⅛ rails per minute.

E. W. Blatchford & Co., of Chicago, are building a new addition to their works, 80 by 100 feet in size and three stories high. They will also add a large amount of new machinery, embracing a complete mill for sheet and bar lead, a shot-tower, etc., and otherwise greatly increase their capacity.

Contracts have recently been awarded to the Keystone Iron-Works Company, of Kansas City, for the construction of four slide-valve engines of 50 horse-power each, and boilers for the same, and for one automatic engine. This company has just completed a double hoisting-engine, of 70 horse-power, for the Rich Hill Coal Mining Company, and a 25 horse-power engine and boiler for the

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Huggins Cracker and Candy Company, of Kansas City. It has also recently built an engine and boiler for John Wuerth, Holton, Kansas, and one for W. C. Johnson & Co., Solomon, Kansas. This company is constantly adding new machinery to its plant. Among the specialties made by the company may be mentioned a patent pump, driven by two cylinders of 175 horse-power, for the smelting-works at Argentine, Kansas. By the use of this pump, the metal which heretofore has been lost through the flume is passed through the pump and saved. In the milling department, the company has just completed a 7-reel bolting-chest for a flouring-mill at Dodge City, Kansas.

The Hotel Oxford, on Huntington avenue, Boston, just completed, is furnished with four of the Whittier Machine Company's steam-elevators—two for high-speed passenger service, two for freight.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

COPPER QUEEN.—Work continues as usual.

HENDRICKS.—The mine is leased to the Tombstone Mining and Milling Company, and produces ten tons of high-grade lead ore daily, which is shipped to Charleston.

TOMBSTONE DISTRICT.

The *Epitaph*, in its review of operations at the various mines, states that a satisfactory condition of affairs is shown throughout the district. The quantity of ore daily extracted is fully up to the average, while the bullion product at the mills shows no diminution in the richness of the ore. The steady progress made on the Contention pumps is gratifying, and the announcement that the anxiously awaited work of draining the lower levels will be commenced on December 1st will be hailed with rejoicing throughout the camp. Fears have been entertained by some that the capacity of the new pumping machinery would not be sufficiently great to handle the volume of water in the lower levels of the hill properties. It is stated, however, by competent authorities in Tombstone that such fears are groundless, and that the Contention pumps, when in place and worked in conjunction with those of the Grand Central, would be enabled to successfully overcome a much larger body of water than that with which they will have to contend.

GIRARD.—Work has been resumed.

PEABODY.—A strike of a new body of ore in this mine, which is located at Johnston, is reported. The thirty-ton copper furnace is running steadily, and there is some talk of the company erecting another large one of fifty tons.

SAN DIEGO.—The furnace is to be started up shortly at this mine, which has been idle for some months.

TOMBSTONE MINING AND MILLING COMPANY.—At the Luck Sure, the ore-body is increasing, both in quality and quantity, some of the ores carrying as high as forty per cent in lead, making the same a very desirable smelting ore. The shipping of 200 tons of ore to the company's furnace at Charleston has just been commenced.

WAY UP.—Since the last court decision, this mine has been under a lease, and quite a quantity of high grade ore has been extracted, the same milling from 97 to 800 ounces of silver to the ton.

MARICOPA COUNTY.

TIP TOP.—It is learned from the Phœnix *Gazette* that this mine, after having produced about $2,000,000, will shortly be closed down for good. The company's books show a debt of $95,000 over and above the production of the mine. By the sale of supplies, the superintendent realized sufficient to pay off all the debts at the mill and mine. He is now running the mill, working over a few tons of tailings. When this is done, the mill will be closed down and the last man discharged.

MOHAVE COUNTY.

THE LOS BASINS AND GOLD BASINS.—Writing from Williams, under date of September 3d, Mr. J. C. Bramwell reports to us as follows: While the mining fever is assuming such large proportions in our neighbor, New Mexico, it would be doing ourselves a great injustice not to speak of the precious metal which, though yet undeveloped in many sections of this territory, still bids fair to surpass even our own sister territory, and prove of incalculable value to those who have ventured to penetrate a section of country up to within a recent period in the hands of savages. This obstacle has now been removed by the advent of the railroad, which has reached the Colorado River. Here is the section of country called Los and Gold Basins, situated in Mohave County, Arizona. These two mining camps are as yet in their infancy; but according to the reports of one of the most reliable and best informed of mineral prospectors in this section, Mr. J. S. Coon, their resources can not be equaled for the amount of ore in sight. A thorough and searching examination having been made by him of these camps and surroundings, he is competent to speak on their merits. The following statement best describes the condition of the country: The camps above mentioned are 45 miles north of Hackberry, which is a stirring camp on the line of the Alantic & Pacific Railroad, containing a ten-stamp mill running night and day on free-milling silver ore. The road leading from here to the Los and Gold Basin camps is so smooth that a basket-phaeton could be driven from Hackberry to within one mile of the mines, without the slightest injury. The Colorado River runs on the north boundary of this camp, and will furnish water-power sufficient to turn all the machinery needed, and shafting up and damming can be done with comparative ease and safety. The road from the mines to the river leads down-hill; and ore has a natural drift in that direction, which makes the hauling of it merely nominal, and places the mill and mines in close proximity. There is a natural foundation for a dam and mill, there being a small mountain of granite in the center of the river at the head of the rapids, which would furnish a sure hold for the dam. The cost of water-power, compared with steam, makes the operation of milling the ores comparatively cheap. The formation of this country is granite, and the leads true fissures. They can be traced from one claim comrising 1500 feet to three and even five miles, and will assay from $25 to $300 per ton at the surface. The ore is mostly free milling. Some is base with copper; some contains from 0·9 to 22·8 per cent copper. On the east side of Los Basins camps, there are several good ledges of galena, with no development whatever. Little is yet known of these camps, as they have been examined by but one expert, and then only an imperfect examination was made. It revealed sufficient to convince him, from the large quantities of good ore above ground, of the great value of its mineral properties. It was here, where the small boulder of quartz was found containing $700; also the piece of float that assayed $96,000 to the ton; and the lead is yet undiscovered. On the Ida mine, there is a shaft 25 feet deep, showing a vein 7 feet in width. There is no other mine in Los Basins that has more than 12 feet of work done, and all ore taken out thus far is good milling ore. The camp is well supplied with water; no prospect being over six miles from the river. There are four springs in easy reach—Burro Springs, four miles distant; Grape Vine Springs, six miles; Grass Springs, seven miles; and Patterson Wells, six miles. This, for Arizona, is a decided advantage over other camps, which should not be overlooked. Work can be done the year around; but the winter season is the most pleasant. Snow seldom falls, and only in small quantities. The supply of charcoal is abundant; the timber being only fifteen miles from the river. If smelting be considered, coke can be had in sufficient quantity from Hackberry.

PIMA COUNTY.

TUCSON SMELTING AND MILLING COMPANY.—The county's appropriation of $15,000 in bonds to the person who erects the first smelter has attracted Aaron Mason to the scheme, and the above company has been organized upon the basis of 20,000 shares of $5 each, of which Tucson takes 5000 shares, or $25,000, thus placing $40,000 in subscription and bonds at the disposal of Mr. Mason, who subscribes the rest of the stock, namely, 15,000 shares. The capacity of the smelter is 60 tons a day. The smelter is to be close upon the junction of the railroads, and the company will buy all sorts of ore, in lots from 50 pounds and upward. These facts we gather from local papers.

YAVAPAI COUNTY.

HIDDEN TREASURE.—Some good ore has been found at a depth of some 300 feet. It is evident, from all experiments made on Turkey Creek, that the great ore-bodies of the district are not found until a depth of from 200 to 300 feet is attained. Surface workings show that the ore is scattered all through the veins; but, as above stated, when a proper depth is attained, the ore becomes concentrated in solid bodies and of a richness which justifies the outlay necessary in sinking. The company's mill will probably start up shortly.

CALIFORNIA.

MONO COUNTY.

CARBONATE.—McLaughlin & Co. are working this mine situated at Benton. They have developed a fine prospect. The ledge improves in quality and quantity as depth is reached.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GOLD STRIPE.—According to the *Bulletin*, work has been stopped at the mine. The mill will continue to run but a short time, when all the ore now at the dump will be worked up. It is reported that there is no ore in sight in the mine, and that no prospecting will be done unless the shareholders furnish the money.

SIERRA COUNTY.

A prospecting company has been formed in Grass Valley, and it is its intention to keep experienced miners on the road all the time; these experts to prospect for mines and examine mines and report on them. Same parties have started out for a trip through Sierra County.

IDAHO.—The mine is improving, and some good ore has been taken from the bottom of the shaft below the 14-foot level.

PEABODY.—The company has leased its mine for two years, and every thing is now getting into order for work, which will be commenced as soon as water can be had.

CANADA.

PROVINCE OF NOVA SCOTIA.

OXFORD.—It is reported that the property at East Chezzetcook, east of the gold mines of this company, has been purchased by the Oxford for $20,000.

COLORADO.

CHAFFEE COUNTY.

One of the most important elements affecting the prosperity of the Monarch Mining District is the completion of the extension to Garfield of the Maysville branch of the Denver & Rio Grande Railroad.

CLEAR CREEK COUNTY.

Following is a statement of ore-shipments from Georgetown during the month of September:

Shipped from	Tons.	Value in dollars.
Boston & Colorado Works	291	$28,029
Silver Plume Sampling-Works	210	19,800
Miners' Smelting Company	110	12,100
Morris & Noone	222	27,350
G. W. Hall & Co.	15	4,270
Lawson and Silver Creek		
Total	848	$91,810

Besides the above amounts, the Moline Tunnel Company has been shipping from its side-track a short distance below the depot sixty tons a day to the concentrating mill at Lawson.

MICHIGAN.—This property has lately been purchased by a gentleman from New Orleans, at an outlay of a few hundred dollars, and after the expenditure of a few hundred more has developed a value of many thousands. Tests recently made gave of yellow copper $131.65 and of gray copper $111.80 to the ton, and the average of the whole four-foot streak returned $42.80 to the ton.

MOUNTAIN CITY.—This lode at the head of Spring Gulch is down 160 feet. Heretofore, the ore has been greatly scattered, but is now getting more and more compact. Over one inch of solid gray copper, together with 10 inches of galena, with copper and iron pyrites, is now in the shaft. Mill-runs have been had at Black Hawk showing 266 ounces in silver. Shipments will be made weekly.

PERKINS TUNNEL.—This lode on Spring Gulch is driving on a 100-foot contract. At 70 feet in depth, the tunnel is showing up finely. Streaks and bunches of gray copper, with iron and copper pyrites are fast coming in as depth is gained. The gold quartz on the foot-wall remains in place. Nuggets and wires of fine gold are found in the seams. With 100 feet of development, there is no doubt but that this mine will be a steady producer of ore in paying quantities.

RED ELEPHANT.—The properties of this company, which consist of the White, two claims aggregating 3000 feet, Boulder Nest, 1500 feet, and the Free America, 1500 feet, are reported to be in a flourishing condition.

GILPIN COUNTY.

COLUMBIA.—This enterprise began operations about a year ago. The tunnel has been driven since that time 600 feet from the tunnel entrance under Quartz Hill. Situate as it is above Quartz Hill tunnel and below the Central City tunnel, it will be the means of opening up and draining a large number of veins. Several veins have been cut, among them a lode abandoned some years ago, where the tunnel is connected with a shaft sunk to a depth of 110 feet, which affords splendid ventilation to the tunnel. On the foot-wall of the Argo, was found quite a streak of mineral, but of too low grade to be made profitable at the present rates charged for treatment of refractory ores. In and near the breast of the tunnel, two lodes have been struck, the Argo and Vedette, both of which are patented properties. At this point and along the back of the tunnel, there is a large wide crevice which carries considerable mineral. The promoters and owners of the tunnel have ample dumpage ground below the mouth of the tunnel in the gulch to dump waste material. Good headway is made in the tunnel breast, the ground being easily broken. Last month, the tunnel was driven by two shifts, three men on a shift, 67·7 feet in twenty days, at a cost of $4.70 per foot. One man will break enough crevice-matter in one shift to keep two men tramming.

MINERS' WORKS.—The new McNair furnace at these works in Golden is reported by the *Globe* to be a success. A test run made recently treated 53 tons and 1400 pounds of ore more than the other furnace, with 48 tons less fuel. This company has the exclusive right to use this furnace in Colorado, and it is its intention to change all old furnaces for this kind as soon as possible.

REPUBLIC GOLD MINING COMPANY.—In the case of this company, the property of which is situated on the Pewabic Lode, Russell District, where the end-lines of the location were not parallel, in comformity with law, the Secretary of the Interior has decided that the location shall be accepted as it now stands.

FREMONT COUNTY.

ROYAL GORGE SMELTER.—This smelter, located near Cañon City, with two Hall & White stacks, and a nominal capacity of 100 tons a day, gives employ-

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ment to sixty hands, and does much to sustain the business character of the town. It has, however, been seriously hampered for want of capital to carry heavy stocks that would enable it to compete with other places in the purchase of ores. This is now to be remedied. The smelter has been cleaning up, and on the 26th blew out entirely, with all stock worked up. It will open on the 15th of October with a large backing of Pittsburg capital, which will enable it to take a place among the strongest works of its kind in the country.

ROCKY MOUNTAIN MINE DEVELOPING COMPANY.—This organization, owning the Green Mountain copper mine, seven miles south of Parkdale, and representing Chicago capital, broke ground for its new works on the 25th of last month. The smelter will be located about half a mile below the town, on the river-bank. It will employ hydraulic power, but will also be rigged with steam for emergencies. Most of the plant is already at Cañon, and the work will be pushed without delay. It will have one blast-furnace, with a capacity of 60 tons a day, and the first efforts will be confined solely to the treatment of the company's own ores from the Green Mountain mine; but there is a project of indefinite enlargement as time and capital serve, and the ultimate purpose is to secure the great facilities of Cañon in the way of cheap fuel, cheap flux, and cheap power, to become extensive smelters of copper ores. The furnace is one of Rankin, Brayton & Co.'s stacks, with sufficient engine and crusher capacity to run three additional furnaces. The company has 4500 feet on a very wide lode, carrying oxides and sulphurets, with from 2 to 3 ounces of silver and half an ounce of gold, and from 10 to 16 per cent of copper. Work will be confined to smelting for matte for the present. The mine is opened by a main shaft 100 feet deep, and a winze below that level of 45 feet, the latter in ore. On a distance of 1000 feet, there are 13 test pits, one of them being 45 and the other 40 feet deep. The president is Mr. Wilbur K. Johnson, of Chicago; the general manager, W. E. Johnson; the secretary, Orson G. Stanley, who is now in this city; and the treasurer, J. W. Harrison, of St. Louis. The capital is $3,000,000. The company proposes to do custom-work in the future.

GUNNISON COUNTY.

RICHMOND.—This mine has been sold for $40,000. Regular shipments will be made. The developments consist of shaft, 100 feet, and tunnel; pay-streak, three feet; mill-runs, 750 ounces.

LAKE COUNTY.

ARKANSAS VALLEY SMELTER.—This company has all five of its furnaces in blast. The establishment is turning out about three car-loads, thirty-three tons, of bullion a day. The product of the works is sent to the Kansas City refinery.

CHRYSOLITE.—Exploration-work from the *All Right No. 2 shaft, situated* northwest of the company's office buildings, has been resumed. The shaft has a depth of about one hundredfeet, and discloses a large body of iron. Upon this, drifts are now driving to the east and north, and upward of one hundred feet of drifting has been done. So far no pay ore has been found, but the exploration-work discloses some fine iron ore. Work on the "Iron" incline has been nearly suspended. In the absence of a suitable pump, it has been found impossible to handle the water, and in consequence the advance of the incline is delayed. A large Cameron pump is now on its way from New York, and is expected here in a few days.

DOUBLE DECKER.—This mine, on Yankee Hill, just this side of the Adlaide, promises to become again a producer of rich ore, having recently disclosed very high grade chloride. For six months or more past, the mine has been worked on a lease by Colonel Rush Field and others. Until within the past few days, the results of the work done by these parties were any thing but satisfactory, and it is doubtful if persons could be found in Leadville, that, under all the discouraging circumstances encountered by Mr. Field, would have continued with the same energy and persistency that he has displayed. On last Saturday, a seam of ocherish mineral was struck, which on close inspection showed chlorides of silver. The streak was followed up and soon improved in strength and value, until, at the present time, an eighteen-inch body of ore has been opened in which the occurrence of lumps of horn-silver is very frequent, while the entire mass is impregnated with bromide and chloride of silver. About three tons of this mineral have been hoisted to the surface, from which assays have been obtained ranging from 97 to 747 ounces to the ton. This does not include assays of the higher grade of ores. A shipment will be made to the smelters in a few days.

GERTRUDE.—The strike in this mine, adjacent to the Venture lode, in the Little Frying Pan District, promises to be quite important. The vein is identically the same as the one opened in the Venture, and had previously been explored by a number of shafts. On account of the difficulty encountered by the large flow of water, it has been determined to drive a cross-cut tunnel to intersect the vein. The work was begun during the early spring, and about ten days ago struck the vein at a distance of 210 feet from the portals of the tunnel, and at about seventy-five feet below the surface. A level was next started on the vein to the northward, and at fourteen feet from the tunnel encountered an ore-chimney which has since been penetrated for a distance of twenty feet, showing a three-foot face of mineral the entire height of the drift, giving an average assay of 129 ounces in silver to the ton; while assays have been obtained running as high as 221 ounces. The northern end-line of the claim is still 200 feet distant. Considerable ore has already been extracted, and shipments will be commenced shortly.

IRON SILVER.—The California Gulch properties of this company are doing well, the Stone mine maintaining its regular production of two hundred and fifty tons of ore a day. The lessees on the Rock mine are shipping about twenty tons daily. The incline on the Stone claim, which was driven some years ago, and not given enough pitch, is to be rebuilt. The incline is about four hundred feet in length. A winze is sinking to determine the depth of the contact, in order to ascertain the correct pitch to be given the new incline. No. 5 Stone shaft, which was recently supplied with hoisting machinery, is doing well and yielding a large amount of ore. The shaft has been connected with ore-bodies left beyond the face of the old Rock incline, by a drift. At the Moyer shaft, a second large boiler is getting into position. A building for an engine-house is also going up 180 feet east of the shaft. The seventy horse-power engine formerly in use at the Iron mine incline will be placed in position here, and will be connected with two drums. The water in the Moyer shaft has lately decreased to a considerable extent, and the sinking of the shaft was again resumed.

MAID OF ERIN.—A shipment of fifty tons of ore to the Elgin smelter showed that the mineral ran 140 ounces in silver to the ton, and contained fifty-nine per cent in lead. Pending the decision of Secretary Teller, the mine is doing nothing.

MORNING STAR.—It is said that the Lower Waterloo mine, of this group, contains a seam of ore from one to eight inches in thickness, averaging 797 ounces in silver to the ton, and carrying twenty-four per cent of lead. A wagon-load shipped to Cumming & Finn's smelter the other day netted over three thousand dollars.

NEW ENGLAND.—The Ohio Bonanza tunnel, situated near the California Gulch, is worked and extends good promises of developing an ore-body. The property is owned by the New England Company. The tunnel is in over 200 feet, and is reported showing a well-defined vein, assaying from six to seven ounces in silver and two tenths ounces in gold to the ton.

OPULENT.—That portion of the mine on Little Ellen Hill not in conflict with other properties is working again.

PRINTER BOY.—This mine, situated opposite Oro City, is to be worked again. A contract has been let to put up a hoisting-engine, boilers on the property, and also a large steam-pump. Work is to be commenced in the lower shaft of the claim. The property has already produced largely, and only fell off in production when the depth precluded further operations on account of the absence of proper machinery for working the mine and handling the water.

RUBY.—So far, the mine has shipped but limited quantities of ore, all efforts having been concentrated in the attempt to more thoroughly explore and develop the mine's resources. This work is now nearly accomplished. The property will be incorporated some time in October, the company to be known as the Savannah Mining Company. Its capital will be moderate, probably not exceeding fifty thousand shares.

SILVER CORD.—Prospect-work has been started in a number of places. The extension of the main incline (No. 2) has been resumed, also the driving of the south level, in each of which machine drills are employed. As a consequence, good headway is made. The south gold incline, driven for some time past on a barren crevice, has opened a large body of medium-grade ore, through which is dispersed some fine shipping mineral. The crevice disclosing this ore-body is nearly parallel with the Gold Ore chute, and a short distance to the south. It gives indications of developing a new and profitable source of ore supply to the mine. The Gold Ore chute is holding out about the same as heretofore. The ore, to appearance, is a little lower in lead, consisting more of ocher, but may have improved in a proportionate degree in gold. The No. 3 ore-chute shows no noticeable change. The breast of the ore-chute is evidently composed of as good material as at any time in the past, while the ore-body shows no diminution in strength or size. The product for September is estimated at about 3600 tons. The work of reconstructing and repairing the plant destroyed by fire several months ago will soon be completed.

PITKIN COUNTY.

OAKLAND CONSOLIDATED.—A note, published by the Aspen *Rocky Mountain Sun* states that this company will not be responsible for any work done on the Oakland No. 2 mine, nor for any debts contracted, unless authorized by the superintendent, L. J. W. Herrick.

SPAR.—The mine is worked steadily. Ten tons of ore daily are packed to the smelter, averaging $200 per ton in silver. A 1000-foot tramway is to be built from the workings, upon which to chute the ore to the foot of the mountain to a point where it can be teamed to the smelter, when the shipments will be largely increased.

PUEBLO COUNTY.

PUEBLO OIL COMPANY.—The result of the recent meeting mentioned in our last issue has been the organization of a company with the above name, with a capital stock of $50,000. Work will be commenced at once, and if the sinking of one well does not find oil, another will be sunk.

SUMMIT COUNTY.

ROBINSON.—The Leadville *Herald* says that eight car-loads or eighty tons of ore were shipped September 22d. September 24th, the shipments amounted to only twenty-five tons. The mine, judging from what can be learned in conversation with parties familiar with its appearance, is not looking as well as might be desired.

DAKOTA.

ESTRELLA DEL NORTE.—The superintendent reports that the result of this season's work so far has turned out beyond all expectations. The force-pumps which are to convey the water to the higher bars will soon be in position; and when they are up, the product of gold will be greatly increased.

ETTA.—Work is now in progress at this tin mine.

FATHER DE SMET.—The superintendent writes, under date of September 15th, as follows: The Golden Gate south header made its usual progress last week, the face showing as well as ever. East cross-cut, third level, continues in ore, though mixed up some with slate, but it is a good average. We are now in about 17 feet in this body, and the chances for developing a considerable amount of ore in this level seem very favorable. The rest of the mine shows about as usual, plenty of ore being in sight, the cut being very low grade in quality. I am compelled to draw for $25,000 to-day, to meet last month's expenses, which were very heavy, owing to the large bills coming in for winter supplies. I think the September account will about finish these bills up, and enable us hereafter to get along with much less expense for several months to come, every thing running along well. The report for the week ended September 22d shows: Ore extracted from first level, 700 tons; second level, 800 tons; third level, 485 tons. Ore milled, 1975 tons. Golden Gate east cross-cut, third level, in 62 feet; Golden Gate, south header, second level, in 42 feet. I herewith inclose you express company's receipt for bar No. 167, containing 758 1-5 ounces gold, the result of run of mill for the first half of September. This is averaging so far a little better than the previous month. Every thing is going ahead and looking about as usual. The mill is running along smoothly and doing good work.

GRIZZLY BEAR.—The ore which is to be worked by the new stamp-mill is taken from the recent rich strike. On this streak, a tunnel has been driven eastward from the old open cut about twenty feet, and another westward sixty feet. This tunnel is about forty feet below the surface. Another ditch has been surveyed to bring water from a small branch of the gulch, in order that the whole twenty stamps may be brought into service.

STAND-BY.—Every thing will be in readiness for starting the water into the ditch early in October, and a number of the stamps will be employed upon ore from the Stand-by mine. This ore will be extracted from the old open cut and from a shaft which is now down to a depth of twenty feet. In this shaft, a streak of rich rock has been found.

IDAHO.

The Mayflower, Jay Gould, Narrow Gauge, and other mines whose ores carry 50 per cent of lead or more, are making arrangements to ship either to Omaha, Denver, Salt Lake, Melrose, or San Francisco, since the Philadelphia Smelting Company declines to buy their ore.

ALTURAS GOLD HILL.—The working force has been increased. A vein of rich ore about about three and a half feet in width has been struck and stripped for a length of 35 feet along the vein. There have been recently extracted about 200 tons of this ore that will yield an average of $100 per ton.

COLUMBIA & BEAVER.—The mill has not only been running satisfactorily, but has been doing better than was expected.

ORADO.—This company has purchased the Byron and Baltic mines, in Mineral Hill Mining District, Wood River. The mines are on the great vein or mother lode of the district, cropping out bodily from four to five feet wide, between a lime and granite formation, lime for the foot and granite for the hanging-walls. They were located in 1881.

PHILADELPHIA SMELTING COMPANY.—The order recently given regarding the purchasing of ores applies only to the ores which go very high in lead. The company will continue to buy all those that are low grade in lead.

DOUGLASS.—At the sale of this copper company's stock, delinquent under the fourth assessment of twenty-five cents per share, held at Bangor recently, nearly the entire block, comprising some 35,600 shares, was purchased by Hon. F. M. Laughton for the amount of the assessment.

MICHIGAN.

Explorations on section 10, T. 34, R. 34, have been suspended on account of "wet ground." The intention is to resume work again as soon as the weather is cold enough to freeze up the surface water accumulations.

A project is said to be on foot for the erection of a concentrating mill near Republic, at some point where the water-power can be had from the Michigamme River.

BRIER HILL.—Local papers report the stoppage of work on account of exhaustion of the ore-deposits.

EAST VULCAN.—A new shaft was started recently for the purpose of tapping the new vein.

INDIANA.—After a five weeks' idleness, work has been resumed with favorable results.

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IRON HILL.—A hard blue hematite carrying nearly 60 per cent of metallic iron was taken out of the shaft sinking by this company.

NEGAUNEE CONCENTRATING COMPANY.—The mill has been closed down for the winter. The cause of this suspension is not yet known. Some reports state, however, that it has been owing to a disagreement among the stockholders.

PENN.—The company is putting down a test shaft in the hill between the Norway and Cyclops mines.

ROPES.—The mill is now running on rock taken from a new shaft, 100 feet east of the Curry where the rock milled in the first run was obtained. The management desires to prove by actual test the character of the vein at this point, and will mill 100 tons of rock mined there to that end. This shaft is down some 12 feet, the lode having a width of six feet, and the vein-matter gives promise of making a very satisfactory showing under treatment, several assays indicating that it is quite highly charged with the precious metals. Mining work is also going on in the Curry shaft, where some extremely rich rock is taken out, the free gold in it being visible to the naked eye.

MONTANA.

SILVER BOW COUNTY.

MARGARATH.—An important strike is reported in this mine, which lies immediately east of the Colusa. The shaft is sinking in vein-matter which shows a width of fifty feet at the surface. At a depth of 37 feet, an 18-inch pay-streak has been struck. The ore is black sulphurets carrying native silver, and assays from 120 to 200 ounces.

MONTANA COPPER COMPANY.—The numerous inquiries received by this company as to the amount of production of its smelting-works have induced Mr. Rauuheim to state the following through the Butte *Inter-Mountain:* Owing to the recent depression of the copper market in this country, it was formerly thought not advisable to publish figures, the copper produced by this company being consumed by home brass manufactories. Since September, 1882, all the mattes produced by this company have been exported to England and contracts have been made in Europe lately for a long time to come, therefore there is no reason for withholding figures from the public. During the last twelve months, ended September 1st, 1883, the Colusa Smelting-Works shipped for export 8100 tons, averaging sixty-five per cent copper and fifty-five ounces silver per ton. Should a reduction of freight rates and fuel be granted by the rival railroads, the Montana Copper Company intends to erect an additional blast-furnace, having a daily capacity of 100 tons, thus doubling the present production.

WILLIAMS SMELTER.—The capacity of these works is to be increased by three stacks. The castings for two of them, which will be erected this fall, have already been shipped. The third stack will not be built until spring. These improvements were made as the result of the recent visit of Senator Hill and Mr. Richard Pierce, of the Argo Works, to Butte, the magnitude, permanence, and richness of whose mines deeply impressed them with the great future in store for the district. The amount of Butte ore in a crude state at the Argo Works is about 3000 tons, all of which was shipped from the Williams smelter in addition to its matte shipments.

NEVADA.

ESMERALDA COUNTY.

ENTERPRISE.—Operations have been resumed on this mine, the first westerly extension of the Mount Cory mine. This property has favorable prospects. It is intended to extend the present tunnel, which is in about 350 feet, to the ledge.

STATE LINE.—According to Nevada papers, the judgment of Tallman & Co. for $20,000 against this company has been set aside. It is stated that the company has been waiting the termination of this suit to resume work.

EUREKA COUNTY.

ALBION.—The *Sentinel* states that the mine is economically prospected, and the outlook for it is encouraging. The east rise is yielding ore in paying quantities, and some rich ore has been discovered in a rise from the June chamber. It was found about 150 feet from the A. C. line, and is making strong in Albion ground, in a northwesterly direction. The prospecting tunnel, continued from one of the flue-dust tunnels, cut a large open crevice or cave a few days ago, which goes to show that open and better ground is to be expected from now on. A farther distance of 60 feet will bring the tunnel to a point over the east uprise, where the chances for striking an ore-body have always been considered good.

ELDORADO CONSOLIDATED.—A streak of high-grade ore has been discovered in the No. 2 mine 120 feet below the level of the Eureka Tunnel and Eldorado Consolidated properties. It assays $190 per ton.

LINCOLN COUNTY.

RAYMOND & ELY.—All the machinery and company's lands and improvements at Bullionville are advertised for sale. Application may be made to J. V. Keeley, agent for Lazard Frères, San Francisco.

NYE COUNTY.

TWO G.—Work has been resumed at this mine, which has been closed down for three years. The mine has not been prospected lower than 400 feet. At this depth, water was encountered and work was stopped, and there was no machinery to handle it. On this level, the ledge was followed in a direction nearly north and south about a mile, the vein holding out along that length and going down all the while. A great deal of prospect-work has been done, generally with profitable results. The present company has had excellent success in mining and milling. It roasts and crushes the ore, instead of smelting it, as was formerly done, and works it up to 92 per cent of the pulp-assay; whereas, in the smelters, it was not worked up to more than 61 or 62 per cent. The twenty-stamp mill crushes 23 tons a day. The company is working for the present in the 300 level. It has put in a pump, and the water it uses is taken from the 400 level. It has had no occasion yet to try to drain the water-level, but believes that, when it needs to, there will be no great trouble in doing so. Since starting up the mill, it has turned out an average of about $500 very fine bullion per day. The run of the last thirty-five days was over $17,000, with two or three thousand dollars of amalgam remaining over. The present company, owing to its closer milling, can utilize a great mass of ore in the mine as well as a good deal on the dump that the former company did not succeed in working at a profit.

STOREY COUNTY—COMSTOCK LODE.

IMPERIAL.—The furnaces have been fully fired up, and the shriek of the whistle heard for the first time in nearly two years.

NEWFOUNDLAND.

A new lead and silver mine has been opened near Little Placentia, under the management of Mr. F. Ellershausen, who purchased the claim from the discoverers for £4500 sterling. Some of the richest specimens yielded, on analysis, 300 ounces of silver to the ton. It is considered a most promising mine. A large number of men are employed in working it.

BETTS COVE.—A considerable amount of ore has been extracted this year.

LITTLE BAY.—At the copper mine, nearly five hundred men are at work. The yield of the mine is in every way satisfactory.

NEW MEXICO.

GRANT COUNTY.

There are about twenty-five men employed in placer mining in Piños Altos, making a fair living. In many instances, the dirt is carried several miles to water. The arrastras are running permanently on good ore from mines in the vicinity.

BLACK PRINCE.—At the bottom of the fifty-foot shaft, 20 inches of good milling ore are found. The surface croppings plainly indicate great value.

COLUMBIA.—The shaft is 70 feet in depth, and shows from the surface to the bottom a continous and well-defined vein of ore having a milling value of $125 per ton. The vein occurs in a granite rock, and runs north of east and south of west, and is almost vertical in its dip. The mineral consists of chlorides and sulphurets of silver associated with heavy-spar and talcose matter which constitutes the gangue of the vein.

GLADSTONE.—At present, this is but a mere pit as far as developments go; but when the owners prosecute the work now contemplated, their labors will be rewarded by an abundance of fair milling ore.

OLD MAN.—The developments made show most satisfactory results. An important strike was recently made in the deep shaft.

SOCORRO COUNTY.

A number of parties are about six miles east of Socorro, working the coal-banks and marble quarries, which show well. A large bed of tripoli has been discovered; in the same neighborhood and not far distant, some excellent fire-clay has been brought to light. But few mines are developing in the Socorro Mountains; but those that are worked, notably the Alabama, Reserve, Morning Star, and others, are all looking well. The Merritt is idle on account of a disagreement with the owners of the stamp-mills.

SILVER PEG GROUP.—This is considered one of the most promising properties in the entire Magdalena range. The group comprises the Doubtful, Black Crook, Gertrude, and Commonwealth locations, and is located on the west side of the mountains, adjacent to water, of easy access for wagons and but three fourths of a mile from the smelter. It shows large quantities of galena running well in silver. The property is said to be for sale, and can be purchased for $20,000.

NEW YORK.

A correspondent of the *Evening Post* writes from Northville that the discovery of gold has caused some excitement. One of the mines is situated on the south side of a hill rising steeply from the Sacondaga, in a ledge of soft, shaly rock, easily disintegrated. There was gold there, to be sure, but it was much mixed with the sulphuret of iron, a peculiarity of most of the Adirondack ores. The second mine was on the opposite side of the hill range, and had been opened to a depth of about thirty feet, and then abandoned. At Benson Center, ten miles west, there are two mines in full operation, one worked by a local company, the other by Amsterdam (N. Y.) capitalists. The material of these mines is sand, which is worked by being reduced to powder in a "pulverizer," the gold being extracted in the ordinary way. These companies are said to be taking gold in paying quantities, although they are quite reticent about the matter.

NORTH CAROLINA.

SILVER VALLEY.—This company has ordered a concentrating plant to be connected with its twenty-stamp mill. It is stated that this is a step the company should have taken long ago, as it has been losing many valuable metals in the tailings which it now purposes saving.

PENNSYLVANIA.

Mr. John Eyerman, of Easton, sends us the following notes of interest:

FRIEDENSVILLE ZINC MINES.—All underground work at this mine has ceased. A new shaft is sinking about 150 yards from the old one. It is expected to strike the ore at a depth of about 400 feet. Galleries will be extended from the new shaft to the old workings, thus connecting the company's different mines. When the shaft is completed, the company proposes to remove the famous West engine, which has a capacity of 550 horse-power, from the old Ueberroth mine to the new shaft, thus doing away with all steam-pumps, which are hardly applicable for so great a distance on account of the condensation of the steam in the cold air. The new shaft will be 10 by 15 feet, and will probably be completed in five months. The sand collected by the old company is "buddled," and produces from 20 to 25 per cent of zinc. There are acres of this sand around the mines which was regarded by the old company as worthless. The electric lights will be introduced into the mines.

SUNBURY LEAD MINES.—On the 13th of September, a large number of persons, among whom were many stockholders, crowded the furnace-room of the Susquehanna Mining and Smelting Company, at Sunbury, to witness the first tapping of the furnace. At half-past six P.M., the furnace was charged with 3000 pounds of lead ore (galena, etc.), and tapped at forty-five minutes past nine, turning out 1600 pounds of nearly pure metal. Five to six hours is the usual smelting time. The furnace, which was built by Messrs. Holliday & Kidney, will work 3000 pounds of ore in three hours. The ore used for the first charge was washed from the fine dirt taken from the mine. The lump ore, five times richer, can not yet be handled, as the proper reducing machinery has not arrived. It is said that the ore will be concentrated to 60 per cent. The principal men in the company are Bostonians.

CORUNDUM IN LEHIGH COUNTY.—Early in the year 1882, while plowing, a farmer threw out some crystallized substance, which, upon examination, proved to be corundum. The largest crystal had a length of eight inches. Some months ago, two gentlemen from Allentown leased a plot of land adjoining the one on which the crystals had been found, and began sinking shafts on the high land, about 200 yards from the original locality. The shafts vary in depth from 30 to 5 feet. At the time of my visit on the 27th of September, five shafts were opened, and a considerable quantity of corundum taken out. The shaft farthest south seems to produce the best specimens. It is down 18 feet, and is connected by a gallery with the other shaft. As yet, no specimens large enough for working have been taken out; but it is expected that they will strike larger specimens shortly. In some of them, menaccanite, an ore of titanium and iron, is found coating the crystals as well as disseminated through them. The outlook is certainly very favorable, and it is hoped that these enterprising gentlemen may strike the vein containing large specimens.

THE IRON REGION OF NORTHAMPTON COUNTY.—All the iron mines of the Saucon Iron Company have ceased work. For some months, they have only been worked half their capacity. One of the stacks at the company's works at Hellertown is blowing out, the other one having been idle several months. It is reported that the furnaces will be sold. Many iron mines in Lehigh County have been idle for several months.

THE CHESTER COUNTY LEAD REGION.—In a recent trip through the Chester County lead region, I noticed that most of the engine-houses are falling to the ground and the machinery rusting from exposure to the dampness. If these mines were operated, what splendid railroad facilities the company would have, a branch of the Pennsylvania & Schuylkill Valley Railroad running within ten feet of the Charlestown mine and within a short distance of the others. The Pennypacker mine is filled with water to the top of the shaft. There is a considerable quantity of lead and zinc on the waste-heaps.

UTAH.

IRON COUNTY.

IRON MANUFACTURING COMPANY.—The mining claims owned by this company, recently incorporated with a capital of $200,000, with the privilege of increasing it to $2,000,000, are known as the Duncan No. 1, Blomont, Chesapeake, Excelsior, Pot Metal, and Black Magnetic, in all about 120 acres, located in the Pinto Mining District, also, the Desert Mound, in Iron Springs District, and other mining claims in this county. The principal place of business is Salt Lake City.

SUMMIT COUNTY.

BON HOMME.—This company has been incorporated with a capital stock of $300,000. The following properties belong to the corporation: The Lucky Boy, Old Observation, Protection, Park View, Springfield, Nevada, Red Boy, Bevan, Sample, Boston, Crown Point, Garden City, Davenport, Henry Clay, Alameda, and Protector, situated in Uintah Mining District.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Oct. 5.

The mining market this week has been simply a brokers' market, and the dealings, or most of them, have been confined to the fancy low-priced stocks. Of these, Eastern Oregon, Decatur, Elko, and Sonora take the lead, while Sutro Tunnel and Robinson also show very large transactions. There is no change in the price of these stocks worthy of notice. The stock of the Harlem Mining and Milling Company suffered a considerable raid, and the price was forced down to a low figure. The transactions were very heavy, the stock being the most active in the market. The total number of shares sold aggregates 183,363 shares, as against 107,890 last week.

The Comstock shares were quiet at steady prices. California was quiet and weak, selling from 15@8@14c. Consolidated Virginia was moderately dealt in and was steady, selling from 39@44c. Sierra Nevada was strong, under a small business, selling from $3.40@$4. Union Consolidated was irregular, with a small business; it sold from $4@$4.75@$4.25. Mexican was quiet and steady at $2.25@$2.50. Ophir sold at $3.25; Savage at $2; Yellow Jacket at $3.25, and Best & Belcher at $3.10. Sutro Tunnel was active and irregular, selling from 19@17@18c.

The Leadville stocks were but moderately dealt in, and were steady. Amie was quiet and a little weak, selling from 16@18c. Chrysolite was moderately dealt in, and was also a little weak; it sold from $1.25@$1.15. Dunkin sold at 25c. and Breece at 19c. Iron Silver was quiet and strong, selling from $2.90@$3.10. Leadville was also quiet at steady prices; it s old from 40@49c. Little Chief was quiet and a little weak, selling from 63@58c. Little Pittsburg sold from 64@65c., with a very small business.

The Bodie stocks were quiet and weak. Bodie Consolidated was fairly dealt in at weak prices; it sold from 58@50c. Bulwer was also weak, under a small business, selling from 57@46c. Standard was quiet and strong, selling from $5.75@$6.25. Bechtel sold at 5c.

The Tuscarora stocks were very quiet at steady prices. Grand Prize was quiet and steady at 15@22c. Belle Isle sold from 31@28c., with a small business. Navajo was quiet at $2.75. North Belle Isle was quiet and steady at 46@41@45c. Elko Consolidated was very actively dealt in and was a little weak; it sold from 9@7c.

In the miscellaneous list, Alice was strong, with a small business, selling from $2.70@2.75. Bassick sold at $9. Eureka Consolidated was quiet and steady, selling at $6.25@$6.13. Hall-Anderson was quiet at steady prices, selling from $1.15@$1.10. Horn-Silver was moderately dealt in and was steady; it sold from $7@$7.13. Northern Belle was quiet and steady, selling from $5.50@$5.75. Robinson Consolidated was fairly dealt in at irregular prices; it sold from 36@40@38c. Sierra Grande was strong, with a small business, selling from 83@$1.10.

Barcelona was quiet and irregular, selling from 36@33@34c. Caledonia sold at 35c. under a small business. Central Arizona was quiet and steady at 33@30c. Decatur was very actively dealt in at irregular prices; it sold from 3@5@4c. Eastern Oregon was also very actively dealt in and was steady; it sold from 49@47c. Harlem was very active and weak, selling from 97@70@76c. Rappahannock was irregular, with a small business, selling from 6@9@7c. Red Elephant was quiet and steady at 5@6c. Sonora Consolidated was actively dealt in at about steady prices; it sold from 28@25c.

MEETINGS.

The Findley Gold Mining Company, No. 70 Broadway, New York City. Special meeting of stockholders, October 23d, at three o'clock P.M.

The Hampshire & Baltimore Coal Company, No. 18 Broadway, New York City. Annual meeting of stockholders and election of trustees, October 18th, from twelve o'clock M. to one o'clock P.M.

The Mamie R. Gold and Silver Mining Company, Windsor Hotel, Fifth avenue and Fifty-sixth street, New York City. Annual meeting of stockholders and election of trustees, October 6th, at half-past one o'clock P.M.

The Rara Avis Gold and Silver Mining Company, Stock Exchange, Room 30, Philadelphia, Pa. Special meeting of stockholders for the purpose of increasing the capital stock from $2,000,000 to $4,000,000, November 15th.

DIVIDENDS.

The Idaho Mining Company, of California, has declared a dividend of $1 per share, payable in San Francisco.

The Leadville Consolidated Mining Company, of Colorado, has declared a dividend of five cents per share, payable October 15th, 1883. Transfer-books close October 9th and reopen October 17th.

The Plymouth Consolidated Gold Mining Company, of California, has declared a dividend of fifty cents per share, payable immediately.

The Standard Consolidated Mining Company, of California, has declared a dividend of twenty-five cents per share, payable October 12th.

The Union Coal Mining Company, of Maryland, has declared a dividend of two and a half per cent upon its capital stock, payable October 8th.

PIPE LINE CERTIFICATES.

The petroleum market this week has been very active, but prices have declined from the opening last Saturday, closing weak to-day, as will be seen by the table below.

On Monday last, the news from the oil-fields was "bullish," several wells being reported dry. The news helped the market, but a continual selling caused a gradual decline. Tuesday, the market was very active, liberal purchases being made by the "shorts." There was an advance at one time, but the market gradually weakened. Wednesday and Thursday, there were very heavy dealings, with a declining market. Reports that two new wells near the border side of the Balltown belt had come in, one dry and the other a small producer, influenced a slight rally, but the close found the market in an unsettled condition. To-day, the market declined slowly, and closed in an unsettled condition.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
Sept.	29	$1.15⅞	$1.16¼	$1.15¼	$1.15½	1,619,000
Oct.	1	1.15⅝	1.15⅞	1.14⅜	1.14⅝	2,168,000
	2	1.14⅝	1.15⅜	1.13⅝	1.14	3,772,000
	3	1.13⅜	1.14⅜	1.13¼	1.13⅜	3,330,000
	4	1.13⅜	1.13⅞	1.12⅝	1.13¾	3,464,000
	5	1.13¾	1.13¾	1.12⅜	1.12⅞	3,140,000
Total sales						17,493,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Sept. 28.	Sept. 29.	Oct. 1.	Oct. 2.	Oct. 3.	Oct. 4.
Albion						
Alpha	2¼		2¼	2¼	2⅛	
Alta	1⅜	1⅛	1⅛	1⅜	1¼	
Argenta						
Bechtel						
Belcher		1⅛		1⅛	1	
Belle Isle			.30	.30	.35	
Best & Belcher	3⅛	3	3⅛	3⅛	3⅛	
Bodie	.55	.60	.50	.50	.55	
Bullion						
Bulwer						
California	.15	.10	.15	.10	.10	
Challar	2⅝	2¼	2⅝	2¾	2⅝	
Con. Virginia	.45	.45	.45	.40	.45	
Crown Point	1¼		1⅛		1¼	
Elko Cons	.10	.10	.15			
Eureka Cons	6¼		6¾	6½	6½	
Exchequer						
Gould & Curry	2¼	2¼	2¼	2¼	2⅜	
Grand Prize	.20	.20			.25	
Hale & Norcross	3⅝	3⅝	3⅝	3½	3¾	
Independence						
Martin White						
Mexican	2⅜	2¼	2¼	2½	2⅜	
Mono						
Mount Diablo						
Navajo	2¾			2⅝	2⅝	
Northern Belle	5⅞	5⅞		5¾		
North Belle Isle						
Ophir	3⅜	3¼	3½	3⅜	3½	
Overman						
Potosi	1	.90	1	.85	.95	
Savage	1¾	1½	1¼	1⅜	1½	
Scorpion	.60		.55			
Sierra Nevada	3¼	3⅜	3⅝	3½	4	
Silver King						
Tip Top						
Union Cons	4½	3⅞	4	3⅞	4¼	
Utah	1⅞	1⅞	1⅞	1¾	2	
Wales Cons						
Yellow Jacket	3⅛	3⅛	3¼	3	3⅛	

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, October 4.

There is but little change to note in the condition of the market for mining stocks the past week. The coppers are firm, and in a few instances a slight advance is noted, but the market continues dull and without any special indication of an increased activity in th near future. The silver stocks are as dull as ever, and it is evident that the public generally has no money or disposition to invest in new ventures with the experience of the past two or three years looking it in the face. Calumet & Hecla holds its price well at $245@$246, with but little stock changing hands. Franklin advanced from $12@$12½, with sales of a small lot at $13, and is quite firm at $12½ bid and none offered. There was a rumor that the Quincy was negotiating for the purchase of this mine, but we hear that it is officially denied. The product for September was 187 tons, against 170 last year, and there is no doubt that the mine is a paying one and can earn a dividend the present year. Quincy sold at $54@$54¼, but there was very little doing in it. The increase in the product last month was about 12 tons, being 336 tons, compared with 325 in 1882 and 317 in 1881. Osceola advanced from $18@$19 on sales of 15 shares. Pewabic declined from $3 (September 21st) to $2½. The reports from the mine are not very encouraging, the September product showing a loss of 23 tons as compared with last year. A sale of 100 shares of Ridge at 62½c. is the only transaction reported of the low-priced stocks. The reports from the Huron mine continue favorable, the September product being 57 tons, against 27 tons last year and 12 tons in September, 1881. $1½ is bid for the stock, and none offered less than $2. No sales reported.

In silver stocks, Bonanza was steady at $1¾, with sales of 500 shares only. Catalpa declined from 35c.@32½c. Crescent sold at 7½c. Harshaw at 50c. Sullivan was quite firm on limited transactions at $⅞@$1. Bowman Silver, sales at 11@13c., assessment paid. Massachusetts & New Mexico, offered at 4c. Dunkin, 25c., ex dividend. Silver Islet advanced from $2½@$3 on good news from the exploring party on the company's lands on Lake Superior. It is reported that a vein of very rich silver-bearing ore twelve inches wide and only eighteen feet below the surface has been struck, assays of which yielded an average of over 5000 ounces to the ton. Should this prove to be a veritable bonanza, the stockholders will find cause for congratulation upon the outlook and prospect of a return for the numerous assessments which they have been called upon for to keep up the enterprise.

3. P.M.—There was nothing doing at the afternoon Boards and prices unchanged. Closing prices: Bonanza, $1½ bid, $1⅞ asked. Calumet & Hecla, $245 bid, $246 asked. Franklin, $12½ bid, $13 asked. Pewabic, $2½ bid, $3 asked. Quincy, $54 asked. Silver Islet sales, $3 and bid.

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 5.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Sept. 29	50 15-16	110¾	Oct. 3..	50 15-16	*
Oct. 1	50 15-16	110¾	4..	50 15-16	*
2	50⅞	*	5..	50 15-16	110⅝

* 110½@110⅝.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended October 5th, as compiled from various sources, amounted to $160,000, as against $254,111, reported for the previous week. The receipts from January 1st, 1883, to date are $8,649,047.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended September 29th	$382,387
Corresponding week last year	246,844
Since January 1st, 1883	10,988,176
Corresponding period last year	44,243,595

Imports.

Week ended September 29th	$719,840
Corresponding week last year	399,532
Since January 1st, 1883	12,231,430
Corresponding period last year	3,107,468

METALS.

NEW YORK, Friday Evening, Oct. 5.

Copper.—In Lake, small parcels coming forward are taken at 15¼c., sales this week aggregating

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DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Sept. 29. H.	Sept. 29. L.	Oct. 1. H.	Oct. 1. L.	Oct. 2. H.	Oct. 2. L.	Oct. 3. H.	Oct. 3. L.	Oct. 4. H.	Oct. 4. L.	Oct 5. H.	Oct 5. L.	Sales.	
1	Alice, S. C.	Mont	$10,000,000	400,000	$25	*				$400,000	Dec.	1881	.10	2.70		2.70				2.70		2.75	2.70	2.75		1,300	
2	Amie Con., S. L.	Colo.	5,000,000	500,000	10	*				320,000	Oct.	1883	.05	.16		.15		.15				.16		.13		7,400	
3	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	220,000	Feb.	1883	$2.00														B.
4	Argenta, S	Nev.	10,000,000	100,000	100	275,000	Jun.	1883	.25	40,000	Feb.	1880	.20														
5	Barbee & Walker, S.	Utah	1,000,000	100,000	10	*				60,000	Nov	1880	.10														
6	Bassick, G. S.	Colo.	10,000,000	100,000	10	*				200,000	Jun.	1883	1.00									9.00				100	
7	Belle Isle, S.	Nev.	10,000,000	100,000	100	85,000	May	1883	.20	300,000	Dec.	1879	.25					.31				.30	.28			300	
8	Belcher, G. S.	Nev.	10,400,000	104,000	100	2,588,000	Apl	1883	.25	15,397,000	Apl.	1876	1.00														
9	Birdseye, G.	Cal.		15,000							Dec.	1882															S.F
10	Black Bear, G.	Cal.	3,000,000	30,000	100	15,000	Sept	1879	.50	895,000	May	1883	.20														
11	Bodie Con., G.	Cal.	10,000,000	100,000	100	225,000	Aug	1883	.50	1,295,000	Nov	1882	.20			.58		.50								3,000	S.F
12	Bonanza Developm't	C & M	3,000,000	300,000	10					135,000	Oct.	1882	.15														
13	Boston & Mont, G.	Mont	2,000,000	200,000	10	*				310,000	Jan.	1883	.05														
14	Breece, S.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01	.19												1,000	F.
15	Bulwer, G.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	165,000	July	1883	.15					.57	.55			.55	.46			700	
16	California, G. S.	Nev.	54,000,000	540,000	100	962,000	Sept	1883	.20	31,320,000	Dec.	1879	.50					.12				.15	.08	.14	.10	1,350	B.
17	Calumet & Hecla, C.	Mich	2,500,000	100,000	25					23,850,000	Aug.	1883	5.00														
18	Carbonate Hill, S. L.	Colo.								60,000	July	1883	.05														
19	Caribou Con., S.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10														
20	Carolina Queen, C.	N. C.	200,000	100,000	2					8,000	Oct.	1882	.02														
21	Castle Creek, G.	Idah.	100,000	100,000	1					48,000	Sept	1883	.03														B.
22	Catalpa, S L	Colo.	3,000,000	300,000	10	*				240,000	Jun.	1883	.10														
23	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,670,000	Feb.	1883	3.00														
24	Christy, S.	Utah	6,000,000	60,000	100					90,000	Jan.	1883	.10														B.
25	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*				1,600,000	Dec.	1881	.50	1.25		1.25						1.20	1.15			1,466	
26	Con. Gold Mining, G.	Ga.	500,000	100,000	5	*				112,000	Aug.	1883	.04														S.F.
27	Con. Virginia, G. S.	Nev.	54,000,000	540,000	100	1,005,000	July	1883	.20	42,930,000	Aug.	1880	.50	.45		.44		.43		.41	.39			.44	.43	1,825	
28	Contention, S	Ariz.	12,500,000	250,000	50					‡2,461,500	Jun.	1883	.25														
29	Copper Queen, C.	Ariz.	2,500,000	250,000	10	*				1,100,000	July	1883	.50														S.F
30	Crown Point, G. S.	Nev.	10,000,000	100,000	100	2,678,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00														
31	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*				†900,000	Jan.	1883	.10														B.
32	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*				210,000	Oct.	1883	.05							.25				.25		200	
33	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	300,000	Sept	1883	.50	4,767,500	July	1882	.25			6.25	6.13									250	S.F.
34	Evening Star, S. L.	Colo.	500,000	50,000	10	*				1,275,000	Aug.	1883	.50														
35	Excelsior, G.	Cal.	10,000,000	100,000	100	380,000	Aug	1883	.60	875,000	Oct.	1880	.25														
36	Father de Smet, G.	Dak.	10,000,000	100,000	100					610,000	July	1883	.20														
37	Findley	Ga.																									
38	Franklin, C.	Mich		51,000		360,000	Jun	1877		243,000																	
39	Freeland, S.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.25														S.F.
40	Fresno Enterprise, G	Cal	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10														S.F.
41	Gem, S.	Colo	125,000	125,000	1					28,750	May	1883	.02														
42	Glass-Pendery, S. L	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10														
43	Glen, S.	Colo.	100,000	100,000	1					7 000	May	1883	.01														
44	Gold Stripe																										
45	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	3,530,000	Jun.	1883	.50	3,826,000	Oct.	1870	10 00					.07								2,000	S.F.
46	Grand Central, S.	Ariz.	1,000,000	100,000	10					625.000	Dec.	1882	.25														
47	Grand Prize, S.	Nev.	10,000,000	100,000	100	470,000	Jun.	1883	.25	450.000	Sept	1880	.25	.16										.22		1,410	
48	Granite, S.	Colo	125,000	125,000	1					6,250	May	1883	.01														
49	Great Eastern, G.	Dak.	3,000,000	300,000	10	*				16,000	July	1883	.01														
50	Great Western, G.	Cal.	5,000,000	50,000	100	35,500	Aug	1873	.15	262,500	Oct.	1882	.25														
51	Green Mountain, G.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½														
52	Hale & Norcross, G. S	Nev.	11,200,000	112,000	100	4,118,000	Sept	1883	.50	1,598,000	Apl.	1871	5.00														
53	Hall-Anderson, G.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.05	1.15	1.10	1.15		1.10				1.15	1.10			3,100	S.F
54	Hecla Con., S.	Mont	1,500,000	30,000	50					507,500	Oct.	1883	50														B
55	Henriett, L.	Colo.		270,000						27,000	Feb.	1883	.10														
56	Hibernia, S. L.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40														
57	Holyoke, G.	Idah.	200,000	200,000	1					44,000	Sept	1883	.02														
58	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	2,212,500	Sept	1883	.40							17.50		18.00				108	
59	Hope, S.	Mont	400,000	8,000	50	*				113,036	Oct.	1883	1.59														
60	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				2,600,000	Aug.	1883	.75			7.00		7.00		7.13		7.00		7.1	7.00	1,690	
61	Howell S. & M. Co.	Ariz.	375,000	187,500	2	*				3,750	Aug.	1883	.01														
62	Hukill, G. S.	Colo.	1,000,000	200,000	5	*				210,000	Dec.	1873	.10														
63	Idaho, G.	Cal.	310,000	3,100	100					3,390,850	Oct.	1883	1.00														B.
64	Independence, S.	Nev.	10,000,000	100,000	100	245,000	May	1883	.30	225,000	Sept	1879	.25														
65	Indian Queen, S.	Nev.	250,000	125,000	2					368,750	July	1883	08														S.F
66	Inyo, G.	Cal.	500,000	100,000	5	*				45,000	Apl.	1882	.05														
67	Iron-Silver, S. L.	Colo	10,000,000	500,000	20	*				1,200,000	Oct.	1883	.20			2.90				3.00		3.10	3.00			1,750	
68	Joculstitta, S.	Mex.	10,000,000	100,000	100					900,000	Aug.	1883	.50														E.
69	Kentuck	Nev.	3,000,000	30,000	100	342,000	Nov	1881	.30	1,261,000	July	1883	.10														
70	La Plata, S. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30														
71	Leadville, S. L.	Colo	4,000,000	400,000	10	*				310,000	Oct.	1883	.05	.43		.45	.40			.47	.42	.49	.48			1,215	S.F.
72	Leeds, S.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	75,000	Oct.	1878	.15														
73	Little Chief, S. L.	Colo	10,000,000	2,000,000	50	*				720,000	Oct.	1883	.10			.63				.62	.60	.60		.58		1,600	
74	Little Pittsburg, S. L	Colo.	20,000,000	200,000	100	*				1,050,000	Mch	1880	.50			.64		.65								300	S.F
75	Marguerite, G.	Cal.	500,000	25,000	20					18.750	Oct.	1882	.25														B.
76	Martin White, S.	Nev.	10,000,000	100,000	100	1,025,000	Sept	1883	.25	90,000	July	1879	.30									.05				325	
77	Minas Nuevas, S.	Mex	300,000	100,000	3	*				20,000	July	1883	.10														
78	Morning Star, S. L.	Colo.	1,000,000	100,000	10					590,000	July	1883	.25														
79	Mt. Diablo, S.	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	‖25,000	Sept	1883	.25														
80	Napa, Q	Cal.	700,000	100,000	7					250,000	Jan.	1883	.10														
81	Navajo, G. S.	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	225,000	May	1883	.25			2.75						2.75				700	
82	New York Hill, G.	Cal.	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10														
83	New York & Colo., G.	Colo	1,250,000	50,000	25					25,000	July	1879	.10														B.
84	Northern Belle, S.	Nev.	5,000,000	50,000	100					2,400,000	Apl.	1883	.50	5.75		5.75						5.50		5.75		570	
85	North Belle Isle, S.	Nev.	10,000,000	100,000	100	95,000	May	1883	.20	30,000	Aug.	1881	.15							.46		.41		.45		800	
86	Ontario, S. L.	Utah	15,000,000	150,000	100					4,925,000	Jan.	1883	.50													10	B.
87	Ophir, G. S.	Nev.	10,000,000	100,000	100	3,645,000	Aug	1883	1.00	1,595,000	July	1882	1.00									3.25					
88	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	985,000	Sept	1883	50														S.F.
89	Oxford, G.	N. S.	100,000	100,000	1	*				30,000	Aug	1883	.05														
90	Pleasant Valley, G. S.	Cal.	10,000,000	100,000	100	80,000	Sept	1883	.15	30,000	Dec.	1882	.05														
91	Plymouth Con., G.	Cal.	5,000,000	100,000	50	*				250,000	Oct.	1883	.50														
92	Polonia, S.	Colo.	200,000	8,000	25					12,000		1882	1.50														
93	Prussian, S. L.	Colo	1,500,000	150,000	10					132,000	Jan	1883	.10													100	P.
94	Quick-liver, pref, Q	Cal.	4,300,000	43,000	100					654,000	July	1882	6.00	38 50												100	
95	" com., Q	Cal.	5,700,000	57,000	100					151,000	July	1882	.40							6.00							S.F.
96	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,584,200	July	1883	3.50														
97	Renfrew, G.	N. S.	60,000	30,000	2					4,800	July	1882	.02														E.
98	Richmond, S. L.	Nev.	1,350,000	54,000	25	*				4,042,587	May	1883	1.25														
99	Rising Sun, S.	Dak.	750,000	150,000	5	*				52,000	May	1881	.07½														
100	Robinson Bar, G.	Idah.	100,000	100,000	1	*				9,000	Dec.	1882	.03														
101	Robinson Con, S. L.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50	.40	.39	.39				.38		.38		.38		10,200	E.
102	Robert E Lee, S. L.	Colo.	250,000,000	500,000	500					100,000	Dec.	1882	.10														
103	San Francisco, C.	Cal.	5,000,000	50,000	100	45,000	Sept	1880	.50	20,000	Feb.	1883	.05													100	B.
104	Savage, S.	Nev.	11,200,000	112,000	100	5,540,000	July	1883	.50	4,460,000	July	1869	3.00	2.00													
105	Shoshone, G.	Idah	150,000	150,000	1					7,500	Apl.	1883	.01														E.
106	Sierra Buttes, G.	Cal.	225,000	22,500	10					1,435,308	Apl.	1883	.25														
107	Sierra Grande, S.	N. M	10,000,000	100,000	25					700,000	Oct.	1883	.25													305	P.
108	Sierra Nevada, G. S.	Nev.	10,000,000	100,000	100	5,350,000	Aug	1883	1.00	102,000	Jan.	1871	1.00														B.
109	Sta. Pimas Eureka, G	Cal.		40,625							Apl.	1882															S.F.
110	Silver Cord, G. S. L.	Colo	4,500,000	450000	10					180,000	Aug	1883	.25													100	
111	Silver King, S.	Ariz.	1,000,000	100,000	100					1,275,000	Jun.	1883	.25														
112	Silver King, S.	Colo.	1,000,000	500,000	2					50,000	Aug.	1881	.10														
113	Smuggler, S. L.	Colo.	600,000	60,000	10					66,700	Aug.	1883	.25														B.
114	Socorro, C.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾														
115	Spring Valley, G.	Cal.	200,000	200,000	1	*				50,000	Jan.	1881	.25													690	
116	Standard, G. S.	Cal.	10 000,000	100,000	100	*				4,250,000	Oct.	1883	.25	5.75		6.00	5.75			6.00		6.25					
117	Stormont, S.	Utah	200,000	200,000	1	*				155,000	Nov	1883	.05														
118	St. Joseph, L.	Mo.	1,000,000	100,000	10	*				300,000	Dec.	1882	.20														
119	Tip Top, S.	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov	1881	.20														B.
120	Tombstone, G. S.	Ariz	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10														
121	True Fissure, G. S. L.	Utah	1,500,000	150,000	10	*				75,000	Jun.	1883	.15														
122	United Gregory, G.	Colo	300,000	300,000	1					38,250	Apl.	1883	.25														E.
123	United Gold Min. Co.	Colo.									Oct.	1883	.05														B.
124	Vizina, S.	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1882	.10													100	
125	Yellow Jacket, G. S.	Nev.	12,000,000	12 ,000	100	5,358,000	Feb.	1862	1.00	2,184,000	Aug.	1871	1.50									3.25					
126	Yuba, G.	Cal.	5,000,000	200,000	25					4,000	Sept	1881	1.00														

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ This company, as the Western, up to December 10th, 1881, paid $1,475,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British companies. ‖ Total number of shares, 500,000; 50,000 shares have never been issued, and are still held by the company. Dividend shares sold, 50,693.

several hundred thousand pounds. The contracts with consumers made earlier in the summer are soon ended, and the period for the purchase of new supplies is drawing near. One of the Arizona mines has contracted for the sale of six months' product, roughly five and a half millions, at 14½c., about three quarters of the quantity going abroad. Quotations for other brands than Lake range between 14¼@14¾c., according to quality, the quantity available being moderate. England cables lower to-day, quoting £62 7s. 6d. for Chili Bars. Business abroad seems depressed.

Tin.—Though quiet, this market is firm at 21c. spot for Straits and Malacca. The shipments from the Straits and from Malacca were, during Septem-

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Par Value.	Assessments. Total levied to date.	Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Sept. 29. H.	L.	Oct. 1. H.	L.	Oct. 2. H.	L.	Oct. 3. H.	L.	Oct. 4. H.	L.	Oct. 5. H.	L.	Sales.	
1	Advance M & M. Co.																						
2	Albion, S. L.	Nevada	$15,000,000	150,000	$100	$622,500	July	1883	.50														S. F.
3	Alloucz, C.	Michigan	2,000,000	80,000	25	200,000	January	1883															B.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50														S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	2,137,290	July	1883	.25														S. F.
6	Alta-Montana, G.S.L.	Montana	5,000,000	500,000	10																		
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25														
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*				.56	.35			.34				.33		.34		1,100	
9	Battle Creek, S.																						
10	Bear Creek	California		300,000	1																		
11	Beauce																						
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1882	.10									.05				500	S. F.
13	Best & Belcher, G. S.	Nevada	10,080,000	100,800	100	1,446,190	Septemb'r	1883	.50									3.10				200	S. F.
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																	
15	Black Jack, G.	California	250,000	100,000	2½																		
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	
17	Bonanza King, Cons.	California	2,000,000	200,000	10	*																	
18	Bondholder	Colorado	500,000	200,000	2½				.25														
19	Boston Con., G.	California	10,000,000	100,000	100	95,000	October	1882															
20	Boulder Con.	Colorado																					
21	Bradshaw, S.	Arizona	2,250,000	225,000	10																		
22	Buckeye	Colorado	2,000,000	400,000	5	*																	
23	" preferred	Colorado																					
24	Bull-Domingo, S. L.	Colorado	10,000,000	200,000	50	*																	
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,767,000	May	1883	.20														S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	
27	Calaveras, G.	California	500,000	500,000	1	*																	
28	Cal. W'r & M. Co., G.	California																					
29	Caledonia, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15	.35		.35										2,300	
30	Catskill, S.	Nevada	1,500,000	30,000	5																		
31	Central Arizona, S.	Arizona	10,000,000	100,000	100					.33	.30											300	B.
32	Chapparal	California																					
33	Cherokee, G.	California	1,500,000	150,000	10																		
34	Chollar, S.	Nevada	11,200,000	112,000	100	633,000	August	1883	1.00														S. F.
35	Climax																						
36	Colorado Central, S.	Colorado	3,000,000	300,000	10																		
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50																		
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05									.04				100	
39	Con. Pacific, G.	California	6,000,000	60,000	100	150,000	March	1883	.15														
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*																	B.
41	Crowell, G.	North Car.	500,000	500,000	1	*																	
42	Dahlonega, G.	Georgia	250,000	250,000	1	*																	
43	Dardanelles, G.	California	1,000,000	100,000	10																		
44	Decatur									.04	.03	.05	.03	.04		.04		.04		.05	.04	19,500	
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*																	
46	Durango, G.	Colorado	500,000	500,000	1	*																	
47	Eastern Oregon									.48		.49	.48	.49	.48	.49	.48	.47		.47		20,900	
48	Elko Con., S.	Nevada					April	1883	.15	.09		.09				.09	.08	.09	.08	.07		12,900	
49	Empire, S.	Utah	10,000,000	100,000	100																		B.
50	Enterprise	Colorado																					
51	Exchequer	Nevada	10,000,000	100,000	100	650,000	June	1883	.20														
52	Fannie Barret, S.	Colorado																					
53	Globe Copper	Arizona																					
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*																	
55	Goodshaw, G.	California	10,000,000	100,000	100	210,000	June	1883	.10														
56	Granville, G.	North Car.	300,000	300,000	1	*																	
57	Harlem M. & M. Co, G.	California																97	.85	.84	.70	.78	.74	31,200	B.
58	Harshaw, S.	Arizona	10,000,000	100,000	100																		
59	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20														
60	Hortense, S.	Colorado	2,000,000	20,000	10											.09	.07					2,100	
61	Julia, G. S.	Nevada	11,000,000	110,000	100	1,405,000	April	1883	.10														
62	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15														
63	Lacrosse, G.	Colorado	1,000,000	100,000	10	*														.09		100	
64	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														
65	Lucerne, S.	Colorado	5,000,000	500,000	10	*																	
66	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881															
67	" common, G.	California	10,000,000	100,000	100	1,975,000	February	1883	.25														
68	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20														
69	Mayflower, S.	Nevada	1,000,000	100,000	100	35,000	February	1883	.10														
70	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,420,200	Septemb'r	1883	1.00					2.50	2.25					2.50		340	S. F.
71	Michoacan Synd.	Mexico																					
72	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																	
73	Miller	Nevada	5,000,000	200,000	25																		
74	Mono, G.	California	5,000,000	50,000	100	595,000	January	1883	.20														S. F.
75	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																	
76	Moulton, G. S.	Montana	10,000,000	400,000	25	*																	
77	Nevada Syndicate																						
78	North Standard, G.	California	10,000,000	100,000	100	20,000	November	1881	.10														
79	North Horn-Sil., S. L.	Utah		400,000																			
80	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00														S. F.
81	Old Dominion, C.	Arizona	3,000,000	300,000	10	*																	
82	Oriental	Nevada	2,000,000	200,000	10																		
83	Oriental & Miller, S.	Nevada	10,000,000	400,000	25																		
84	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25														S. F.
85	Parnell																						
86	Potosi	Nevada	10,200,000	112,000	100	612,640	August	1883	.50														S. F.
87	Quartz Creek				100																		
88	Rappahannock, G.	Virginia		250,000		*				.08	.06	.08		.09				.07				6,200	
89	Red Elephant, S.	Colorado	500,000	500,000	1	*						.05		.06								1,500	
90	Retort M. & M. Co.	Colorado			10																		
91	San Pedro, G. S. L.	New Mex.		400,000																			
92	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*																	B., P
93	Silver Islet	Canada	1,000,000	40,000	25																		
94	Sonora Con.	Mexico								.27		.28	.27	.26	.25	.26	.25	.26		.26	.25	13,500	
95	South Bodie, G.	California		100,000		100,000	March	1882	.15														
96	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25														
97	South Hite	California	10,000,000	100,000	100		January	1883	.05														
98	South Pacific	California			5																		
99	State Line, No. 1, S.	Nevada	200,000	200,000	1																		B.
100	" No. 2, S.	Nevada	5,000,000	200,000	25																		
101	" No. 3, S.	Nevada	5,000,000	200,000	25																		
102	" No. 4, S.	Nevada	5,000,000	200,000	25																		
103	" Nos. 1 and 4, S.	Nevada			25																		
104	" Nos. 2 and 3, S.	Nevada								.06										.04		1,200	
105	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25														
106	Sutro Tunnel	Nevada		2,000,000						.19		.19		.18		.19	.18	.18	.17	.18		18,000	B.
107	Taylor-Plumas	California			10																		B., P
108	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10														
109	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														
110	Unadilla, S.	Colorado	50,000,000	500,000	100	*																	
111	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,670,000	July	1883	.50	4.60		4.00		4.25	4.00			4.50	4.00	4.75	4.25	630	
112	Utah, S.	Nevada	2,000,000	20,000	100	1,420,000	July	1883	1.00														S. F.
113	Vandewater	Nevada	20,000,000	200,000	100	*																	
114	Washington	Arizona	2,000,000	200,000	10																		
115	Whalen Copper	Nevada	2,500,000	100,000	25																		
116	Wide West																						
117	Willshire	California	250,000	50,000	5	*																	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 132,670. Total shares sold, 138,368.

ber, 710 tons to the United States and 350 tons to Great Britain, which received also 900 tons of Australian. London cables to-day £94 10s.

Lead.—During the week, sales aggregating 600 tons, exclusively ordinary and good Western, were made at 4·30@4·32½c., and one lot 4·25c. Negotiations for the sale of several thousand tons of Richmond lead have fallen through, the best bid being, we understand, 4c.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day:

The market remains the same — if any thing, a shade weaker. The demand is very moderate, and there is very little doing on account of carnival week. Refined here is held at 4·05c. and Common at 4c.

From Chicago, Messrs. Everett & Post send the following dispatch:

Our market shows signs of weakness. Sales have been made of some four hundred tons of Common and Refined at 4·05c., 4·04c. and 4·02½c. Our market closes quiet with 4c. bid.

Spelter.—The market is quiet and dull. Ordinary Western brings 4⅝c., better grades 4¾c., and such brands as Glendale, preferred for brass making, as high as 5c. Foreign is nominally 5⅛c. There is some talk in Europe of another "syndicate."

Antimony.—With a moderate trade, quotations

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remain 10⅛@10¼c. for Cookson's and 9⅛c. for Hallett's.

IRON MARKET REVIEW.

New York, Friday Evening, Oct. 5.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has compiled the following statement of stocks in bond in the ports of New York, Philadelphia, Boston, Baltimore, and New Orleans on October 1st:

	Jan. 1, 1883. Tons.	Sept. 1, 1883. Tons.	Oct. 1, 1883. Tons.
Pig-iron	6,330	5,261	4,473
Spiegeleisen	4,131	1,467	1,667
Old rails	5,504	2,151	2,151
Scrap-iron	1,384	2,157	1,141
Scrap-steel	456	306	806
New iron rails	6,642	355	481
New steel rails	4,816	121	571
Grand total	29,263	11,818	12,290

American Pig.—The Metal Exchange has the following returns from five furnaces for the month of September:

Grade.	Stocks. Sept. 1.	Stocks. Oct. 1.	Production. Aug.	Production. Sept.
No. 1	9,808	9,345	5,001	6,461
No. 2	7,561	6,682	3,020	2,692
Bess., Forge, and lower grades	32,184	27,676	6,907	7,299
Grade not specified	7,750	7,171	6,606	6,717
Total	57,303	50,874	21,534	23,165

The event of the week has been the reduction in the price of Thomas No. 1 Foundry to $21 from $22, No. 2 being quoted at $20, and Gray Forge at $19. Sales in consequence of this reduction, which we presume simply follows openly the lead taken by others quietly, aggregate 500 tons. Transactions during the week have been on a very moderate scale. We quote No. 1 Foundry, $21@$22.50; No. 2, $19@$20.50, according to quality; and Gray Forge, which is easier, $18@$19.50, all at tide-water. There have been sales of round lots of Bessemer Pig at $20, and Spiegeleisen is dull at $30.12½@$30.50 for 20 per cent. Low grades are dull at $25.

At the Exchange, the following transactions were recorded:

Saturday, 100 tons pig, No. 1, spot, $19.25. Monday, 200 tons American pig, No. 1, January, $20; 100 tons Carbon, No. 1, short notice, $19.25. Tuesday, 300 tons pig, No. 1, January, $20.25. Wednesday, 100 tons Colebrook, No. 1, short notice, $19. Thursday, 100 tons American, No. 1, November, sold at $19.50; 100 tons No. 1, January, $20¼. To-day, 300 tons, No. 1, January, $20.25, and 300 tons, No. 1, February, $20.50.

Scotch Pig.—Nothing has been done, and though arrivals are light and the number of parties importing is steadily diminishing, business is limited.

We quote ex ship and to arrive: Coltness, $22.75@$23; Langloan, $23; Summerlee, $22.50@$23; Dallmellington, $20.50@$21; Eglinton, $20@$20.50; and Glengarnock, $22@$22.50.

At the Exchange, warrants to-day were 47s.

Rails.—Business is very dull, and a number of the mills have no engagements beyond the first of December. It is likely that the most unfavorably situated will have to stop temporarily, unless orders come forward more liberally, and prices are maintained at the present quotation, $37@$37.50 at mill.

Old Rails.—There is very little doing at lower figures. We quote $22.50@$23 for Ts.

Scrap.—Scrap is dull at $22 ex ship.

Philadelphia. October 5.

The break in pig-iron this week is expected to develop considerable activity in the course of the next ten days. No. 1 Thomas iron was reduced in New York to $21, and No. 2 to $19, although the company here has had no instructions to sell at those prices. It s understood that business will be done on that basis. Other companies are preparing to follow suit, and it is probable that a restriction of output will be developed in a short time, because of the impossibility of a number of the furnaces now in operation to make and sell iron at those prices. $22 is still asked and probably will be held to for some of the brands of No. 1, while No. 2 will range from $19 to $20, according to brand. The requirements are large and have been withheld, and it is now probable that they will be presented and filled for the rest of the year. Authorities in pig-iron think that the policy of cutting prices is a wise one, and that it will have a two-fold effect, first to restrict output, and secondly, to induce buyers to purchase. An upward tendency is certainly needed to stimulate trade. The business for the past week has been confined to small lots. No. 2 Foundry is plenty, and the consumption moderate. Gray Forge is unchanged, but is firm at $18 at furnace for best makes. A number of transactions took place at $17.50@$17.

Bessemer iron is without activity. A few thousand tons of Spiegeleisen have been sold at $30.25@$30.50. A great deal could be sold at $30. Muck Bars have sold from $33@$34 for ordinary makes, with $34.50@$35 asked for the best makes. Good Puddled Bars command $34, and orders for the best makes have been refused within a day or two at that figure. Some mills are sold from four to six weeks ahead, and the demand is active.

In manufactured iron, there is still a declining tendency. It is scarcely possible that that drop in foundry can affect forge, as foundry is simply equalizing itself with forge. Refined iron has weakened down to $20 in large lots, though iron has sold all along at 2·10@2·15c.; but the tendency is decidedly to the lower limit. Country mills are taking orders at this price. There is much apprehension as to Western competition, Western iron being delivered in this market at 2c., and it is said that even lower prices have been named.

There is a fairly active demand for nails, for the season, though fewer car-load lots have been sold this week than heretofore. Jobbers are not urgent about filling up, on account of the downward tendency. Quotations, $2.90@$3.

All the sheet mills are busy, stocking up for the winter's consumption, and filling current orders at card rates, 4c.@4½c.

The plate mills report fair inquiry, but less business for the past week. Prices are firm at 2·40@2·50c. for Tank, 3@3·25c. for Shell, and 4@4·25c. for Flange.

No heavy orders for structural iron have been received, but there is plenty of business in sight, which will be placed at the right time at the usual rates.

No new business has been done in steel rails. Quotations, $37@$38. Offers are made below these rates for winter deliveries.

A few thousand tons of old rails in large and small lots have been sold at $24.25 for Bridge Rails and $23.50 for Tees. Cargo Scrap is quoted at $23; Selected, $24@$25.

COAL TRADE REVIEW.

New York, Friday Evening, Oct. 5.

Anthracite.

The anthracite trade has had its sensation this week, and is to-day in a state of considerable excitement, which, so far as we can learn, is not quite warranted by the facts. It became generally known this morning that the Delaware & Hudson Company had "made a cut in prices," and pretty wild stories were afloat as to the extent and character of the reduction. Mr. Dickson, of the Delaware & Hudson Company, informs us that, owing to shortage of cars for shipment of coal Westward, the company had larger quantities of anthracite than usual coming to tide-water, and, to prevent an accumulation, had decided to offer stove and chestnut coal at a lower price to some of its clients. It is reported that the figure is $4.30 for stove, and that it has been offered to commission houses at that figure. So far as this proceeding is concerned, there is nothing startling in it, as a number of New York companies have undoubtedly done the same thing repeatedly during the past month, but they have one and all nominally held to their prices, and have in a quiet way made the best bargain they could, and well-posted buyers have been perfectly well aware of the fact. If the object of the managers of the Delaware & Hudson Company was merely to place a temporary surplus of coal, they have certainly gone at it in a manner likely to defeat their own end. The open and sudden announcement coming from such a source would simply, as it did, check all business and destroy what little confidence there was in the future of the trade. We believe that the aim of doing what was done in the manner in which it was done was to force a restriction of the output. We have ourselves repeatedly and emphatically given our opinion on the subject, but did not look forward to its realization until the close of navigation. So far as the interests of the New York companies are concerned, we are still convinced that it would have become necessary before a long time, possibly in November. So far as Philadelphia interests are concerned, it would not be necessary or advisable even till the close of navigation. The Reading Company has persistently objected to it, because it had orders on its books for its entire tonnage for weeks to come. As it controls nearly one half of the tonnage, it is, of course, the most important factor; but if confidence is to be undermined by what looks like an attempt at coercion on the part of one company on the other, a large portion of the orders on the books will melt away. We do not believe that there will be any rupture of the harmonious relations between the companies, because very few if any of them can afford to lead the way in such a course; but it does look now as though a restriction of output will have to be agreed upon a little earlier than it would have naturally come. The market could not have taken all the coal mined by full-time work for the whole of the year; and by an earlier reduction of the output, the average returns to the companies for the three coming months may be as good as though they had waited until a plethora of anthracite in the tide-water markets later on had forced them to stop. The principal duty of the managers of the companies will be to promptly arrive at an understanding on this point. It may cause a good deal of inconvenience to some of them.

Business, of course, is at a stand-still, and will be until the trade has learned to appreciate the fact that the many sensational stories afloat are not based on substantial foundation. The many buyers who have been looking for a break so patiently for many months are, of course, on the tip-toe of expectation, and the dispatches of out-of-town purchasers pouring into the offices here countermanding orders indicate their eagerness to benefit by the situation. Nothing but prompt and decisive measures will undeceive them. The majority of the trade is now carrying heavy stocks, and any fall in prices would be a serious matter. We need hardly report that as yet there has been no actual decline.

Bituminous.

Were it not for the fact that the current business is very small, the scarcity of cars in the Clearfield region, and the lack of vessels in shipping ports of Cumberland, coal would tend to improve prices. The incoming steamers are generally light in freight and carry considerable coal for their return voyages, so that the steamer trade is more than usually dull.

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended September 29th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	3,235	87,615	67,727
Coal for shipment at South Amboy	9,958	562,447	618,066
Coal for distribution	21,473	608,528	529,746
Coal for company's use	3,746	118,858	95,322
Total	38,412	1,377,448	1,310,861
Increase		66,587	
Decrease			

Horsford's Acid Phosphate

For Wakefulness.

Dr. Wm. P. Clothier, Buffalo, N. Y., says: "I prescribed it for a Catholic priest, who was a hard student, for wakefulness, extreme nervousness, etc. He reports great benefit."

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WANTED.—A FIRST-CLASS MAN, CAPAble of taking full charge of large Works for the Reduction of Silver and Gold Ores in a Spanish-American country. Must understand the business thoroughly and have the highest references. Address, SILVER ORES care Office Engineering and Mining Journal.

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THE ENGINEERING AND MINING JOURNAL

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VOL. XXXVI. No. 15.

RICHARD P. ROTHWELL, C.E., M.E., ROSSITER W. RAYMOND, Ph.D., CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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THOSE who have invested capital in the phosphate lands of the Province of Ontario are considerably alarmed at a recent decision in the Quebec courts. The local legislature had passed an act canceling the title to certain crown lands, on the ground that the necessary settler's improvements had not been made, and had sold them as phosphate lands. This act has now been set aside by the courts, and, should their decision be sustained on appeal by higher courts, the titles under which many phosphate mines are worked by American capital would be destroyed.

THE WASTE OF ANTHRACITE COAL.

Mr. CHARLES A. ASHBURNER, geologist in charge of the anthracite district of the Pennsylvania Survey, has recently read before the Engineers' Club of Philadelphia an interesting paper on the estimation of the contents of highly plicated coal-beds, to which Mr. ARTHUR WINSLOW, one of his assistants, has contributed a mathematical discussion of the errors involved in the method employed. Mr. ASHBURNER states this method (which is the one proposed by him two years ago, in a paper before the Institute of Mining Engineers) substantially as follows: The contour-survey of the coal-bed having been made, it is desired to obtain the actual area, that is, the area which would result if the surface were developed or ironed out into a horizontal plane. This area, multiplied by the thickness, would give the cubic contents of the bed. To obtain the bed-area, by a graphic method, vertical cross-sections of the contoured bed are constructed perpendicular to the general direction of the coal-basins, and at equal distances apart. The restored position of the bed is constructed where the coal has been eroded. Each of these individual section-lines is developed into a straight line, which represents the distance, "up hill and down hill," along that section, across the basin from outcrop to outcrop. The development of the section is made on each side of its intersection with a vertical plane, arbitrarily located, but preferably near the axis of the basin. The ends of the developed section-lines are then connected by a broken line, which thus incloses approximately the area sought, namely, the total area, "up hill and down," of the basin, including the regular dips, the overturned dips, and the portions removed by erosion.

We do not need Mr. WINSLOW'S calculations to convince us that this method is sufficiently accurate, where the sections are not too far apart, and great irregularities do not occur between them. Mr. ASHBURNER has settled upon 1600 feet as the distance between his parallel sections; and by a test-survey of the eastern end of the Panther Creek basin, he finds that, by putting the sections 800 feet apart, the developed area obtained was 0·344 per cent less than with 1600 feet interval. From this, he concludes that the probable error by the use of 1600-foot intervals is 0·688 per cent. To this should be added the error due to the method of development, which Mr. WINSLOW discusses for spherical and conical contours and for wedge-shaped troughs. In the latter class, he places the Panther Creek basin, and determines the error at 0·217 per cent (deficiency). Added to the error for sectional intervals, this gives a total error in area of 0·905, or say 1 per cent. Considering that the area thus obtained has to be multiplied by the average thickness of the bed, and allowances have to be made for eroded coal, and for crushed and dirty coal, we are quite ready to say that this one element of a calculation in which the other elements are largelye stimated, is thus determined with almost unnecessary accuracy.

But the question suggests itself, whether this elaborate graphic method is required. Why could not the *horizontal* or cadastral area be simply multiplied into the *vertical* thickness? This eliminates at once the errors which Mr. WINSLOW has discussed with the aid of the calculus; and the sources of error which it substitutes are probably less serious. Indeed, they are present to some extent in Mr. ASHBURNER'S method. For, after he has determined his "developed area," he must still obtain from columnar sections an average thickness by which to multiply it; and it is quite as easy to get the average vertical thickness as the average thickness perpendicular to the roof and floor. In fact, the latter must often, in each single measurement, be determined from the former. In the case of a bed of uniform thickness with frequent changes of dip, it might be easier to ascertain the "developed area," and multiply by the uniform thickness, than to take the cadastral area and try to determine an average vertical thickness from a sufficient number of measurements of a vertical thickness constantly varying with the dip. But such a case scarcely ever arises in practice; for in practice plicated beds vary in thickness anyhow. The only other difficulty in the simpler method we suggest is that, where dips are overturned, this method would take no account of the duplication of the bed within a given area. But as Mr. ASHBURNER, employing a method which laboriously includes these overturned dips, would have to subtract them afterward, because they almost invariably contain crushed and worthless coal, this objection visibly dwindles, if it does not disappear.

We are not certain, however, that this method would be for all cases the most convenient; and we will not quarrel with Mr. ASHBURNER about his preference. His forthcoming volume will doubtless give in detail the calculations of special cases. We shall welcome that volume as a valuable contribution to the literature of the important question of waste in mining anthracite; and meanwhile, we are glad to give, through Mr. ASHBURNER'S courtesy, the figures he has obtained for the property of the Lehigh Coal and Navigation Company, in the Panther Creek Valley, between Mauch Chunk and Tamaqua. By careful work, he arrives at the following result:

	Tons.
1. Amount of coal originally contained in the basin	1,032,997,131
2. Original amount in the exploited area	92,188,922
3. Amount taken out (to January 1st, 1883)	54,115,834
4. Which has produced in marketable fuel	24,817,361
5. Estimated amount still accessible in old workings within the exploited area	10,000,000
6. Which will produce in marketable fuel	3,400,000

The difference between No. 2 and No. 3 represents the amount left underground by wasteful methods of working, and No. 5 may be taken as representing a portion of that loss which better economy and better engineering can still recover. Mr. ASHBURNER has had the advantage of a careful record, kept for two years, of the distribution of every pound of

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coal which came from the mines; and combining this with the general data above summarized (the details of which for each separate colliery will appear in his volume), he reaches the following conclusions for the mining industry of the Panther Creek Valley:

	Percentage left in mine.	Percentage sent to culm-bank.	Percentage converted into fuel
From 1820 to Jan. 1st, 1883.....	41	32	27
For 2 years, from Jan. 1st, 1881, to Jan. 1st, 1883..	30	24	46

These conclusions differ widely from the statements of some of our best anthracite engineers; and the unusual care with which they have been obtained will attract to them much interest. The improvement indicated by the final figures is highly creditable to the management of the Lehigh Coal and Navigation Company. It indicates great progress, both in the mining and in the preparation of coal—principally, we think, in the latter. That is to say, improved breaker machinery and jigs for washing coal have permitted a good deal of coal to be mined which was formerly left underground as too dirty for preparation, while at the same time, they have permitted the preparation of clean small sizes, formerly thrown away with the dirt, but now esteemed for many purposes a favorite fuel. It would be instructive to learn how much of the diminished waste is due to these causes, and how much to real improvement in underground work. Perhaps Mr. ASHBURNER'S report will tell us something on this head.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Mr. Alfred R. West and the Guanacevi Mining Company.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Seeing in your issue of September 29th a communication from a Mr. J. J. Downing, in regard to the Guanacevi Mining Company, in which my name is freely used, I would say that my name has been used in a number of the transactions of this company, and always against my consent, having repeatedly forbidden its use in any way. I would like parties connected with this company in any way to write me, and I will give them full information in regard to this company's mines.

Respectfully yours, ALFRED R. WEST.

DENVER, COLO., Oct. 4.

THE TROY MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

A large number of members had gathered in Keenan Hall, Troy, on Tuesday evening, when Mr. R. W. Hunt, President of the Institute, called the meeting to order, and introduced the Hon. Martin I. Townsend, who delivered an address of welcome, to which Dr. R. W. Raymond responded.

Professor T. Egleston was then called upon for his paper on

RECENT RESEARCHES ON GOLD.

Professor Egleston has been trying hard to find gold that will not amalgamate, but did not succeed so long as he was working in the wet way. He suspected that arsenic and antimony might be the cause of the losses of gold in working ores on a large scale, and hit upon the happy thought of melting mispickel together with given quantities of metallic gold, as he had no auriferous mispickel ores at his disposal. This fused material he roasted with the greatest care; and when he tried to amalgamate the gold, he could only get from 40 to 50 per cent out of it, although he tried the Designolle process with and without acids. He found the rest of the gold in the tailings. This discovery Professor Egleston believed to be one of importance, and he is now engaged in following out the cue it furnished him. He repeated former experiments, by which he claims to have shown that beaten gold will not amalgamate, at least not before it has been annealed. He obtained gold used for jewelry from Tiffany & Co., of New York City, rolled it down as far as he could, and then hammered it. It would not amalgamate as usual; but, after it had been put into an acid bath or brushed, it would promptly amalgamate. Professor Egleston reached the conclusion that there must be a film on the surface of the gold-dust which prevented it from being attacked by the mercury, and he has now set himself the task of finding out what this film is. It is not grease, because he avoided that with the most scrupulous care; but Professor Egleston suspects arsenic, antimony, lead, zinc, or copper. Professor Egleston did not enlighten the meeting as to the methods by which he proposes to solve this delicate question, but he has promised to follow the matter up. He has been vainly trying to get "rusty" gold, but as yet has not been able to secure any. If there is such a thing, the difficulty in amalgamating it is probably due to deposition of some metal or substance on the outside of the gold.

Mr. R. P. Rothwell, in opening the discussion on Professor Egleston's record of the results of his researches, stated that he had worked hundreds of tons of auriferous mispickel, and had not found it as refractory as it was represented to be in the paper. By amalgamating previously roasted ore, he had obtained from 80 to 86 per cent of the gold; and by chlorination, which requires a much more perfect roast, he had taken out up to 94½ per cent. Professor Egleston believed that the explanation of the discrepancy between these results obtained on a large scale, and the results of his laboratory test, lay in the fact that he had to prepare his auriferous mispickel artificially.

Dr. R. W. Raymond then followed with his paper on the

LAW OF THE APEX.

Dr. Raymond, speaking often in a humorous strain, sketched briefly the historical development of our national mining laws, and then dwelt in particular on the ambiguities growing out of the introduction in the last law of the word "apex." He illustrated how the law had been interpreted in seven different ways, when it referred to wide veins in particular. He gave suggestions as to the means of avoiding much of the hardship of the law, and spoke strongly, in concluding, in favor of square locations, which are now, in consequence of a recent decision of a United States Court in Colorado, on placer claims, practically in force, pending a decision of a higher court.

After a few brief announcements, the meeting adjourned, the members gathering at the Troy Club, where they for the first time experienced that Trojan hospitality which was to contribute so largely toward making the meeting so successful a one.

Among the members attending the meeting are:

R. W. Hunt, President, Troy; Dr. T. W. Drown, Secretary; John Fritz, Bethlehem, Pa.; J. E. Johnson, Longdale, Va.; W. S. De Camp, Boonton, N. J.; W. F. Durfee, Bridgeport, Conn.; P. Barnes, Joliet, Ill.; P. Roberts, Philadelphia; Philip W. Moen, Worcester, Mass.; W. S. Saunders, New York City; Alfred E. Hunt, Pittsburg; Frederick P. Dewey, Washington, D. C.; Stephen Baldwin, New York City; Martin Coryell, Lambertville, N. J.; R. W. Raymond, New York City; John Birkinbine, Philadelphia; I. P. Pardee, Stanhope, N. J.; E. S. Moffat, Scranton, Pa.; A. B. De Saulles, Dunbar, Pa.; R. P. Rothwell, New York City; Dr. Thomas Egleston, New York City; J. C. Platt, Waterford, N. Y.; J. A. Burden, H. Burden, Henry C. Shaw, John H. Mars, J. M. Sherrerd, Troy; J. C. Bayles, A. F. Hill, C. A. Stetefeldt, C. M. Rolker, New York City; Dr. Persifor Frazer, Philadelphia; L. G. Laureau, New York City; Dr. Fr. M. Wolff, Berlin, Germany; W. B. Kunhardt, G. Curtis, New York City; R. Crocker, South Pueblo, Colo.; G. J. Atkins, Pottsville, Pa.; Robert Forsyth, Chicago, Ill.; J. B. Mackintosh, Hoboken, N. J.; Charles Kirchhoff, Jr., New York City.

WEDNESDAY'S PROCEEDINGS.

Early in the morning, the members were driven in carriages to the works of Messrs. Fuller & Warren, of the Clinton Stove Foundry, a very large establishment, a good representative of a very large and flourishing industry, of which the sister cities, Albany and Troy, are the great centers in this country. They witnessed the molding, and went through a number of other shops in which are carried out the many auxiliary processes required to turn out the bright and cheerful stoves for the most luxurious as well as the most humble homes. Many details in the system of organization of so large an establishment were explained to the visitors.

A visit was next made to the merchant steel and rail mills of the Albany & Rensselaer Iron and Steel Company, which we described fully in a recent issue. All the departments were running full, and the works were seen to the best advantage.

Again taking the carriages, the members were driven to the Burden Iron-Works near by, and were at once taken to the most interesting feature of the establishment, the horseshoe mill. The iron is rolled down in a number of two-high trains to the proper section for the horseshoes, and after leaving the rolls, is run into long heating-furnaces entering one end, and as it issues from the other end, it is delivered directly into the horseshoe machines, of which there are in all eight, three of them being in the main mill. These machines, which were designed by the late Mr. Burden, seize the red-hot bars, and by a series of movements which it would be impossible to describe without the aid of drawings, cut it into lengths, and bend it into the form of the horseshoe, simultaneously giving it the two cuts under the shoe in which are located the holes through which the nails pass. Thus prepared, the blanks drop upon an underground carrier, which takes them to an adjoining building, in which stands a long row of punches, by the aid of which the holes are punched through the blank. As yet, the latter are of uniform width. They are delivered into heating-furnaces in which they are brought to a red-heat. They are then drawn out, and by boys are fed into the swaging-machines, the invention of Mr. James C. Burden. These machines, of which there are six, give the shoe its final form. The works have a capacity of 160 tons of horseshoes per day. After admiring the shipping facilities of the horseshoe department, the visitors were taken through the puddling and merchant mills, in which the well-known brand of iron, "Burden's Best," is manufactured. The mills are very extensive, have modern furnaces, two-high rolls and vertical engines throughout. After a walk through the extensive machine-shops, a visit was paid to the blast-furnaces, one of which was just preparing to go into blast. Blast is furnished by two horizontal engines designed by the late Mr. Rumpf, of the West Point Foundry. After being shown the beautifully equipped general offices of the works, the members were taken to the "water-mill," the chief curiosity of which is a 60-foot water-wheel, built in 1850, which has since been running steadily, needing only occasional trifling repairs of the wood-work. This wheel was designed by the late Mr. Burden, the stamp of whose genius the works still bear in many departments.

After partaking of the hospitality of Mr. Burden, at his country-seat, the members resumed work, and went to the Albany mill of the Albany & Rensselaer Iron and Steel Company, and later to the Bessemer mill.

THE SECOND SESSION

was opened by a paper read by Mr. Robert Forsyth, of Chicago, on the

BESSEMER PLANT OF THE NORTH CHICAGO ROLLING-MILL COMPANY,

which was designed at a time when the adoption of the basic process in this country seemed imminent, and it was therefore thought best to so arrange the new plant at South Chicago as to allow for its introduction; and in view of the economy of fuel and labor, it was decided to build a plant permitting at the same time the use of metal directly from the blast-furnace. The small size of the ingots, 12 inches square and long enough for three and four rails, and the large number cast from each heat of 10 tons made it necessary to provide a good deal of room in the casting-pit and to furnish extra facilities for handling ingots. To meet the delays incident to the basic process, it was decided that three vessels should be used with the Holley removable converter-shell, a plan involving the conveyance of the old vessel shell to a convenient repair-shop and the substitution of a newly lined shell in its place. The difficulty of working these vessels to one casting-pit without the use of cumbersome and unwieldy ladle cranes was obvi-

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ated by the method suggested by Mr. L. G. Laureau, of transferring the steel ladle from the receiving-cranes to the casting-crane. Between the jibs of the cranes was put, at South Chicago, a short piece of fixed track on which the ladle may rest on its transit from crane to crane. The use of the transfer ladle permits the iron and spiegel ladles to be brought in front of the vessels instead of behind them, thus allowing the use of simple runners or none at all.

The buildings are: A boiler-house, 118 feet by 44 feet; an engine-house, 114 by 48 feet; a converting building, 108½ feet by 102½ feet, to which adjoin a spiegel cupola building, 66 feet by 47 feet, and a shed; a repair shop, 238 feet by 75, with a ladle drying shed; a producer-house, 60 by 44 feet; and a grinding-house, 100 by 50 feet; the total ground area covered by the work being about 60,000 square feet.

The engine-house contains two separate horizontal condensing blowing-engines, with steam-cylinders 54 inches in diameter, and air-cylinders 66 inches in diameter, by 60 inches stroke, the design being by Mr. Kriete, the chief-engineer of the company.

The converting building contains three 10-ton vessels, two receiving ladle cranes, one casting ladle crane, three ingot cranes and one crane used in cleaning and handling ladles. The ingot and ladle cranes are placed symmetrically about a casting-pit of 20-feet radius, and command its whole circumference. In this pit, there is room for forty 12-inch molds, occupying nearly three quarters of the available casting space, and there is an ingot crane for each set of molds, so that three heats may be working at the same time, if necessary.

The three 10-ton vessels stand with their trunnion axes in the same line, 18 feet above general level and are 26 feet apart from center to center. Each vessel, which is of the old form, not being concentric, has a cast-iron trunnion section in one piece, inside of which is hung the shell. The vessels are rotated by horizontal hydraulic cylinders, 20 inches in diameter, with racks and pinions of cast-iron. They turn through an arc of 270 degrees. Under each vessel, is placed an hydraulic lift for handling the vessel shell, and putting on bottoms, with a 24-inch plunger and 8-foot stroke. Though not used, one of these lifts was found to have a capacity of 98,000 pounds at 300 pounds accumulator pressure.

In front of the vessels, and 19 feet above general level, runs the elevated railroad, on which metal and spiegel are brought, the one from the blast-furnace, the other from the spiegel cupola building. The scales and tracks in this building are so arranged that, if necessary, any cupola may be melting siliceous pig.

The metal is brought from the furnace, a distance of 1500 feet, in 10-ton ladles mounted on cars up an incline with an average rise of two feet per 100 to a level siding just outside the converting building. From this siding, carried on arches, the ladle-car is pulled by a special locomotive into the building, and the metal is poured into a short runner directly in front of the vessel.

In front of the vessels, are the two receiving ladle cranes, so placed that both of them may serve the center vessel of the three, while the end vessels are reached by one crane each. The ladle on one of the receiving cranes, when filled with steel, is swung around until it points to the center of the casting-pit, when it is lowered until the outer ends of the jibs rest solid upon iron blocks which carry one end of a piece of fixed track some 10 feet long, placed in line with the crane jibs. The other end of this track is carried upon similar blocks, upon which the jibs of the casting-crane rest when lowered in the same way. The carriage and ladle are thus transferred to the casting-crane.

By the general arrangement of the cranes, the great blowing capacity of the vessels is fully utilized, and the quantity of product becomes a question of keeping the pit clear of ingots.

So far as possible, all work of repair and renewal is taken out of the converting room and done in the repair-shop. Newly lined ladles are dried under a gas firing-hood, of which there are twelve. The bottoms are of the "dish" pattern, and each bottom stands on a car which it never leaves except to go on a vessel. The vessels and bottoms were designed for making heavy charges of direct metal, and having in view the occurrence of "long blows," care was taken to provide plenty of wind. There are 18 tuyeres in the bottom. The blast-pipe on the vessel is 12 inches in diameter, and the blast-main is a 15-inch pipe.

The largest blow on record at South Chicago lasted 45 minutes; but 10 tons of metal with 2 per cent of silicon are commonly blown in from 10 to 12 minutes, and one blow of 9000 pounds was finished in three minutes. At the rate of 12 minutes to a blow, 5 heats an hour can be made regularly; for with three vessels, blowing can go on continually, and by the use of two ladles and ten transfer cranes, a ladle is always ready for a charge when finished. As this rate of working will keep the vessels constantly employed, the possible limit to the product of a Bessemer pit, 600 tons in 12 hours is reached.

The possible need of cupolas for remelting the Sunday iron and using up scrap was recognized in the design, but was not put up. It would seem that, for a plant to work mixed cupola and direct metal, and having a large furnace capacity, the cupolas might be advantageously placed near the furnaces, and be considered, in fact, adjuncts to them, if the office of the cupola is merely to remelt Sunday iron.

The South Chicago practice differs in some points from that at other works. With reasonably good ores, success in working direct depends primarily upon intelligent and scientific furnace management, and in almost equal degree, upon careful and constant watchfulness in the Bessemer works. With the object of knowing what sort of metal is about to be blown, the plan was adopted, at South Chicago, of taking a test from the metal as it ran to the vessel, which was cast in a chill, and cooled at once in water. The fracture of this "chill" enables the blower to judge very accurately of the probable heat of the charge, and the necessary additions to be made. Though the quick determination of the silicon has been brought to great perfection at the Edgar Thomson Works, the chill furnishes all the necessary information in a better form.

It is surprising what great variety of metal the Bessemer process can deal with under favorable circumstances. White iron with 0·75 silicon has been successfully converted, and so has iron with 4 per cent, with all the intermediary grades. But the best metal for direct working is found to be that with from 1 to 1·5 per cent of silicon, partly gray, and with not more than 1 per cent of manganese. Ten tons of such metal can be blown in from 10 to 12 minutes, and, phosphorus being low, will make good steel. The higher limit of silicon is perhaps the safest as affording reasonable security against sulphur, and there is no difficulty in dealing with 2·50 or even 3 per cent of silicon, quantities which insure that sulphur in hurtful amount will not be present.

It became evident, very soon after work began at South Chicago, that there would be difficulty in keeping down the heat of the metal by means of scrap alone, and steam connections were therefore put in to each of the vessel blast-pipes with the object of cooling the metal by means of steam. To Mr. W. R. Walker, is due the credit of having made the use of steam in the Bessmer process a success on a large scale, for all previous applications had been hardly more than experimental. As used at South Chicago, the apparatus consists of a 2-inch pipe tapped into the blast-pipe leading to each vessel. As soon as the metal in blowing shows signs of undue heat, steam is turned on and kept on until, in the judgment of the blower, the proper cooling effect is produced. An enormous quantity of steam is sometimes required, the full opening of a 2-inch pipe at 50 pounds pressure being occasionally given. Nothing can be more effectual than this way of cooling metal. There is no handling of scrap, and the whole matter is under the complete control of the blower, who, by opening a valve, can regulate the temperature of the metal with the greatest nicety. A capital advantage of steam is, that with its aid metal high in silicon can be converted without difficulty, so that a furnace may make pig in which sulphur may be kept low without complaint from the Bessemer works. No removal of sulphur or phosphorus is effected by the use of steam. The steam is evidently condensed before reaching the metal, because the tuyere-box and blast-pipe are quite cold, whereas without steam these parts are usually hot enough to burn the hand, and water runs freely from any leaky joint about the bottom. By using steam, the consumption of scrap may be confined to what the Bessemer works itself produces.

At South Chicago, vessel linings are balled up with finely ground patching stuff, and last for months; and bottoms are made in much the same way. A 10-ton vessel has been lined up in seven hours, and a bottom has made as many as 29 heats, yielding 238 tons of ingots; and the average life of a whole month has been 18¼ heats, yielding 159 tons of ingots, as against 55 at North Chicago in 1875. One hinderance to large output which was foreseen and, so far as possible provided for is the large number of small ingots cast. Thus, to get 381 tons, no less than 436 ingots had to be handled in an equal number of molds. The cranes and trucks are so arranged that this large amount of handling is done without difficulty and without interfering with any other operations. But some mechanical device is very much needed for handling ingots and molds.

President Hunt, in opening the discussion, referred to the introduction of the basic process, stating that an engineer who had closely studied it abroad had come to the conclusion that it would not be profitable to replace the acid by the basic process in this country, unless the difference between Bessemer pig and phosphoric iron was at least $3 per ton. Mr. Durfee called attention to a table giving the results of early experiments on the back pressure in turning converters, and exhibited a design to take the place of the rack movement now generally used to tip converters. Mr. Hunt called attention to the fact that it was Mr. Durfee who had been the first to make a successful blow of Bessemer steel at the experimental works at Wyandotte, the metal being taken directly from a small charcoal blast-furnace. After a few brief remarks by Mr. Durfee and Mr. Forsyth, Mr. Alfred E. Hunt, of Pittsburg, Pa., read his paper:

SOME NOTES AND TESTS OF AN OPEN-HEARTH STEEL CHARGE MADE FOR BOILER-PLATE.

The charge to be described was made in a seven-ton furnace, with a hearth twelve feet long and eight feet wide, with three gas and three air-ports on each side. The stock of the entire heat was charged cold in one hour and five minutes, a part of the pig being first placed upon the bottom to protect it, then upon it the plate-scrap and blooms, and finally the remainder of the pig—some two thousand pounds. In five hours and twenty-five minutes after beginning the charge, the metal was melted down level, and two hundred pounds of hot twelve per cent spiegel were charged, care being taken to have it entirely immersed in the bath. In two hours more, the bath was thoroughly melted and hot, and began to boil; that is, the carbon began to be oxidized and evolved through the bath of covering slag as carbonic acid and carbonic oxide gases. Seventy-five pounds of lumps of Republic specular iron ore were added at this time, increasing the action, so that in ten minutes after, the metal was in active ebullition. A test of the metal showed it to have about 0·90 per cent carbon. One hour after the first ore was added, a test was again taken, after thorough rabbling of the metal, and it was found to be 0·37 per cent carbon. One hundred pounds more of lump Republic ore and about seventy-five pounds of limestone were then added, and fifty minutes later, after the bath was thoroughly rabbled, a test showed the metal to have 0·23 per cent carbon. Twenty-five pounds more of Republic iron ore were added, and the metal allowed to boil for twenty minutes, when a test, after rabbling, showed the carbon to be 0·18 per cent and the manganese to be 0·01 per cent; the slag fracture was vitreous and of a very dark-green color. About forty pounds of limestone were added, and, the metal being hot and in a state of quiet ebullition, a hickory pole of twelve feet length and about four inches diameter, was run through the aperture in the center door and held in a steady inclined position in the bath, with the end touching the bottom, the pole being shoved in farther as it was burned away. The bath was carefully watched to see that the action that ensued was not too violent, the pole being several times pulled out to check the splashing of the metal. This "poling" of the metal lasted for about ten minutes. Ten minutes were then allowed for the bath to quiet down, when, after rabbling, two tests taken in different places in the furnace showed between 0·14 per cent and 0·15 per cent in carbon. The metal was hot, and rapidly cut off a hook of inch iron in the bath, leaving no steel but only slag caught on the hook, on cooling the sharp pointed end that was withdrawn from the furnace. The furnace test of 1½ by 1 by 5 inches long showed a good clear silvery fracture, which had to be indented by a chisel for about three eighths of an inch on each side before giving way to the blows of a heavy sledge. The final addition of 150 pounds of seventy-two per cent ferro-manganese was then added, the metal was thoroughly rabbled and tapped into the ladle just twenty-five minutes after the pole was taken out of the bath, and nine hours and

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twenty minutes after the first piece of stock was charged. The metal was cast into a hot ladle, and was bottom-poured into four plate ingots 7 inches thick by 37 inches wide by 48 inches long, and weighing about 3300 pounds each; and one ingot, 18 inches square and 48 inches long, on the same group, weighing about 4000 pounds; and one ingot, 7 by 15 by 22 inches, weighing 630 pounds; and one 12-inch square ingot, weighing 1620 pounds, which was top cast. The charge yielded 19,430 pounds of sound ingots, or 92·35 per cent of the charge; 600 pounds of runners and scrap, or 2·85 per cent of the charge; and 1010 pounds loss, or 4·80 per cent of the charge. Two hundred pounds of Republic ore were used in reducing the bath, and 115 pounds of limestone to clear the slag of metal.

The charge consisted of—

No. 1 charcoal Titan pig-iron	6,080	pounds.
Open-hearth plate scrap	4,570	"
Chateaugay blooms (62 in number)	10,100	"
12 per cent German A U spiegel	200	"
Weight of original bath	20,890	"
Final addition of 72 per cent ferro-manganese	150	"
Total charge	21,040	"

The analysis of the finished metal and of the constituents of the charge is as follows:

	Carbon.	Manganese.	Silicon.	Sulphur.	Phosphorus.	Copper.	Silica.	Carbonate of lime.	Iron.
	p. c.	per c.	per c.	per c.	per c.	per c.	per c.	per c.	p. c.
Furnace test of finished steel at tapping	0·15	0·41	0·020	0·023	0·033	0·023	... ...	.....	.....
Drillings from rolled plate	0·15	0·29	0·021	0·025	0 037	0·025	.....	.....	.....
Plate scrap used in the charge	0·15 to 0·18	0·25 to 0·35	0·025	0·025	0·040	0·025	.....	.....	.....
Chateaugay blooms used in the charge	0·10 to 0·30	none	0·013	trace	0·015	none	slag 25–50	.....	.....
No. 1 Titan charcoal pig used in the charge	3·75	0·112	1·958	0·006	0·050	none	.....	.....	.....
12 per cent German A U spiegel used in the charge	4·60	11·290	0·030	trace	0·076	0·310	.....	.....	85·50
72 per cent ferro-manganese used in the charge	5·08	68·520	0·062	trace	0·226	0·138	silica	.....	26·15
Republic iron ore used in the charge	.....	0·144	.....	0·070	0·030	0·063	1·393	...	67·80
Limestone used in the charge	.....	none	.....	0·054	0·028	none	13·49	84·10	1·04

Tests were made, which, though too few to generalize upon, are all typical results which have been confirmed very many times, so that from them, as illustrations merely, the following propositions are stated:

I. There is about 25 per cent reduction in the percentage of elongation in the results of a specimen of soft steel of 8 inches between shoulders from those of two inches in length, and the percentage of elongation varies proportionately to the length of the specimens measured; hence figures, as often given, of the percentage of elongation, without stating the length of the specimens, are meaningless.

II. The percentage of elongation measured at "the moment of failure," gives from 15 per cent to 20 per cent lower results than those measured in the usual way, after the rupture, or as finally automatically recorded by the testing machine.

III. As steel is usually rolled with the most of the work in the direction of the length of the plate, specimens cut transversely to the grain of the metal in such cases give slightly lower results than those cut with the grain.

IV. Soft plate steel, of over one half inch thickness, needs to be reduced from an ingot of at least nine inches thickness. A very important and often occurring cause of defective steel is, that it has not had work enough; that is, has not had sufficient reduction from the ingot to the finished steel.

V. An increase of from two to four thousand pounds per square inch, and a correspondingly lower elongation of from one to three per cent in two-inch length sections of soft plate steel, is obtained by casting ingots twelve inches by sixteen inches in section, and hammering them to slabs of about five inches thickness, and then, after reheating, rolling these slabs into plate steel over plates of the same heat of steel, which are rolled directly from the ingot to the plate, or over ingots rolled to slabs and reheated and re-rolled to plate, showing that there is a sort of hammer-hardening in this soft steel, which the subsequent reheating and rolling do not entirely remove.

VI. Soft steel, of no matter how low carbon, can be hardened to a certain extent by being heated red-hot and plunged into water, and hardened more when plunged into brine, and less when quenched, in oil.

VII. Soft steel, of no matter how low carbon, can be hardened, and then the temper drawn to a certain extent, as can be easily proved by the testing-machine.

VIII. If soft steel plates are finished at the rolls too cold, or are too suddenly chilled in the cooling down, a considerable decrease in ductility and increase in tenacity will be obtained between specimens from the plate without further treatment and specimens which have been carefully annealed before dressing.

IX. For soft plate steel bottom-poured ingots are more solid and uniform in structure, and yield much better plates than top-poured ingots.

X. The percentage of carbon in steel for practical work is usually obtained by the color method. It is doubtful whether there are a half-dozen laboratories in the country where the color standards would perfectly agree; so that before a general intelligent discussion of the properties of various kinds of steel can be had, it will be necessary for the steel-works chemists to agree more exactly as to their color standards for carbon determinations.

A few remarks bearing on the subject were made by Mr. P. Barnes, and, in the absence of further discussion, the Secretary read a paper by Mr. G. C. Stone, of Newark, N. J., on

THE DETERMINATION OF MANGANESE IN SPIEGEL,

in which were submitted the results obtained by analyzing the same sample of spiegel by different methods.

In all, forty-six determinations by fifteen chemists using ten methods are given; these methods may be divided into four classes, that is, 1st. Williams's method. 2d. Other volumetric methods. 3d. Methods in which the manganese is precipitated and weighed as phosphate. 4th. Methods in which the manganese is precipitated as basic carbonate or hydrate in presence of large quantities of alkaline salts and weighed as Mn_3O_4. The results may be divided into, 1st, those below 13 per cent; 2d, those between 13 and 14 per cent; and, 3d, those above 14 per cent. If they are so divided, it will be seen that 71 per cent of the results below 13 per cent were by methods of the 1st class, 87 per cent of those between 13 and 14 per cent were by methods of the 2d and 3d classes, and 83 per cent of those above 14 per cent were by the 4th class.

Mr. Mackintosh, of Hoboken, submitted the data given in the paper to a mathematical analysis, while Mr. Alfred E. Hunt spoke of the homogeneity of samples of spiegel, referring to the fact that the finer material is richer in manganese than the coarser stuff.

ASBESTOS AND ITS APPLICATIONS.

Asbestos, a peculiar variety of the amphibole or hornblende family of minerals, is most largely found in Canada and Italy. It occurs in regular layers or veins, generally as a grayish-green rock made up of innumerable fine crystalline fibers which become soft, white, and of a silky luster when separated from each other by slight pressure. The thickness of the veins varies considerably in different localities, from a thin sheet, in the case of the variety known as mountain leather, to several inches in the deposits of the delicate amianthus found in the older crystalline rocks, in the Pyrenees, the Alps of Dauphiny, the St. Gothard, the Savoy, and Corsica. A single fiber of asbestos, heated in the flame of a blow-pipe, readily fuses to a white enamel, the varieties containing most iron being most easily fused, but in the mass it resists the heat of an ordinary flame, and for this reason it has recently begun to attract considerable attention. Unfortunately, the fibers of asbestos differ from all other known fibers in having a perfectly smooth surface and in being much less elastic than those of either animal or vegetable origin, in consequence of which all efforts to spin and weave them by modern machinery have until very recently entirely failed. In addition to amianthus and mountain leather, there are several other varieties of asbestos, for instance, mountain cork, which is a brownish or dirty-white deposit, less flexible and less regular than amianthus and mountain leather, and so light as to float on water; mountain wood, a soft, opaque, brownish colored variety, which melts to a black slag before the blow-pipe; and lastly, the common asbestos, which has recently been discovered in large quantities in Canada, in veins from one inch to two inches thick, and which is the kind most generally used for manufacturing the various articles to which we shall have occasion to refer.

The introduction of asbestos for such purposes as engine packing and jointing for pipes has been attended with very considerable difficulty. Of all materials, it is perhaps that which requires the most careful manufacture and intelligence in adapting it to its special purposes; and when these have not been sufficiently exercised, users have been disappointed, and have not unfrequently given up the trial in disgust. As already stated, the peculiarity incidental to asbestos fiber for a long time baffled all attempts to spin it into a yarn without the intermixture of a certain proportion of flax or other vegetable fiber. Within the last few years, however, the difficulty has been overcome, and yarns capable of withstanding great tensile stresses can now be readily produced by machinery specially constructed for the purpose. One of the most important applications of this yarn is for the manufacture of steam packings. In making packing, it was at first not sufficiently recognized that the fibers of asbestos were apt to be largely charged with minute particles of pyrites; and until this fact was appreciated, it was often found that the piston-rods were scored, the damage being attributed to the action of the asbestos itself, instead of to the impurities it contained. To obviate this defect, it therefore became necessary to thoroughly cleanse the asbestos from all stone and grit before spinning, for which duty machinery had to be adapted. The yarn now produced is quite pure, and is capable of being woven into almost any kind of fabric. But it was soon ascertained that special cases required special treatment, and though the plaited packing was generally satisfactory, it became evident that something else was wanted in the case of steam-engines with extremely high piston speeds. To meet this demand, the yarn was first woven into a cloth, which, being slightly water-proofed with vulcanized India rubber, was rolled up into a rope in much the same way as the canvas is treated in what is known as Tuck's packing, only without the rubber core. This packing answered admirably, and is much used in cases where the rapid destruction of ordinary packings gave rise to most serious inconvenience. The enduring powers of this asbestos block packing are quite remarkable. In one place, on being taken out after twelve months' working with steam of 70 pounds pressure, it was found to be perfectly good, and was accordingly replaced. It has often been erroneously stated that asbestos packing could be used without lubrication. No greater mistake could exist. It not only requires a good supply of oil, but demands careful attention on the part of the engineer in charge. If carefully manufactured and properly used, asbestos is the best material for packing the glands of steam-engines; but if ignorantly made up and carelessly used, it is probably the worst.

A great deal of yarn is woven into cloth, and is adopted for a great variety of purposes. One noteworthy application is for fire-proof curtains, and several of these have been supplied by Mr. Bell for theaters in Great Britain, the United States, and elsewhere. So important is this material considered in regard to the prevention of the spread of conflagrations that a company has been formed in New York with the sole object of extending its use in the shape of protective shields, either permanently fixed or applied in case of a sudden emergency. In relation to this application, a fire-shield was recently exhibited at a meeting of the Firemen's Convention held at Rochester, N. Y., and attracted very great attention. The shield consisted of a piece of pure asbestos cloth about twenty feet square, and supported on an iron frame. A pile of pine wood saturated with petroleum and tar was built on the windward side

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of the curtain, and set on fire. The blaze was tremendous, and the heat so intense that persons could not stand within fifty feet of the burning mass on the exposed side. On the side protected by the shield, however, the heat was scarcely felt, and a dummy erection of wood and glass, which was placed close beside it, was not in any way injured. The curtain, of course, did not suffer, and was as good after the experiment as it was before.

For forming the joints of pipes exposed to the action of moisture, and for man and mud-hole doors requiring frequent removal, asbestos woven cloth is very largely in demand. In these cases, asbestos millboard, which is the cheapest form of jointing material, is comparatively worthless, if, indeed, it is not absolutely objectionable, from its permeability to water, which soaks through and attacks the iron of the bolts, and it was therefore necessary to devise a combination which would effectually resist the heat and damp. This is provided in what is known as asbestos and India-rubber woven sheeting, which is made in any thickness, and is supplied either in sheets to cut to the required shape, or in a tape from one to two inches wide, which can be cut to lengths and bent to circle or oval without puckering. When all other materials have failed to give satisfaction, this has answered admirably, and in the case of man-hole and mud-hole doors and feed-water pipes, the joint can be broken twenty times without requiring renewal of the strip.

The last application of the yarn which we shall mention is the manufacture of rope and cord. Having great tensile strength, and being unaffected by heat and damp, this material is in course of introduction for sash-lines and for ropes of fire-escapes. It is also adopted for covering rollers in print-works, especially when aniline dyes are used, and in cases when it it exposed to great heat and to the action of hydrochloric acid. Asbestos cord has also been found to be the most effectual material for making the joints of the hot-air pipes for blast-furnaces, which are exposed to an exceedingly high temperature. The jointing consists of an iron ring wrapped with the cord, which is simply put in place and nipped between two flanges, and, being unaffected by heat, lasts a very long time.

We now come to an entirely different manufacture of asbestos, in which the rock, after being broken down and reduced to fluff, is pulped and formed by pressure into sheets from $\frac{1}{16}$ inch to $\frac{1}{4}$ inch in thickness. This millboard, as it is called, is used for making joints not exposed to the action of moisture, such as for dry steam, air, and gas. When properly made and used with faced surfaces, this material affords the easiest and most cleanly method of making a joint, while, if the faces are previously painted over with boiled oil, the danger of having a troublesome leaky joint is reduced to a minimum. The board is easily cut to the desired size, and as no time is required for drying and setting, steam can be turned on as soon as the bolts are screwed up. A much commoner and cheaper description, though it still possesses most of the essential qualities, is manufactured for fire-proofing floors and ceilings. It is made in sheets about $\frac{1}{32}$ inch thick, and is applied in the simplest possible way, either above or below the joists. It is also used for lining the walls of wooden buildings, where, from its non-conducting and fire-proof qualities, it affords an immense protection in case of the outbreak of fire. As an insulator of electricity, asbestos in one form or another is greatly sought after. Millboard has for some time been used in the construction of dynamos, while cables and leads covered with plaited yarn have been adopted in many installations. The remaining uses of asbestos which we have to notice appear to be mainly in the production of fire-proof cement and putty, for which there is considerable demand for certain kinds of joints, and in the manufacture of fire and acid-proof lumps, blocks, and bricks. The ordinary gas fire is familiar to every one, and it will suffice to point out that asbestos enters largely into the composition of the artificial fuel upon which the success of the fire in a great measure depends.

THE PRESENT CONDITION OF THE MINES OF THE TOMBSTONE MILL AND MINING COMPANY.

The tendency of Eastern purchasers to secure a large amount of territory when they are buying mines has often been laughed at by their Western rivals, who know that, if one mine is a failure, the fortunes of the owners will not be improved by the possession of other territory of no better quality. But this reasoning must contain a fallacy; for there is more than one instance in the recent mining history of the West of marked advantages springing from this habit of Eastern investors. The Tombstone Mill and Mining Company is one of the best examples of this system of purchase. Holding nearly a dozen mining claims, the company has made four of them into extensive mines, and has carried work to a point of useful production on one more with the prospect of still further extensions. Their producing mines are the Good Enough, Tough Nut, West Side, and Lucky Cuss, and the Defense has also been yielding steadily, though without being pushed. Among their other claims is the Tribute, a claim which has always borne the reputation of containing a good vein, though until two months ago no one had found it. At that time, some prospectors out of work found croppings, and secured from the company a short lease. The vein is parallel with the West Side claim and immediately adjoining it. Its ore has a close resemblance to that from the latter mine, and the officers of the company say it will be opened by them as soon as the lease expires. Nearly parallel with this vein and on the other side of the West Side, is the Defense, a claim that contains a vein of base ore, not suitable for free milling. This has been worked steadily for a year by a small force, the product being a smelting ore, which has been sent to the company's furnace. Besides these openings, some ore has been taken from the Intervenor, East Side, Old Guard, and other claims, all in the same portion of the Tombstone District, and lying between the old belt of free-milling ores and the newly opened manganese mines.

A new strike was also made on the Tough Nut mine of the Tombstone Company, and ore found extending from the surface down to the depth of about 90 feet. Its position is directly among the large ore-bodies which have made this company so prominent; but whether it will end in an addition to them or continue without increasing its dimensions, can not be predicted. The high grade of the ore is considered a favorable indication in Tombstone, whether this high grade belongs to a surface outcrop or an underground body.

But though the other claims have yielded a considerable amount of ore, the Tombstone Company's work has been done mainly in the West Side mine, where three important tasks have been accomplished recently, or undertaken—stoping out the 3d level, opening the 4th level, and sinking to the 5th level. The last-mentioned is the completed work. The 5th level was reached in September, and a cross-cut run to the vein before the close of the month.

The 4th level was begun the last of May, and is now nearly four hundred feet long. It has shown a greater length of ore-bearing ground than any other level opened in the mine. At present, it extends from a point about 180 feet north of No. 3 shaft to a point more than 200 feet south of it, and ore has been found at two other points, which carry the line of prospecting 400 feet farther south. The winzes necessary for the air-connections in this direction are already sunk, and the opening of the drift will be greatly facilitated.

The opening of this mine has developed two interesting points. The west side claim is 1500 feet long, and the vein-croppings are very plain from the north end line to No. 1 shaft, a distance of about 1100 feet. The vein is just what the croppings indicate it to be, a nearly straight line of ore, not remarkably thick, but more than usually continuous. Near the surface, the vein was mostly from two to four feet thick, and remarkably straight. On the third level, undulations in the course came in, and at one point, the vein branched. One of these branches continues to bear the name *main* vein, because it preserves the old direction, while the other trends to the east.

Between these two branches lay a body of ore of unusual formation. Instead of being a solid mass, with barren spots distributed irregularly, it was made up of ore-seams lying between beds of barren limestone. The ore-seams ran from one of the vein branches to the other, lying directly across the regular direction of the vein. In form, the mass viewed from the south had the shape of a pear; but a side view showed that its length was much greater than its width, being 110 feet long and 40 at the greatest width. Added to the peculiarities of this singular formation was the fact that the alternate layers of ore and limestone were strongly bent, dipping 50 degrees north at the north end, and about 55 degrees south at the south end. The ore was of high grade, and always richest at the apex of the fold.

Connected with this body and forming one of its downward prolongations, were "shoots" or layers of ore, that have been encountered again on the fourth level. In one of them, was found a mass of telluride ore, from which several tons of ore, worth $1200 per ton, were sent to the mill. This development is unique in the Tombstone District, though tellurides in small pin-points have been seen in the ores before.

The other point demonstrated by the opening of the mine is the steady improvement of the south end as depth is reached. At this place, there is a wide ravine on the surface, about fifty feet deep. Under this ravine, the vein was so poor on the first level that the drift was not carried across it. On the second level, the ravine was crossed in ore that was just below milling value. Improvement continued to the 3d level, where the stopes are somewhat extensive, and some bunches of excellent ore have been found. In this portion of the mine, there is a winze down to the 4th level, which gave an excellent grade of ore through its whole depth.

These conditions, probably, point to the effect of surface action in dissolving and redistributing the contents of the vein; and if this is the case, the south end of the West Side may become for a time its richest ground, carrying in one level the accumulated reserves of two or three hundred feet of leached-out ground.

The West Side ore contains more gold than the ore from the flat ore-bodies which this company has worked, and also an amount of lead, which indicates that the concentrating-works of the company will have a successful run.

Of the other mines of the company, the Lucky Cuss is the only one that has exhibited any peculiarities of interest. There the manganese used in the lead furnace as flux is mined, and also some lead ore containing silver. A new outcrop of the latter character was found during the summer, and has yielded good ore.

In mining the manganese, small pockets of carbonate ore, rich both in lead and silver, have always been encountered; and at the depth of 175 feet, there has been a more extensive change in the composition of the vein-matter. The ore contains less manganese and more iron, alumina, lead, and silver than before. A change of this kind was expected, but it had been delayed so long that its probability had become doubtful, especially as other manganese mines in the neighborhood had been worked much deeper and more extensively than the Lucky Cuss without finding any but transient changes in the constitution of the vein-matter, or any but insignificant bodies of carbonate ore.

It is quite possible that the Lucky Cuss may return to the strict manganiferous ore with which it began. In one respect, however, it is not likely to go back on its record. Its manganese has improved materially in silver value as the mine deepened, and this is reported to be the case in other Tombstone mines of like character, so that mines with a manganese gangue may be put down among the class that lose their metal by exposure to the elements.

The works for treating the company's ore are situated at Charleston, ten miles from Tombstone. There is an amalgamating mill for the "dry" silver ores, a concentrating establishment for the tailings and ores that contain lead, and a furnace where the concentrates are smelted.

The company has been obliged to renovate the silver mill almost completely, new pans having been put in throughout during the summer. Practically, this makes a new mill of it, with just as good prospect of running four years to another repairing time as it ever had.

Besides this, the old concentrating machines have been removed to a new building, where they will work with new machines that will more than double the capacity of the works. The new works are nearly finished, and will probably be running before November. They have been so planned that the entire daily product of the mill will be treated in addition to a quantity of old tailings as great as was treated in the first concentrating-works, and arrangements have also been provided for crushing and concentrating ores that are too base to be proper subjects for treatment by amalgamation. These arrangements secure the provision of sufficient material to keep the furnace constantly at work,

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and in fact may require the increase of the company's smelting plant. In addition to these arrangements, a long lease of a lead mine has been secured, the ore from which has been used in August and September.

The policy which has controlled all these arrangements was based upon the evidence, shown in the last report of the superintendent, that the tailing-beds resulting from the treatment of the company's ores, taken in connection with the Lucky Cuss mine, contained silver enough to insure the payment of the company's obligations, without drawing upon the new supplies of the mines. The object sought was to organize the treatment of these tailings as an entirely separate branch of the company's business, independent of future contingencies; so that the whole system, once set in operation, would finally result in the payment of all obligations. This has now been done, and it is believed that the only questions that remain to be considered are those that relate to increasing the rapidity of this work and lessening the time of realization. Some experience has been had in this respect, and steps taken, which, however, can not be completed until November. The furnace has run steadily and successfully since last May, the only difficulties encountered being in matters of detail which were corrected as they developed themselves.

Taken as a whole, the system of work and the plant provided at Charleston form, probably, the most complete establishment in the country for the treatment of dry silver ores. While the new concentrating-works were in progress, the company bought considerable quantities of ores from Tombstone mines, smelting them with the accumulation of concentrates from its machines. The result showed that, even in this camp of "dry" silver ores, there is quite a production of ore suitable for furnace treatment.

The introduction of concentrators and a furnace as a mode of treating tailings from a silver mill is undoubtedly an interesting innovation on the usual practice. Its results have been favorable. The tailing-beds have already yielded a greater profit than could have been looked for from any other mode of treatment. The fact that the whole work has been of an experimental character until now prevents an accurate comparison of results. The purchase of ores to fill out the interregnum caused by rebuilding the concentration-works would naturally lessen profits, besides disturbing the regular operation of the system; but the company is reported to have derived a steady profit from its operations, and to have paid a large sum on its indebtedness.

THE SOURCES OF LOSS IN THE COMBUSTION OF FUEL.

The many tests made on the continent during the past fifteen or twenty years have not furnished much material of value for ascertaining the comparative efficiency of boiler-furnaces, and the combustion of fuel in them. As Mr. William Kent pointed out recently, the few data on record here can not be accepted, although some of them appear to us to possess a value as giving data as to the relative merit of different kinds of fuel. The Germans, in their thorough way of taking up technical subjects, have quite recently struggled with this one, and two leading associations, the Society of Engineers and the Association of Steam-Boiler Users, appointed a committee which has just reported. Mere competitive tests, without a full examination of the entire process of combustion, are of little use. The work of the fireman must be checked by chemical analyses and a complete set of observations. There are cases on record where the same fireman, using the same coal in the same boiler on two successive days, evaporated 8·45 and 7·37 pounds of water per pound of fuel. The Germans, therefore, insist that the only means of getting at a good estimate of the work of a fire-place is to analyze the gases of combustion, and compare the loss of heat through that source with the theoretical calorific value of the fuel. They would thus be saved the expense of many costly experiments to test boiler appliances and settings, for which their inventors generally claim, in a modest way, a saving of at least from 20 to 30 per cent of fuel. It is true that such an examination of the gases entails expenditure and is troublesome; but the results afford a clew to many sources of loss, and thus pave the way for an improvement.

The report of the committee referred to gives interesting instructions on the method of computing the theoretical calorific value of a fuel and the loss through the escaping gases of combustion.

The quantity of air L required for the complete combustion of a kilogram of fuel, containing by analysis c parts of carbon, h parts of hydrogen, s parts of sulphur, o parts of oxygen, and w parts of water, may be calculated as follows:

$$\left(\frac{2{\cdot}667\ c + 8\ h + s - o}{21 \times 1{\cdot}43}\right) \times 100 = L \text{ cubic meters.}$$

There are wide variations in the data chosen in the computation of the calorific value of fuel according to the Dulong formula. Some make use of the simple formula,

$$W = 8000\ c + 34{,}500\ (h - \tfrac{1}{8}\ o).$$

Others make deductions for the hygroscopic water, as under:

$$W = 8000\ c + 34{,}400\ (h - \tfrac{1}{8}\ o) - 637\ w.$$

Others take into account the heat required to evaporate the total water formed during the process of combustion, like Ferrini, who uses the following formula:

$$W = 8100\ c + 34{,}500\ h - 600\ (w + 9\ h).$$

The most accurate method certainly is to use the calorimeter; but the determinations with its use are so troublesome that, for practical purposes, computation from elementary analysis of the fuel will probably be generally retained. The commission rejects the practice of assuming that the oxygen found by analysis should be computed as combining with a corresponding quantity of hydrogen in forming water. It is argued by them that due deductions should be made for the fact that, by the combustion of the hydrogen of the coal, steam is produced, which carries off a certain quantity of heat. They therefore reduce the calorific value of the hydrogen to 28,800 instead of 34,220 calories, which is the average of the determinations of Thau, Andrews, Thomsen, Favre & Silbermann, and Schuller & Wartha. They have therefore put forward the formula:

$$W = 8100\ c + 28{,}800\ (h - \tfrac{1}{8}\ o) + 2500\ s - 600\ w.$$

The theoretical calorific value of a fuel may thus be found from its analysis.

When the question is to ascertain the loss of heat by the gases of combustion, the analyses of the latter must be given. Let it be assumed that they contain k per cent of carbonic acid, d per cent of carbonic oxide, m per cent of methane (CH_4), and r per cent of carbon in the form of soot. In every cubic meter of carbonic oxide, carbonic acid, and methane, there is 0·5395 kilogram of carbon; therefore, one cubic meter of a mixture of these gases contains:

$$\left(\frac{k + d + m}{100}\right) 0{\cdot}5395 + r = A.$$

Calling this expression A, then one kilogram of coal will yield: $\frac{C}{A} = G$ cubic meters of dry gases passing up the chimney. In these gases, there are $\frac{G \times k}{100}$ cubic meters of carbonic acid, $\frac{G \times d}{100}$ cubic meters of carbonic oxide, $\frac{G \times m}{100}$ cubic meters of methane, $\frac{G \times h}{100}$ cubic meters of hydrogen, $\frac{G \times o}{100}$ cubic meters of oxygen, and $\frac{G \times n}{100}$ cubic meters of nitrogen. The specific heat for one cubic meter of the different gases is:

Carbonic acid	138·9
Oxygen	93·3
Nitrogen	91·9
Sulphurous acid	133·4

By multiplying these values with the quantity of gas in cubic meters and with the excess of the temperature possessed by the chimney gases over and above that of the boiler-house, the loss of heat by this source will be found.

There is also contained in the gases aqueous vapor resulting from the combustion of the hydrogen in the coal, which will produce 9 times its weight of water. At 100 degrees Centigrade, this quantity of aqueous vapor contains 637 times the product of calories of heat, and for every degree and kilogram of hydrogen must be added to this 0·475 calorie, so that the total loss of heat from this source may be found.

A third source of loss is the unburnt combustible constituents, carbonic oxide, methane, and hydrogen. Making deductions for the specific heat of the aqueous vapor formed by the combustion of hydrogen and methane, the calorific value of these gases per cubic meter is as follows:

Carbonic oxide	3058 calories.
Methane	8514 "
Hydrogen	2580 "

The determination of the loss of heat through the ashes is found by multiplying the grains of combustible fuel in the ash per kilogram of coal burned by 808.

Bunte gives an example of Ruhr coal containing:

Carbon	81·60 per cent.
Hydrogen	4·21 "
Oxygen	5·48 "
Ash	6·04 "
Water	2·69 "

This coal was burned so carefully that the gases showed by analyses the following composition:

Carbonic acid	6·12 p. c. by volume.
Carbonic oxide	0·89 " "
Hydrogen	0·10 " "
Oxygen	14·21 " "
Nitrogen	78·68 " "

The losses in this case were distributed as follows:

Specific heat of gases	1,492 calories.
Specific heat of aqueous vapor	283 "
Unburnt combustible substances	647 "
Loss in ash	331 "
Total loss	2,753 "

The total heat development of the coal per kilogram, as determined in this case by elaborate calorific experiment, was 8037 heat units, thus showing a loss of 34·25 per cent, the excess of temperature of the chimney gases over mean temperature of boiler-house being 224 degrees Centigrade, and the quantity of fuel burned per square meter of grate surface per hour being 54·5 kilograms.—*Coal.*

FUEL-GAS COMPANY.—Another fuel-gas company, composed of Chicago, Pittsburg, and Westmoreland County capitalists, has been formed. Colonel Archibald Blakeley, its representative, has secured twenty charters for supplying the greater portion of Westmoreland, Indiana, and Armstrong counties with natural gas. The capital stock is $1,000,000, and the company has purchased 2000 acres of land along the Kiskiminetas River, and also controls one of the Murraysville gas-wells. The object of the company is to supply Scottdale, Mount Pleasant, Irwin, and other towns in the vicinity with the natural gas, and it is expected that the company will be in active operation by the close of the winter. It is composed of Milton Weston, Judge John C. Polly, William H. Mechling, and Jonas Mechling, of Chicago; A. M. Sloan, Dr. J. S. Crawford, and Messrs. Johnston and Wallace, of Greensburg; and Colonel Blakeley, of Pittsburg. The company will begin operations shortly near McKeesport.

THE CHECK-WEIGHMAN LAW.—The law compelling the use of cars of a uniform capacity in all bituminous coal mines, the branding of all cars within three months' service, and the employment of a check-weighman, went into effect in Pennsylvania, on the 15th of September. The law regarding the latter is as follows: "The check-weighman shall not be considered a trespasser during working hours while attending to the interest of his employers, and in no manner shall he be interfered with or intimidated by any person, agent, owner, or miner; and any person violating these provisions shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than $20 and not exceeding $100, or imprisonment at the discretion of the court. Should any weighman or weighmen or check-measurer, whether employed by operators or miners, knowingly or willfully adopt, or take more or less than 76 pounds for a bushel or 2000 pounds for a ton, or willfully neglect the balancing or examining of the scales or cars, or knowingly or willfully weigh coal with an incorrect scale, he or they shall be guilty of a misdemeanor, and upon conviction thereof shall be imprisoned in the county jail for three months."

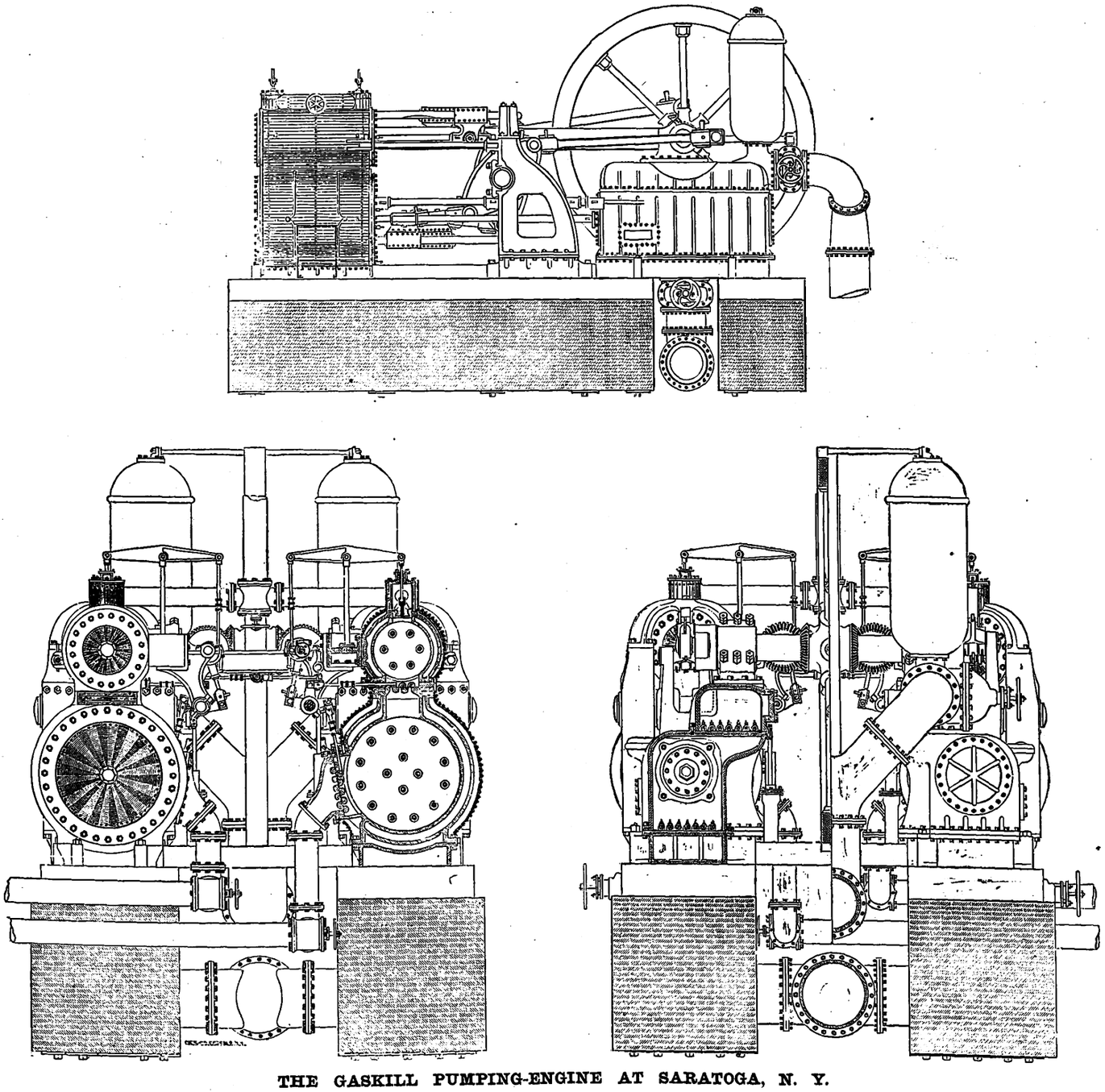
THE GASKILL PUMPING-ENGINE AT SARATOGA, N. Y.

The exceptional record of the Gaskill pumping-engine at the Saratoga Water-Works has attracted much attention, being the first built after the latest design. It has been the subject of two interesting reports, one by Mr. John W. Hill, M.E., who comments on the results in a paper contributed to the October number of Van Nostrand's *Engineering Magazine*, and the other by Mr. Charles T. Porter.

The engines which we illustrate in the accompanying engravings are horizontal compound, of the type designed by Mr. H. F. Gaskill, of the Holly Manufacturing Company, Lockport, N. Y. Mr. Porter describes the engines as follows:

Each high-pressure cylinder is placed on top of a low-pressure cylinder, between these cross-heads is made by means of a short vertical beam and connecting-links, through which also the force exerted in the high-pressure cylinder is transmitted. A shaft carrying a fly-wheel revolves on bearings which are set upon the delivery-chambers of the two pumps. The two engines are connected through this shaft by means of cranks set on each end of it, at right angles with each other, and connecting-rods from these cranks to the upper ends of the beams. The cranks determine the length of the stroke, control the movements of the pistons and plungers, maintaining those of the two engines and pumps in a constant relation with each other, and give motion to the valve-gear.

The steam is admitted to the high-pressure cylinders by double-seated poppet-valves. A cut-off mechanism is introduced into the motion of these valves, which is adjustable to cut the steam off at any point in the



THE GASKILL PUMPING-ENGINE AT SARATOGA, N. Y.

in the manner shown in our engravings, the object being to obtain a direct and short passage for the steam from the first to the second at each end, and thus avoid the waste of steam of the usual long passages, in compound engines, between the high and low-pressure cylinders. This arrangement requires the pistons of the two cylinders to move in opposite directions, the pressure of steam upon the pistons of each pair being transmitted to the flanges of their pumps in the following manner: The latter is set in line with the low-pressure cylinder, and so receives the thrust produced by the pressure of that cylinder directly. The low-pressure piston is provided with two rods, which are extended to the length of ten feet to the cross-head by which they are connected with the rod of the pump-plunger. Midway in their length, another cross-head is secured upon them, which runs on a guide. The rod from the high-pressure cylinder is keyed into a cross-head corresponding to this. The connection

length of the stroke. The point of cut-off may be fixed by hand, or by the action of the governor when the latter is thrown into gear. The governor is constructed to be operated by changes in the pressure of water in the delivery main, and acts to correct these changes by varying the point of cut-off, and thus the speed of the engine, in accordance with the variations in the demand for water. The communicating valves between the high and low-pressure cylinders and the exhaust-valves are gridiron slides. All the valves are driven by eccentrics, mounted upon two longitudinal shafts turning in bearings sprung from the inner sides of the high-pressure cylinders. These shafts are driven by miter-wheels from the main shaft.

All the cylinders and their heads are steam-jacketed. The water formed by condensation in the jackets is returned to the boilers in the ollowing manner: The jackets blow directly into a small heater. The

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feed-water is conducted through this heater in a two-inch coil-pipe. A separate pump receives its supply from the bottom of this heater, and sends the hot water forward to unite in the feed-pipe with the new water, which has been already partially warmed in passing through the coil in the heater. This is a restoration to the boilers of that portion of the heat supplied by them to the jackets which had not been imparted from the jackets to the steam in the cylinders. The restoration is effected very well, except that the stuffing-box of the pump has no special provision for retaining hot water, and leaks sufficiently to make an appreciable loss.

There is no provision for preventing steam from blowing along with the water from the jackets into the heater. A valve was put into the drain-pipe, by partially closing which the full pressure was maintained in the jackets, and only a pressure of about twenty pounds was allowed in the heater. This was all that the situation admitted of, and it could not be known how much steam passed with the condensed water into the heater. Had it been practicable to attach an apparatus by which all the steam would have been kept back, and only the condensed water been allowed to pass, it would then have been easy, as it was desirable, by taking the temperature of the feed-water as it entered the boilers, to have known, very nearly at least, the quantity of steam condensed in the jackets. Since, however, the coil feed-water pipe in the heater acted as a surface condenser, and it was impossible to determine how much steam from the jackets was condensed by it, it seemed idle to take this temperature, which would rather lead to confusion than give any information.

The knowledge of the amount of heat imparted by the jackets would alone, however, give an exaggerated idea of the gain from their use, since there can be no doubt that they are most efficient in evaporating moisture contained in the steam at the time when it is passing directly into the condenser. The only satisfactory mode of determining the amount of the gain would be by a comparison of the results of this trial with those of another one, conducted with equal care, in which the steam was entirely shut off from the jackets.

The following are the principal dimensions:

Stroke of all cylinders			36 inches.
Diameter high-pressure		cylinders	21 "
" " "		piston-rods	3 "
" low "		cylinders	42 "
" " "		piston-rods	3·5 "
Clearance high "		cylinder	2·35 per cent.
" low "		"	2·50 "
Diameter of fly-wheel			12 33 feet.
Weight " "			12,000 lbs.
Diameter of main shaft			10 inches.

These are horizontal double-acting plunger-pumps, the plunger working through a diaphragm separating the two chambers, and are constructed on the multiple-valve system. Their dimensions and performance are given in the following table.

During the test for duty and a part of the fire pressure test, their speed very much exceeded that required to supply the demand for water. The excess of water delivered was got rid of partly by opening hydrants and partly through the relief-valve.

The pressure in the supply-chambers was got by the indicator, with a spring showing twelve pounds to the inch. The pencil described the figure shown in a diagram which affords an interesting exhibition of the changes in the pressure as momentum is imparted or arrested in the current of water. The mean pressure, when corrected for elevation, was found to be one and one quarter pounds on the square inch at the center of the plungers, showing the level of the water from which the supply is drawn to be about thirty-four inches above this point.

It is to be observed, relatively to the fluctuations of pressure, both in the supply-chamber and in the delivery main, and also relatively to the motion of the plungers while the valves are closing, that in these pumps this motion, with that of the pistons, is controlled by the cranks, precisely as if it was transmitted through them. The valves are assumed to close only as fast as gravity would cause them to fall, although without doubt the reverse current brings them to their seats more quickly than this. But even on this assumption, the slip is no more than four tenths of one per cent.

The pumps are provided with by-pass pipes and valves, forming, when the latter are open, a communication between the two chambers of each pump. Their function is this: At the instant of starting, the engines are able to exert only a portion of their power, because no steam has yet been admitted to the low-pressure cylinders. The pressure of water is liable to be greater than the steam in the high-pressure cylinders alone can overcome.

In such a case, the by-pass valves can be opened, when the water flows through them into the opposite chambers, the pressure on the opposite ends of the plungers is in a measure equalized, and the engine is enabled to start. As soon as it is fairly in motion, these valves are closed.

They are available, also, when the motion of the engines required to supply the demand for water would be so slow that, on account of the insufficiency of the fly-wheel, it could not be maintained with the desired regularity, or perhaps not at all. Then, by partially opening these valves, the engines are enabled to run faster, and so to maintain their motion satisfactorily, the excess of water displaced by the plungers passing through them into the chambers that are filling.

The principal dimensions of the pumps are:

Aggregate length of the two chambers in each pump	7 feet 6 inches.
" width " " " " " "	2 feet 3 inches.
" hight " " " " " "	2 feet 11 inches.
Capacity of each pump-chamber, in cubic feet	25
Diameter of plunger, inches	20
" " rod	4
Area of plunger, mean of two faces, square inches	307·88
Stroke of plunger, inches	36
Displacement of plunger, in cubic feet	6·41417
" " " in gallons	48

The two boilers furnishing steam are of the horizontal return tubular type, the following being the principal dimensions:

Diameter	66 inches.
Length	18 feet.
Number of tubes in each boiler	87
External diameter of tubes	3 inches.
Arrangement of tubes: horizontal and vertical rows	
Least distance between tubes and shell of boiler	4·5 inches.
Hight of crown of boiler above tubes	24 inches.

Heating surface in both boilers, as follows:

One half the shells, 311; tubes, 2460. Total	2771 sq. feet.
Furnace, width	6 feet.
" depth	5·75 feet.
" length of opening between grate-bars	5 feet.
" " these openings uncovered	4·25 feet.
" width of each grate-bar	1·75 inches.
" width of air spaces	·5 inches.
" square feet of grate area, under both boilers	51·00
" of which the proportion in air space is only	·22

Horizontal flues, as follows:

Three times the length of each boiler	54 feet	
From wall between boilers to chimneys	24 "	
Total		78 feet.
Internal diameter of common flue and chimney		3 "
Hight of chimney above flue		75 "
Square feet of heating surface for each one square foot of grate area		54·3
Square feet of heating surface for each indicated horse-power		14·9

Mr. Porter reports the following results of a test of forty-eight hours.

Boilers.

Coal burned	16,860 lbs.
" " per hour, on each one square foot of grate	6·9 lbs.
Water evaporated	155,961 "
" " by combustion of one pound of coal	9·25 lbs.
Average temperature of feed-water	71·5 deg.
" pressure of steam, by gauge	73·66 lbs.
Number of thermal units contained in one pound of steam	1211·1
Equivalent evaporation from 212 degrees, under one atmosphere	10·916 lbs.
Evaporation per hour from each one square foot of heating surface	1·175 "

Engines.

Average number of revolutions made per minute	19·370
Average piston speed, in feet	116·220
Pressure of the atmosphere, in pounds on the square inch	14·560
Average horse-powers exerted in high-pressure cylinders	109·200
" " " " " low " "	76·550
" " " " total	185 750
Pounds of coal burned per hour	351·000
" " " " horse-power per hour	1·900
Pounds of water evaporated per hour	3250·000
" " " " horse-power per hour	17·500
" " " " hour for each horse-power exerted in the high-pressure cylinders	30·000
Total average back-pressure in high-pressure cylinders, pounds	12·500
Pounds of water per hour accounted for by indicator:	
1st. At point of cut-off in high-pressure cylinders	2061·000
Proportion of the quantity evaporated	·634
2d. At point of release in low-pressure cylinders	2880·000
Proportion of the quantity evaporated	·886
Temperature of the steam in all jackets, degrees	318·700
" " high-pressure exhaust (average)	204·000
" " low " "	153·000

Pumps.

Number of double strokes of each plunger per minute	19·3700
Mean velocity of plunger, in feet, per minute	116 2200
Number of valves acting together	84·0000
Diameter of each valve-opening, inches	1·3125
Total area opened by valves, square inches	113·6000
Lift of each valve, inches	·3125
Mean velocity of water through valves, in feet, per second	5·2500
Weight of each valve, pounds	·5625
" " " " for each one square inch of opening, pounds	·4160
Resistance to current on each one square inch of opening, pounds	·2600
Total loss of efficiency in pounds on square inch	(·416 + ·26) × 2 = 1·3620
Mean excess of pressure in the delivery main, pounds on square inch	84·5700
Proportion of power lost in passage through valves	·0160
Time occupied by valves in closing, seconds	·0400
Motion of plunger while valves are closing, inches	·0700
Proportion of stroke lost in closing of both admission and delivery valves	·0040
Net delivery from both pumps per double stroke, gallons	190·0000
Net delivery from both pumps per double stroke, pounds	1584·0000
Delivery per day at eighteen revolutions per minute, gallons	4,924,800·0000
Number of double strokes made in 48-hour test	55,779·0000
Net foot-pounds of work done on each double stroke	309,338·0000
" " " " " " by consumption of 100 pounds of coal	102,340,000·0000

In a duty trial extending over twenty-four hours, Mr. Hill gathered the following data:

In the following table are recapitulated the averages of all data and totals for duty trial:

Duration of trial, hours	20
Average pressure by engine gauge, pounds	74·25
Average vacuum, inches	27·295
Average temperature of injection, Fahr	56·225
Average temperature of overflow, Fahr	71·125
Average temperature of feed-water to boilers	169·175
Average pressure by gauge on force-main, pounds	95·06875
Difference of levels, center of pressure-gauge and source of supply, pounds	0·12965
Revolutions in twenty hours	21,449
Revolutions per minute	17·8742
Piston speed per minute, feet	107·2452
Total coal burned, pounds	6,750
Calculated discharge of pumps per revolution, gallons	191·923
Actual estimated discharge of pumps per revolution, gallons	187·125
Weight of water per gallon at 56 Fahr., pounds	8·33
Contract delivery at 18 revolutions, gallons	4,000,000
Actual estimated delivery at 18 revolutions, gallons	4,850,280
Excess over contractor's guarantee, per cent	21·257
Contract duty per 100 pounds coal	80,000,000
Conventional duty as per trial	112,899,988 104
Excess over contractor's guarantee, per cent	41·125
Net absolute duty, as per trial	108,793,535·3
Excess over contractor's guarantee, per cent	36

The following are the totals and averages of a daily report made by

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David L. Holland, engineer of the water-works, for the week ended September 8th:

Total revolutions—6 A.M. to 6 P.M.	50,060	
" " —6 P.M. to 6 A.M.	37,460	
" "	87,520	
Coal burned from 6 A.M. to 6 P.M.	18,000	lbs.
" " " 6 P.M. to 6 A.M.	17,200	"
Total coal	35,200	"
Average water pressure	113	"
" steam pressure	70	"
" vacuum	28 1	"
Total gallons pumped	16,716,270	
Average duty	103 040 851	
Maximum duty	106,413,967	
Minimum duty	100,448,140	

Mr. Porter speaks in the highest terms of approval of the workmanship of the machinery. He, however, expresses the opinion that the fly-wheel is insufficient, and believes that the fluctuations of pressure, which do not appear to exceed five pounds, could be reduced by using a fly-wheel eighteen feet in diameter. He advocates, also, in order to prevent in a greater degree the transfer of heat from the steam in the steam-pipe to the condenser without doing work, the employment of higher piston speed or moderate superheating of the steam.

DIAMOND MINING IN THE PROVINCE OF MINAS-GERAES, BRAZIL.—II.

The region in the vicinity of Diamantina forms a vast plateau through which a great number of rivers pass in deep cañons. The diamonds, which seem to come from the chains of mountains beyond the plateau, might therefore have been spread over another surface at the time the rivers were at the same level. Those which have been thus deposited on that part of the ground not removed by later erosion have remained, and this may be the origin of those deposits which are now found at great altitudes. In any case, all the deposits thus found in the beds of the rivers, as well as those on the banks or on the plateaus, are alluvial. Of all the rivers in the region, the most important and the richest is the Jequitinhonha, at least in its upper portion. The tributaries of this Jequitinhonha River from the right are very poor, while those entering from the left bank are very rich; for instance, the Rio Caëthémerim, the Rio Pinturo, and particularly Ribeirao-de-Enferno. These have their source in the chain of mountains alluded to. This fact gives strong evidence that the diamonds found to-day come from this chain above the plateau of Diamantina, and this leads me, says M. de Bovet, to allude to a special deposit, the only one of its kind, so far as I know, which does not possess any of the characteristics of an alluvial deposit. At S. Jean-de-Chapada, one of the highest points of the chain, diamonds have been extracted from layers of argillaceous schist interstratified with quartzite. These shales are distinctly stratified, and seem without any doubt to be in place, being produced by the decomposition of schists. Formerly, there were at this point extensive workings, now abandoned. There is an open cut more than 180 feet deep at some points, in which there are two small springs, one of them the source of the Rio Duro, and the other of the Rio S. Joao. A study of the topography leads me to believe that this deposit was a lenticular body in beds of quartzite. I have seen the shale taken out in my presence, and, after washing, it gave some diamonds, and with them were the same minerals which accompany the diamonds in the gravel, though not rounded, and in very much smaller quantity. This is natural, as it came from the deposit in place, and therefore had not been submitted to any natural mechanical separation. It seems that this is an original deposit, from which the diamonds were derived. It may be noted that at Grao Mogol, diamonds have been found in quartzite beds; but with the exception of the San Joao shales and the Grao Mogol quartzite, the diamond has never been taken from workings in other than alluvial deposits.

THE EXTRACTION OF THE DIAMOND.

So far as can be judged from the traditions which have come down to us as to the method employed in working the river-beds in former times, it does not seem that any notable progress has been made since then, except that pumps have been introduced. To-day, as it was then, the diamonds are extracted by hand. The river workings can not be opened without diverting the river from its bed, which is generally done by allowing it to pass into a canal. This canal is constructed, whenever possible, on one of the banks, by building a dam of rock; but generally, for its greatest length, it must be made of planks and carried on trestles.

When the point at which the workings are to be made has been chosen, the river is dammed above and below, and it is between the two dams that the work is done. At Diamantina, these dams are generally very well constructed. The workings are pumped dry by pumps driven by means of undershot wheels placed in the canal itself. The top sand is removed entirely by hand by means of flat scoops, carrying about thirty pounds, which a man places on his head and dumps into the canal. When the sands have been removed and the layer of rocks has been reached, the rock is blasted with powder and the small pieces are carried off in the same way. At Acaba Mundo, about 280 men were at work. Eighteen filled the scoops, which some 260 were employed in carrying off, so that, during a day's work of ten hours, about twelve hundred tons were removed, being lifted from twenty to twenty-five feet, and carried away a distance of from two hundred to two hundred and fifty feet.

The workmen are almost all of them negroes and slaves. They are divided into three or four gangs. The first one who reaches the canal dumps his sand, and then does not stir until the last one of the gang has done the same thing. All of them sing two or three verses of some negro song, and then rush back to the workings, where they have their scoops reloaded. This may be very picturesque, but it is very slow work, and very extravagant. The figures given above refer to work in the beginning when the diggings are not yet extensive, and the men do not get in one another's way; but as the pit deepens, the large number of men disturb one another, and they must form a chain along which the scoops are passed. This, of course, reduces the effective work considerably. All this labor is done in a country from which all the timber has been cut, and where the soil is exclusively sand, which does not retain the water, so that the slightest rain increases the volume of water in the river very much. As soon as the rainy season begins and the first storm has come, all of the dams are carried away, and in a few days the excavations made during the dry season are filled up. The dry and the wet seasons are fortunately very distinctly separated; and as soon as the latter has ceased, four months may be counted upon, from the middle of May to the middle of August, during which not a drop of rain falls. During this very short period, and with manual labor, it is evident that no great stretch of the river-bed can be worked, and that the extent of a working is still more restricted when the gravel must be sought at a great depth. The miners at Diamantina believe a depth of eighty feet to be the limit which they can reach. Those portions of the canal which are made of timber are always removed prior to the beginning of the rainy season.

TREATMENT OF THE GRAVEL.

As the nature of the workings in the river-bed is such that work must go on as rapidly as possible until the day when it is believed prudent to remove the canal, no attention whatever is paid during the dry season to getting the diamonds. All that is done is to remove to a place of safety the greatest possible quantity of the diamond gravel. When the gravel contains clay, it is first puddled in a shallow basin. The workmen walk about in it and agitate it with hoes, the water carrying off the fine mud. The rest goes to the washer. This is a small basin, about three feet square, one end being open, while the other and the sides are from twelve to sixteen inches deep. The bottom is slightly inclined toward the open end. Immediately below is a second basin full of water, in which the workman stands knee-deep. When the gravel has been placed in the upper basin, the workman takes up water with a scoop, and throws it against the gravel. Thus the lighter sands are carried off. The larger pieces are removed by hand. The rest is washed in a pan. This must be done very slowly by skilled men. The diamond is not found at the bottom of the pan, as gold is. On the contrary, it appears on the surface. After having agitated by a peculiar movement the sand on which he is working, the washer slowly allows the excess of water to flow off, and at a glance sees the diamond which he has brought to the surface. Sometimes, white sand is mixed with the gravel, in order to enable the washer to see the diamond more distinctly. It is not probable that this part of the process can be replaced by any mechanical contrivance.

THE STRENGTH OF WROUGHT-IRON STRUTS.

At a meeting of the American Society of Civil Engineers, a paper by Mr. James Christie was read on Experiments on the Strength of Wrought-Iron Struts. These experiments were made at the Pencoyd Iron-Works, for the purpose of determining the comparative resistances to compression of long and short struts of rolled angles, tees, beams, and channel sections. The specimens were tested by four different methods, namely, with flat ends between parallel plates, to which the specimen was in no way connected; with fixed ends, or ends rigidly clamped to parallel plates, the plates substantially forming flanges to the specimen; with hinged ends, or both ends fitted to hemispherical balls and sockets or cylindrical pins; with round ends, or both ends fitted to balls resting on flat plates. The specimens varied in length from six inches up to 16 feet, and were selected to obtain a uniform character of material. The paper gave tabulated results of 299 experiments, and these results are illustrated by a number of diagrams. There were also results given of a number of tests of welded tubes. The general conclusions drawn from these experiments were as follows ($\frac{l}{r}$ being length divided by least radius of gyration): When struts are short, say $\frac{l}{r}$ below 20, there will be no practical difference in the strength of the four classes, so long as reasonable care is taken to keep the center of pressure in the center of the strut. Hinged-ended struts vary all the way from round-ended up to flat-ended in strength. If the hinges are pins of substantial diameter, well fitted, and exactly coincident with the axis of greatest resistance of the strut, the strength of the strut will be fully equal to that of a flat-ended, but, considering the impracticability of maintaining this rigid accuracy, the average hinged struts as compared with flat-ended will fall in strength as the length is increased until $\frac{l}{r}$ is about 250, when they will average one third less resistance than flat-ended. From this point, they will gain comparatively until $\frac{l}{r}$ becomes about 500, when both classes will be practically equal. Fixed-ended struts gain in comparative resistance, from the shortest lengths upward, until $\frac{l}{r}$ becomes about 500, when they are twice as strong as either the flat or hinged-ended.

Round-ended struts continually lose in comparative resistance as the length is increased. When $\frac{l}{r}$ is above 340, they will be half as strong as hinged-ended, and when $\frac{l}{r}$ is above 160, they will have only half the strength of flat-ended.

The iron from which the tests were made exhibited the following resistances to direct compression, being the general results of several tests of small section, fifteen inches long, and secured in such a manner as to prevent lateral flexure:

With 30,000 pounds pressure per square inch, incipient permanent reduction of length was observed. With 35,000 pounds pressure per square inch, failure of elasticity occurred, and marked permanent reduction of length. With 50,000 pounds per square inch, a permanent reduction of length of three per cent occurred. With 75,000 pounds, a permanent reduction of ten per cent; and with 100,000 pounds pressure per square inch, a permanent reduction of twenty-eight per cent of the length.

The paper was discussed by Messrs. Theodore Cooper and Charles E. Emery, who both expressed the opinion that these experiments were of very great value, being made with material of uniform character, and in such a way that comparisons could be made directly between the different methods adopted in testing.

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FURNACE, MILL, AND FACTORY.

The Lidgerwood Manufacturing Company, No. 96 Liberty street, New York, manufacturers of hoisting machinery, has determined to be represented in Baltimore, and hence has placed an agency for its goods with Messrs. Morton, Reed & Co., who are favorably known to the trade of the North and South.

The Crane Brothers Manufacturing Company, of Chicago, is building for the Charlotte Iron-Works, Rochester, N. Y., a complete blast-furnace hoist containing some new improvements. The machinery department of the works is running full.

Eckert's furnace, No. 1, at Reading, has chilled, and during the past few days and nights a force of men has been vainly trying to break up the solid mass within. Chipping and prying have been almost useless, so hard has it become, and several blacksmiths are kept busy sharpening tools. The furnace is 57 feet high, and now contains 38 feet of chilled material. It will require several months before it is again in running order. The remaining furnace has been idle also, but is now blown in.

The Lechner Manufacturing Company, Columbus, O., manufacturer of elevating and conveying machinery and roller detachable chain belting, has made a shipment of a chain elevator to the New York City Plate Glass Company, at Tarentum, Pa., to be used for elevating sand; and has also furnished S. J. Meeker, Newark, N. J., with roller chain belting, etc. In addition to this, it has furnished the Columbus & Hocking Coal and Iron Company, Columbus, O., with another chain elevator for its mine at Longstreet, Ohio, for elevating coal.

The articles of association of the Chartiers Iron and Steel Company, Limited, have been placed on file in the recorder's office at Pittsburg. The capital is $60,000, and has been paid in as follows: John C. Kirkpatrick, $25,000; David A. Carter, $12,500; Barker C. Wilson, $12,500; and John Henry, $10,000. The officers are: J. C. Kirkpatrick, Chairman; D. A. Carter, Secretary; and B. C. Wilson, Treasurer.

The Indianapolis *News* of the 20th ult. reports as follows: The new steel rail mill ran through several blooms yesterday, having begun operations again the day before. The machinery worked so well, and all the operations promised to be so economical, that Secretary Jones told the reporter that it was not improbable that the company would make contracts for a regular supply of blooms, and continue in operation permanently. Not much could be made at it at the present prices of steel rails, but he was so well satisfied that the work could be done so much more cheaply by their improved processes than other mills could do it that there would at least be no loss. Since the last notice in the *News* of the operations of this great enterprise, Mr. Lentz has added some minor improvements that help the automatic work considerably. One of these is a combination of levers or lifters that turn the hot bloom on the hooker rollers, as they raise it to the upper rolls. This saves some trouble and uncertainty about getting the bloom into proper position to pass through the rolls. The two 1 300-pound blooms which the reporter saw rolled out into 60-foot rails met with but two or three slight hitches from the roughing rolls to the saw, and the worst of these was the result of an oversight that was soon remedied.

The guide mill, connected with the Portland Rolling-Mills, at Portland, Me., was burned October 9th.

A dispatch from Cleveland says that the scheme of reorganizing Brown, Bonnell & Co., the iron-works company of Youngstown, has failed, and an effort is making to form a new company, with a capital stock of $1,200,000, and to assume all the assets and liabilities of the old company.

The new water-jacket furnace at Reading, Pa., owned by Henry S. Eckert, has been in blast about one week, and up to this time the result has been very satisfactory; thirty tons of iron are made daily, but it can be increased to forty. This is said to be the only furnace of the kind in the United States. The jacket surrounds the furnace to the hight of 19 feet 9 inches; it is made in sections, so that if an accident should occur to either section, it could be replaced. Between the outer and inner plates of the upper section, is a thickness of five inches of water, and in the lower section, four inches. The fresh water is constantly running in above, and is allowed to flow off below through pipes.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

Edgar B. Salsig *et al.*, Forty-nine lode. Dana Harmon, Bradford, Salvation, and Delta lodes. Morning Star Extension Mining Company, Extension of the Morning Star lode.

CALIFORNIA.

THE BODIE DISTRICT.

A. R. Conklin *et al.*, Summit No. 2 lode. Bodie Consolidated Mining Company *et al.*, Prince, Granger, Gildea, Edith, Bodie, Lucky Jack, and Molly lodes.

MARYSVILLE DISTRICT.

C. E. Kusel, Elmwood placer.

SACRAMENTO DISTRICT.

Giacomo Giacomella, placer. Henry Christiensen *et al.*, New Schleswig placer mine.

SHASTA DISTRICT.

Martin Ford, Hudson Bay mine quartz mine. W. J. Hupp *et al.*, Five Cent Gulch placer.

COLORADO.

CENTRAL CITY DISTRICT.

Conasa Silver Mining Company, A. B. Robbins and Hope lodes. Lebanon Mining Company, Tom Ollire lode and mill-site. Marcus W. Rasback, Crouse, Bobtail, and Boom lodes. Charles I. Dreifus, Cincinnati lode. Frederick Ware *et al.*, Candler placer mine. M. M. Chambers, Alpine lode. Edward Lowe *et al.*, Bob Emmet lode. Pitkin County Mining Company *et al.*, Carbonate Chief and Buckhorn No. 2 lodes.

DURANGO DISTRICT.

W. E. Webb *et al.*, Allie Davis, Moonstone, Hercules, and Red Rover lodes. I.X.L. Tunnel Company, Lucy lode. James B. Ross *et al.*, Sinbad lode. Sultan Mountain Silver Mining Company, Avalanche lode.

GUNNISON DISTRICT.

Finla McClure, Robert Wilson lode.

LAKE CITY DISTRICT.

Moline Silver Mining Company, Fire King lode.

LEADVILLE DISTRICT.

John H. Reed, Alicante lode. Charles Hawkes *et al.*, Tip Top lode. D. D. Belden, Bird, Little Chicago, Little Ella, and Louise lodes. B. F. Follett *et al.*, Batavia lode. New Haven Mining Company, Modoc lode. William T. Holt, Republic lode. Clayton K. Smith, coal.

DAKOTA.

DEADWOOD DISTRICT.

Moses S. Emery *et al.*, Katahdin lode.

IDAHO.

BOISE CITY DISTRICT.

Colman Mining Company, Colman and Oregon lodes.

MONTANA.

HELENA DISTRICT.

John McLaggan *et al.*, Samantha lode. Mary E. Higgins *et al.*, Kessler lode.

JEFFERSON DISTRICT.

William H. Hartman, Great Eastern lode.

NEW MEXICO.

LA MESILLA DISTRICT.

Plymouth Rock Mining Company, New Issue lode.

LAS CRUCES DISTRICT.

Ivanhoe Mining Company, Ivanhoe lode.

NEVADA.

CARSON CITY DISTRICT.

Auburn Consolidated Gold Mining Company, Auburn lode. General Jackson Mining Company, Trump quartz, Lightning quartz, and Silver quartz mines.

EUREKA DISTRICT.

A. P. Hegeman *et al.*, Harlem & Eureka Bell Consolidated lode.

OREGON.

LA GRANDE DISTRICT.

John W. Larkin, Boston quartz mine.

UTAH.

SALT LAKE DISTRICT.

Alonzo H. Earll, coal.

GENERAL MINING NEWS.

ARIZONA.

GILA COUNTY.

Miners at Pioneer have struck against a reduction of fifty cents a day. It is said that they will not permit any one to work for less wages than they received.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—The Longfellow and Metcalf claims, which, with Coronada and Copper Queen, are the principal properties of this company, are actively worked, and sundry improvements are in progress which will tend to the more economical working of the company's properties. Four new smelters are to be erected.

DETROIT COPPER COMPANY.—The company has four mines adjoining, and west of the Longfellow mine. The daily shipments of ore amount to between 50 and 60 tons, which yields an average of 25 per cent copper. The mines are worked by a series of tunnels, the ore being mainly stoped out from these tunnel levels. Two shafts have been sunk on the Copper Mountain mine, one of which, a main working-shaft, is down about 180 feet. The gangue of the ore in the Copper Mountain carries enough iron to flux the carbonate ores of the Arizona Central and Lower Yankie. The reduction-works of the company are at Morenci, on the Frisco River, some six miles distant from the mines. The company has two water-jacket furnaces—one Rankin & Brayton and one Fraser & Chalmers. But one furnace is blown in at a time, the other being kept in reserve in case of accident. The company contemplates at an early day putting in another furnace, and running two constantly. The average daily output of copper matte is at present between 9000 and 10,000 pounds. The copper matte is shipped to Ansonia, Conn., where it is refined and is sold in the market as the Anchor brand.

CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED.—Mr. W. Van Norden writes us that the company was organized June 1st, 1883, by the consolidation of several properties, and has paid dividends regularly each month. About two millions of dollars in gold have thus far been taken from the mine. The mine is down about 1400 feet, and has a large quantity of ore in sight, having four levels open, and each but little worked. The company has kept much ahead of its needs in development. The vein is from 20 to 54 feet in width, of mixed gray and white quartz—called "ribbon quartz"—and with a small percentage of sulphurets. The gold mills freely. The shaft is vertical, three compartment. There is steam-power to raise 500 tons per day. The mills are run by water, and have a capacity of 120 stamps. The rock runs from $14 to $16 a ton. The production is about $80,000 per month. One hundred and twenty stamps are running at times, and part of the time 80, until the water rises in the fall. The cost of plant, including stamps, was about $350,000.

MONO COUNTY—BODIE DISTRICT.

The Bodie *Free Press* says that the Noonday, North Noonday, and Red Cloud Consolidated mining companies, together with all real estate belonging to the companies respectively, will be sold at public auction on the premises by the assignee in insolvency, Irwin C. Stump, on Monday, November 19th, 1883.

BODIE CONSOLIDATED.—The official report for the week ended September 29th shows: Ore crushed, 164⅛ tons; average assay value of pulp, $50.45; of tailings, $5.87.

STANDARD CONSOLIDATED.—The mill has resumed operations. The new engine, which takes the place of the old one, was built at the Union Iron-Works, in San Francisco, and is one of the best obtainable. It is of about 170 horse-power, and the cylinder is 20 by 36 inches. While the new engine was getting into place, the boilers were overhauled and placed in a condition for a protracted season of usefulness. It takes about seven cords of wood each twenty-four hours to keep up the fires in this twenty-stamp mill. Every thing is now in excellent order.

HOMER DISTRICT.

MAY LUNDY.—It is reported that this mine has passed into the hands of an English syndicate, which proposes to develop and work it to its fullest capacity. Heretofore, says the San Francisco *Stock Report*, it has been worked during the summer months only, and even then the ore was run down a 3000-foot tramway to Lake Cañon, and then hauled three miles on wagons to a rude ten-stamp mill. The mine has already shipped something over half a million dollars in gold, and the average yield has been a fraction over $50 to the ton. The ore is free milling. The English company contemplates a deep tunnel over 10,000 feet in length. Desiring to run through its own ground, and to reap the benefits of any discoveries resulting from its enterprise, it is understood that it has purchased, or is to purchase, all the properties along the line of the tunnel. This adit will pass 3000 feet vertically beneath the croppings of some of these properties. The lower levels of the mine make a far better showing, both as to quality and quantity of ore, than the upper workings. Three tunnels or adits have been run—the upper tunnel, 100 feet from the surface, following the vein 90 feet through the

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crest of a cross-ridge; the second being 270 feet from the surface and 493 feet in length; and the third nearly 600 feet beneath the surface and 899 feet in length—all following the vein.

CANADA.

PROVINCE OF MANITOBA.

It is stated that some English capitalists are considering a proposal to invest largely in mining property in the Lake of the Woods section.

ONTARIO.

A number of American capitalists, according to recent reports, propose to form a company with sufficient capital to enable them to erect crushing and concentrating mills, with a view to the utilization of the waste phosphate rock which so rapidly accumulates about the Ottawa County mines. These gentlemen are the holders for Canada of the patent for Paddock's pneumatic ore separator, and they profess to be able to utilize all rock containing 75 per cent down to 20 per cent of phosphate, and by means of crushing and contracting to bring it up to 85 per cent standard.

ALBERTA.—This company has applied for supplementary letters patent increasing its capital stock from $50,000 to $2,000,000.

COLORADO.

ARAPAHOE COUNTY.

HARRIS.—At a meeting of directors recently held in Denver, it was decided to increase the capacity of the smelter to 150 tons of ore per day, the work to be completed within the next six months. During the interval, the present works wil be run to their fullest capacity, which is from fifteen to twenty-five tons per day.

GILPIN COUNTY.

CALIFORNIA.—The shaft is about 1600 feet deep, and sinking as rapidly as possible to gain a depth of 2000 feet. In the 1400-foot level, a body of ore was recently struck over eight feet solid pay, which is running an average of ten ounces of gold per cord under the stamps, and smelting ore, of which there is a large streak over $150 per ton. The last clean-up from the seventy-stamp mill running on this ore was over 300 ounces of fine gold.

WHITING.—The lessees have begun drifting east and west at a depth of 250 feet in the main shaft of that mine. Enough ore is raised to keep from five to ten stamps running. The mine is now more than paying current expenses in doing the development-work.

GUNNISON COUNTY.

EASTMAN & SHORT CONSOLIDATED.—The concentration-works at Tomichi were burned to the ground recently. The loss is reported to be from $35,000 to $40,000. No insurance.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY.—The Ute and Ulé keep up their regular production of about thirty tons per day. The principal work is done in the lower levels of the Ute, although some active development is going on in the Ulé. The concentrator at these mines is running in full blast, and is kept busy concentrating the Ute and Ulé ores, and the ores from several neighboring mines.

INDEPENDENCE.—Work is vigorously prosecuted, and the contract for 1000 tons with the Mingo Smelting Company will shortly be filled.

LAKE COUNTY.

The question of giving the Stamm gas smelting process a practical test at Leadville is again agitated with good prospects of success.

ARGENT.—The Vining mine, on Rock Hill, one of the properties of this company, is looking very well, having undergone great improvements. Recent work toward the southwest has carried developments beyond the unfavorable area, and there is now disclosed to view a quite regular ore-chute. The strength of the ore-body is demonstrated by a stope about seventy feet square, while the breast of ore shows for nearly an equal length, with a thickness ranging from one to five feet. The shipments average about six tons of ore a day, all of fine grade, which is sufficient to meet the expenses of the mine, and leave a surplus of from four to eight hundred dollars a month.

BROOKLAND.—The capital stock has been increased from $1,500,000 to $2,000,000.

CHRYSOLITE.—The lessees of the different portions of the old workings of the mine are working with varied results. The lessees of Muldoon shaft, situated on the north side of the head of East Seventh street, have abandoned the hope of finding mineral on the contact already pierced, and have resumed the sinking of the shaft. At present, the workings are in porphyry at a depth of 160 feet.

CUMMINGS & FINN.—The Grant Smelting Company has just purchased this smelter at Leadville. It is the largest smelter in the carbonate camp, having a capacity of about two hundred tons a day. The property is to be turned over to the Grant Company next month. The purchase is the result of the increasing mineral output of the State, and although the Grant works at Denver are treating 300 tons daily, yet the supply has been increasing rapidly on the company's hands, so that it became absolutely necessary either to enlarge the Denver works or buy or build additional works elsewhere.

EVENING STAR.—The company has nearly one hundred thousand dollars on hand, and no indebtedness. The pumping machinery for the upper shaft is all in place and paid for. The enlarging and retimbering of the shaft is completed within about one hundred feet of the surface, and will be finished in a fortnight. About two weeks more will be consumed in getting the pumps in working order, so that it is anticipated that by the first week in November the sinking of the shaft will again be in progress. The present depth of the shaft is 411 feet, and it is calculated to sink it to a depth of six hundred feet. At the McHarg shaft, the sinking of the sump to greater depth has been taken up. The cutting out of the station has disclosed the mineral vein, which has a thickness of about thirty-four inches of fine sand ore. Some of this mineral has been shipped to the smelter, and returned seventy per cent in lead and nineteen and a half ounces in silver to the ton. A drift will soon be commenced on the strike of the vein, and the extraction of ore will immediately follow. The ore-vein seems to be improving in strength and grade to the southward.

GLASS-PENDERY.—The property is shipping about twenty-five tons of ore a week. The mineral averages twenty per cent in lead, and contains from fifteen to twenty ounces in silver to the ton. The ore also carries a large percentage of iron, constituting it a most desirable ore.

HARRISON.—The works are increasing and improving by the addition of a large roasting-furnace, designed for desulphurizing the sulphide ores at present produced by a number of the mines in California gulch.

HIGHLAND CHIEF.—A meeting is to be held at Leadville shortly, to discuss the present condition of the company. It is evident, says the Leadville *Herald*, that the company can not pay interest or redeem its bonded indebtedness, and that the property will revert to the bondholders pro rata to the amount of bonds they possess. As the bonds expire at an early day, the prospects are, that the stock of the company will soon be valueless, and that the bonds alone will represent interest in the consolidated property. There is but a very small interest in shares out that is not represented by a corresponding amount of bonds. The indebtedness was incurred in working the property and supplying it with machinery and buildings, and afterward in unsuccessful exploration and development-work. The company possesses about twenty-five acres of promising territory, of which an area of only three fourths of an acre has been opened and thoroughly explored. Three shafts on other portions of the company's ground have been sunk to mineral, but no drifting has been done from any of them.

LEADVILLE CONSOLIDATED.—The mines of this company are said to be looking better than at any time during the past six months. During the month of September, a lot of ore of seventy tons was shipped from the Carbonate mine, averaging ninety-eight ounces to the ton. Another lot of about sixty tons is at the smelter, estimated to average one hundred ounces to the ton.

LITTLE JOHNNY.—Owing to litigation, this mine, situated on Breece Hill, was closed down for some months until within a few days, when work was again resumed. The first ore has been hoisted, and the mine will be in a position to ship from ten to twenty tons of ore a day.

LITTLE PITTSBURG.—The monthly expenses range from $8000 to $9000. The principal work in progress is carried on in the Dives and northern portion of the company's claims. The old workings of the mine are gleaned over by miners working on tribute. Included in the new work to be undertaken this month is the cleaning out of No. 10 shaft, and the extension of the drift to the northward on the west side line of the Little Pittsburg claim.

PARK COUNTY.

WESTON.—The company is building a mill at the mine in Mosquito Gulch, of sufficient capacity to accommodate the entire product.

WYANDOTTE.—Contracts have been let for a cross-cut tunnel at the base of the mountain, tapping the vein about 200 feet below the present workings.

PUEBLO COUNTY.

COLORADO COAL AND IRON COMPANY.—A dispatch to the Denver *Tribune* says that the first run of spiegeleisen was made at Bessemer recently, and eleven tons of this valuable material were turned out. A practical test of the new goods has been made in the converters. The home-made spiegel and iron worked to a nicety. The first run of steel rails from the new goods was a success.

SAGUACHE COUNTY.

BUCKHORN.—One of the most wonderful mineral discoveries on record, says the *Chronicle*, was made in this mine on Crystal Hill recently. In the process of developing the mine, caves were discovered varying from a foot to several feet in diameter and many feet in extent, possessing walls of solid, rich mineral.

SAN JUAN COUNTY.

SAMPSON.—The mill is almost completed and will be started up soon.

SUNNYSIDE EXTENSION.—An important strike has been made.

DAKOTA.

BATTLE CREEK GRAVEL MINING COMPANY.—The properties of this company have passed into the hands of Messrs. E. L. Sawyer, Daniel Ferguson, and Peter Johnson, subject to redemption by the company at any time within one year from the date of the sheriff's sale. Arrangements will be speedily made for extensive work. A large amount of gold has already been obtained, and it is alleged that plenty of money could have been made if it had been properly worked.

FAIRVIEW.—The mill has started up on gravel from the Hill claim, Blacktail Gulch.

FATHER DE SMET.—The superintendent reports for the week ended September 25th: At the mine, every thing is going ahead well without any drawbacks. Golden Gate south header shows no change, the face looking as well to-day as it did a month ago. We shall begin breaking out across the ledge soon and get it in shape for stoping. East cross-cut, 3d level, is now out about 69 feet, 43 feet having been run since the present work began. So far, we have cut through a ledge about 20 feet in thickness, which, I think, is part of the ore-body in Cook's chamber, 2d level. As soon at practicable, we shall open out both ways on it and get in shape for a stope. The quality is mixed somewhat, but I think it will average a little better than the ore now milled. The face of the cross-cut is now in slate, and I expect no change until it strikes the Golden Gate ledge. The mill is doing good work so far this run. For the week ended September 30th: Ore extracted from first level, 1000 tons; second level, 900 tons; third level, 845 tons. Ore milled, 2700 tons. Golden Gate east cross-cut, third level, is in 80 feet, and Golden Gate south header, second level, is in 50 feet. For the week ended October 1st: Ore extracted from first, second, and third levels, 2745 tons. Ore milled, 2700 tons. Golden Gate east cross-cut, third level, advanced 18 feet. Total length, 80 feet. Golden Gate south header, second level, advanced 8 feet. Header in 50 feet.

JULIA.—This company has filed articles of incorporation. It intends to develop the Julia and other mica mines in the Black Hills.

GEORGIA.

The supply of water has increased, and most of the mills at the mines in Lumpkin County have started up. The work of development at the mines continues with favorable results.

MEXICO.

From a letter, written by a correspondent of the Mexican *Financier*, from Pachuca, we learn that the Progreso hacienda is at last in full blast. It is reported that the Encino mine is to start to work at full blast very soon. The prospect, Alta Gracia mine, has got its large malacate all up and in running order, and the shaft is sinking.

The Pachuca River Concentrating Company's works shut down a few days ago for a couple of weeks, till the new machinery arrives. A sale of one hundred shares of this company's stock was reported the other day at the rate of $15 per share. The par value is five dollars, U. S. currency. At Santa Rosa, the Schley Mining Company, of New York, owns several splendid mines; the Ida, Robert E. Lee, Washington, New York, La Reina, Savannah No. 1, Savannah No. 2. Of these mines, the Ida, La Reina, Robert E. Lee, and both Savannahs are in paying ore, and these ores are not in pockets, but in true fissure-veins, which, when worked on a large scale, will pay very profitably. All that is now wanting in this district is a good reduction-mill, as the ores have now to be shipped eighteen miles to be reduced. The old Capula mine has eighteen different large lodes coming into it; but at present, it is lying idle. The Santa Teresa Company is a promising property, but badly handicapped, it is said, for want of funds.

MICHIGAN.

The product, of the mines mentioned, for the month of September, is as follows:

PORTAGE LAKE DISTRICT.

	Tons.
Atlantic	159
Calumet & Hecla	1,679
Franklin	188
Grand Portage	40
Pewabic	51
Hancock	37
Huron	58
Quincy	336
Wolverine	43
Peninsula	31

KEWEENAW DISTRICT.

Allouez	105

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CALUMET GOLD AND SILVER MINING COMPANY.—The company is exploring on sections 21 and 29, town 48, range 47, which property lies to the north and northeast of the Ropes property.

ERIE.—Operations have entirely ceased, and it is rumored that a reorganization of the company will be effected. The cause of the trouble seems to be that not enough capital to work the mine properly was available.

HYDRAULIC POWER COMPANY.—The company was organized with a capital of $200,000. It has recently been increased to $300,000. The work done will cost $300,000, and when completed will effect a saving of $50,000 per annum to the Chapin and Ludington companies.

NORTHWESTERN.—Shipments are regularly made. The mine is supplied with adequate machinery, and bids fair to become a very large producer.

OHIO.—A depth of about 250 feet has been reached by the diamond drill at work on this tract, and it is expected to strike the ore-body shortly.

PITTSBURG & LAKE SUPERIOR.—A strike has been made about a quarter of a mile south of the Palmer mine workings. At a depth of 220 feet from the surface, the diamond drill encountered ore, and has passed through 22 feet of it. The ore is of a hard variety, and is said to be of excellent quality.

ROPES.—The experiments made have been so successful that the company intends to erect a forty-stamp mill.

MONTANA.

DEER LODGE COUNTY.

GRANITE MOUNTAIN.—The recent discoveries have been so favorable that the company has decided to work the mine on an extensive scale and erect a sixty-stamp mill next year. Until recently, the operations in the main tunnel, prosecuted at great expense for a thousand feet, were so unfavorable that they were on the point of stopping work.

SILVER LION.—This recent discovery has been bonded. About fifteen tons of ore are on the dump that will average about 200 ounces. This ore will be shipped to Denver for reduction.

TIDAL WAVE.—This mine is the oldest discovery in this district, and has been developed to a greater extent than any other. It is opened by two tunnels which have been tapped by a shaft, thus giving the mine a good ventilation. A large pocket or chamber was struck lately. The ore will average over 200 ounces to the ton.

MADISON COUNTY.

The erection of a twenty-ton smelter in Tidal Wave District has induced the owners of a number of claims to prosecute work vigorously.

BROADWAY.—Recent reports state that this property, through extravagant management, was put under a cloud about a year ago, but as soon as a few attachments now resting on it are raised, the mill and mine will again be started.

SILVER BOW COUNTY.

It is stated that the transportation of copper ore from Butte to Baltimore costs $40 per ton. Wood costs $6.50 per cord, and salt, of which enormous quantities are used in the mills in the process of separating, costs $5 per ton in Ogden, Utah, and the railroad charges are $25 per ton for transportation.

NEVADA.

ESMERALDA COUNTY.

NORTHERN BELLE.—Considerable fair-grade ore is obtained at a small expense from the sorting over of the waste-dumps. Five stamps of mill No. 2 are now engaged on custom ore, consequently but 23 tons of ore from the mine are delivered daily, that amount being amply sufficient for the other fifteen stamps.

EUREKA COUNTY.

EUREKA TUNNEL.—This company has been attached by F. W. Chite, of San Francisco, for $36,000, and by O. N. Hansen for $300. Suit was also begun against the company by the White Pine Bank of Eureka for $5391.

STOREY COUNTY—COMSTOCK LODE.

On September 28th, at a distance of about 21 feet, the Union west cross-cut had not reached the vein. There is a slight increase of quartz in the face. The last streak of quartz that was cut had swung around (together with the stratification) until it was parallel to the cross-cut. Whether the vein has swung with the cross-cut is the question which is at present puzzling the management and the holders of securities. The ground showed indications of water at one time, and the Burleigh drill was sent ahead until the ground became drier and the possibility of encountering a flow lessened.

IMPERIAL.—Work will soon begin in the old upper levels for the extraction of low-grade ore. There is probably in the Imperial, Alpha, and Exchequer a large amount of ore of about the same quality as that which the Crown Point, Yellow Jacket, Belcher, and Kentuck folks have been mining.

NEW MEXICO.

DONA ANA COUNTY.

At the annual meeting, held at Lake Valley recently, the following gentlemen were elected directors of the Sierra Grande, the same being chosen for the Sierra Bella and Sierra Apache: Edward D. Cope, Ellis H. Yarnall, R. Pearsall Smith, Stuart Wood, Robert C. Canby, David Bransoul, Charles H. Helman, G. G. Posey, F. M. Endlich. Messrs. Cope and Yarnall are the only members of the old board who hold over. The bulk of the proxies were held by a man named Bacon, who had been sent out by the Philadelphia stockholders. An impression prevails in this vicinity, says the Silver City *Southwest Sentinel*, that the Sierra properties can be made to pay a handsome interest upon the investment, even at the present high capitalization, and it is hoped that the new management will take the mines in hand and honestly strive to show what the ore contains.

SANTA FE COUNTY.

BONANZA No. 8.—Work will be resumed at this mine.

CASH ENTRY.—Since the property was purchased for $40,000 by the present owners, it has been worked in a straight and regular way. In connection with this mine, are a large number of prospects. The mine is developed by two shafts—No. 1, 160 feet deep; and No. 2, 140 feet deep. At 130 feet, they are connected by a level of 150, which is extended south beyond No. 2 for 25 feet. At this depth, there are two veins which form a junction at shaft No. 2. At the junction, the ore-body is from 18 inches to ten feet in width. The larger body averages at this time about $10 silver and 30 per cent lead. The other vein, as shown in shaft No. 1 and the 130 foot level, is about 17 inches in width, while the pay-streak is from 2 to 10 inches in width. In the smaller vein, the ore is likewise principally galena, which runs about $50 silver per ton and 45 or 50 per cent lead. The mine is well timbered, has good machinery, and about 1000 tons of ore on the dump.

DAVENPORT.—It appears that the question of a water supply has been solved by this company. An artesian well, sunk at nearly the highest point where placer gravel is found, struck an immense body of water at a depth of a little more than five hundred feet. The workmen are now piping or lining the well, and in a few days the water will be pumped upon the placer ground, when actual operations will be commenced.

GALISTED MINING AND REDUCTION COMPANY.—The company has a three years' lease, with the privilege to purchase, upon the Gold Hope mine. It has begun work with the view of thoroughly developing this property.

MARSHALL BONANZA.—Continuous development-work with the view to production will soon be commenced upon the property.

ST. LOUIS & NEW MEXICO.—It is reported that this company owns 800 acres of placer ground on Tuerto Gulch, two miles and a half below Golden. It has just received a car-load of machinery, and begun active work.

OHIO.

A dispatch to the New York *World* states that the tunnel for lubricating oil is about to be driven at Mecca, under the management of a company organized in New York, with Silas B. Dutcher as president. The oil is found in an area fifteen miles in length by five miles wide. It is estimated that 500,000 barrels have been taken out by pumping wells at an average of forty feet, which would represent, at its present value of $20 per barrel, $10,000,000. It has been demonstrated that a tunnel about six feet by three feet will pay to cut through a stratum of shale that forms the division between two layers of sandstone. The company has two square miles of territory in the heart of the best developed region, and should the yield be but one pint per running foot per day, it would pay 33⅓ per cent on the capital stock of $1,000,000. The tunnel will be four miles long.

UTAH.

BEAVER COUNTY.

It is understood, says the Salt Lake *Tribune*, that the Utah Central Railroad will extend a switch out six miles toward the mines from Milford, where the upward slope begins. The ore can be delivered at this point for 60 cents a ton. There is a strong desire among the large ore-producers in this region to see a second railroad penetrate the country, since every body is convinced that smelting at Sandy is much cheaper (40 per cent, it is said) than down here, the difference being mainly in cost of labor and fuel. If really fair rates for transportation of ores could be depended on, there would never be any more smelting in this southern country.

JUAB COUNTY.

MAMMOTH.—Reports state that a suit has been instituted against the company for the recovery of sums aggregating $50,000.

MILLARD COUNTY.

RED CLOUD.—This company has been organized with a capital stock of $1,000,000. The properties belonging to the company are the Chief of the West and Last Chance, in Antelope Mining District. Salt Lake City will be the chief place of business.

PI UTE COUNTY.

BULLION CAÑON COMPANY.—This mill, at Marysville, has been undergoing an overhauling, and has been placed in good condition for working ores. The mill is operated by water-power. The latest improvement was the addition of Frue vanners to make the concentration more perfect, and now the loss of metal is very small. A lot of ore from the Pluto mine has lately been milled, saving all the assay value except about $1 per ton. Since the improvements, the mill ran a few days, and produced a bar of bullion weighing 800 ounces, which was 931 fine in silver, and contained sixteen ounces of gold. This company also owns the Pluto mine. It expects to do custom work, and to operate all winter, both at the mill and mine.

CLYDE.—The mine is developing by a tunnel now in 932 feet, and driving to cut the vein at depth of 500 feet below the surface. To do this, the tunnel will have to run 150 feet farther.

SALT LAKE COUNTY.

A number of gentlemen interested in the mining industry of Utah have organized the Salt Lake Mining Institute, the purpose of which is to report upon the prospects of mining and of business in general; to develop mines; and to sell the properties at a reasonable price to capital that will make vigorous and extensive developments.

SUMMIT COUNTY.

EMPIRE.—It is stated that the claims of the employés of this company against the property have nearly all been bought in, and it is probable its affairs will all be settled soon.

ONTARIO.—The drain tunnel, says the Salt Lake *Tribune*, tapping the mine on the 600 level, at shaft No. 3, is 5763 feet long, from its mouth to the shaft; it is 5 feet by 7 in the clear, exclusive of lumber flume on the floor, 18 inches deep by three feet wide, in which the water is running nine inches deep like a mill-race, the grade being half an inch to the rod, or 13·4 feet per mile. This tunnel cost between $25 and $30 a foot. There are two compound 17-inch plunger steam-pumps on the 800 level, lifting 2700 gallons a minute to the tunnel, and another similar pump, 14-inch, on the 700 level. The cross-drift from shaft No. 2 on the 600 level is about 175 feet long to the vein. Thence this level is opened 850 feet east. Shaft No. 3 is farther from the vein, so that the cross-drift from it to the vein, which is really an extension southward of the drain tunnel, cuts the vein 426 feet south of the shaft, and 330 feet west of any other work on the vein. They drove the 600 level west from the No. 2 cross-drift as far as they could for the water, and then bore off northwest into the hanging country, and took the shortest cut to shaft No. 3. Through this, the water lifted from below runs to the drain tunnel, a distance of some 1400 feet. It is 1150 feet on the course of the vein from shaft No. 2 to shaft No. 3, or between the cross-drifts from the shafts. This, with the 850 feet east, makes the 600 level 2000 feet long from the east face to the cross-drift from shaft No. 3. At the latter point, the vein is 10 feet thick, with one foot of about 100-ounce ore on the hanging-wall, and 1½ feet on the foot-wall. Westward of this point, the company, or some of the principal owners in it, have a block of ground 3000 feet square, through which it is certain the Ontario vein continues, and which will be opened in due time, and contribute its share to the irrigating supply of Summit County, all of which above the drain tunnel will, of course, pass off without expense. All along the surface of this new ground, the vein has been traced; and although it seems to be for the most part pinched, yet it bears the characteristic ore that has made the Ontario output of $14,000,000 above the 600 level. The entire property, it will be seen, is about one mile long. The great shaft, No. 3, is now nearing the 800 level. From the 600 level down to that station, a double 20-inch pump column is to be put in, through which a double Cornish pump, worked by the enormous engine on the surface, will send up 3000 gallons of water per minute if necessary. The shaft will be sunk to the 1000-foot level; the double 20-inch column of the Cornish pump will be extended down there. Thus it is believed that the water trouble, which for a year or two has taxed the resources of the company, has been got under control, at least for two or three years.

WASHINGTON COUNTY—SILVER REEF.

STORMONT.—During August and September, the main incline was sunk 125 feet to the 6th level, most of the distance being in ore. Under date of October 2d, the superintendent reports: Progress in 6th level has been somewhat delayed by cutting station, now completed. The south drift has been advanced nine feet, and continues to show a very good vein of ore. The probabilities are, that there is a chute of pay-ore from the 5th level, but its extent can only be told as we push the level ahead.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Oct. 12.

The number of shares dealt in at the Mining Exchange foots up a large total, but the business done was confined to a few low-priced fancy stocks. Harlem, which was raided last week, was again very largely dealt in and its price was stronger; but it was simply manipulation. Eastern Oregon, Decatur, Sutro Tunnel, Robinson, and Amie are the other stocks which were very largely dealt in, and which, in fact, comprise the whole business done in the market. In every one of these stocks, the prices did not materially change, but were generally steady. We give a full summary of the market below. The total number of shares sold aggregates 193,710 shares, as against 188,363 last week.

The Comstock shares have been very quiet, at steady prices. California was irregular, selling from 11@18@16c., with a small business. Consolidated Virginia was quiet and steady, selling from 43@50@47c. Sierra Nevada was also steady, selling from $4@$4.25. Union Consolidated was very moderately dealt in at steady prices, selling from $4.05@$4. Mexican sold from $2.20@$2.25 under small transactions. Sutro Tunnel was active and steady at 18c.

The Leadville stocks were moderately dealt in at steady prices. Amie was quite active at steady prices; it sold from 13@12c. Chrysolite was fairly active at irregular prices; it sold from $1.20@$1.10. Dunkin, with a small business, sold at 25c Breece records a small business at 16@18c. Iron Silver was moderately dealt in at steady prices, selling from $2.95@$3. Leadville sold at 43c. Little Chief was steady, with a small business, selling from 53@60c. Little Pittsburg was quiet and steady at 63@65c. Climax sold from 11@12c., under a small business.

The Bodie stocks were very quiet, and were steady. Bodie Consolidated sold from 50@55c., with small transactions. Standard was quiet and steady at $5.75@$6. Bulwer was but moderately dealt in at steady prices, selling from 52@50c. North Standard was quiet and strong, selling from 10@25@20c.

The Tuscarora stocks were moderately dealt in at stronger prices. Grand Prize was fairly dealt in and was strong, selling from 25@59@55c. Belle Isle was quiet and steady at 30@33c. Navajo was at one time quite strong, but declined toward the close; it sold from $2.65@$3.50@$3 under a small business. North Belle Isle was quiet and steady at 45@50c. Elko Consolidated was quite weak, under a small business, selling from 7@2c.

In the miscellaneous list, Alice was a little weak, under a moderate business, declining from $2.85@$2.65. Horn-Silver was moderately dealt in at steady prices, selling from $7.25@$7. Hukill was quiet and steady at 5@7c. Northern Belle records a small business at very irregular prices; it sold from $5.63@$4.85@$5.50@$5. Robinson Consolidated was quite active and was irregular; it sold from 39@34@40@37c. Sierra Grande was moderately dealt in at steady prices, selling from $1@$1.05.

Barcelona was quiet and a little weak, selling from 32@28c. Central Arizona was steady at 21@25c. under a small business. Decatur was very actively dealt in at steady prices; it sold at 4c. throughout. Eastern Oregon was also very active, and was also steady; it sold from 40@48@47c. Harlem recovered from its weak prices of last week, and was stronger under a very active business; it sold from 76@87@86c. Sonora Consolidated was almost neglected, and was steady, selling from 25@24c.

The annual meeting of the stockholders of the Amie Consolidated Mining Company was held on Tuesday last at No. 40 Broadway, this city, at which there was a good attendance. There were 402,490 shares of stock represented out of a total of 500,000. The chief object of the meeting was the election of a board of directors for the ensuing year; and, as there was considerable opposition to the present management, it proved quite interesting. Mr. Thomas G. Roebuck, of Newark, led the opposing element; but he and his friends could muster but 169,410 proxies, while the management voted on 233,080, and thus succeeded in electing the following directors: A. W. Gill, Robert Sewell, L. V. De Forrest, L. D. Roundebush, George P. Sheldon, George H. Morrison, and J. S. Lockwood. The financial statement of the company for the year ended October 5th shows that the receipts were $53,828.53; disbursements (including a dividend of $25,000 and $414.40 lost by the failure of the Bank of Leadville), $44,864.69; cash on hand, $8963.64. The superintendent, who was at the meeting, stated that he had received a dispatch from the mine that No. 5 shaft was looking very well.

It is reported that the Ontario will soon resume dividends. It has probably accumulated fully $250,000 in its treasury after paying for the coal mines and railroad.

On the Green Mountain, the following is reported from a good source: The vein has been cut at about the calculated distance. Work is going forward on the vein at the rate of 200 feet or more a month, seven and a half feet a day, with power-drills. The vein is extremely well defined; the quartz is soft and friable, and breaks into small fragments. It contains some gold, but not enough as yet to pay. There are some 500 feet to run before the Blake chute will be reached. The mills on the hill are stopped, all the stamping now being done at the 60-stamp mill. The sixth level will be extended back along the vein as far as the supposed Gregg chute or beyond. This chute is so known from the fact that it was opened by Mr. Gregg, who is now the acting superintendent of the Homestake and adjoining claims in the Black Hills.

The new management of the Sierra Grande Mining Company, under the presidency of Professor Cope, in the announcement of dividend No. 7, presents the following approximate preliminary statement, pending a detailed financial report now in preparation:

Cash in bank and at mint	$130,500
Cash—in hands of general manager at Lake Valley; receivable from ore shipped to Pueblo during September; and from other sources, partly estimated	98,500
	$229,000
Deduct dividend No. 7, payable October 3d, 1883	100,000
Reserve of cash assets, receivable by October 31st	$129,000

The circular continues as follows:

"Reductions in the current expenses of about three thousand dollars per month have been recently inaugurated, and work which has proved unproductive has been stopped. A part of the resources of the past few months has been derived from the tailings of the hurried mill work of last winter. These are now exhausted, and we shall henceforth depend on the fresh product of the mines. The output of ore is indicated by our manager as satisfactory in high-grade ore, and he reports that there are no present indications of a decrease in quantity or quality. The low-grade ore is found in large quantities and is of value. There appears to be an economy in shipping high-grade ore to a smelter in Pueblo, and in working the low grades in our own mill. But this problem is not yet fully worked out. A diamond rock-drill has just been put into operation which will save much expense in sinking shafts for discovery of ore-beds. It is also proposed to purchase concentrators for utilizing the lowest grade of ores and tailings. It is expected that the railroad will be soon extended from Nutt station to Lake Valley."

The action of Ralph D. Perkins and other stockholders against Charles Dennis, J. Warren Brown, and others, and "the Dunderberg Mining Company," which was begun in the Supreme Court of the State, has been transferred to the United States Circuit Court. The corporation was organized in May, 1879, under the laws of the State of New York, with a capital stock of $1,500,000, divided into 150,000 shares of $10 each. It is alleged that soon after the organization the defendants entered into a pretended agreement with J. Warren Brown, the owner, in trust for himself and others, of certain mining claims and property situated in Clear Creek County, Colorado, to issue to him and his associates as full-paid stock 150,000 shares for the pretended consideration of the conveyance of the mining claims and property. It is alleged that the mining property was not worth $1,500,000 nor more than $242,000, which was the sum actually paid to the several owners of it. The plaintiff prays that the defendants may be ordered to account concerning the gains and profits received by each of them from the sale of said stock, and that the value of the property in question be determined by the court.

DIVIDENDS.

The Castle Creek Gold Mining Company, of Idaho, has declared a dividend (No. 17) of three per cent, payable October 16th.

The Copper Queen Mining Company, of Arizona, has declared a quarterly dividend of $125,000, payable October 16th.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 13) of two per cent, payable October 18th.

The Juniper Gold Mining Company, of Idaho, has declared a dividend (No. 1) of two per cent, payable October 20th.

The Mount Diablo Mining Company, of Nevada, has declared its third consecutive monthly dividend of twenty-five cents per share.

The Oro Grande Mining Company, of California, has declared a dividend (No. 3) of $16.000.

PIPE LINE CERTIFICATES.

Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

The market for the past week has been a declining one. Friday, October 5th, it opened at $1.13¾, sold down to $1.12⅝, closing dull at $1.13⅛. There was considerable covering of short accounts at about these figures, and the market was devoid of such strength as comes from short buying. Saturday, the market was stationary at about $1.13¼. Monday, the market exhibited weakness. The immediate cause of this weakness was the announcement that Howe No. 10 had come in over Sunday, and had made 150 barrels the first hour. It had declined by Monday morning, but the evidence was unmistakable that the Balltown production was increasing to an extent that alarmed the bulls and made a decline seem probable. Tuesday, the market dropped down to $1.10⅛, recovering at the close to $1.12 in anticipation of the Pipe Line report which was to appear the next day, and the agreement among prominent Balltown and Cooper tract producers to suspend the starting of any new wells until next spring. This bull feeling was very unsubstantial; but early Wednesday morning, the market rose to $1.13. It soon began to drop, however, and did not stop till it reached $1.09¼. Thursday, the market declined to $1.07⅛, rallying at the close to $1.09⅝. This (Friday) noon, the market, after having declined to $1.08⅝, rallied to $1.10¼, but there is nothing in the situation at the present moment to justify high prices for oil.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Oct. 6	$1.13¼	$1.13¾	$1.13	$1.13⅛	2,260,000
8	1.12⅝	1.12⅝	1.11⅝	1.11½	4,373,000
9	1.11¼	1.12¼	1.10½	1.12⅛	3,347,000
10	1 12	1.13	1.09¼	1 0⅝	5,243,000
11	1.09⅛	1.09⅝	1.07⅞	1.09½	4,206,000
12	1.09⅜	1.10¾	1.08⅝	1.10⅝	4,384,000
Total sales					23,813,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Oct. 5.	Oct. 6.	Oct. 8.	Oct. 9.	Oct. 10.	Oct. 11.
Albion						
Alpha	2¼					
Alta	1⅜	1⅜	1⅜	1¼	1¼	1⅛
Argenta				.05	.25	.30
Bechtel						
Belcher	1¼	1¼	1¼	1¼	1¼	1⅛
Belle Isle				.30	.35	
Best & Belcher	3⅛	3⅛	3¼	3¼	3¼	3⅜
Bodie	.50	.50	.55	.55	.55	.50
Bullion						
Bulwer						
California	.10	.15	.20	.15	.10	.20
Challar	2⅝	2¾	3	2⅞	3	3
Con. Virginia	.45	.45	.45	.45	.55	.50
Crown Point	1¼	1¼			1⅛	1⅛
Elko Cons		.10	.10	.10	.10	
Eureka Cons	6	6	5¾	5⅝	6	5¾
Exchequer						
Gould & Curry	2¼	2¼	2⅜	2¼	2¼	2¼
Grand Prize	.30	.30	.40	.60	.60	.60
Hale & Norcross	3¾	3¾	4	3⅞	4	3⅛
Independence						
Martin White						
Mexican	2¼	2⅜	2¼	2⅛	2¼	2⅛
Mono						
Mount Diablo					4¼	4
Navajo		2¾	3	3	3¼	3¼
Northern Belle	5		5	5	5	5⅛
North Belle Isle						
Ophir	3⅝	3⅞	4¼	4¼	4⅛	4⅝
Overman						
Potosi	1	1	1⅛	1¼	1⅛	1⅛
Savage	1⅛	1⅛	1⅛	1⅛	1⅛	1⅛
Scorpion	.55	.60	.65	.60	.60	
Sierra Nevada	4⅛	4¼	4¼	4¼	4¼	4¼
Silver King						
Tip Top						
Union Cons	4	4¼	4	4	4	4
Utah	1⅞	2	2⅛	1⅞	2⅛	2
Wales Cons						
Yellow Jacket	3¼	3¼		3¼	3¾	3¾

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The following are the financial balances of the various mining companies on October 1st:

CASH ON HAND.

Alta	$28,109.40	Justice	$8,000.00
Andes	6,000.00	Jackson	4,289.46
*Argenta	766.32	Mono	2,729.00
Alpha Con	6,458.09	Northern Belle	43,771.90
Booker Con	403.38	Javajo	2,639.97
†Belcher	23,362.67	Occidental	5,809.01
Bulwer	411.65	Ophir	61,579.68
Bodie Con	32,323.09	Pedro Con	10.55
Benton Con	6,313.89	Potosi	35,991.58
‡Con. Virginia	84,693.76	Sierra Nevada	65,648.40
Challenge Con	5,575.13	Standard	161,509.00
Chollar	91,604.60	Savage	11,475.48
§California	857.35	Syndicate	4,977.82
Crown Point	21,170.54	Summit	1,046.15
Double Standard	36.20	Tioga Con	842.00
Exchequer	17,867.22	Utah	4,564.44
Genesee Valley	3,758.77	Union Con	17,422.77
Gould & Curry	18,778.17		

INDEBTEDNESS.

Best & Belcher	$7,119.02	Hale & Norcross	$14,536.75
‖ Day (overdraft)	371.42	Lady Washingt'n	3,864.83
** Grand Prize (overdraft)	16,392.79	Martin White	2,012.99
		Mexican	21,499.67

Albion indebtedness, exact amount not yet known; approximate $260,000.

* Outstanding drafts $6382.75.
† Due Sutro Tunnel Company, $10,920.
‡ Monthly expense of mine, amount unknown.
§ Overdraft at bank, $7471.17.
‖ Bills payable, $91,151.81.
** Outstanding drafts, $3919.37.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, October 11.

There is no improvement to note this week in the market for mining stocks, which continues to rule dull, with prices inclined to a lower level. This is not because of any change in the price of ingot copper to warrant a decline, but is one simply of supply and demand. The orders to purchase stocks from *bona-fide* investors are few, and as there are two sellers to one buyer, some have to be left out in the cold or submit to lower prices in order to effect sales. As an instance, take Quincy, which last week was strong at $54 on good buying orders, this week has declined to $51, for no other reason that we can learn than an absence of orders to buy, there being no disposition to speculate in the stock. Calumet & Hecla has ruled steady and firm at $245. The usual quarterly dividend of $5 per share is announced. Franklin continues firm at the advance of last week, with sales at $12½@$12¾; while Pewabic, on the expectation of another assessment, has declined from $2½@$1½, and closed at $1¼ only bid for it. Osceola sold at $19@$19½. The rest of the list is entirely neglected.

In silver stocks, the market is duller than ever. With the exception of Silver Islet, there is really nothing doing. Silver Islet advanced from $3@$3½ on the strength of the strike alluded to last week; but he public generally do not take kindly to these reports, and are cautious about making investments in this class of mines, especially when assessments are the regular rule rather than the exception. Bonanza sold at $1¾, same as last week (100 shares only). Sullivan at 87½c., and at the Mining Board at 85c., seller 30. Bowman Silver, 12@18c. Harshaw, at 50c.

3 P.M.—The market this afternoon was without any special feature. Pewabic sold at $1¼. Silver Islet at $3. Quincy, $51@$50¾. Franklin, $12½ bid, $13 asked. Osceola, $19 bid, $21 asked. Atlantic, $10 bid. Pewabic, $1¼ bid, $1½ asked. Bonanza, $1½ bid, $1¾ asked.

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 12.

The market has been pretty steady the past week until to-day, when a decline of 1/16d. in London, and the equivalent of ⅛ per ounce in sterling exchange here, reduces our figures one quarter of a cent per ounce, as quoted in annexed table:

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Oct. 6	50 15-16	110¾	Oct. 10	50 15-16	110¾
8	50 15-16	110¾	11	50 15-16	110¾
9	50 15-16	110¾	12	50⅞	110½

The Assay of Japanese Coins.—Dr. Lawyer, the assay officer of the Mint Bureau, has just completed his test of the pyx coins sent from the Imperial Mint at Japan, and has made his report to the Director of the Mint. The results of the test correspond so closely with the results of that made at the Japanese Mint as to be thought remarkable.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of August.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	113,146	$681,587
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont	"	———	12,604
Bodie, G. S.	Cal.	12,273	174,001
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	47,533	426,967
*Boston & Montana, G.	Mont.	5,274	128,830
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah	.....	162,513
*Chrysolite, S. L.	Colo.	21,379	284,308
*Consolidated Bobtail, G.	Colo.	4,898	47,986
*Contention, S.	Ariz.	———	635,413
Crescent, G.	Cal.	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak.	42,163	283,880
*Derbec Blue Gravel, G. S.	Cal.	16,212	88,482
Dunkin, S. L.	Colo.	.....	32,015
Evening Star, S. L.	Colo.	.....	47,061
*Father de Smet, G.	Dak.	29,739	238,590
*Frisco M. and S. Co., G. S. L.	Utah	.....	$77,084
Gunnell, S.	Colo.	.....	58,828
*Haile, G., S., C.	S. C.	3,872	27,900
*Head Center Consolidated	Ariz.	4,250	32,618
*Head Center and Tranquillity	Ariz.	8,910	89,108
*Hecla Consolidated, G. S.	Mont.	.....	293,922
*Homestake, G.	Dak.	99,298	685,972
*Hope, S.	Mont.	.....	62,447
Horn-Silver, S. L.	Utah	324,200	2,171,200
*Howell S. and Mg. Co., G. S. L.	Ariz.	38,452	90,520
Idaho, G.	Cal.	.....	150,642
*Independence, G. S.	Nev.	———	32,991
Iron Silver, S. L.	Colo.	.....	751,062
*Jocuistita, S.	Mex.	.....	‡258,959
*Kentuck, G. S.	Nev.	1,454	16,866
*Lexington, S.	Mont.	112,147	856,703
*Little Pittsburg, S. L.	Colo.	12,414	54,505
*Marguerite, G.	Cal.	3,034	65,504
*Martin White, G. S.	Nev.	———	136,317
Morning Star, S. D.	Colo.	.....	84,428
*Moulton, G. S.	Mont.	.....	123,288
Mount Diablo	Nev.	67,333	329,433
*Navajo, G. S.	"	———	411,642
*North Belle Isle	"	———	2,153
Northern Belle, S.	"	27,947	474,987
*Ontario, S. L.	Utah	194,283	1,409,544
*Oxford, G.	N. S.	4,734	45,265
*Phœnix, G.	N. C.	3,500	17,500
*Pinal Consolidated, S. L.	Ariz.	.....	181,485
*Plymouth Consolidated, G.	Cal.	79,105	227,218
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	25,616	203,947
*Silver Cord, G. S. L.	Colo.	.....	703,333
Silver King, S.	Ariz.	.....	367,802
Standard, G.	Cal.	40,943	779,344
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah	23,377	176,105
Syndicate, G.	Cal.	7,957	46,385
Tintic M. and M. Co.	Utah	3,920	29,116
*Tip Top, S.	Ariz.	.....	37,868
*Tombstone, G. S. L.	"	51,574	548,764
Wyoming Consolidated	Cal.	.....	31,541
Yellow Jacket, S.	Nev.	.....	265,885
Total amount of shipments to date			$15,839,687

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (———) indicates that no shipments have been made in the month named.

Cheap Nickel for Coinage.—Col. A. Loudon Snowden, Superintendent of the United States Mint at Philadelphia, received at noon, October 3d, bids for 20,000 pounds of metal to be used in minor coinage. Joseph Wharton was the only bidder, but his figure, ninety-one cents per pound, is the lowest at which the government has ever been able to get the metal.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended October 12th, as compiled from various sources, amounted to $296,000, as against $160,000, reported for the previous week. The receipts from January 1st, 1883, to date are $8,945,047.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended October 6th	$339,900
Corresponding week last year	58,200
Since January 1st, 1883	11,378,076
Corresponding period last year	44,301,795

Imports.

Week ended October 6th	$674,790
Corresponding week last year	261,517
Since January 1st, 1883	12,906,220
Corresponding period last year	3,368,985

Foreign Bank Statements.—The Governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £492,000 bullion, and the proportion of its reserve to its liabilities was reduced from 43 15-16 to 42¼ per cent, against 32½ per cent at this date last year.

The Coinage of Silver.—From an official statement made by Mr. Burchard, Director of the Mint, it appears that the silver on hand on July 1st, 1878, and purchased since then, is 123,447,480 ounces, of which 119,206,224 ounces have been used in the coinage of silver dollars and some subsidiary silver coin, 304,375 ounces have been wasted by the operative officers of the mints and sold in sweepings, leaving a balance on hand July 1st, 1883, of 3,936,880 ounces. This remainder has been weighed and verified by officers of the Treasury Department.

The profits on the coinage of this silver, including the repayments by the Adams Express Company, amount to $17,342,113, of which sum $15,581,718 have been deposited in the Treasury of the United States, $358,399 have been paid for shipping silver dollars, $51,925 for loss on sweepings sold, $71,429 for wastages, and $48 for loss on recoinage, leaving a balance in the coinage mints on June 30th, 1883, of $1,278,596, all of which has since that date been covered into the Treasury.

METALS.

NEW YORK, Friday Evening, Oct. 12.

Copper.—Sales for the week have been confined to a couple of hundred thousand pounds Lake Superior at 15¼c., which is the asking price at the close, 15⅛c. being bid. Other brands sell to a moderate extent at from 14⅜@14¾c. As the contracts for Lake copper with manufacturers expire this month, the question arises whether a new pool is to be made. It will be made if the manufacturers see any advantage in the conditions offered them; if not, they may as well fill their current wants at ruling prices from hand to mouth—and this seems to be the feeling. The Chili Bar speculation in London after all does not seem to work satisfactorily, good ordinary brands of Bars being down to £61 7s. 6d. (to-day's cable), and New Selected to £68.

Tin.—The large shipments from the Straits this way, and from Australia to London, combined with dullness in the metal trade both in Europe and here, have caused a downward tendency on both sides for the moment so far as large lines of Straits are concerned, while, in a jobbing way, prices are tolerably well sustained. Thus, we quote large lots on the spot 21c., and smaller parcels 21⅛@21¼c. London has meanwhile given way to £93 15s. with Straits Tin.

Lead.—Since our last report, some 600 tons of Common lead have been forced on the market and have gone at 4·20c., which is the closing figure on a firm market, Refined barely being worth 4·25c. The general tendency is a weak one just now, and will probably remain so unless a brisker demand for consumption should soon manifest itself, in which respect both September and so far October have been a disappointment. Chief consumers here are meanwhile still sufficiently stocked to be able to bide their time a couple of weeks longer, if need be. Much will depend, as regards prices in the near future, on the course the one or the other of the big holders out West may choose to adopt with what he has still on hand. London cables English Pig £12 7s. 6d. @£12 10s., steady.

From Chicago, Messrs. Everett & Post send the following dispatch:

Our market has declined slowly since our last report. The demand is only moderate, and there is but very little doing. Buyers are holding off, expecting a further decline, and are purchasing only for immediate wants. Sales for the week have been 800 tons Common and Refined at 4c.

Spelter.—The market for Common Domestic spelter is about as listless as it has been for months past, at 4½c., while Silesian is worth 5½c., nominally. Under date of the 28th ult., Messrs. H. R. Merton & Co., London, write:

A large business has been done at improving prices, £15 12s. 6d. for special, and £15 7s. 6d. for ordinary brands having been paid. Makers abroad will only sell moderately, as they believe in higher prices.

There is also a large demand for sheet-zinc, prices

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Oct. 12.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.80	....	2.75	....	2.85	....	2.85	....	2.85	2.75	2.75	2.65	1,600
Amie Con., Co.	.13	.12	.13	.12	.13	....	.13	....	.13	....	.12	....	18,100
Argenta, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bar. & Walker, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bassick, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Belle Isle, Ne.	....	....	....	....	.30	....	.33	....	....	....	....	....	300
Bodie Cons., Ca.	.50	....	....	....	....	....	....	....	.55	....	....	....	250
Breece, Co.	.16	....	.16	....	....	....	.18	....	....	....	....	....	775
Bulwer, Ca.	.52	.50	....	....	....	....	....	....	....	....	....	....	400
California, Ne.	....	....	.11	....	.16	.15	....	....	.18	.16	.16	....	5,800
Cal. & Hecla, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Carbonate Hill	....	....	....	....	....	....	....	....	....	....	....	....	....
Caribou Con., Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite, Co.	1.20	....	1.20	....	....	....	....	....	....	....	1.20	1.10	4,000
Cons. Va. Ne.	....	....	.43	....	.43	....	.46	....	.50	....	.47	....	5,250
Crown Point	....	....	....	....	....	....	....	....	....	....	....	....	....
Deadwood-Terra, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Co.	.25	....	....	....	....	....	.25	....	.25	....	....	....	1,700
Eureka Cons., Ne.	....	....	....	....	....	....	5.75	....	....	....	....	....	100
Excelsior, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Father de Smet, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Findley, Ga.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Stripe, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gould & Curry, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Ne.	.26	.25	....	....	.41	.38	.59	.54	.54	.53	.55	....	3,800
Great Eastern, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Green Mountain, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hale & Norcross, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hall-Anderson, N. S	1.15	....	....	....	....	....	....	....	....	....	....	....	100
Hibernia, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Homestake, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn-Silver, Ut.	7.25	7.00	7.00	....	7.00	....	7.00	....	....	....	7.00	....	1,220
Hukill, Co.	.07	....	.06	....	.06	....	....	....	....	....	.07	....	1,550
Independence, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Iron Silver, Co.	3.00	2.95	3.00	....	3.00	....	....	....	....	....	3.00	....	4,700
La Plata, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C., Co.	....	....	.43	....	....	....	....	....	....	....	....	....	100
Little Chief, Co.	.58	.56	.55	....	.53	....	....	....	.58	.57	.60	....	2,900
Little Pittsburg, Co.	....	....	....	....	.65	.63	....	....	.65	....	.65	....	600
Martin White, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Moose, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Ne.	2.65	....	....	....	3.50	3.25	3.00	....	3.00	....	....	....	1,300
Northern Belle, Ne.	....	....	5.69	....	4.90	4.85	5.50	....	....	....	5.00	....	620
North Belle Isle, Ne.	.48	.45	.45	....	....	....	.45	....	.50	.47	.50	....	1,750
Ontario, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ophir, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Plumas, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Prussian, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Quicksilver Pref., Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., Ca.	....	....	....	....	....	....	....	....	....	....	6.50	....	100
Rising Sun, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson Cons., Co.	.39	....	.39	.34	.38	.35	.40	.37	....	....	....	....	12,400
Saint Joseph's Lead.	....	....	....	....	....	....	....	....	....	....	....	....	....
Savage, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Grande, N. M.	....	....	....	....	1.05	1.00	1.05	....	....	....	1.05	....	4,000
Sierra Nevada, Ne.	....	....	....	....	....	....	4.00	....	4.25	....	....	....	310
Silver King, Ar.	....	....	....	....	....	....	....	....	8.25	....	....	....	30
Spring Valley, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Ca.	6.00	....	5.75	....	....	....	6.00	....	....	....	....	....	185
Stormont, Ut.	....	....	....	....	....	....	....	....	....	....	.25	.24	200
Tip Top, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Yellow Jacket	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Oct. 12.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion.	....	....	....	....	....	....	....	....	....	....	....	....	....
Alta.	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Flag, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Barcelona, g.	....	....	.32	....	.32	.30	....	....	.30	....	.30	.28	1,100
Bear Creek	....	....	....	....	....	....	....	....	....	....	....	....	....
Bechtel Con., g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Belvidere	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & B'licher, g. s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Big Pittsburg, s. l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradshaw, s.	....	....	.23	....	....	....	....	....	.28	....	....	....	2,400
Buckeye	....	....	....	....	....	....	....	....	....	....	....	....	....
" pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bull-Domingo, s.L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bye and Bye.	....	....	....	....	....	....	....	....	....	....	....	....	....
Calaveras, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Clav'r'a W. & M. Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal., B. H., g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Central Ariz'na, s.	....	....	....	....	.25	.21	....	....	....	....	.25	....	300
Cherokee, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chollar	....	....	....	....	....	....	....	....	....	....	....	....	....
Climax, Co.	....	....	.12	.11	.12	....	....	....	....	....	....	....	1,850
Cons. Imp'ri'l, g.s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Crowell, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dahlonega, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur	.04	....	.04	....	.04	....	.04	....	.04	....	.04	....	21,800
Dunderberg	....	....	....	....	....	....	....	....	....	....	....	....	....
Durango, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Eastern Oregon	.47	.40	.47	.46	.47	.46	.47	.46	.48	....	.47	....	18,300
Elko Cons.	....	....	.07	.05	.03	....	.03	....	.03	.02	.02	....	1,600
Enterprise	....	....	....	....	....	....	....	....	....	....	....	....	....
Fannie Barret	....	....	....	....	....	....	....	....	....	....	....	....	....
Globe Copper	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Placer, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Goodshaw, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Granville, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Harlem M. & M. Co.	.78	.76	.81	.77	.83	.79	.85	.83	.85	.84	.87	.85	31,600
Hortense, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Imperial, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Lacrosse, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Lucerne	....	....	....	....	....	....	....	....	....	....	....	....	....
Mariposa Pref., g.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., g	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, g. s.	....	....	....	....	....	....	....	....	2.25	2.20	....	....	160
Miner Boy.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mono	....	....	....	....	....	....	....	....	....	....	....	....	....
North Standard, g.	....	....	.10	....	....	....	....	....	....	....	.25	.20	1,500
N. Horn-Silv'r, s.L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ori'nt'l & Miller, s.	.08	....	.08	....	....	....	....	....	....	....	.09	.08	1,400
Parnell	....	....	....	....	....	....	....	....	....	....	....	....	....
Quartz Creek.	....	....	....	....	....	....	....	....	....	....	....	....	....
Rappahannock, g.	.07	....	....	....	.07	....	.07	....	....	....	.08	.07	6,100
Red Elephant, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ruby, of Arizona.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cliff, s.	....	....	....	....	....	....	....	....	.10	....	....	....	500
Sonora Con.	.25	....	.25	....	....	....	.24	....	.24	....	.24	....	2,900
South Bodie, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Bulwer, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Hite.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Pacific.	....	....	....	....	....	....	....	....	....	....	....	....	....
State Line, 1 & 4, s.	....	....	....	....	.03	....	....	....	....	....	....	....	500
" Nos. 2 & 3, s.	....	....	....	....	....	....	.06	....	....	....	.05	....	2,000
Sutro Tunnel.	18	....	.18	....	.18	....	....	....	.18	....	....	....	18,100
Taylor Plumas	....	....	....	....	....	....	....	....	....	....	....	....	....
Tioga.	....	....	....	....	....	....	....	....	....	....	....	....	....
Unadilla, s.	....	....	.02	....	....	....	....	....	....	....	....	....	3,000
Union Cons., g.	....	....	....	....	....	....	4.05	....	4.00	....	....	....	160

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 78,140. Non-dividend shares sold, 115,570.

BOSTON MINING STOCKS.

	Oct. 5.		Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.	....	....	....	....	....	....	....	....	....	....	....	....	....
Amie.	.15	....	....	....	.16	....	....	....	....	....	....	....	700
Atlantic.	....	....	....	....	....	....	....	....	....	....	....	....	....
Aztec.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bodie Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bonanza D.	1.75	....	1.75	....	....	....	....	....	....	....	....	....	300
Bowman Sil	.13	.12	.13	....	.13	.12	....	....	....	....	....	....	5,000
Bruns. Ant.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer.	....	....	....	....	....	....	....	....	....	....	....	....	....
California.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal. & Hec.	245	....	245	....	....	....	245½	....	245	....	....	....	61
Catalpa.	.30	....	.35	....	.35	....	....	....	....	....	....	....	300
Central Ariz	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherryfield.	....	....	....	....	....	....	....	....	....	....	....	....	....
Co. Virginia	....	....	....	....	.42	....	....	....	....	....	....	....	200
Copper F'lls	....	....	....	....	....	....	....	....	....	....	....	....	....
Copperop.	....	....	....	....	....	....	....	....	....	....	....	....	....
Crescent.	....	....	....	....	....	....	....	....	....	....	....	....	....
"Cusl"	....	....	1.70	....	....	....	....	....	....	....	....	....	100
Decatur.	....	....	....	....	....	....	....	....	....	....	....	....	....
Deer Isle.	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	....	....	....	....	....	....	....	....	....	....	....	....	....
Douglas.	....	....	....	....	....	....	....	....	....	....	....	....	....
Duncan.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin.	.23	....	....	....	....	....	....	....	....	....	....	....	200
Empire.	.19	....	....	....	.18	....	....	....	....	....	....	....	800
Eureka Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Franklin.	12.75	....	12.50	....	12.75	12.50	....	....	12.75	....	....	....	490
Hancock G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Harshaw.	.50	....	....	....	....	....	....	....	....	....	....	....	100
Huron.	....	....	....	....	....	....	....	....	....	....	....	....	....
Independ'ce	....	....	....	....	....	....	....	....	....	....	....	....	....
Indian Q'n.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mammoth	....	....	....	....	....	....	....	....	....	....	....	....	....
Mass. & N.M.	....	....	....	....	....	....	....	....	....	....	....	....	....
Milton.	....	....	....	....	....	....	....	....	....	....	....	....	....
Napa.	....	....	2.75	....	....	....	....	....	....	....	....	....	100
National.	....	....	....	....	....	....	....	....	....	....	....	....	....
North. Belle	....	....	....	....	....	....	....	....	....	....	....	....	....
Ontario.	....	....	....	....	....	....	....	....	....	....	....	....	....
Osceola.	19.00	....	19.00	....	19.00	....	19.50	....	....	....	19.00	....	82
Penn-Breck.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pewable.	....	....	2.00	1.75	1.75	....	....	....	1.63	1.50	1.50	1.25	1,105
Pine Tree.	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth.	.11	....	....	....	....	....	....	....	....	....	....	....	100
Quincy.	....	....	52.00	....	52.00	51.50	....	....	52.50	51.00	51.00	50.75	188
Ridge.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson.	.36	....	.38	....	....	....	....	....	....	....	....	....	200
San Pedro.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Nev.	....	....	4.00	....	....	....	....	....	....	....	....	....	50
S'ra Grande	1.00	....	....	....	....	....	....	....	....	....	....	....	100
Silver Islet.	2.50	....	3.00	....	3.50	....	3.50	....	....	....	3.00	....	500
Silver King.	....	....	....	....	....	....	....	....	....	....	....	....	....
Simpson Gd	....	....	....	....	....	....	....	....	....	....	....	....	....
South Pacl.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sullivan.	.90	....	....	....	.92	.86	.87½	....	....	....	....	....	700
Sutro Tun.	.18	....	.19	....	....	....	....	....	....	....	....	....	500
Sycamore.	....	....	....	....	....	....	....	....	....	....	....	....	....
Twin Lead.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con.	....	....	....	....	.25	....	....	....	....	....	....	....	100
....	....	....	....	....	....	....	....	....	....	....	....	....	....

PHILADELPHIA MINING STOCKS.

	Oct. 5.		Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.	....	....	....	....	....	....	....	....	....	....	....	....	....
Argent.	.16	....	.16	....	.16	....	.17	.16	.18	....	.17	....	31,300
Arizona So.	....	....	....	....	....	....	....	....	....	....	....	....	....
Battle Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
Buena.	....	....	....	....	....	....	....	....	....	....	....	....	....
California.	....	....	....	....	....	....	....	....	....	....	....	....	....
Calista.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cincinnati.	....	....	.09	....	....	....	09	....	.10	....	....	....	4,100
Comprom'e.	.12	....	....	....	.13	....	.12	....	.13	....	.18	....	3,500
Contention.	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Virg.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dauntless.	.02	....	.02	....	....	....	.02	....	....	....	....	....	6,600
Del Monte.	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	....	....	....	....	....	....	.11	....	....	....	....	....	1,000
Eureka.	....	....	....	....	....	....	....	....	....	....	....	....	....
Girard.	....	....	....	....	....	....	....	....	....	....	....	....	....
Governor.	....	....	.06	....	.06	....	.06	....	.06	....	.06	....	7,600
Grand Uni'n	.03	....	.03	....	.03	....	.03	.02	.03	....	....	....	12,500
Green Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gunnison.	....	....	.15	....	....	....	.15	....	....	....	.17	....	9.0
Homestake.	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver.	....	....	....	....	....	....	....	....	....	....	....	....	....
Iowa Gulch.	.04	....	.04	.03	.04	....	.04	....	.04	....	.04	....	28,500
Iron Silver.	....	....	....	....	....	....	....	....	....	....	....	....	....
King Bul'on	....	....	....	....	....	....	....	....	....	....	....	....	....
Ledger Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Dia'd.	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Maud	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Pitts.	....	....	....	....	....	....	....	....	....	....	....	....	....
L'g & D'y H	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mt. Sheridan	.04	....	....	....	....	....	....	....	....	....	....	....	800
Navajo.	....	....	....	....	....	....	....	....	....	....	....	....	....
North'n B'l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion.	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion Pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Palmetto E.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pembina.	....	....	....	....	....	....	....	....	....	....	....	....	....
Penn-Breck.	.11	....	.10	....	.10	....	.11	....	.10	....	....	....	13,100
Permanent.	....	....	....	....	....	....	....	....	.02	....	....	....	2,000
Pizarro.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pizarro Ex.	....	....	....	....	.01	....	....	....	....	....	....	....	3,200
Potosi.	....	....	....	....	....	....	....	....	....	....	....	....	....
Rara Avis.	....	....	....	....	....	....	....	....	....	....	....	....	....
Rara Avis E.	.09	....	.09	....	.09	....	.09	....	.09	....	.09	....	19,900
Record	....	....	....	....	....	....	....	....	....	....	....	....	....
Rico Pion'r.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Apac.	.30	.25	....	....	....	....	....	....	....	....	.27½	....	2,650
Sierra Be.la.	.67½	.65	....	....	.70	....	....	....	.70	.67½	....	....	4,250
Sierra G'nde	1.15	1.10	1.12½	....	1.12½	....	1.10	1.07½	1.10	1.07½	1.07½	....	9,300
Sierra Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cord.	1.60	....	....	....	1.60	....	....	....	....	....	....	....	4,200
Silver King.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silv'r Plume	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sultana.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tun'l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone.	.80	....	.65	....	....	....	....	....	.80	.75	.85	....	490
Victor.	....	....	....	....	....	....	....	....	....	....	....	....	....
Yale Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

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of which are also moving upward. At the fortnightly sheet-zinc sale, 50 tons were sold at £18, which is an advance on the last sale price.

Cable advices state that the market continues steady at the improvement.

Antimony has been quite dull at 9⅛c. Hallett's, and 10¼c. Cookson's.

IRON MARKET REVIEW.

New York, Friday Evening, Oct. 12.

American Pig.—The Metal Exchange has the following returns from ninety-five furnaces up to October 1st:

Grade.	Stocks. Sept. 1.	Stocks. Oct. 1.	Production. Sept.	Production. Oct.
No. 1	18,617	16,663	10,011	10,398
No. 2	14,102	12,585	4,887	5,951
Bess., Forge, and lower grades	51,535	48,194	31,800	33,749
Grade not specified	32,170	31,013	14,019	14,915
Total	116,424	108,473	61,617	65,013

There is nothing new to report in this trade. Business remains in the same apathetic state that it has been for some time past, and while a fair consumption is going on, there are but very few buyers in the market. Some of the furnace companies threaten to cease production, and already there are some furnaces blowing out along the Lehigh, Schuylkill, and Susquehanna rivers. This would be a wise action at this time, and would help the market considerably, as prices would thus be forced to a higher figure than at present. We quote No. 1 Foundry at $21@$22; No. 2 at $19@$20; and Gray Forge at $19.

At the Exchange, the following transactions were recorded:

Saturday, 1600 tons of pig. Monday, 100 tons, No. 1, January, $20.50. Tuesday, 100 tons, No. 1, May, $21.

Scotch Pig.—This trade is very quiet. Nothing new has been done that we hear of. Imports are gradually diminishing, and prices abroad remain very firm, owing to labor troubles and cost of coal.

We quote ex ship and to arrive: Coltness, $23.25; Langloan, $23.25; Summerlee, $22.75@$23; Eglinton, $21; Glengarnock, $22@$22.50; Dallmellington, $21.

At the Exchange the following cable quotations were received to-day: Coltness, 57s. 6d.; Langloan, 57s.; Summerlee, 56s.; Gartsherrie, 54s. 6d.; Glengarnock, at Ardrossan, 54s.; and Eglinton, at Ardrossan, 48s. Warrants at the Exchange to-day were 46s. 8d.

Rails.—There has been a little better demand for steel rails, and we hear of orders for some 20,000 tons at Pennsylvania mills at $37, for delivery in 1884. Prices, however, remain unchanged, and we quote, as last week, $37@$37.50, at mill.

Old Rails.—Nothing is doing in this trade. Old rails are scarce, and some spot lots are held firmly. We quote $22.50@$23 for Ts.

Scrap.—Scrap continues dull at $23.75 ex ship.

Philadelphia. October 11.

The pig-iron market has not recovered in any respect from the unfavorable condition in which it was reported last week. The consumptive requirements seem to have fallen off, but actual consumption has not. Stocks in makers' yards are lighter than usual, and a number of large consumers have about reached the end of their summer contracts. Were it not for the present fluctuations in prices, large contracts would be placed at once by these parties; but they have concluded to wait until prices have reached bottom limits, or until conditions are more favorable. The usual quotations are $21@$22 for No. 1 Foundry, though a number of small sales have been heard of at $20@$20.50 for what is called No. 1. No. 2 continues in greater abundance than No. 1, and ranges in price from $19@$20, with average sales at or near $19. A few brokers have been endeavoring to close out large lots at furnace banks. A few large sales have been made, but the bulk of business is trifling. Gray Forge has not weakened, except in the case of a few inferior irons, which were placed at $17 at furnace.

Foreign Irons.—Nominal quotations given for Bessemer, $29.50@$31. Brokers, who had inquiries for large blocks some time ago, are seeking buyers at the former figure; but no large transactions, and but few small ones, have been heard of. It is expected that Bessemer will decline, although no reason has been given for this belief.

Blooms.—At the bloomaries, there is a fair degree of activity, and orders run a month ahead for charcoal and anthracite at old quotations. Unusual concessions have been heard of in both qualities; but it is uncertain whether the figures at which business was done will be permanent.

Muck Bars.—One or two sales have been heard of at $35, and some inferior irons have sold as low as $33. Standard are firm at $34 for small lots; in large lots, these figures are shaded.

Manufactured Iron.—It is said to-day that some manufacturers will reduce to single turn unless demand should improve. The feeling in the finished iron trade is far from satisfactory. The depression is greater than at any former time. At the best prices obtained, there is very little in iron; and with the fluctuating demand and weak prices, the outlook is very discouraging. Quotations are nominally 2·15c., but business, especially in the country mills, is done away below this figure. Some few transactions in common iron have been closed at 1·80c. Good makes of common are held at 1·90@2c.

Plate and Tank Iron.—The situation in plate and tank iron is more satisfactory in consequence of the heavy demand and the large orders in hand for delivery during October and November. A decline is looked for on account of the weakness in the other departments. Some requirements are held back in view of this fact. Quotations are 2·50c. for Plate, with Shell and Flange 3c. and 4c., in large lots. Locomotive requirements are fair; but lots are bought for pressing requirements only, and works are carrying but little stock.

Structural Iron.—No heavy transactions can be reported, although there are specifications in hand which will probably be placed this or next week. Prices are unchanged.

Steel Rails.—Steel rails are quoted at $37@$37.50; but the impression prevails that the offers of large buyers will yet be accepted, though no actual business has been closed.

Old Rails.—There are a number of inquiries in hand, some of which have been floating around for several weeks. Bridge rails are offered at $24.50; Double Heads, $26; Tees, $23.25. Material could be sold at about 50 cents below these quotations. Buyers of small lots will give 25 cents less than holders ask.

Nails.—Nails have dropped to $2.85, in consequence of the offerings of the Danville and other new mills. Trade price, $2.90. Jobbing price, $3.

Scrap.—A fair amount of scrap was carted out of yards this week at $25 for best, and from that down to $20 for inferior.

Pittsburg. October 11.

There are no signs of improvement in the Western Pennsylvania iron trade, notwithstanding the efforts of outside parties to unload stocks at concessions from rates heretofore asked. Among sales reported are 250 tons of Gray Forge at $18; 1500 tons of Bessemer at $20.50; sales of Foundry at $18.50@$19. Muck Bars are selling at $33. Manufactured iron, 1·80c. Nails, $2.70. Wrought Pipe, 75 per cent off list. Tubes, 60 per cent off. Inquiries for Old Rails are in hand at $24.50@$25 asked. Winter deliveries of Steel Rails, $37. Merchant Steel, 11@12c. for Refined Cast; Crucible machinery, 6@7c. Crop Ends, $23.50@$24.

Graff, Bennett & Co.'s mills at Millvale have been shut down for want of gas. Bridge and locomotive-works are crowded with orders.

COAL TRADE REVIEW.

New York, Friday Evening, Oct. 12.

Anthracite.

The situation has not materially changed from last week, and there is absolutely nothing new to report. The trade is demoralized, and can not recover until there is the most decisive evidence of co-operation among the companies. As they now stand, the Delaware & Hudson, the Lehigh Valley, and the Lehigh & Wilkes-Barre probably unite in recommending an early stoppage. The roads will be simply blocked, if the present state of affairs continues for a week. The Delaware, Lackawanna & Western, it is presumed, is indifferent, while the Philadelphia & Reading and the Pennsylvania Coal Company want to continue full-time, the latter because in about thirty days stocking for its upper river trade will cease, so that it is now exceptionally busy.

President Gowen, of the Reading Road, was in this city last Tuesday, but no consultation of the head officials was held; and no agreement was entered into.

A telegram from Philadelphia states that the Girard estate has leased its mines in Schuylkill and Columbus counties, Pa., to the Philadelphia & Reading Coal and Iron Company, the Lehigh Valley Coal Company, the Thomas Coal Company, the William Penn Coal Company, and Myers, McCreery & Co., for fifteen years from January 1st, 1884, on a royalty of forty cents per ton the first year, and increasing annually one cent per ton during the continuance of the leases. The collieries were previously leased for fifteen years to the same tenant at 25 cents per ton and 1 cent additional each year, the rate being 39 cents for this year. These collieries produced last year 1,500,000 tons of coal.

Bituminous.

The bituminous trade continues very dull, and there are but few small orders reported. Vessels, which were driven in larger numbers into Boston harbor by the late storm, have been generally distributed to their different shipping points, and are consequently in better supply than of late. Low prices still prevail.

Horsford's Acid Phosphate

A Good Thing.

Dr. Adam Miller, Chicago, Ill., says: "I have recommended Horsford's Acid Phosphate to my patients, and have received very favorable reports. It is one of the very few really valuable preparations now offered to the afflicted. In a practice of thirty-five years I have found a few good things, and this is one of them."

MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch: 10·5 miles. Size, 31×40 inches. Pocket form. $1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 6 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, $1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26·6 Mexican Leagues to the degree, and 69·16 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53X41 inches. Printed in colors. Pocket form, $5.

MAP OF MINING CLAIMS ADJOINING LEADVILLE, California Mining District, Lake County, Colo. By Edward Rollandet. 1879. Mounted on muslin, $2.50. In cloth-bound covers, $2.

MINING MAP OF UTAH.—Showing the location of the Mining Districts, over an extent of territory 150 miles from North to South. Compiled from U. S. Government Surveys and other authentic sources. Scale, one inch to four miles. Colored. 1879. Pocket form. $1.50.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored, 1878. $3.50.

POCKET MINING ATLAS OF THE MINES OF THE UNITED STATES.—Showing the Mines of NEVADA: the Comstock Lode, the Eureka, Treasure Hill, and Toscarora Districts; CALIFORNIA, including Map of the Bodie District; COLORADO, including the Leadville, Silver Cliff, San Juan, Caribou, and Central City Districts; DAKOTA, including Map of Deadwood; MONTANA, IDAHO, UTAH, ARIZONA, NEW MEXICO, LAKE SUPERIOR REGION, the SOUTHERN STATES. 1880. Printed in colors, and bound in flexible leather covers. Price, $1.

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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EMIL WOHLERS, a prominent German engineer, and a member of the firm of NATHAN & DREYFUS of this city, died recently in Vienna, when on a visit. He was the representative of the Friedman injector, and introduced it here.

THE Ontario Silver Mining Company has recommenced making dividends. These have now amounted to five million dollars. A splendid record and testimonial to the honesty and intelligence of the company's management.

UNDER "MINING NEWS," in our issue of September 29th, we made favorable mention of the New York Mining and Milling Company's property in Colorado. We have since received information from very reliable and well-informed sources which is very unfavorable to the enterprise. We feel it our duty to the public who may be disposed to invest in this concern to state that there is at least such a difference of opinion as to the value of these mines as should induce prudent capitalists to desire fuller information from disinterested sources as to their value before investing.

WE referred in a recent issue to the proposal made by POETSCH, in Germany, to facilitate sinking through quicksand by freezing the ground. More complete details are now available through a communication by Professor G. KOEHLER, of the Clausthal School of Mines. The enormous difficulty encountered in many important works, in mining as well as in railroad tunneling, notably on the continent, are well known to engineers, by whom quicksand is more dreaded as a source of very heavy expense and delay than the hardest and toughest rock. The Poetsch method will, we are convinced, take rank among the best means of getting through such ground; and however absurd the method may appear at first sight, it has in it the elements of considerable value under special circumstances. After he has reached the quicksand in the ordinary way, he puts down a number of holes, three feet apart in a circle, through the layers of quicksand, at such an angle that they reach into the ground through which the shaft must pass. Further, a smaller circle of holes is put down in the bottom of the shaft and one in its center. All of the holes are sunk by means of a sand-pump, being tubed as they go down. A circular distributing-pipe is suspended above the bottom of the shaft, copper tubes provided with cocks connecting with each of the holes and descending in them to their bottom. Though these copper tubes he pumps into the holes a solution of calcium and magnesium chlorides reduced at a temperature of 25 degrees Celsius below zero. The solution flows to the bottom of the holes and ascends in them in the annular space, being gathered as it reaches the top of the holes by a collecting-pipe. It took from 10 to 14 days to freeze a deposit of 12 feet of quicksand into a solid mass of ice through which sinking may go on without any danger of accidents from water.

SOMEWHAT prematurely, to say the least, some people in the lead trade are beginning to protest that mining argentiferous lead ores will soon become or now threatens to become an unprofitable business, because the prices of lead are falling. On a declining market, this cry is generally raised, and our experience has been, that the pressure of necessity creates efforts at economy which have a wonderfully scaling effect upon the cost of production. It is at a time like the present that there is a fruitful crop of estimates, which, as they come from those who would like to stay the downward tendency of prices, do injustice to the mines. As an example, we quote the following from a letter written by Messrs. J. H. ACKERMAN, metal merchants of this city, to the *Iron Age*, in which they protest against the statement that the Pueblo Smelting and Refining Company was understood to have on hand 7000 tons of lead :

"To mine 10 tons of lead ores, fully 23 tons of matter are taken out on an average. Say, to mine 23 tons of matter, at $3.45 per ton, $79.35.

10 tons of ore from 23 tons, at $7.93	$79.25
Assorting 10 tons of ore from 23 tons of rock, dirt, etc	10.00
Cartage from mines to railroad depot, from 3 to 22 miles, $2 per ton	20.00
Freight on 10 tons to smelter, say, average from 60 to 700 miles.	60.00
To smelt 10 tons ore in bullion lead, $6 per ton	60.00
Total	$229.35
As ores do not average over 15 per cent per ton of 2000 pounds, it takes 10 tons of ore to produce 3000 pounds bullion, at 4¾c.	$142.50
Average amount gold and silver in 3000 pounds bullion, at $60	90.00
Total	$232.50

"Or profit to mines of $3.22 on 10 tons of ore, if the following prices are obtained :

Price of 3000 pounds bullion lead, at $50 per ton	$75.00
Freight to New York or Newark, at $31.50 per ton	47.25
Cost of separating 3000 pounds (1½ tons), at $12 per ton	18.00
Gold and silver	90.00
Interest, two months, on outlay	2.32
Total	$232.57

Now, there is loss in smelting ores, from 2½ to 5 per cent, we have not calculated for.

3000 pounds lead at 4¾ cents	$142.50
Gold and silver	90.00
Total	$232.50

"You see there is loss. You see mining ores at $3.40, and should lead bring 4¾ cents per pound in New York, there is loss of 7 cents per ton. You can not say $3.45 is too much to mine lead. Coal companies obtain as much. These figures show why there are so many worthless mining companies—depreciation in the value of their stocks—as a good, fair mine don't pay to work, and few mines will produce 10 tons of ore out of 23 tons taken out.

If these figures were correct, the outlook for lead mining in the far West would be discouraging enough, not to speak of the Missouri mines. The latter, not having argentiferous ores, have always been looked upon as the weakest, and yet the large producers of that section can undoubtedly lay down lead in New York for 3·75 cents, and some of them for half a cent less.

It is a dangerous thing to generalize on the cost of mining of a metal like lead, whose production is scattered over so enormous an area. The conditions affecting the cost are not equal in any two localities ; and even in the same camp, they vary with every individual mine. A little more water, a crumbling roof, the existence of large areas of barren ground, a lower grade, the admixture of a small percentage of some refractory metal, or a large percentage of silica, singly or combined, may double or treble the cost of production or reduce the net returns. There is another point which must not be forgotten. When the margin of profit for a mine becomes so small as to imperil its existence, there are few managers

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or boards of directors who can resist the temptation of doing less expensive dead-work, of taking risks by light timbering and of worrying along with an impaired plant of machinery. The falling off in ore supplies makes the smelters more eager to secure material, by scaling down the profits; and last, but not least, the railroads are liable to listen more attentively to complaints as to rates. In 1878 and the spring of 1879, when lead receded from 4·35 in January, 1878, to 2·87 in May and April, 1879, the statement that the mines could not live was repeated over and over again, and yet the only effect of low prices was to check the extraordinarily rapid pace at which the production was increasing. The following statement of the output for the period 1872 to 1882 will fully illustrate this point:

PRODUCTION OF LEAD IN THE UNITED STATES.

1872	25,880 net tons.	1878	91,060 net tons.
1873	42,540 " "	1879	92,780 " "
1874	52,080 " "	1880	97,825 " "
1875	59,640 " "	1881	117,085 " "
1876	64,070 " "	1882	132,890 " "
1877	81,900 " "		

Since then, great progress has been made. The extension of the railroad system in the West has rendered much more territory accessible, has opened out new sources of fuel supply, and has cheapened the cost of shipment to market. We have now magnificently appointed smelting-plants, under the management of skilled metallurgists. Some of them, and, to a less pronounced extent, all of them, use the lead simply as a carrier of silver. They purchase lead ores low in silver, which by themselves would not pay to work, for the sake of being able to work to advantage refractory silver ores carrying little or no lead. The desilverizing works have improved their methods and lowered the cost. All these circumstances have contributed toward lowering the cost, and making available ores of a grade which, five or six years ago. would have promptly wandered to the dumps, and better concentration has even reduced the quantity more.. What this means, every mining engineer will fully appreciate. It brings down the cost in almost every department, and reduces the vicissitudes to which every mine is liable. It more than compensates for the increased outlay of working at greater depth.

To attempt estimates of cost of mining under such circumstances is more than hazardous. We do not know upon what rests the arbitrary assumption, quoted above; that it costs $7.93 to mine per ton of 15 per cent ore. We prefer to look at the problem from a different point of view. Let it be assumed that lead is worth 4 cents per pound at New York—it brings 4½ cents now—then the final products would be $80 per ton for the lead, and say $100 for silver and gold, which is a very low average. Deducting cost of desilverizing, $12 per ton—which leaves a good profit to the refiners, as it does not cost more than $9 per ton, and some of the works can do it for considerably less—and $31.50 for freight, we have net value at the smelter, in Colorado, $136.50. Assuming the ore to carry 15 per cent of lead, it would take, say, seven tons of ore to make a ton of base bullion. With the cost of smelting at $6 per ton, a figure which must not be confounded with the smelting charges, the smelter would have to pay $42 to cover his expenses, which would leave him $94.50 to pay for seven tons of ore at the smelter. Deducting $35 for freight from Leadville, would leave a net price at sampling-works of $59.50 for seven tons of ore, or $8.50 per ton for ore running 15 per cent of lead, and allowance being made for loss of silver, twelve ounces. This would be about equivalent to the payment of twenty-five cents per unit for the lead, a very low figure, it is true, and a smelting charge of $8 per ton. On the other hand, the average of Leadville bullion runs near $130 per ton, and the ores therefore range higher in silver. Our object was merely to show how low grade an ore can be worked. According to Messrs. ACKERMAN'S showing, it would be possible to mine ore at a profit which would carry only about 9 ounces of silver, provided lead brings 4¼ cents a pound in New York, even accepting their estimate that 13 out of 23 tons of mineral hoisted from the mine would go to the dump.

How large a margin some of the largest producers have is shown by the record of the Horn-Silver last year, when it made 16,000 tons of lead, nearly one ninth of the total production. The mine produced 47,232 tons of ore, at a cost of $4.44 per ton; the smelting at Francklyn costing $14.73, and the refining at Chicago $9.05. The ore carried on an average 37·8 per cent of lead and 32·2 ounces of silver, the loss in smelting being 9·71 per cent of the lead and 2·10 per cent of the silver. The average of the grade of the base bullion produced in Utah was 93 ounces per ton, or, deducting allowance for silver to desilverizing-works (5 ounces), 88 ounces per ton, having a value of $95 per ton at New York, with silver at $1.08 per ounce. The dividends during 1882 amounted to $1,200,000, while the net receipts from the sale of lead were $1,326,664.23, thus indicating that the silver paid for nearly the entire cost of extraction, treatment, administration, and marketing. Like all others, it will of course suffer from a low price of lead, but will, with the same grade of ore and the same cost of mining go on producing uninterruptedly.

It will not be denied, of course, that low prices of lead will seriously affect a large number of mines in the West; but to state that even a small minority of them have reached the point where they must stop or make heavy drains on the resources of their stockholders, is somewhat rash. In spite of the disapproval of our Western contemporaries, we must, however, repeat our warning to all interested in the metal, that they should prepare for low prices. We are not inclined to rush at the conclusion reached by our contemporary, the *Iron Age*, that we shall not stop until the export point is reached. Even if there should be no revival of the demand, the decline will probably be gradual. An attempt to stem it by claiming that the point is nearly reached when there will be a curtailment of production does injustice to our mining enterprises in the far West.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Purchasers of Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you give me the names of English companies buying copper matte, having agents in this country? Our mines are located in Old Mexico, and we are about to start our works. We desire to sell our products to English companies on account of the free tariff between Mexico and England. L. C.

YORKVILLE, ILL.

[We have heard that at least one English concern and one German works buy mattes in this country through local agents; but in the absence of direct communication with them, are not at liberty to give their names. We would, however, call the attention of our correspondent to the fact that American works are not necessarily barred out because there is a duty on copper in ore or mattes. It may be imported, converted into ingot, and re-exported under the drawback clause. The latter, it is true, has troublesome restrictions; but our correspondent owes it to our home industry to give it at least an opportunity to bid. If he will address Messrs. Pope, Cole & Co., of Baltimore, Md., or the Orford Copper and Sulphur Company, Nos. 37 and 39 Wall street, New York, he may possibly find it unnecessary to ship to Europe directly.—ED. E. AND M. J.]

THE TROY MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

After a few hours had been devoted to visits to a number of collar and cuff factories and laundries, the

THURSDAY'S MORNING SESSION

was opened with a paper by Dr. Persifor Frazer on

NEW FOSSILS RECENTLY DISCOVERED IN THE PEACH BOTTOM SLATES

in York and Adams counties, Pa. The age of the early Cambrian rocks has been the subject of considerable discussion among geologists. One class believes that the Potsdam and Calciferous, and even the Hudson River, belong to a much higher horizon than the lower Paleozoic, while others hold that all three belong below it. Professor Dr. Persifor Frazer has made an interesting study of the Peach Bottom slates, and has found in them fossils which have been submitted to Professor Hall, of Albany, for determination.

Professor Frazer then called the attention of the members to the color of an anode used in the electrolytic determination of copper. Mr. Mackintosh, who has had a wide experience in this class of work, explained that the dark film on the anode was produced by a deposit either of peroxide of manganese or of peroxide of lead.

Mr. H. M. Howe, of Boston, then read a paper on an ingenious proposal for a Systematic Nomenclature for Minerals, to which we shall have occasion to refer at greater length in the future. Professor Egleston, in discussing the paper, gave the results of his experience in teaching mineralogy during the past twenty-one years.

The session was concluded by the presentation of a note by Mr. P. Barnes, of Springfield, Ill., on the water-gas producers at the Elgin Watch Company's works. The works had been provided with a plant for illumination by means of water-gas, and the idea was natural to attempt the use of water-gas also for firing the boilers, the air-blast being heated by the waste gases. It was found that, with coal at $5 per ton, the gas would have to be furnished at as low a figure as 5 cents per 1000 cubic feet before the gaseous fuel could compete, in the point of economy, with coal. The attempt was abandoned.

THURSDAY AFTERNOON SESSION.

The last session was opened with the election of a large number of members and associates, followed by the reading of a paper by Mr. John Fulton, mining engineer of the Cambria Iron Company, Johnstown, Pa., on

THE PHYSICAL PROPERTIES OF COKE AS A FUEL FOR BLAST-FURNACE USES.

Mr. Fulton, to whom belongs the credit of having first and most thoroughly inquired into this special subject, gives the results of his observations, made as early as 1875, to investigate the causes of the lower value of a coke produced from local coals at Johnstown, as compared with fuel from the famous Connellsville region. Chemical analysis gave no cue, and he turned to physical properties distinguishing them to explain their relative values. Mr. Fulton goes over the ground traversed in recent publications in a controversy between the Connellsville *Courier* and *The Virginias*, and adds a few data confirming former researches, and on the whole his paper contains little that has not been touched upon in them. After speaking of the suggestions made in *Coal*, that the blind following of the Connellsville coking methods has ignored the character of the coal, Mr. Fulton states that the Illinois Central Iron Mining and Coal Company is using a more rapid coking, with good results, by sustaining

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the heat in its Thomas ovens, 36 by 8 by 4½ feet, and by pushing out the hot coke and quenching on the outside of the oven. Mr. Fulton, however, justly insists that no application of temperature or pressure should be used, which would tend to bring about the undesirable dense structure of, for instance, natural coke. If rapid heat is required, oblong ovens with or without flues, may be readily adopted without deepening of the coal charges to produce undesirable density of coke.

Mr. W. F. Durfee read a paper giving a minute description of a chemical laboratory erected in 1863, as an adjunct to the experimental steel-works at Wyandotte. He gave a sketch of the line of investigation followed out, and the often ludicrous opinions and statements advanced to hinder work at "Durfee's apothecary shop."

Professor Dr. Persifor Frazer followed with Notes on the Serpentine Belt of Chester County, Pennsylvania, and Supplementary Remarks on the Rocks of South Wales. Mr. F. W. Gordon, of Messrs. Witherow & Gordon, Pittsburg, Pa., in a paper entitled Boilers and Boiler-Setting for Blast-Furnaces, explained with the aid of diagrams the latest methods of boiler-setting introduced by them in their work, the principal feature of the design being the arrangement for conducting gas and air into the combustion-chamber. Messrs. Barnes, Durfee, and Birkinbine spoke on the subject, the discussion drifting into the causes of boiler explosions at blast-furnaces as influenced by the boiler setting.

Mr. F. P. Dewey, of Washington, gave the results of his observations on a tour of inspection in Canadian iron mines, which elicited no discussion.

The last paper brought before the meeting was that of J. H. Clemes, of Sonora, Mexico, Notes on an Experimental Working of Silver Ores by the Leaching Process, to which we shall refer at greater length in a future issue. The results were subjected to a critical review by Mr. C. A. Stetefeldt, who expressed doubts as to the accuracy of the analysis of the ore given, and who gave a very instructive summary of his experience and that of Mr. C. A. Russell, of the Ontario mill, on many points involved. Professor Egleston, too, spoke at length, dwelling particularly on the necessity of leaching with an ascending current and on the danger of using too much salt in chlorination.

A letter by Mr. Bridgeman was submitted, calling attention to the wish expressed by Bergrath von Groddeck, of the Clausthal School, to collect typical specimens of the ores, country-rock, etc., of the American mines, with a view to aiding him in his researches on ore-deposits. The communication was favorably received, and will, we trust, lead to numerous responses.

After the reading of a number of papers by title, and the passing of resolutions acknowledging courtesies on the part of local members and firms, the meeting adjourned.

In the evening, 125 members, their ladies, and their Trojan friends, sat down to the subscription-dinner, which passed off pleasantly.

THE EXCURSION TO THE HUDSON RIVER ORE-BANKS.

On Friday morning, a special train took the members to Burden station, on the Hudson River Railroad, between Livingston and Catskill stations, to examine the property of the Hudson Ore and Iron Company, of which James A. Burden is president, and to whom the credit of having detected the value of the deposits is due. The discovery of the principal vein is due to a systematically organized search for ores throughout the entire Hudson River valley. The ore of the principal of the two veins, the Dickson, escaped the attention of those working in the vicinity a few years ago, as it is a carbonate, and resembles more a limestone than an iron ore. The party was first conducted to the roasting-kilns, of which three are now building in a small ravine. These kilns, very substantially built, have a hight of 60 feet, and an inside diameter of 21 feet, contracting from a point 22 feet 9½ inches above the ground level to 15 feet 6 inches at the discharge, 10 feet 3 inches above the level. The shaft rests on six cast-iron pillars, there being a discharge-slide between each pair of pillars. A central discharge-cone projects into the kiln in the usual manner. This unusual hight of the kiln was chosen because experience with experimental kilns, 15 and 30 feet high, at the mines proper, showed that the ore has a tendency to clinker or "loop," which interferes with the expulsion of the sulphur. It is believed that the additional hight will destroy all tendency to looping. The kilns—of which three are nearly finished, and to which two more are to be added, the total contemplated plant being ten kilns—will be charged directly from the drop-bottom mine cars, which will be run over their tops on a track. The fuel to be used will be anthracite culm, the total quantity used being two per cent. The ore is drawn directly, in a hot condition, from the discharged chutes, and is weighed, so that the sales of ore are made on the basis of dry material. The kilns are rated at a capacity of 200 tons a day. The main object, of course, is to expel the carbonic acid, but they will at the same time perform the important office of reducing the quantity of sulphur in the raw ore.

After the visit to the kilns, the party partook of a luncheon served on the train, and then boarded a train on the narrow-gauge railroad leading to the mines, to the village of Burden, where a considerable number of workingmen's houses have been put up. The party first ascended a knoll through which the Cannon, the lower vein, passes, and on which are the openings of a party of Pottsville capitalists now abandoned. From this knoll, the course of the upper, the Dickson vein, could be traced by a number of shallow openings on it. Altogether, the vein has been followed for a distance of fully five miles. The principal work has been done at one point, where a shaft has been sunk three hundred feet deep, and headings have been driven. The Dickson vein at this point has a total thickness of 24 feet of ore, the firm hanging-wall being siliceous, while the foot-wall is shale. It does not appear likely that with ample pillars much timbering will be needed. The bed dips one in three. The mining work is laid out in the manner customary in the anthracite regions, the slope having a double track, upon which trains of cars will be hoisted. Only one rope is used, for what reason is not apparent. There is a Rand duplex compressor, with a plant of 16 drills, the mining being done by contract, we understand, for 40 cents a ton. There are at the slope three kilns, two 15 feet high and one 30 feet high, the cars being lifted to their top level by an elevator. These are merely experimental, and a considerable quantity of the ore is now being stocked on a dump for delivery to the new plant of kilns. A large quantity of washed ore is piled up under the kilns. It exhibits, however, the defects of irregular roasting, so that, we presume, the roasted ore prepared in these kilns contains more sulphur than it will when the permanent kiln plant is brought into use.

Much of the ore is so close a mixture of the minerals of which it is an aggregate that it is difficult to trace its mineralogical composition. Some of it, however, coarse in grain, shows spathic iron, calcspar, seams of iron pyrites, and occasionally gypsum. Analyses of the roasted ore show the following composition:

Roasted Ore from Hudson River Ore and Iron Company's Mines.

Metallic iron	51·520	50·080	52·05	51·09	51·880	51·160	50·820	51·296	52·580
Silica	8·760	8·970	8·08	9·14	8·860	9·200	9·030		8·110
Phosphorus	0·024	0·029		0·03	0·034	0·029	0·031	0·027	0·033
Sulphur	0·657	0·730		0·72	0·682	0·350	0·600	0·672	0·530
Lime	4·560		3·22						
Magnesia	7·390		6·81						
Alumina	1·270		2·60						
Oxide of manganese	3·190								

The ore, it will be seen, runs very uniformly in iron and silica. Magnesia seems to predominate over lime, while the phosphorus is always low, coming below the specifications for Bessemer pig. The sulphur, with one exception, goes above one half of one per cent, and will require careful attention to the character of the fuel and pretty high heats to bring within the requirements of steel producers. We presume that the samples analyzed do not represent the results attainable with better roasting facilities, a fact which is indicated by the low figure in one of the analyses. How far an increase in the percentage of pyrites in the ore mixture at greater depth will affect its quality remains to be seen. The depth reached, 300 feet, is presumably below drainage level, or near it, so that probably the maximum has been attained. Careful roasting will cope with it. The ore roasted is porous and easily reduced. The use of Hudson River ore at Crown Point shows the following result:

BURDEN WHILE WORKING MILL IRON WITH ALL LAKE CHAMPLAIN ORES.

Fuel.	Ore.	Flux.	Daily product.
4400 lbs.	5600@6000 lbs.	60 per cent.	54 tons.
	WORKING ONE EIGHTH HUDSON RIVER.		
4400 "	6200 lbs.	52 per cent.	60 "
	WORKING ONE QUARTER HUDSON RIVER.		
4400 "	6280 lbs.	44 per cent.	64 "

These figures illustrate the advantages of an ore approaching hematite over the dense and siliceous magnetites of Lake Champlain. The Hudson River Ore and Iron Company has its plans for a total output of 2000 tons of ore per day, and its policy is understood to be to market it at a low figure, in order to compensate for the high cost of fuel in the East. The shipping facilities by water on the Hudson River and by rail over the Hudson River Railroad are exceptionally good, and chutes and docks are now building to utilize the natural advantages. It is stated that, in all, the company will have expended upward of $500,000 before the improvements now making are completed.

AMONG THE IRON-WORKERS.—LEBANON.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: One can go but a short distance in Pennsylvania, without hearing repeatedly of her great coal and iron interests; on all sides, if he goes to her industrial centers, does he hear the prospects discussed. The Doctor and I were much interested in blast-furnaces and other components of the iron plant, and determined to see the actual operations as they are carried on throughout the State. Winter is not the best time to study the resources of a country, and particularly if one wants to see mining and smelting going on; but as it was the only time at our disposal, we determined to make the best of it, and start out in spite of the January weather. On the morning of our departure, the heavens looked decidedly gray and snowy, and a slight sleet was falling. However, we concluded not to wait, fearing lest the whole month should bring no more cheerful prospect.

The Philadelphia & Reading Railroad, as it winds along the Schuylkill, soon carries one into the heart of the eastern iron country. The road hardly leaves the city where so many industries find their market, before it is in the midst of the busy producers. From Phœnixville onward, accumulating signs bear witness to the great importance of these staple industries. At the time of our visit, all lay beneath a broad mantle of snow, broken only by the dark chimneys and furnace-stacks of some factory or iron-works. The cars, as if in contrast with the disagreeable exterior, were excessively warm, and the Doctor and I were for a time in much greater danger of roasting than of freezing. The driving sleet and steam-coated windows shut us off from the outside world; the isolation made the passengers communicative, and it was but a short time before we found out the destination and partial biography of most of our neighbors. The delicate-looking lady, wrapped up in furs and shawls, was bound for the Sanitarium at Wernersville, while the hearty, prosperous-looking man at her side was off for a visit to his furnaces—in these days of iron depression, we should perhaps say, the *apparently* prosperous; and so it was throughout the crowd, each in pursuit of some object, unmindful of storm and discomfort. A ride of a little over three hours brought us to Lebanon, and here we made our first stop.

Lebanon had always been synonymous in our minds with Weimer, so our first inquiry was for his works. The station-master gave us the necessary directions and politely took charge of our hand-satchels until we should determine on a hotel. The Doctor was anxious lest we should not get them back again when we wanted, so he questioned the agent as to how long the office kept open. The man smiled, as he replied: "We're open all the time, save a few hours on Sunday." The Doctor and I were quite surprised at such activity; for we expected to find rather primitive arrangements as soon as we left the metropolis. The Weimer Machine-Works were fortunately quite near the station, so that we had to take but a few steps to reach them. The offices and drawing-rooms are located in a comfortable and pleasing building recently

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erected; while the works proper, the machine-shops, casting-rooms, etc., give some indications of the extensive business carried on by the firm. Blowing-engines constitute the chief product of the works, although all articles of blast-furnace mechanism are included in the list. Engines of various sizes, and in all stages of manufacture, naturally formed the most conspicuous objects in the workshops. One huge machine destined, I think, for some firm in Alabama, had an air-cylinder of seven feet: it would seem an efficient aid in helping a furnace digest even such a hard diet as magnetite and limestone. In another part of the works, large iron pipes for the hot-air stoves were casting. The molder's art seemed most wonderful to the uninitiated. Molds of large size and difficult pattern were so nicely wrought that the molten metal could not but confine itself to their limits. Great ovens, large enough, but far too heated for human habitation, were accessible from the casting-rooms, so that the molds might be properly dried before being intrusted with the liquid iron. The shops held our attention for some time, but our chief interest centered in the drawing-rooms; for from them issued the elaborate plans necessary for such large undertakings. A commodious, well-lighted room afforded every facility for the draftsmen engaged in working up the details of the furnace mechanisms. Some forty ample drawers accommodated the large collection of tracings and original drawings. Formerly, the drawings were made in pencil on regular drafting paper, and then inked in; tracings on the prepared cloth being then made from these original designs. At present, however, the drawings are only made in pencil, traced on the prepared cloth, and from this tracing the necessary copies got by the popular "blue process." The more recent designs are patterns of elegance in furnace construction; the light and pleasing proportions being in marked contrast with the clumsy masonry of a few years back. The conditions of production which must be considered by the rational designer, and which decide the resulting proportions, are so very numerous that one of these apparently simple designs is the outcome of no little thought. Ore, fuel, flux, blast-pressure, and temperature, etc., all have weight in determining the proper shape of a furnace, and it is only of late years that these important factors have received their proper consideration. The present tendency toward high shafts and lighter construction is fully illustrated by the numerous designs of old stone furnaces which have been enlarged by superstructures of brick and iron. Indeed, a most important branch of the firm's business is in modernizing old furnaces, one design in particular having for its foundation a heavy stone structure fully one hundred years old. As the works were established in 1856, the proprietors have had ample time for experience. One old machine in the shop interested us not a little on account of its history. It was invented in 1857, but was never used to any extent. This present year it will be called into requisition, and is undergoing the necessary preparations. That the head of the firm, Mr. P. L. Weimer, has been most actively employed during his long years of service, is fully shown by the number of patents which have been granted him for his numerous furnace and mechanical inventions. Up to the present time, he enjoys the protection of about one hundred and seventy-five letters patent. Most readers will probably be ignorant of the cost of a furnace plant, and, as an estimate from a reliable source, it may not be uninteresting to record the expense of a small furnace built last year in the neighborhood of Carlisle. Like all the rest of its work, the firm has kept tracings of the designs, and we were pleased to have the opportunity of examining them and of learning the cost. The furnace was built on modern principles, thus saving heavy masonry and castings, and, while more desirable than the olden style, was also less expensive. Though the dimensions were quite modest, being but fifty feet high and eleven feet bosh, yet the furnace, when fed on coke, was capable of a daily output of from forty to fifty tons. The total cost of the work, stack, blowing-engine, pipe-stove, and in fact every thing exclusive of the ground, was a little under $40,000, and we were told that it was one of the cheapest plants ever put up. The iron-work on this plant cost $25,000, but part of the price was paid in the pig-iron produced when the works were in operation, so that the cost would really be somewhat less. Mr. Weimer, when he learned the scientific purpose of our trip, was very attentive, and on our departure gave us copies of some of his most improved designs for furnace plant. We were quite anxious to obtain drawings of the small furnace spoken of, so he kindly offered to have copies made and sent to our address in Philadelphia.

Though we had by no means exhausted the resources of the works, we concluded our visit, and turned our attention to the Colebrook Furnaces, about a mile farther down the railroad. Our most direct path lay in the beaten track made by the workmen on the snow-covered sleepers. The flagman told us that, as we would meet any train that might be coming along just then, we were in no danger on that score. I had never quite understood how so many accidents occur to people walking on the track; but it became a little clearer to me a few minutes later, when a glaring head-light suddenly loomed up before us, and we had to hurriedly spring aside into the snow. The day was nearly spent when we reached the furnaces, so that our view was more general and impressive than detailed and strictly scientific. The Colebrook are considered the most modern furnaces in the neighborhood; but they have the misfortune, we are told, to be the result of ideas indiscriminately collected, rather than growing out of any systematic design. The plant at these works has been fearfully expensive, the two furnaces alone costing some $800,000. When to this is added the additional cost of Whitwell stoves, engines, dressed-stone casting-houses, and other such expensive incidentals, we have an aggregate of capital which can ill afford to be idle when the financial barometer shows depression. A deepening twilight warned us that strangers who walk on busy tracks had better get hotel-ward; so, after only a hasty glance, we turned back again toward the town. The men were drawing cinder off from the furnace; and as we glanced back at the works, its ruddy reflection spread over every thing. The dull, monotonous gray tints were changed to bright rosy ones, and the effect recalled to our minds the Plutonists and their fiery hypothesis of the world-formation. The sulphurous fumes and odor of overheated iron seemed to cling to us and fill our nostrils during the entire night. Nor were our nerves particularly prepared for sleepfulness, when the room clerk informed us, after assigning our persons to the third floor, that there were three avenues of escape, should we be overtaken by that recent nightmare of the modern traveler—fire.

CARL.

THE MANUFACTURE OF BLUESTONE AT THE LYON MILL, DAYTON, NEVADA.*

By J. E. Gignoux.

The origin of the bluestone industry at Dayton, Nevada, which subsequently attained such magnitude, was due to the endeavors of certain mill-owners, who found it necessary to refine, in order to profitably dispose of the bullion which they obtained in working Comstock tailings. By the base process, as the one in vogue was termed, it was found advisable to employ large quantities of copper sulphate in amalgamating, and even as much as 20 pounds to a ton of tailings were used. In consequence, the bullion produced contained from 80 to 90 per cent of base metal, principally copper. Besides the loss in copper, the mill-owner was obliged to bear a heavy discount on his produce.

The first crude attempts at refining were made by the Lyon Mill and Mining Company, and were in imitation of the sulphuric acid process practiced at the mints. The bullion proved to be too base for its success, owing to the great length of time required to dissolve in acid, and it is also stated that a significant mechanical loss of the precious metals was found to be unavoidable.

Subsequently, the bullion was subjected to a sulphurizing process, which consisted in placing in iron kettles charges of about 400 pounds of metal with 20 per cent of sulphur. Layers were made by placing barrel-staves alternately with the charge. The kettles were provided with cast-iron covers having flanges corresponding with similar flanges and bolt-holes on the kettles. When charged, the cover was luted and tightly bolted to the kettle, when a gentle heat was applied for about nine hours. On becoming cool, that portion of the metal converted into sulphide was removed, the remainder received new sulphur, and the process continued until all the metal was converted, for which about 40 per cent of the original weight in sulphur was found necessary. The sulphurized material was next crushed in a Chili mill, passed through a No. 10 sieve, and sent to the furnace-house, where it underwent a desulphurizing roasting. This was performed in a small reverberatory furnace, which was charged with 400 pounds of the granulations. A complete desulphurization was effected in about ten hours, or until the whole was thoroughly heated to a bright red by a very gradually increasing fire. The charge, when drawn, was again crushed and passed through a No. 20 sieve, when it was again roasted in the same furnace, and converted into an oxide. Wood as free from pitch as possible was used, and air was admitted through the bridge-wall. This roasting occupied about twelve hours, and required constant stirring. Leaching was then resorted to, and carried out in almost the identical manner to be subsequently described.

The method in use at the present time is based upon the partial separation which takes place in the retorts when great precaution is used to avoid melting or overheating the amalgam, and the bullion obtained is in such a porous condition as to allow of its being "brittleized," pulverized, and roasted. Two classes, designated as white and base metal, were obtained. The white metal, as its name implies, is of white appearance, and is formed next to the iron of the retort, and is of much denser structure than the base, acting as a coating or shell around the latter. It consists of about 80 per cent of silver, 15 per cent of copper, and the remaining 5 per cent of iron, lead, antimony, with a little gold. The base metal is reddish-brown in color and spongelike in appearance, forms in the center of the retort, and consists of about 90 per cent of copper and iron, and 10 per cent of silver, gold, and other metals, nearly all the gold contained in the amalgam going with the base. In quantity, the base metal greatly exceeds the white. Formerly, these products were treated separately in refining, although the process was identical except as to the quantity used in the charges. The white metal being less bulky, and having less copper to be oxidized, was treated in larger quantities. In roasting, 400 pounds of base and 500 pounds of white metal were usual charges, and in the dissolving-tubs 1000 pounds composed a charge for base, and from 1200 to 1500 pounds for white metal.

The retorting is carried on for twelve hours. During the first four, a low temperature is maintained, but is gradually increased until the quicksilver begins to distill, when the heat is increased until the operation is terminated. Occasionally, a small loss of quicksilver is experienced on account of imperfect retorting. This item is, however, insignificant when compared with the saving made by this manner of retorting when the expense of the sulphurizing process is considered. The retorts used are cylindrical, and hold 1700 pounds of strained amalgam when a little more than half filled.

At the Dayton Works, the sulphuric acid parting process was introduced, and thereafter no distinction, as previously, between white and base metals was made. All the bullion as it comes from the retorts is broken with a sledge-hammer into pieces about the size of an egg, and thrown into the roasting-furnace after the roasting charge has been withdrawn, and remains over night on the still heated hearth, no more fuel being necessary. From 2000 to 3000 pounds are charged in this manner. In the morning, it is drawn, when it presents a dark gray to black color, and has become quite brittle. It is then crushed in a Chili mill, and is sifted by hand through a No. 20 sieve. One Chinaman does the work. The power for the mill is supplied by the main shaft of the pan-mill, and is inconsiderable.

The pulverized metal is then returned to the roasting-furnace, when it is weighed, and an increase of weight of about one tenth of one per cent is usually found, due to the wearing of the wheel and pan of the Chili mill.

The roasting-furnace is a small reverberatory, the hearth of which is 6 by 10 feet, with the corners filled, giving an oval shape. The arch is low. There are two working-doors, one front and one back, situated about the middle of the furnace. The hearth is laid with Scotch fire-brick set on end. A charge of 500 pounds of the metal is placed in the center of the furnace and spread out until about 3 inches deep. It is kept constantly stirred with an iron paddle of ¾-inch iron, 5 by 12 inches, attached to a handle of wrought-iron pipe 12 feet long, and terminating in a ring. When the charge has attained a dull-red heat, the workman throws over

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that portion farthest from the fire to bring it next to the bridge-wall, and then moves all the charge back by slicing it with his paddle, and exposing a new surface to the heat. If the entire charge has become a bright red, care being taken to avoid a greater heat, it is kept in that condition for one hour before drawing. It is then spread out in an iron box 3 by 6 feet, and allowed to cool. When cold, it is carried to the bluestone works in charges of 1000 pounds, first being sifted, and any lumps that have formed being crushed. A gain in oxygen amounting in weight to about 5 per cent of the original charge occurs during roasting. It takes about ten hours to complete the operation, one man doing the work, and requiring about a quarter of a cord of wood.

Circular tubs, 7 feet in diameter and 4 feet deep, are used for leaching or dissolving the copper. They are made with staves cut from 3 by 4-inch joist, and bound together with two iron hoops 3 inches wide made of half-inch iron. The sides are vertical, and the bottoms are let into the sides. The lining is of 6-pound lead, except at the bottoms, and a strip one foot wide on the sides next to the bottoms, which consist of 14-pound lead. They are likewise provided with heavy false bottoms. Steam is admitted through an AA lead pipe, the lower end of which is closed, but has four holes bored in it about one inch from the end. Were the steam allowed to pass directly down through the pipe, it would soften and wear holes through the lead bottoms. The upper ends of the pipes are soldered on the iron steam-pipes, which are provided with valves for the convenience of the operator. The pipe system is suspended from the roof of the operating-room. Each tub is likewise provided with a cold-water pipe.

A bath consisting of 2½ pounds of 45 degrees Baumé sulphuric acid for each pound of copper contained in the charge is prepared by reducing the strength with water to 20 degrees Baumé, and is steamed until brought to boiling. The charge is then fed with a small scoop, and scattered over the surface of the bath, continual stirring being kept up with wooden paddles 9 feet long and having blades 4 inches wide. The strength of the solution is kept as near 40 degrees Baumé as practicable by occasionally weakening it. Usually, it takes two hours to feed the charge, but stirring and boiling are continued for four hours. At the end of that time, the bullion should present a white or light-gray appearance, which is dependent upon the success of the previous roasting, and it should be 900 fine or over. The dissolving-tubes are covered with boards and sacking, the steam is turned off, and the charge allowed to settle for four hours.

At times, a small quantity of silver is dissolved, and, in order to save it, the solution is drawn into precipitating-vats in which copper slabs have been laid, and the silver is thrown down as fine metal. The vats are circular, 10 feet in diameter, and provided with steam-pipes, the same style as those used for dissolving-tubs. They are lined with 6-pound lead on the sides, and 10-pound lead on the bottom, no false bottoms being necessary. The floor upon which they rest is lower than the floor of the dissolving-tubs, so as to admit of the liquor being drawn over with a siphon. After the solution has remained in contact with the copper slabs for several hours, tests are made with a salt solution, to determine the presence of silver, and when no further chloride precipitate is visible, the charge is boiled for an hour, and is then allowed to settle for two or three hours before being drawn into the crystallizers.

The bullion remaining in the dissolving-tubs is leached several times, first with acid, and then with water, being stirred and boiled each time. The first leachings go with the charge in the precipitating-vats, the subsequent ones to the weak-liquor tanks for concentration. The metal is placed in the filters, which are lead-lined barrels, provided with perforated wooden false bottoms covered with muslin, and with discharge-pipes let in below the false bottoms. Clean hot water is run over the metal until no more acid reaction is detected with litmus paper at the outlet pipe. All the water from the filters is collected in a tank, as a small quantity of silver is sometimes carried through. Drying the metal in iron pans heated to redness is next resorted to. The silver is then weighed and charged in the parting-kettles, the mint process being adopted, excepting that the gold is not again treated with acid, but is melted when about 700 fine. There being so little of the latter, it was found more economical to pay refining charges. Having the metal in a granulated state very much facilitates the dissolving in strong acid. A charge of 3000 ounces is dissolved in five hours' time with an armful of wood. The silver usually runs from 997 to 999 fine after melting.

What is termed the bluestone cellar at Dayton contains 40 crystallizers, arranged 20 on a side, with draining-tables built along the center of the room. In the floor, above the middle of the cellar, a large tank is sunk, in which is collected the liquor drawn from the crystallizers, after crystallization, and which is called the pump-tank. A leaden trough runs along under the draining-tables, and is connected with this tank, into which the crystallizers are first drained with a short rubber hose. The crystallizers are 7 feet long and 3½ feet wide on the top, and 7 feet long and 3 feet wide at the bottom. The bottoms and ends are lined with 8-pound lead, the sides with 6-pound. Altogether, 473½ pounds of lead are required for each tank. The wood-work is constructed of 2-inch planks, the ends projecting so as to receive half-inch round iron bolts, two on each end, to hold the sides together. No lead strips are used, it having been found more advantageous to allow the crystals of bluestone to form on the bottoms and sides of the crystallizers, from which they can readily be removed in large cakes requiring to be simply loosened with a bar-chisel. Boards and sacking are used to cover the crystallizers when the liquor is first introduced, and remain on for three of the five days allowed for the crystals to form. Keeping the liquor warm facilitates the crystallization. At the end of the fifth day, the strength of the liquor is found to be reduced to 28 degrees or 30 degrees Baumé. The bottoms are first loosened and taken out, then the sides, the bluestone laid on the draining-tables and broken up with a wooden mallet. After remaining from twenty-four to forty-eight hours on the tables, it is packed in barrels and stored.

Bluestone made in the above manner is of the best quality and compares favorably with Eastern and imported. It usually commands half a cent a pound higher price than that which is manufactured from copper ore. Each crystallizer yields from 700 to 800 pounds of good crystals, and about 100 pounds of broken and fine material taken out as slush, which is placed on separate tables arranged with a draining-tank, and when dry is set aside to be redissolved as refuse. About 3500 pounds make a refuse charge, and with the water necessary fill two crystallizers, and make first-grade bluestone.

The actual cost of producing bluestone from bullion is difficult to arrive at, owing to the copper having no definite value, and having already served a purpose in the amalgamation. Six cents a pound was paid for the copper contained in base bullion produced by other mills, and no charges for refining were made when under 600 fine in silver. This was found profitable when bluestone could be disposed of at 8 cents a pound. The cost of refining is about 2½ cents a pound for bluestone produced.

All the tailing-mills in the vicinity copied at least portions of the process in use at the Lyon mill. At the Atlanta mill, pains are taken to closely separate the base from the white metal when it comes from the retorts, the former only being refined, the latter melted and sold as 800 fine bullion. Besides the refining charges, they sustain a loss of 20 per cent of copper, less the actual cost of refining themselves. This loss is in some measure unavoidable at small mills, as they can not afford to allow their bullion to accumulate to such quantities as would insure economical refining.

At the Omega mill, there is a large refinery for treating all the base bullion produced at the mills controlled by the Pacific Milling Company. Each mill is provided with a Wiegand digester, which is an ingenious adaptation to this purpose of an old German method of separating lead from silver amalgam. The late Mr. C. Wiegand succeeded in parting the silver from the copper and gold by leaching the raw amalgam with heated quicksilver. While the silver is carried out of the digester, the base amalgam remains. Amalgam treated by his method, after straining, retorting, and melting, gives bullion 900 fine in silver. The difficulty experienced in heating the quicksilver, the loss through imperfect pipe-joints, that is sustained in handling such large quantities, also the cost of manipulation, all tend to make the process expensive; besides which, the copper still contained in the bullion, amounting to 10 per cent, is lost to the mills. The base bullion is refined in the manner described, and the bluestone made returned to the mills.

The facilities of the Dayton Works for refining bullion and manufacturing bluestone were greatly augmented by the erection of sulphuric acid chambers. The acid is made from sulphur mined in Humboldt County, Nevada, and is produced at an expense of about $20 a ton. The chambers have a capacity of about 2½ tons a day of 45 degrees Baumé. Concentrators are employed for producing 62 degrees Baumé acid for transportation and supplying the Carson Mint.

The demand for bluestone being much in excess of what could be made from the refining of base bullion, large quantities of it were manufactured from copper ore and cement copper. The prices at which the ore was purchased ranged from $2.25 a unit for 20 per cent, to $3.25 for 40 per cent, increasing 25 cents a unit for every 5 per cent increase in assay for the copper ore delivered at Dayton. A charge of $10 a ton is made for ores which require roasting.

The Walker River mines in Esmeralda County, Nevada, furnished most of the ore, which consisted principally of chrysocolla, azurite, malachite, cuprite, chalcocite, chalcopyrite, tetrahedrite, and chalcanthite in considerable quantities from the Bluestone mine. The cement copper came from Wheatland in California. The advantages which the miners derived from shipping rich ores which did not require to be roasted led them into the habit of assorting very closely, and reserving sulphuret and low-grade material for reduction at some future period, when the facilities for transportation shall have increased. In consequence, high grades of carbonates and silicates formed the bulk of the ore received at Dayton.

The copper roasting-furnace in use is a one-floor reverberatory, 30 feet long and 10 feet wide, with three working hearths and six doors, three of which are on a side. The fire-room is 17 inches. A low arch and perforated bridge-wall, the apertures communicating with the air, are used. The chimney employed for a direct draught is 30 feet high; but when the ore-drier is in use, the smoke is made to traverse a distance of 90 feet under drying-plates, and is then led off through a higher stack. Ore is fed through a hopper, and is discharged into small iron cars. One man working on a pass of eight hours performs the labor, fuel and ore being brought to him. A charge usually consists of 800 pounds, which is shifted every four hours. It is allowed to remain in the furnace twelve hours, thus making the capacity 4800 pounds a day. A little over three quarters of a cord of wood are consumed in twenty-four hours. Enough sulphur is present in the ore to ignite and burn on the first hearth, the charge requiring occasional stirring. On the second hearth, it is heated dull red all through, and does not need much stirring unless a disposition to cake is manifested. When the ore reaches the third hearth, the one nearest the fire-bridge, it requires more stirring and frequent removing back from the fire, as the heat is sufficient to melt the charge. A steady bright-red heat is maintained during the four hours it remains there. About twenty minutes' time is consumed in discharging, shifting the two other charges, and again charging the furnace. The cost of roasting is estimated at $7.50 a ton.

Ores which do not require roasting, and also those which have been so treated, are carried to the bluestone works, or to the mill solution tank, where they are used in making bluestone solution, which serves as an economical substitute for dry bluestone.

At the mill tower, acid is used for the bath, and many residues from the bluestone which do not contain much copper are also utilized. The solution is run into the amalgamating-pans from tanks where it has been reduced in strength to 20 degrees Baumé. The estimated cost of this solution is equivalent to 4 cents a pound for bluestone crystals, making an important saving where such qualities of low-grade tailings are worked.

The ore at the bluestone works is treated in dissolving-tubs similar to those used in refining bullion, acid being added in the bath in excess of 2½ pounds to the pound of copper contained, according to the nature of the ore. The absence or presence of lime or iron is taken into consideration. Sulphate of iron and gypsum, when these substances are present, crystallize with the sulphate of copper, deteriorating the quality of the bluestone, which is then of the second grade. As this grade is sold at lower prices than the first grade, and also because of a prejudice existing among some mill-men that better results in silver are obtained from the use of impure bluestone for pan amalgamation, a more ready sale exists for it than for the purer article. Owing to the impurities mentioned, a

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much larger product is obtained than could theoretically be made from the copper contained in the ore.

The charges vary from 1300 to 1800 pounds, and the solution is made from 37 degrees to 40 degrees Baumé strong. Eight hours is the time usually occupied to make and settle a charge. It is drawn directly into the crystallizing-tanks in the cellar by means of a four-ply rubber hose, which is attached to a float in the tub to prevent disturbing the sediment at the bottom. A glass tube is inserted in the solution from time to time, and by closing the end before withdrawing it the quantity of clear liquor above the sediment is observed. The utmost precaution is necessary to prevent drawing the sediment into the crystallizers. About the same time is allowed for crystallization of ore solution as for bullion. A better grade of bluestone is generally produced by drawing off the solution sooner, as the sulphates of iron and lime form crystals on the top of those of sulphate of copper.

All the liquor from the crystallizing-tanks is drawn into the pump-tank, whence it is pumped by means of a steam-injector, made of lead, into high tanks on the upper floor, and from them fed into the condensing-pans. These consist of two leaden pans, one of which is set 8 inches higher than the other. The larger pan rests partly on iron plates, which are so arranged as to protect the lead from too great a heat. They are made of 16-pound lead, 6 feet wide; one 10 feet, the other 8 feet long. The sides are 12 inches high, and are surrounded by masonwork. The flues are built parallel with the greatest dimension of the pans, and the heat is made to traverse their entire length three times before escaping into a chimney 40 feet high. The fire-room is 20 inches. At the beginning of the concentrating operation, both pans are filled from the high tanks, and a continuous stream, equivalent to the loss by evaporation, is run into the higher pan and siphoned from it into the lower pan. It is kept at a quiet boiling temperature until the strength of the charge in the larger pan has been raised to 41 degrees Baumé: that from the smaller pan decreasing the strength to 39 degrees Baumé as it is drawn into the crystallizers in the cellar. A long four-ply rubber hose is used for the purpose. Two crystallizers hold the condensed charge and yield from 400 to 600 pounds of inferior bluestone, according to the quality of the solution used. Clear liquor from the settling-tanks, into which the residues from the dissolving-tubs have been washed, is likewise pumped into the high tanks and concentrated. Two charges can be condensed in the pans during twenty-four hours, with the consumption of one cord of wood. The boiler-man also attends to this fire. About one cent a pound for the bluestone produced was estimated as the cost of concentrating.

All washings containing copper in solution the strength of which is below 15 degrees Baumé are weakened to 5 degrees, and are then run into the iron tanks, in which the copper is thrown down. Old crystallizing tanks are used for the purpose. They are so arranged that the overflow from one passes into the another, until the liquor is free from copper. A false bottom is made in them of wooden paddles which are worn too short for further use in the dissolving-tubs, and about 300 pounds of scrap wrought-iron are laid upon it. When the precipitated copper covers the iron, it is washed down into the bottom of the tank and then allowed to accumulate. When removed, it is spread upon a wooden platform and sun-dried. It is then screened, and that portion which does not pass through a 20-mesh sieve is melted into bars and used in the refinery for throwing down silver. The finer portion goes to the roasting-furnace, to be subjected to an oxidizing roasting and used again in the manufacture of bluestone.

Not an unimportant factor in the product of the Dayton Works is the copper obtained from the United States Mint at Carson. This institution purchases the acid used in the refinery, and partly pays for it with copper solution. As the mint solution carries a great excess of acid, it has to be used in conjunction with cement copper, or rich ore, and is substituted for new acid in the dissolving-tub baths.

The cost of manufacturing bluestone from ore at the Dayton Works was estimated at 6 cents a pound when 20 per cent ore could be purchased at $2.25. The average cost of labor was $3 a day, chamber acid costing $20 a ton and wood $6 a cord. The wear of the sheet-lead, which, with freight added, cost about 11 cents a pound, and a lead-burner's wages at $4.50 a day, he having to be employed continuously, also formed an important item in the estimate.

During the years 1879, 1880, 1881, the output averaged about 320 tons a year. Several years previous, a much greater quantity was made and sold, taxing the capacity of the works. Since 1881, there has been a perceptible falling off in the demand, owing to a decrease in the tailings milling industry. Shipping to a foreign market is out of the question, on account of the cost of transportation, which likewise serves to keep foreign manufactured bluestone from coming into competition with that made in Nevada.

THE significance of the small quantity of carbonic acid in the atmosphere was fully appreciated during the first half of this century. Through careful researches, it was ascertained that the carbonic acid produced by the decomposition of organic substances, by respiration, by combustion, etc., is absorbed, through the agency of the sun's rays, in the form of carbon. The question has been suggested whether the enormous quantities of coal annually burned in factories and dwellings might not have some effect upon the atmosphere, gradually increasing the carbonic acid in it. Dr. Clemens Winkler, of Freiberg, has gathered some curious figures on this point, which we believe will put at rest any fears on that score. There are very few, we imagine, who have any idea of the enormous quantity of carbon which exists in the atmosphere in the shape of carbonic acid. Dr. Winkler, from the known weight of the atmosphere and its percentage of carbonic acid, 0·04 per cent of the volume, has figured out that there are not less than 800,000 millions of tons of carbon in the air. The total production of coal in the world is roughly 360 millions of tons, equal to 942 millions of tons of freshly cut pine, or 2625 millions of trees of 80 years' growth in a moderate climate. The total population of the world, about 1200 millions of human beings, annually, in maintaining life, breathes into the air carbonic acid enough to equal 180 millions of tons of coal. And yet the quantities of carbonic acid thus sent into the atmosphere are insignificant as compared with the enormous quantity of 800,000 millions of tons referred to.

A MODERN ENGLISH STEEL PLANT.

The most recent addition to the works in Middlesborough, says *Iron*, is the Northeastern Steel-Works, which were begun in 1881, and the company made its first heat of Bessemer steel on May 31st, 1883. Actual work was begun in double shift in the middle of the following month—June—from which time up to the present, the works have been in constant operation, and the output in each week has exceeded that of the preceding one, the rate of working now being from 1000 to 1200 tons weekly. The works occupy 22 acres of ground, which is in the form of a triangle, lying with its base toward the river—the river itself forming the north boundary. The works were designed by Mr. Arthur Cooper, the manager, who has so arranged them that the work proceeds regularly on, stage by stage, from one end to the other. The various departments are placed under one main roof, which is 1030 feet long by 160 feet wide, the converters being at the northern end, and the cogging and rail-mills and finishing-shop following in proper sequence. The raw materials are brought in to the rear of the basic Bessemer converters (which have Holley's movable shells), and where there are three cupolas for melting the pig-iron. The dolomite for lining the converters is stored in bunkers, and before being used is calcined in the cupolas, of which there are three. The calcined material is crushed under edge-runners, and fed into incorporating-mills, where it is mixed with tar to the consistency of stiff paste, in which condition it is used for lining the converters and making the bottoms. Over the converters is a 60-ton traveling-crane, by which they are lifted bodily from their trunnions and carried to the rear to be lined, where they are arranged under a 30-ton traveler. At present, the pig is melted in cupolas, but it is intended eventually to work on the direct system, taking the molten iron from the adjacent furnaces directly to the converter. The three pig-iron cupolas are arranged so that the raw material is taken up to a hight of 21 feet by means of a 20-ton hydraulic lift, and there charged with the necessary quantity of coke and limestone. When melted, the iron is drawn out on the ground floor into 12-ton ladles, and then pushed forward by means of a small locomotive to another 20-ton lift, by which it is hoisted to the converter stage-level, which is 21 feet above the ground line, also on the same level as the charging stage. It is then pushed forward to the converter by a small locomotive which is in waiting on the converter staging. The ladle is then tipped by means of a worm-and-wheel, and the metal passes through a short spout into the converter. The spiegel cupolas are close by the converters, and lime is shot into the converters from an upper platform. After the metal has been blown, it is teemed into a ladle carried by a transfer-crane. This crane receives from two converters, another similar crane receives from other two converters, there being four 10-ton converters. The ladle carried by the transfer-crane is taken by a center casting-crane, which covers a pit 60 feet in diameter. This crane was specially designed for the plant by Messrs. Head, Wrightson & Co., of Stockton. The ingot molds are removed by four 6-ton cranes arranged around the pit, the ingots being taken thence to the re-heating furnaces in the cogging-mill. Soaking-pits on Mr. Gjers's system have been constructed, and will shortly be started. The converters are blown by a pair of vertical compound condensing engines, the high-pressure cylinder being 40 inches in diameter, and the low-pressure 66 inches, with a stroke of 5 feet. The blowing-cylinders are 54 inches in diameter. There are two pairs of horizontal pumping-engines for the hydraulic work, there being four pumping-cylinders on each engine. The steam-cylinders are 26 inches in diameter, with a 3-foot stroke; the pump-plungers being 6 inches in diameter.

The cogging-mill rolls are 36 inches in diameter and 7 feet 6 inches long. The engines for driving this mill have 40-inch cylinders and a 5-foot stroke, and are geared at 1 to 2. In this mill, slabs 16 inches wide are made; also rail and other blooms. The bloom or slab having been brought down to the required size in the mill, is passed forward by means of live rollers to the bloom-shears, where the crop-ends are cut off, and the bloom itself cut to any requisite length. The blooms, if required for export, are then placed on a skid and moved along to the outside of the mill for inspection; but if they are to be still further manipulated, they are run down by means of live rollers to the rail and finishing-mill, the rolls of which are 28 inches diameter and 7 feet long, and are driven by a pair of 50-inch cylinder-engines with a 54-inch stroke. A train of rollers conducts the billet or rail, as the case may be, either to the billet-shears or the rail-saw. If the rails are making, after being cut to requisite length, they are taken on a skid to the hot bank and allowed to cool. When sufficiently cooled, they are removed by means of two 3-ton steam portable cranes to the cold bank, thence to the straightening machines and rail-drills, and afterward to the benches, where they are inspected and loaded on trucks, which are placed in docks alongside these benches. The company has commodious sidings, connected, of course, with the Northeastern Railroad system. The works afford employment to about 500 hands, and are producing about 1000 tons of rails per week by the basic Bessemer process, Cleveland and cinder pig being exclusively used.

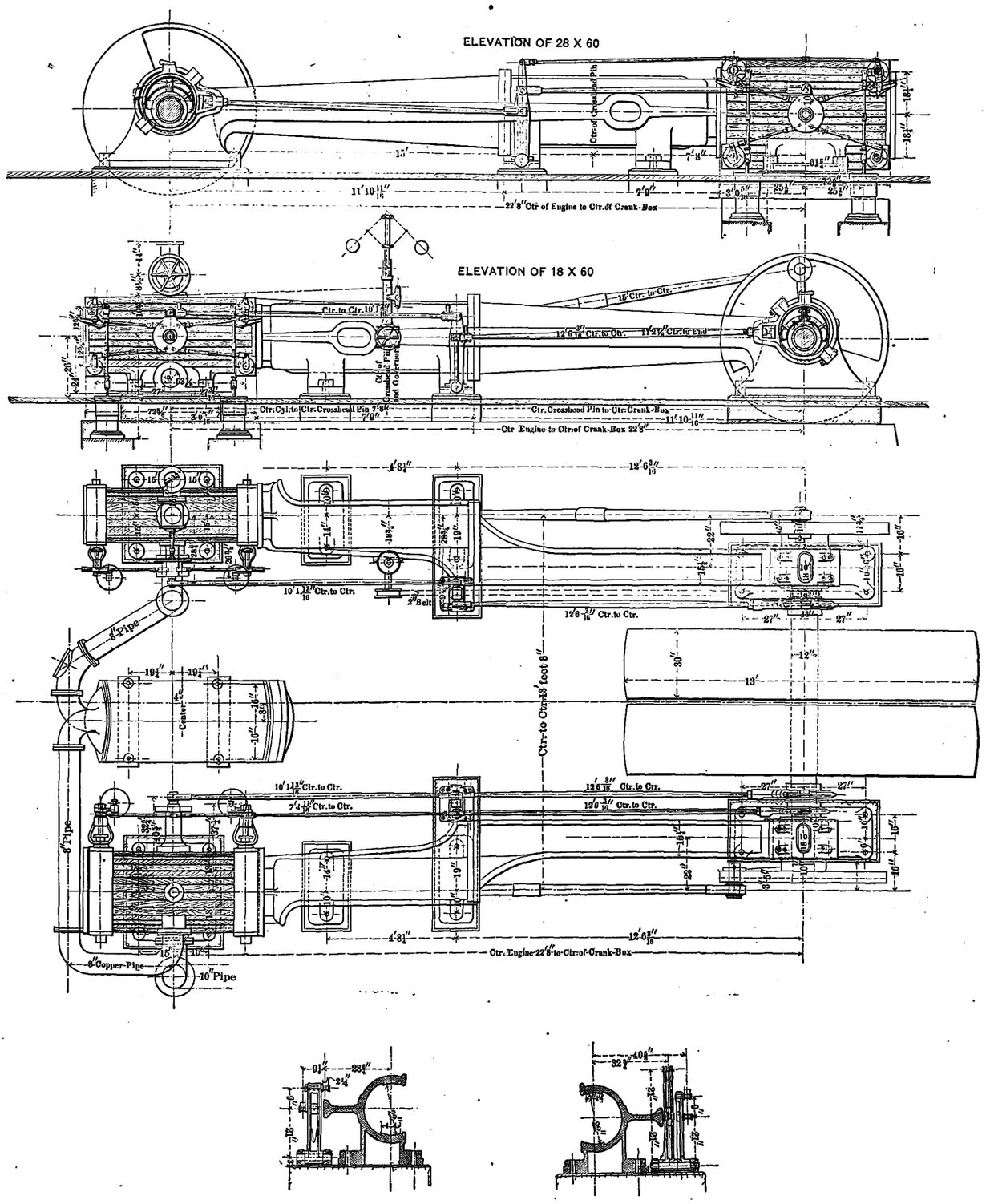
JIGGED COAL.—A circumstance which has had a depressing influence on the smaller sizes of anthracite coal has been the growing quantity of jigged coal offered in the markets, being largely the product of working culm-piles, etc. While the growth of this industry will be hailed with pleasure by all who have been hoping for a reduction in the fearful waste in our anthracite region, the jigged coal unfortunately comes to the market too frequently under false pretenses. Every effort is made to sell it as fresh-mined coal. Some of it undoubtedly is, but some of it is not. Coal obtained from washing a culm-bank, after it has been subject to weathering for years, is undoubtedly a good fuel; but it can not, so far as we are able to judge by inference, claim to be as good as fresh-mined coal. Buyers will therefore do well to be on their guard.

We may here note that, from the accounts which reach us, the jigging operation is carried on in a very crude manner in some of the dressing-works. Sometimes, the jigs are choked with material, coming with a rush from the breaker; and sometimes, the jig is doing comparatively little. The arrangements for the delivery of the refuse and of the washed coal appear to be defective in many instances, and the quantities of water used generally excessive.

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THE LEXINGTON MILL ENGINE.

We illustrate in our present number a specimen of modern engines, one of which was built for the Montana & Utah Mining Company, by Messrs. Fraser & Chalmers, Chicago, Ill. This engine serves as motor for the Lexington Mill, Butte, Montana, and is remarkable for its economy as well as its durability and beauty of design. It is a compound condensing engine, and is provided with a reheating receiver. The high-pressure cylinder is 18 inches in diameter and the low-pressure cylinder



COMPOUND CONDENSING CORLISS ENGINE AT THE LEXINGTON MILL, BUTTE, MONTANA.

28 inches, both having a 60-inch stroke. Both cylinders are provided with Corliss valves, and the admission of steam is controlled by the governor at the high-pressure cylinder, while the cut-off for the low-pressure cylinder is adjusted by hand, to adapt the engines to greater variations—for instance, to run a section of the mill only, and divide the work in such case equally between both cylinders. This adjustable cut-off is a novelty in principle and design, and permits cutting off the admission of steam at any point from zero to full-stroke, while the common Corliss cut-off is limited to four tenths of the stroke.

The receiver, placed between the steam-cylinders, is provided with return-flues, for the circulation of live steam from the boilers, to reheat the steam before entering the low-pressure cylinder. The exhaust steam, leaving the low-pressure cylinder, passes through a feed-water heater, similar in design to the re-heater, and then enters the siphon condenser.

No critical tests as to economy in consumption of fuel have been made as yet; but the practical results are surprising to mill-men. The Lexington Mill is a dry-crushing silver mill, consisting of 50 stamps of 950 pounds each, with all conveyers and elevators, two five-stamp salt batteries, 20 pans, 10 settlers, 2 agitators, screens, furnace conveyers, and feeders for two Stetefeldt furnaces, which machinery, with shaftings at usual terms, may be rated at 275 horse-power. Four tubular boilers 54 inches in diameter, 16 feet long, with 758 square feet of heating surface each, were provided; and although the water supply of the mill is not sufficient to use the condenser, two of these boilers only are in operation to furnish steam to run the entire mill, and this with a consumption of 9½ cords of wood per day of twenty-four hours. The Lexington Mill engines are the first striking instances of the introduction of the best steam engineering practice in silver mines. Their success will, we trust, mark the beginning of a new era, in which due attention is given to this important source of economy.

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THE OILS OF THE JAMESON COKING PROCESS.

Mr. Watson Smith has apparently examined with care the oils condensed in saving the by-products in coking in the Jameson modification of the bee-hive oven. He reports:

The tar, as it was at first called, is now, I observe, termed "oils," and Jameson states that he obtains from six to fifteen gallons of tar per ton of coal coked. As to this tar, various reports have got abroad. In the *Journal of the Society of Chemical Industry*, it has been represented in one case as consisting merely of paraffines, liquid and solid, and in another, as containing no aromatic compounds applicable to the manufacture of colors. Now, neither of these statements is quite true, although in part so. Though benzine is quite absent in the Jameson tar, yet in admixture with paraffines, both very small quantities of toluene and larger quantities of xylene are present. I have obtained their nitro-products. Now benzine, toluene, and, I believe, xylene, are found in the Scottish shale spirit produced in the works of the Young Paraffine Light Company. This I proved as far back as 1868. But these aromatic hydrocarbons are mixed in the shale spirit with bodies of about the same vapor tension, belonging to the olefiant gas series, and the attempt to convert them into their corresponding nitro-derivatives results in the production of bodies yielding most acrid and pungent fumes, resembling those of acroleine. Besides rendering the operation of nitration intolerable, the arid bodies are not easily removed from the nitro-benzine and its homologues. But in the spirit from the Jameson oils, the bodies present belong to the marsh-gas series mainly, and hence the aromatic hydro-carbons present might be safely nitrated, and the paraffines afterward removed by steam from the crude nitro-product. The unfortunate circumstance is, that there is so little of this benzine series present, and the representative member (benzine) was quite absent from all samples I have yet examined.

Lubricating and Burning-Oils.—The chief bulk of the Jameson tar, having a specific gravity of 0·960, consists of oils boiling between 250 degrees and 350 degrees, from which on cooling no crystalline substance separates. These oils I have tested as regards their burning qualities in lamps, and as regards lubricating value, and I find them of little value for burning, and of but secondary value as lubricants. One singular feature about them is, that they are quite devoid of "blueness" or fluorescence. If these oils find their way into the market, I would give a timely warning to all those who are buyers of vegetable and animal oils, namely, cease to rely solely on the test of "blueness" or fluorescence of the oils you examine, as a proof of the presence in them of mineral oils!

Paraffine.—But a considerable proportion of oils distills over above 350 degrees, namely, from somewhere about 400 degrees to the point at which pitch remains in the retort, and these oils do separate paraffine scale, though not so much as could be desired, and the paraffine wax obtained has a high melting-point, namely, 58 degrees Cent. It is characteristic of the solid paraffine obtained (of course in small quantity) from certain normal coal-tars, especially those obtained from Wigan cannel, that this paraffine possesses a very high melting-point. The highest melting-point of the paraffine wax made by the Scottish shale distillers is about 52 degrees C.

Phenols.—If the crude oils boiling between 200 degrees and 300 degrees C. be treated with caustic soda lye, and the phenols extracted in the usual way, a fairly large proportion of a peculiar series of phenols of increasing boiling-points is obtained in the crude extract, certain of these phenols resembling the constituents of the creosote of wood-tar. A mere trace of carbolic acid was found, but more of the cresols, and by far the largest bulk of the constituents of the crude phenol distills at from 250 degrees to 300 degrees C. The latter fraction, boiling at about 300 degrees, is a resinous substance perfectly soluble in caustic soda, to which it communicates a red color.

Certain of these phenols yield blue and red colors with alkalis, but of no stability or value. These colored alkaline salts remind one of the colored salts of eupittonic acid, the phenol-like acid derived by the oxidation of Reichenbach's wood-tar pittacal.

Neither naphthalene nor anthracene is present even in traces in Jameson's coke-oven tar. The fact that the specific gravity of this tar is less than that of water is a circumstance sufficient of itself to indicate that it belongs to the class of tars obtained by the distillation of coal at lower temperatures. I think that Jameson's coke-oven tar offers a fine field of research to the scientific chemist, and that his labors *may* develop valuable fruit in a commercial sense, as well as for science; but I do not consider this tar at present, looking at its heterogeneous and unsatisfactory nature, a very inviting subject for present commercial speculation, in view of the possibility of getting the far more valuable real coal-tar as a coke-oven by-product, with its color-yielding and purely aromatic consitutents.

GEORGE WEBB.—Gen. George Webb, who died in Johnstown, Pa., October 9th, was born in Muncy, Lycoming County, Pa., November 4th, 1828. He taught school and educated himself in civil engineering. In 1850, he went to the lead mining district of Wisconsin. About 1852, he surveyed the northern boundary of that State for the government. The district was a vast wilderness, and he suffered great hardships. From 1856 to 1860, he was City Engineer of Dubuque, Iowa. In 1860, he negotiated with Jefferson Davis for the building of levees on the Mississippi, but, the war breaking out, he gave up all contracts and entered the Union army as captain of a company from Lycoming County. From 1862 to 1872, General Webb was Chief-Engineer and General Superintendent of the Catawissa Railroad, and lived in Williamsport during this time. He was also Chief-Engineer of the Baltimore & Potomac road, and constructed the large tunnel under Baltimore. In 1872, he was appointed Assistant General Manager of the Pittsburg, Cincinnati & St. Louis Railroad, and great credit has been given him in bringing that road to its present high standard. In 1874, he was appointed to the same position on the Pittsburg, Fort Wayne & Chicago Railroad. In 1875, he was appointed General Agent for the Cambria Iron Company. He had full control of all the tests of steel made by this company for the Brooklyn Bridge.

GOLD IN THE PROVINCE OF MINAS-GERAES, BRAZIL.

It was the discovery of gold which, according to Prof. A. de Bovet, of the Ouro-Preto School of Mines, first attracted people to the Province of Minas-Geraes in the beginning of the seventeenth century. Since then, it may be said that the working of gold ores has continued uninterruptedly, though with varying activity. Compared with what was done toward the close of the last century, this industry is to-day falling off, although this can not be attributed to the exhaustion of the deposits. They are far from being worked out. They may be classed under three general types, the pyrites veins, quartz veins, and itabirites. In the quartz veins, the mass of the deposit is quartz in which are found irregularly disseminated crystals of iron pyrites and particles of gold, generally coarse. Their richness is essentially irregular, while the pyrites found in them is also scattered irregularly and in pretty large crystals. In what has been called the pyrites veins, the mass of rock is formed of quartz and pyrites, the latter, however, predominating. The mixture is very fine, differing very much from the rock taken from the quartz vein. Arsenical pyrites forms the mass, iron pyrites being present only in small quantities. The gold in these veins is not found in scales or coarse grains, but in an extremely fine state; so that it is very difficult to pan out any gold. Instead of being irregularly disseminated in the mass, as in the quartz veins, the gold in this class of deposits is, on the contrary, distributed throughout, though with remarkable regularity; and the grade, though low, is approximately the same in different parts of the deposit. These veins are both true fissures clearly cutting through the country-rock, as at Morro-Velho, and as beds at Pary and at Passagem. Granites and gneiss form the lowest rocks of the province, above which lie schists, followed by quartzites and itabirites, which occur in two forms, as a solid rock, called "*pedra de ferro*," and a friable rock which has received the name of "*jacutinga*." The quartz veins are found both in the gneiss and later formations, while, so far as is known, the pyrites veins do not cut through the quartzites or the itabirites. The famous Morro-Velho vein cuts through the schists, while the bedded vein at Pary lies upon the gneiss. Where the veins have cut through or traversed permeable rocks, an impregnation of these rocks has taken place. This is not the case with the pyrites veins, which cut through the hard and compact schistose rocks. It holds good, however, for the quartz veins when passing through deposits of *jacutinga* and the hard quartzites, upon the cleavage surfaces of which gold is found. In the vicinity of Morro Prato, a considerable deposit of *jacutinga* has been worked by an open cut, wherever quartz veins have passed through it, the workings exending from 150 to 250 feet from the hanging and the foot-walls of the vein. The gold found in these deposits is coarse and very irregularly distributed. At some points, these itabirite beds have proved fabulously rich, while over a great extent they are absolutely barren. This class of deposits, it will be noted, is intimately connected with the quartz veins; still it is important enough because of the enormous development of the workings which it has given rise to, to consider it a third type of auriferous deposits. There seems little doubt that the gold in them has been derived from the quartz veins, its character being exactly the same, and being accompanied very frequently by pyrites. The quartzites, like those of Pary and Passagem, on the other hand, show a distribution of gold very similar to that of the Morro-Velho vein, for instance, and therefore it is probable that they have no connection with quartz fissure veins, but rather with pyrites veins.

As elsewhere, the alluvial deposits first attracted the attention of the miners and were rapidly exhausted. They were followed by the working of the itabirite beds; and it was only at a later date that the working of the vein deposits was begun. The large amount of capital required for such undertakings led to a transfer of operations from the hands of the native population to foreign companies, principally English organizations, which introduced new processes and worked with varying success. To-day, the few important mines working are in the hands of English companies, the Morro-Velho, Pary, and Morro de Santa Anna, and the total product of the province is little more than the combined yield of these enterprises. There are a few individuals who put up a small stamp-mill and work with a few men. They have not in view the working of their mines, but seem intent only upon holding their claims until the time may arrive when they can sell out to a foreign company. Generally, they have exorbitant ideas as to the value of their property, and this may account for their lack of enterprise. A description of gold mining in the province may therefore be limited to an account of the three great English companies already mentioned.

THE MORRO-VELHO WORKINGS.

The deposit worked at Morro-Velho is a pyrites vein, the ore being a close mixture of fine grains of quartz, arsenical pyrites, and iron pyrites, with occasional patches of copper pyrites, calcspar, and siderite. The vein, which is almost vertical, cuts through the schists, coursing from east to west. It is very narrow, but has a chute running down at an angle of forty-five degrees, with an average thickness of twenty-five feet and a length on the vein of 200 feet. It is this part of the vein which is worked. The first opening on the vein was abandoned on account of a fire in the timbering which led to caving. Under it, a sufficient thickness of ore was left to form a solid roof, and below it the workings were again taken up, being opened by two pits placed in the south wall of the vein. The workings are carried out without any headings or any gobbing, the whole of the ore being extracted and an open space left above. In this manner, an immense underground chamber has been left open 650 feet deep, 300 feet long, and 25 feet wide. Though the walls are solid, such an opening could naturally not be expected to stand, and therefore timbering on a grand scale is put in. In one year, six thousand cubic feet of timber were put into the mine. In this manner, it has been possible to reach a depth of 1900 feet. The water is pumped out with the aid of a wheel more than fifty feet in diameter, while the hoisting is done by a wheel of about the same dimensions. Dynamite is used for blasting, the holes being drilled by hand. Trials with rock drills have not, it is said, given satisfactory results. The total quantity of ore extracted in 1880 was 63,684 tons in 310 working days. The ore is first broken and sorted. It is then delivered to a stamp-mill and passed over buddles, the concentrates going directly to amalgamation. The

tailings are ground in arrastras, and, after going over a second set of buddles, yield concentrates for amalgamation and a large quantity of poor tailings. The larger part of the latter is carried off by the water and lost. A small quantity is retained to be worked when a practical process has been found to extract the little gold it contains. The concentrates are amalgamated in barrels, the amalgam being collected with mercury, while the tailings go to the buddles, the concentrates of which return to the barrels, while the tailings are taken to arrastras to be treated over again. There are 126 stamps, run by five wheels making from 56 to 67 drops a minute, and crushing per day 171 tons through a very fine sieve. The amalgamation is conducted in sixty Freiberg barrels, into which are charged from 1700 to 2000 pounds of ore and from 45 to 50 pounds of mercury. It takes twenty-four hours to complete a charge. The Morro-Velho ore is poor, the average being thirty grams per metric ton. Out of one lot of 162·5 tons, containing 4·8756 kilograms of gold, the first buddles under the stamps catch 3·604 kilograms in 9·144 tons of concentrates. Out of this, 3443 grams are obtained in the first amalgamation, and by the second working the rest is recovered, with the exception of 12 grams lost in the tailings. In the material from the first buddles and from the arrastra buddles, are obtained 160 tons of tailings containing 1420 grams of gold. Of this, a sufficient quantity is saved to reduce the loss to 25·4 per cent. Though this loss may be great, it is not high when it is considered how difficult it is to treat an ore in which the gold is in so fine a state that it is never visible to the naked eye, and can not be shown in the pan. It is very possible, besides, that a certain quantity is not in the metallic state and therefore escapes amalgamation. The Morro-Velho Company is continually carrying on experiments to extract the gold from tailings saved. Mr. De Bovet holds that it is not good practice to attempt to improve the yield by diverting attention exclusively to these tailings which only contain twelve grams per ton. He believes that it would be better to try to improve the other parts of the process, to direct the main efforts to the ore extracted from the mines, and not to the deposits of tailings. He advocates a closer classification for the buddles, and believes that roasting would facilitate the present operations. The labor question is one which is now seriously embarrassing the company, and coolies are to replace the slaves. In 1880, the profits of working 64,000 tons were £63,000 sterling, against £78,000 in 1879 and £103,000 in 1878, the dividends distributed in 1880 amounting to twenty-five per cent. In 1880, the mines employed 90 Europeans and 1211 Brazilians.

THE PARY WORKINGS.

The Santa Barbara Company is working at Pary a bed of iron pyrites, mispickel, and quartz, dipping at 45 degrees east, with a thickness of from 6½ to 8 feet. Its contents vary considerably. At some points, the vein seems divided in two parts, the upper being almost exclusively composed of quartz, hornblende, garnet, and mica, being barren and the lower part quartz and pyrites, containing gold and being similar to the Morro-Velho ore. At other points, the two rocks are mixed from the foot-wall to the hanging-wall. The deposit crops out on the side of the hill on the left bank of the Rio San Francisco, and at a few feet above the level of the river a long tunnel has been driven in. Above the level of this tunnel, all the ore has been removed, and the workings now are below it. The mine makes a little water, which is easily pumped out. The ore is broken and sorted by women, and the pyrites sent to stamps driven by water-power. There are four mills having an aggregate of 51 stamps, crushing per day about 38 tons of ore. The pulp is run over buddles, and is amalgamated in Freiberg barrels, yielding about 12½ grams of gold per ton. The average grade of the rock does not seem to be known. Work at these mines is considerably hampered by lack of water, and it is the intention of the company to provide it by a long ditch.

THE MORRO DE SANTA ANNA WORKINGS.

The workings of the Don Pedro North Del Rey Company are in a deposit of *jacutinga* of a very friable character, so that it is not necessary to crush it. The gold is irregularly disseminated, being in small grains. It seems to occur in pockets of great richness, which are, however, limited in extent. There appears to be no system whatever in the workings, which are simply a blind groping after the rich streaks. The only guide is the pan, samples being taken repeatedly each day from the workings, which are tested by panning. The mine naturally requires very extensive timbering, and the quantity of water is very large, while on the other hand, the power available is limited. In spite of the expense which these conditions entail, work has been going on with varied success, passing through extraordinary returns which are out of proportion to the yield for such an ore as the Morro-Velho. These bonanzas are followed by times of absolute failure, and it is a crisis of this kind that the mine is now passing through. The greatest difficulty encountered is the question of drainage. Formerly, the pumps were worked by a water-wheel, and when increasing depth made this means insufficient, another method had to be sought for. Only a small quantity of water for power was available, but it is under a high head. Therefore, a large iron wheel, sixty feet in diameter, was put up. The mine is opened by a long tunnel, ending in two inclined planes dipping at 28 degrees. Into one of these planes, the pump-rods were put in. This rod from the wheel to the pumps is in all 4560 feet long and weighs 45 tons. The cost of this enormous mass of iron brought from England may be imagined. Whether it was that the axle of the wheel was too weak or its spokes poorly attached, it was found that it would not work, and after a few attempts it had to be stopped and the mine was drowned out.

FURNACE, MILL AND FACTORY.

The Pratt Coal and Iron Company was organized at Birmingham, Ala., last week, by the consolidation of the Pratt Coal and Coke Company and the Birmingham Coal, Coke, and Iron Company. The new company takes possession of all the property of the concerns of which it is the successor, assuming their liabilities. The lands comprise about 75,000 acres, of which one half, that belonging to the Birmingham Company, is undeveloped. The paid-in capital of the new concern is $1,500,000. The following officers were elected at a recent meeting: Enoch Ensley, President; J. C. Neely, Vice-President; J. H. Smith, Secretary; J. C. Radcliffe, Treasurer; and W. L. Gude, Superintendent. It is believed that the proposed issue of $800,000 of bonds, which the stockholders will consider at their meeting on the 1st of November, is for the purpose of providing funds for building blast-furnaces near Birmingham.

T. C. Snyder & Co., manufacturers of iron roofing, at Canton, O., report increasing business. This firm is now manufacturing what is known as "calamined iron." The sheets are coated by a new patent process, which causes the iron to become coated with a material that is said to withstand sulphuric acid and all deleterious substances, and also solders better than tin or galvanized iron. The finished calamined iron resembles galvanized iron, and is said to be indestructible.

The Arizona Copper Company, owning the Clifton and Longfellow mines, Clifton, Arizona, has ordered of Fraser & Chalmers the following machinery: Three furnaces, 42 inches diameter, with all slag-pots, carriages, and bullion-pots. Three No. 6 Baker blowers. One No. "C" Comet crusher. Two Blake crushers. Three Leffel water-wheels. One upright boiler. Stillwell & Bierce heater and lime-catcher, pump, car irons, scales, furnace tools, roofing, iron blast gates and pipes. Two tubular steam-boilers, 60 inches by 16 feet, and accompanying machinery, amounting in all to about seventeen car-loads.

The Lackawanna Iron Company has started a remodeled spiegel furnace at Newark, which is doing excellent work. They closed the top and the front, and put in a Cooper stove which carries the blast up to 920 degrees at the stove. They blow through five 2¾-inch tuyeres and one small one above the front, the pressure of blast ranging between 6½ and 7½ pounds. The furnace is 34½ feet high and 8-foot bosh. Formerly, in blowing in, the furnace would make gray iron the first few days, not coming up to the regular grade of spiegel until the eighth day. With the remodeled furnace, spiegel was produced at the very start, and came up to 20 per cent metal on the third day. They get more gas and more oxide of zinc, approximately 15 per cent of the weight of the pig. The production now is eight tons per day, and it is expected that when running full it will average ten tons, against 7½ tons formerly. Mr. G. C. Stone has charge of the furnace.

The Jefferson Iron-Works, at Steubenville, which have been making extensive repairs about the mill, factory, and furnace the past three months, have resumed operations.

The Saucon Iron Company has closed its iron mines, and will blow out its furnaces. Low prices are said to be the cause of the suspension.

The rolling-mill of the Hollidaysburg Iron and Nail Company, which has been idle for about two months, is now running on full-time. The mill was thoroughly repaired during the suspension.

The Chicago Automatic Steam-Engine Manufacturing Company has lately been organized, with a capital of $300,000, by Lyman E. De Wolf, John V. Colby, and Dennis O. B. Ladd.

The Bridgeport Brass Company, Bridgeport, Conn., is erecting a new factory 150 by 35 feet, three stories, and built of brick. This building is erected to accommodate the increasing business in the manufacture of electric light and telegraph wires.

Col. A. H. Leftwich has purchased the James River Iron-Works, four miles above Lynchburg, Va., for $75,000. He will turn the same into a nail factory. It is valuable property, and cost originally $296,000. It has not been worked for several years.

The Ordnance Bureau of the War Department has made a contract with the South Boston Iron Company for the manufacture of one of the Yates heavy rifle cannon for experimental purposes.

The Catasauqua *Dispatch* reports that the new blast-engines at the Crane Iron-Works have been tested and found to work well. The erection is not yet completed. The blast-engines of the company are repainting and getting in good order. The fire some years ago in No. 8 engine-house destroyed the wooden platforms, and when it was rebuilt, they were abandoned altogether. It has been found necessary to rebuild them, for the better security of the walls.

The Steelton *Reporter* states that the rail-mill for the month of September rolled 14,318 tons of steel rails of various patterns, being an increase of 3472 tons over the corresponding month of 1882. The production last week was 3619 tons of steel rails. The Bessemer mill last week produced 4436 tons of steel ingots. The tonnage for the month of September in the Bessemer mill was 17,210 *tons*, being an increase of 2152 tons over the corresponding month last year. The blooming mill cut out during the month of September 15,858 tons of blooms. The merchant mill will be put in operation as soon as the engines are completed. The engine on the lower train of rolls has been running all the week testing the rolls, which have been found to be in perfect order. The frog, switch, and interlocking department is running night and day to fill orders on hand and those constantly arriving. No. 5 furnace is again in full blast, and lately made the largest production in the history of the furnace.

The Pittsburg Bessemer Steel-Works, located at Homestead, Pa., were sold October 16th to Carnegie Brothers & Co., of the Edgar Thomson Steel Company. The basis of the sale is said to be $1,200,000.

The Union Steel Company has been incorporated at Springfield, Ill., with a capital stock of $4,600,000. This is the company organized to purchase the plant of the Union Iron and Steel Company. The date for the resumption of work at the mills is still indefinite.

The announcement is made officially by the Thomas Iron Company, of Hokendauqua, that two of its furnaces at Columbia have been blown out and two at Hokendauqua; in addition, two already idle will be blown out shortly. Another furnace at Hokendauqua, which has been in blast for five years, will probably be blown out soon.

It is rumored that the Allentown Iron Company will blow out its last working furnace.

The Cincinnati Cooperage Company has placed its order with the Lechner Manufacturing Company, Columbus, O., for chain conveyers, to be used at its works at Cincinnati, O. This company has also received orders for chain belting from the Colorado Machinery Company, South Pueblo, Colo.; F. W. Schroeder, Roca, Neb.; C. C. Warren, Waterbury, Vt.; and others, to be used for conveyers and driving purposes.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

PRESCOTT DISTRICT.

Grand Gulch Mining Company, Adams lode.

TUCSON DISTRICT.

Oro Blanco Mining Company, Louise, Franco-American, and Normand lodes.

CALIFORNIA.

SACRAMENTO DISTRICT.

John Carre, Leahy & Riley placer. Alexander Wylie *et al.*, Mountain Ranch placer.

SHASTA DISTRICT.

Michael Smith, placer.

STOCKTON DISTRICT.

Antonio Gianelli, placer. Thomas Poyzer, Hite Central gold quartz mine and mill-site.

SUSANVILLE DISTRICT.

A. E. Leavitt *et al.*, Elizabeth Town Flat placer.

COLORADO.

CENTRAL CITY DISTRICT.

George Darsie *et al.*, California lode. William A. Brown, California, Montana, and Brown lodes. Republic Gold Mining Company, Pewabic lode. Gray War-

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ner, Waterloo lode. J. D. Armstrong, Mendick lode. Marcus W. Rasbach, General Herkimer lode and mill-site and Herkimer lode. David B. Anderson, Champion lode. William J. Barker, Peck lode. Charles H. Dugliss, Mastodon lode. Ernest Stahl *et al.*, Lac la Belle Tunnel No. 1. J. E. Benjamin *et al.*, Cape Cod Tunnel lode No. 1. Jacob Kisthard *et al.*, Little Willie lode. Conara Silver Mining Company, Tunnel No. 1. Jacob Burnet *et al.*, Badger State lode. Leonard A. Watkins, Commonwealth lode. J. V. W. Vanderburgh, Pratt lode and mill-site.

DURANGO DISTRICT.

Pride of the West Consolidated Mining Company, Richmond lode and mill-site Tower Mountain Mining Company, Rowell lode. Robert Dremon *et al.*, Paymaster lode.

LAKE CITY DISTRICT.

W. Weston *et al.*, Declaration lode and mill-site. Hugh J. Alexander *et al.*, Golden Fleece lode. Emma Mountain Mining Company, Sidney lode. Benjamin F. McKenzie, Great Republican lode. John M. Cooper, Chrysolite lode. Mary J. Lee, Ajax lode and mill-site. Marshall Basin Mining Company; Argentine No. 1 lode and mill-site. W. W. Roof *et al.*, Ida May lode. Robert Crooke *et al.*, Will Crooke lode.

LEADVILLE DISTRICT.

William H. Lovell *et al.*, Bush Lode. Continental Gold and Silver Mining Company *et al.*, Bijou and Golden Queen lodes. Continental Gold and Silver Mining Company, Central lode. Bullion Consolidated Mining Company, Baltic and Condor lodes and mill-sites. Bullion Consolidated Mining Company *et al.*, Lottie lode. W. G. Richardson, Little Lottie lode. F. B. Keyes *et al.*, N. K. Carlton lode. Consolidated Gold and Silver Mining Company, Juliana lode. W. A. Kester *et al.*, Comstock lode. Henry D. Bates *et al.*, Richmond lode. D. D. Belden *et al.*, Jenny Lind lode. F. H. Ketcham, Comstock lode. Clifton Consolidated Mining Company, Clifton lode. Townsend Webster, Imperial lode. John R. Knodel *et al.*, Mamie R. lode. J. K. McDonald, Kremlin lode. Fryer Hill Mining Company, Virginius lode. Mary A. Cummings *et al.*, Rough & Ready lode. John A. Willard, Ontario lode. J. R. Long *et al.*, Battle Mountain lode. John H. Skillman *et al.*, Golden Terra lode. James B. McDonald, Chelsea lode. Jacob E. Rice, Houston lode. A. H. Bereman, Louisa and Columbia lodes. Little Delaware Consolidated Mining Company, Little Delaware lode and McAllister mill-site. John Mattson, Mattson lode.

PUEBLO DISTRICT.

Louis Wahl, Terrible lode and mill-site. Christian Wahl, Mammoth lode and mill-site. Christian Wahl *et al.*, Horn-Silver lode and mill-site, and Chlor Silver lode.

DAKOTA.

DEADWOOD DISTRICT.

Cashier Gold Mining Company, Cashier lode.

MONTANA.

HELENA DISTRICT.

John Reed *et al.*, Keystone lode. Clara L. Hathaway, Clara Hathaway lode. Clara Kennedy, Little Emma and Marietta lodes. James R. Clark, Mountain Boy lode. Patrick Conlon, Corona lode. Charles E. Colbert *et al.*, placer. Benjamin F. Horsum *et al.*, placer.

NEVADA.

EUREKA DISTRICT.

George W. Lamoureaux *et al.*, Carbonate lode and mill-site.

OREGON.

LA GRANDE DISTRICT.

E. W. Webster *et al.*, placer. Michael Hyde, Michael Hyde quartz mine.

UTAH.

SALT LAKE CITY DISTRICT.

Climax Consolidated Mining Company, James A. Garfield lode. Thomas Cupit *et al.*, Fourth of July No. 2, Silver Age, and Golden Age lodes. James Watson, coal. Joseph M. Watson, coal. Henry Wood, coal. Joseph H. Jennings, Carrie lode and Carrie mill-site. Charles C. Woodhouse *et al.*, Cortes lode. Morton French, Osceola lode. Richmond & Teresa Mining Company, Teresa lode.

WASHINGTON.

OLYMPIA DISTRICT.

Ahio Watt, coal.

GENERAL MINING NEWS.

ARIZONA.

Governor Tritle, in his report on the progress and development of the territory, says that the territory can now claim a population of 75,000 people and the possession of over $20,000,000 in taxable property. The dangerous and disturbing elements which have been factors in checking progress are now well under control. In the last two years, exceptional development has been made in all industries, mining, grazing, and agricultural. Extensive railroad enterprises have been completed, and the affairs of the territory are in an exceedingly prosperous condition. The value of the gold and silver product for the year ended December 31st, 1883, is placed at $9,298,267, against $8,198,766 in 1881. A large quantity of rich ore and base bullion, which is estimated to amount to at least 10 per cent of the figures given, is not included in this valuation. The yield of copper in 1882 was about 15,000,000 pounds. The combined value of the silver and copper product for 1883 will be between $15,000,000 and $16,000,000.

COCHISE COUNTY—TOMBSTONE DISTRICT.

DEAN RICHMOND.—Work will be resumed shortly. A contract is to be made with the Woronoco Smelting Company.

EMPIRE.—Work has been resumed.

GIRARD.—At the 200-foot level, a four-foot body of fine chloride ore has been encountered, and a large quantity of fine-grade ore is hoisting to the surface. From a series of assays made, it appears that the averages were $200 in silver. At the 300-foot level, the ores are sulphurets, but equal in richness to those in the upper level.

GILA COUNTY.

OLD DOMINION.—Superintendent Thomas, of this company, at Globe, reports the August product from one of the Rankin, Brayton & Co.'s 30-ton smelters to be 403,810 pounds, an average daily yield of 13,460 pounds, bullion running 99 per cent.

PINAL COUNTY.

RAY COPPER.—Under date of October 9th, J. M. Haskell writes to Mr. L. Zeckendorf, secretary and treasurer of the company, as follows: I visited the Ray Copper Company's property on the first instant, and remained there some days. I was very much pleased with the developments. There have been 500 feet or more of tunnel, winzes, and drifts run since my last visit, and nearly every foot in ore, native copper, carbonate, glance, and oxides. There is a large amount now in sight, enough to run a year or more, with good reduction-works, to say nothing about the rest of the properties where there are thousands of tons that will work in with the Ray ores. I also, while there, tested thoroughly the carbonate ore and native copper, both sheet and shot, and the concentrations were very satisfactory indeed, settling much better than I expected. There need be but a very little loss in concentrating—in fact, nearly nothing—and it will be possible to run the grade well up, say from 20 to 30 per cent. The native copper you can either melt or ship, as you may elect. I recommend starting a new shaft, which will, when down 50 or 100 feet, cut the vein where I believe it will expose a larger and better body of ore than yet found in the mine, and also will answer for the main working-shaft for at least 400 feet in depth. The property now is a settled fact. You can order concentrating-works and put your furnace in repair. The property will pay good dividends, when once the reduction-works are fairly running.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

The men are taking up the pump-column at the Lent shaft at the 1000-foot level, and a number of men have been discharged. For two or three months, the Bodie and Standard people have been negotiating with the view of sinking the Lent 200 feet deeper, and prospecting both mines on a level from it. This would give the Standard a depth of 1440 feet, and the Lent 1200 feet, the collar of the Lent being 240 feet lower than the Standard. A division of the expense would have made it comparatively light for each company, and, in fact, it would seem to be as sensible and economical a proposition as could be made. For some reason, says the Bodie *Free Press*, the plan seems, for the present at least, to have fallen through. The stopping of work on the 1000-foot level of the Bodie will not affect the extraction and milling of ore, as the latter is taken from above the 800 level. The ore for a week or two back has been of better quality than heretofore, and the bullion shipments have been larger. The appearance of the mine generally is better than it has been for some time back.

NEVADA COUNTY.

IDAHO.—The average output of ore is about 100 tons a day. The results of the working of the ore are entirely satisfactory.

EMPIRE.—The output continues steady and profitable. The mine gives employment in all its departments to 200 men. Outside of these, there are working in various parts of the drifts of the mine, and at the surface on small veins or feeders to the main vein, some thirty men as tributers.

CANADA.

PROVINCE OF ONTARIO.

A number of prospectors are at work in the county of Ottawa searching for galena deposits. Several very rich deposits of this ore have been recently found in this district.

COLORADO.

CHAFFEE COUNTY.

ALPINE SMELTER.—The smelter is about ready to blow in, and is already contracting for ore. Concentrating machinery and amalgamation tables will be added to the present plant.

CLEAR CREEK COUNTY.

CORRY CITY.—In driving the tunnel level west of the shaft, a streak of iron ore several inches wide was exposed which assays from 99 to 105 ounces in silver per ton. Seventy-five feet down the shaft, a cross-cut has been run eleven feet south toward the foot-wall, and is all concentrating material, which runs from 11 to 172 ounces. There is a three-inch streak in it which mill-runs over 100 ounces.

FREELAND MINING AND MILLING COMPANY.—The company has purchased the Dumont smelter, situated at Freeland. The company will not enter into possession before January 1st, 1884, previous to which a general clean-up will be made, and the works put in perfect repair. Alterations will be made and improvements added. It has already proved itself perfectly adapted to the smelting of the ores from the Freeland mine.

KOHINOOR & DONALDSON.—Five car-loads of machinery for the mill at the mouth of Fall River have been received. The machinery is in process of removal to that place, and will be put in operation as soon as possible. This mill, when completed, will be one of the largest in this part of the State.

PAY ROCK.—The mill is now running steadily double shift, and is consuming about thirty tons of dirt daily. The supply of water is sufficient, and the mill will probably run all winter.

DOLORES COUNTY.

LITTLE MAGGIE.—A shaft was started 120 feet from the mouth of the tunnel, and has been sunk 30 feet, in which distance 65 tons of first-class ore have been taken out and shipped to the Grand View smelter. This ore runs 68 ounces in silver and 40 per cent in lead. An equal amount of ore of lower grade has been reserved from this working, making 130 tons of ore from a shaft 30 feet deep. At the bottom of this shaft, a chamber has been cut, showing the vein to be 18 feet wide, with a solid ore-body 12 feet wide.

GILPIN COUNTY.

LITTLE EDDIE.—Drifts are extending east and west from the main shaft at a depth of 45 feet. The west drift is passing through quite an extensive body of ore, milling and smelting, the former varying in its yield from 2½ to 6½ ounces gold per cord, the average being 4 ounces. The smelting ore nets $40 per ton.

REPUBLIC.—The company's 25-stamp mill is well supplied with ore from the Pewabic mine, and is kept running steadily.

LAKE COUNTY.

CHRYSOLITE.—The new double-plunger Cameron steam-pump for the Iron incline has been received and put in position. The capacity is estimated at from 250 to 300 gallons a minute.

CUMMINGS & FINN.—Grant & Company will assume possession of this smelter November 5th.

DUNKIN.—The following statement, taken from the books of the company, shows the product of the mine from January 1st, 1883, to October 1st, $42,959; expenses during the same period, $18,047; profits, $24,912. Dividend paid, $10,000. Cash on hand October 1st, 1883, in New York, $6771; in Leadville, $8529. Total cash on hand October 1st, $15,300. The product of September amounted to $6113.29; the expenses to $2194.32.

FIRST NATIONAL MILL.—This concentrating mill, situated in Iowa Gulch, has been leased and will be started up.

HARRISON.—The new roasting-kilns recently erected at the works are partially completed and several of the stalls will be fired at once. The compartments are about ten feet square and six feet deep, erected in two parallel rows, with a flue between them, connecting with a stack 60 feet in hight. The compartments number sixteen or twenty. The ore to be roasted in these kilns is the sulphide mineral now produced by the Colonel Sellers and other mines of California Gulch. Quite a lot of this ore was found on the ground, which averages about forty per cent in sulphur. A layer of wood about twelve inches in depth, it is estimated, will start the sulphur in the ores to burning, and when this is once accomplished, the process will continue until completed.

IRON HILL CONSOLIDATED.—The mines during the month of September shipped 950 tons of ore. The product of the mines has shown a marked improvement in the average value per ton. The mines are all looking well. The new hoisting machinery for the Imes shaft is all in place and in working order. The shaft has reached a depth of 600 feet, penetrating the underlying limestone 200 feet. The intentions are to begin work at this shaft by drifting from the 400-foot level. It is at this station that a line of contact between the porphyry and limestone was intersected. The further exploration of the lower lime strata will, however, not be deferred any great length of time, and at an early day a pump is to be added to the plant, and the shaft, now containing considerable water, is to be cleared,

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and sunk to greater depth, and levels driven on the mineralized seams already disclosed.

LITTLE PITTSBURG.—Work is to be started up immediately on No. 10 shaft of the Little Pittsburg claim.

LITTLE SLIVER.—The mine is worked principally with a view to exploration and development, and as a consequence the output is very light.

LUZERNE.—An important strike was made recently in this lode. The ore consists of sand and hard carbonates, and ocher, and to all appearances will prove very rich in silver, in addition to carrying an appreciable amount of lead. The location is isolated from working mines, being about midway between the Henriett and Chrysolite and Little Pittsburg mines, and opens up a section of territory heretofore universally condemned. The possibilities presented are therefore great, and it would not be surprising if this discovery led to the development of an ore-chute that will prove a great bonanza. The shaft has a depth of 175 feet, and was sunk to within a few feet of the ore-body last year, when the owners ran out of funds, and were forced to suspend work.

ROBERT E. LEE.—The mine is working from thirty to forty men, and shipping from twenty to thirty tons of ore a day, in addition to the shipment of dump material to the Leadville Gold and Silver Mining Company's mill. The general range of the ore is from 60 to 300 ounces to the ton, while small lots have been shipped assaying as high as 2200 ounces in silver. The first, second, and third-class ores are sold to the smelters, who work them in with the lead ores and the low-grade material to stamp-mills.

SILVER CORD.—During the month of September, the mine shipped 3700 tons of ore. The output of the mine has not yet been completely settled for, but sufficient is known to show an appreciable deterioration in the grade of ore. The mine is producing its customary amount. So states the Leadville *Herald*.

RED MOUNTAIN DISTRICT.

The mines and prospects situated along Lake Creek, above Twin Lakes, are doing well. A number of properties are shipping regularly, and several mills in this section are kept employed steadily. The ten-stamp mill at Everett's is running on Forest Queen ore, and is doing satisfactory work.

Among the mines working is the Lucky Strike, which is having the assessment-work done, and is looking much better than last year, when the annual work yielded a ton of ore running 473 ounces in silver. The vein is two feet in width, and is situated on Mount Ewing.

The Jeannette mine is worked, and is producing some fair ore, that is shipped. A cross-cut tunnel is driving by the Jack Pot lode.

PARK COUNTY.

SOVEREIGN.—This property is situated on the eastern slope of North Star Mountain, and embraces four locations aggregating 6000 feet on the old Harrington vein.. This lode attracted attention twenty years ago, and its large production and unusual wealth soon collected about it a large number of the early miners, forming the town of Montgomery. The vein has a width of from four to ten feet, is very regular, and possesses fine walls. Its course is nearly north and south, with a dip to the westward of about 75 degrees. The oxidation of the mineral extends from 25 to 35 feet below grass-roots, where the ores in their original condition are found. Below this line, the vein-matrix consists of copper and iron pyrites and quartz carrying gold and silver in profitable quantities. The ore is reported to range in value from $50 to $150 per ton. The development of the mine aggregates about 4000 linear feet of tunneling and shafting, thoroughly demonstrating the strength and permanency of the lead. Several of the tunnels have been driven in on the vein from 200 to 300 feet, the deepest showing a solid breast of mineral four feet in width, that numerous assays have proved to be worth about one hundred dollars per ton. Another tunnel shows three feet of solid ore, while other openings show from twenty to thirty inches of excellent pay mineral. The lower tunnel is in 306 feet, and will be continued until a length of 2500 feet is attained, which will open the vein 800 feet below the outcrop and highest workings. The operations of the mine being confined to opening it for a future production, the yield so far has been light. The dumps, it is estimated, have 3000 tons of pay-ore, to which additions are made daily as development-work advances. The shipments during the past season have been limited to small quantities of free-milling ore. Thirty days' work on this class of material, treated at a quartz-mill, yielded 360 ounces of gold, worth nearly $7000.

SUMMIT COUNTY.

HORN-SILVER.—A large body of high-grade mineral has been struck.

DAKOTA.

FATHER DE SMET.—The superintendent reports October 1st: At the mine, work is going along as well as usual, with no important changes to note in any of the ore-breasts. The Golden Gate south header shows up as well as ever; the face is all in ore that samples from $5 to $7. We begin breasting out across the ledge to-day. East cross-cut, third level, is making very good progress, and ought to strike the ledge soon. The face is still in slate, mixed up with small stringers of quartz, but of not much value as yet. The report for the week ended October 7th shows: Ore extracted from first level, 900 tons; second level, 700 tons; third level, 375 tons. Ore milled, 1975 tons. The Golden Gate east cross-cut, third level, is 86 feet, and the Golden Gate south header, second level, is in 58 feet. The superintendent writes October 4th, as follows: I herewith inclose Express Co.'s receipt for bar No. 168, containing 1189·65 ounces gold, the result of the clean-up of the mill for the last half of September. This makes a total of 1947·35 ounces for the month. I am afraid it will be impossible to keep these figures up right along, but will do the best we can and make the best showing possible. At the mine, every thing is about the same as usual. The faces of both cross-cuts and south header show no change since last report.

KING SOLOMON.—The personal property has been sold at Tigerville. The Black Hills *Index* says that this is the result of bad management.

IDAHO.

The *Times* reports that the current season on Wood River has been one of great activity, and the consequent results are becoming apparent in the increased yield of the mines. Notwithstanding the late date of the completion of the railroad to Hailey, and the corresponding resumption of active operations, the yield of the mines, concentrating-works, mills, and smelters, will be large, and, when the many obstacles that had to be overcome are considered, eminently satisfactory. The aggregate yield of the Wood River and Sawtooth region this summer will probably not fall short of $5,000,000.

BAVARIAN.—Some ore treated showed 90 ounces silver and 75 per cent lead. The vein of this recently discovered mine is about two feet wide.

COLUMBIA & BEAVER.—The second shipment since starting up the mill has been made.

DAVITT.—This mine has yielded $45,000 since the end of last April, when the company resumed work. Within the past three weeks, a new shaft was started on a vein entirely distinct from the Davitt. This shaft is down 50 feet, in ore all the way, which shows widest at the bottom, where a drift that is in 25 feet from the shaft shows the vein to widen all the way out, until it gets to be fully two feet wide in the face of the drift. This new vein or ledge can be traced on the surface for 800 feet.

MAYFLOWER.—The Salt Lake smelters have purchased 100 tons, and an arrangement for the sale of all the product of the mine has been concluded with the agent of the Kansas City Reduction-Works. As soon as that contract is ratified by the company, the shipments of Mayflower ore (which have been suspended since the Ketchum Works refused to buy any more of it at the rates then ruling) will be resumed.

MULDOON.—The mine has been shut down for the winter.

SILVER KING.—About $40,000 were produced in two months.

MEXICO.

A correspondent of the Mexican *Financier* speaks of mines along the Pacific coast between Alamos and Mazatlan as follows: Near Alamos, there are the Minas Nuevas, run by an American firm, which employs 150 men, works 10 stamps, a concentrator and roasting-furnace, heating apparatus, smelting-furnace, and refining furnace. From Agiobampo, distant 170 miles, freights rule from $2.75 to $5 a carga. From Mazatlan to Agiobampo, freights are $10 a ton by schooner; and from Guaymas to Agiobampo, $8 a ton. Also in this district, within six miles of Alamos, four mines are working a large force, and three in Aduana.

The Promentorio mine has a 30-stamp mill, a 30-ton water-jacket smelter, and employs about 500 men.

At Pochibampo, no mines are actively worked now; but as soon as cheap transportation is afforded, several veins of low-grade and rebellious ores will be available.

At Techibampo, a number of mines have steadily been working for three years. The best ores have been shipped to Europe at a great expense, the cost of hauling to Agiobampo being about $35 a ton, and in little schooners from there to Mazatlan, $10 a ton.

At Roricarichi, are extensive silver mines which ship 300 or 400 tons a year to England of picked ores. It costs $50 a ton to haul or pack this ore to Agiobampo, or $4 a carga to the reduction-works at Minas Nuevas. At these mines, they leave about ten tons of low-grade ore on the dumps for every ton of ore they ship.

At Chinipas, there are a number of low-grade mines, which are now useless on account of the high rates of freights.

At San Agustin, there are two very important mines not now worked because the owners have not the means to put in the machinery required.

At Talmarapa, there are about 1000 men working on high-grade ore, with 14 stamps now running, and more going in.

The Hurapa mines are equally important. They have ten stamps now running by water-power, and will soon have twenty more worked by steam.

In the State of Sinaloa, is the Cosalá District, one of the largest in all Mexico. Some of its magnificent mines have been worked for many years, and are still as promising as ever. The Estacata mine had a vein of three inches on the surface. It gradually widened and increased until, at the depth of 400 feet, a bonanza was struck, not so rich, yielding $200 a ton. This was about 50 feet wide and 300 deep, when it became narrower and tapered into the original width of the vein. A second bonanza was struck at a much lower depth, 30 feet wide of continuous ore, averaging $250 a ton. Thirty stamps are employed. There is a group of old mines, the Mammoth, Realito, La Estrella, Mina del Agua, and Bufa, worked by a San Francisco company, the Mexican Mining and Real Estate Company of Sinaloa. The Mammoth opens into a large body of quartz. Two shafts have been sunk 200 feet deep and 120 apart, with rich rock on all sides, averaging $80 a ton.

The Realito is on the side of a mountain, reaching a vein three feet wide by a tunnel 500 feet above the arroya. The mineral assays run high. La Estrella dips at an angle of 45 degrees, is about 65 feet wide, assays average $175. The Bufa and Del Agua are also valuable properties. The company working these mines has large reduction-works and a large estate in lands, about 80,000 acres.

The Golconda mine, of the Cosalá District, is a large body of fine gold quartz, easy of reduction, and worked by the usual process. The ore at a depth of 120 feet assays $300 a ton. Several shafts have been sunk from 300 to 500 feet apart, each striking the same lode and the same body of ore. This mine is situated on the Cosalá River, a tributary of the Flota, and within a mile and a half of the valley of Cosalá.

The Nuestra Señora is another old and celebrated mine which has produced millions.

The Barretras mine built up the town of Cosalá and was founded on its tributes.

Northeastwardly from Culiacan is the Guadalupe and Calvo District, with rich mines all around, among them the Yedras, owned by Clarence King's company, with 40 stamps and consuming from 5 to 8 tons of salt daily. The Guadalupe and Calvo mine, with ten stamps, takes three quarters of a ton of salt a day to work 15 tons of ore. The Mineral del Cuerro ore is free-milling.

At Galiana, several companies have recently been organized. The Aldama mine is now opening up, and the natives work scores of mines in a small way by arrastras. From this group, conductas charge one per cent for taking ore to Parral or Culiacan.

TLALPUJAHUA DISTRICT.

BORDA.—At this mine, they are making a new start at the northern end, and will cut the main vein at a depth of 50 or 60 yards.

CONCEPCION.—The July product of the mine was 7000 ounces of silver; in August, it increased to 13,247 ounces. The mine is producing from 250 to 300 cargas a week, there being 300 pounds to the carga. Up to June, the work cost at the rate of from $8 to $10 a carga. In July, it cost $4.25 a carga; in August, it cost, up to the 22d, $3.15 a carga; and the last week of August the cost was reduced to $2.85. It is thought that the cost can be reduced to as low as $1 a carga. The present cost of milling is $8.10 a ton of 2000 pounds, that is, with the small five stamps and three barrels now running; but if they had 50 stamps, the milling could be done for $4 or $5 a ton. The average of ore is 67 ounces to the ton, but the select ores go as high as $1800 to the ton, and very small amounts, $4000 or $5000 a ton. The actual depth of the mine, although it is an old one, is only 225 feet. The main vein is 8 feet wide. If the mine were worked with hoisting machinery and all kinds of improvements, the ore could be taken out at $2 a ton; but by having peones to carry it out on their backs, it costs four times as much, and of course low-grade ore can not be worked profitably.

MONTANA.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED.—The following statement shows the production from January 1st to August 31st:

Month.	Pounds lead.	Ounces silver.	Ounces gold.	Value in dollars.
January	419,416	41,651·80	2·293	$64,310.46
February	394,618	38,327·12	1·171	59,562.60
March	401,194	40,229·35	9·462	63,396.02
April	405,275	35,314·27	2·032	56,711.91
May	405,749	38,550·23	8·088	61,470.05
June	533,309	56,531·93	2·022	85,521.42
July	531,551	55,524·01	1·767	84,286.50
August	458,149	55,421·47	2·128	81,089.57
	3,549,252	361,580·18	29 963	$556,348.53

GALLATIN COUNTY—NEW WORLD MINING DISTRICT.

The district is situated at the head of Clark's Fork, bordering Wyoming, on the western spur of the Bear Tooth Mountains. The mineral belt is about eight miles wide, extending from the western slope of Miller to the eastern slope of the Henderson Mountains, and fifteen miles long, running from the Wyoming line, on the south, to Lake Providence, on the north. The veins are numerous, strong, and well defined in a porphyry and slate formation, trending north and

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south, and bearing rich tetrahedral and cube galena ores. The country abounds in iron and lime for fluxing purposes.

REPUBLIC.—This company is the only one in operation. It is erecting concentrators and smelters with a capacity of 100 tons per day. The company owns several valuable claims which are thoroughly prospected, showing sufficient ore in sight to keep the works running for a limited number of years, and from tests made will yield from 55 to 60 ounces in silver and from 45 to 50 per cent lead.

LEWIS & CLARKE COUNTY.

BOSTON & MONTANA COMPANY.—The machinery for the additional works at the Gloster is now shipping. By the addition to the plant of sixty stamps, the company will have the pan amalgamating principle which has proved profitable in the gold mines of California. The machinery of twenty-four pans and twelve settlers is constructing by the Union Iron-Works, of San Francisco.

SILVER BOW COUNTY.

ALICE.—In the 100-foot level, the stopes are in a body of black sulphurets, which break off from the ledge in blocks and work and mill easily. The ore assays from 120 to 130 ounces. The west drift from the 800 has advanced 125 feet from the bottom of the winze, and the stopes are in 58-ounce ore. Prospecting is vigorously prosecuted at the face of the drift, to develop the extent and value of the vein. So far as developed, the ore-body in the lower level has been very satisfactory. The rock is fine-grained and carries less base than the ore from the upper levels, and, like the south vein, there is a great improvement in the quality of the ore as depth is attained.

ANACONDA.—The Dexter mill is running on free-milling ore from the Anaconda dump and running through 25 tons per day. The ore is from the waste-dump, and after sorting, produces from 14 to 16 ounces to the ton, which is worked at a profit under the improved appliances in use at the Dexter.

POLLACK.—Clark Brothers, of Walkerville, who are operating this property under a lease, have run a tunnel on the ledge from the east end of the claim which is now in 125 feet. A shaft is running which will intercept the tunnel 100 feet farther west, and another shaft has been started to the west and south. Both shafts and tunnel are in good pay, some of the ore assaying high.

TRAVONIA.—Much interest is taken in Butte in the development of this property, recently begun by W. A. Clark, from the fact that it was in this mine that silver-bearing quartz was first discovered in Summit Valley, and shipments to the Newark Refining-Works of the rich chloride ore from the Travonia first attracted the attention of outside capitalists to the camp. In 1875, twenty-five tons of ore from the west shaft were shipped to Newark, which returned over 300 ounces per ton, and in 1877 another shipment was made, which returned 136 ounces of silver and $6 gold. The mine has lain idle for many years until recently. A lot worked at the Colorado smelter recently yielded about the same return. The work at present is principally confined to development and exploration to determine the character and value of the ore-chutes. Very thorough work is done.

NEVADA.

ESMERALDA COUNTY.

COLUMBUS CONSOLIDATED.—All recent work in this mine has been followed by good results. The connection made between the new shaft and the Bonanza winze has proved to be of great advantage to the men working in the winze, as well as to those in the other parts of the mine. When sinking was resumed in this winze, it was down 83 feet. It has now reached a depth of 107 feet. The bottom shows streaks of very rich ore. It is intended to sink 25 or 30 feet farther, and then drift to the east and west on these streaks of ore. The prospect in this winze is very encouraging, and the work of sinking and developing will be diligently prosecuted. The cross-cut has a length of 33 feet, its face being in ground showing broken ledge-matter.

MOUNT DIABLO.

The drift from lower winze No. 2 has developed some ten inches of $40 ore. The stope from this winze shows improvement, and is giving considerable $60 ore. The stopes below the third level, near winze No. 1, are yielding a good deal of $50 ore. The stope above the west drift on the third level is giving some $40 ore from a wide ledge. A little rich ore is extracted from the second level near the center of the mine. The east and west drifts on the second level are giving considerable manganese ore of rather low grade. The intermediate, between the first and second levels, is turning out a good deal of $60 ore. The stope above the west drift from the Callison winze shows a rather stronger ledge in the west end. The center of the ledge shows but little of value, while the east end of the stope is giving some ore of high grade.

EUREKA COUNTY.

EUREKA CONSOLIDATED.—The recent development on the 1200-foot level has gradually improved. Other parts of the mine, all worked through the old shaft, have also brightened materially. The developments in the K. K. ground also continue with the most cheering results.

STOREY COUNTY—COMSTOCK LODE.

There is nothing of importance to report from the various mines. Work goes on as usual. The low water in the Carson River, however, prevents the mills from running to their full capacity. Mr. J. W. Mackey has recently been in Virginia City, and visited the Union Consolidated and adjacent mines. In an interview, he stated that he found the north end mines greatly improved.

NEW MEXICO.

GRANT COUNTY.

Until recently, very little has been heard of the Steeple Rock District, which is in the western part of Grant County, bordering on the Arizona line. The mineral belt is about two miles in width, the veins being true fissures, cutting the formation for miles in extent. The formation is principally porphyry, the ore being found in the quartzite ledges. The ore-body, of course, varies in width, but in some places where opened up has been found to be thirty feet wide, carrying principally gold, but also running well in silver.

LINCOLN COUNTY.

RITA.—The mine has about forty feet of development. A clean-up was lately made at Professor Glass's stamp-mill, from a run of eighteen tons of the Rita ore, which resulted in a nugget of gold weighing thirty-one ounces, valued at $20 per ounce, or $620.

SOCORRO COUNTY.

The product of the smelting-works at Socorro for the past month amounts to 10,000 bars of bullion. A third stack is building, when the monthly product will be $75,000 in bullion.

NORTH CAROLINA.

It is reported that the copper mines at Ducktown have been purchased by an English company from Williams & Black, of New York, for $600,000. The mines failed a few years since for $3,000,000. They are the most extensive in the South.

UTAH.

BOX ELDER COUNTY.

TRUE FISSURE.—The mine is producing regularly. A shipment made demonstrates that the ore is getting richer and better as depth is gained.

SALT LAKE COUNTY.

GERMANIA.—The smelter began shipping August 3d, and up to September 10th shipped fifty-six cars of bullion, 1,857,955 pounds, valued at $129,006.95. The white-lead product has been an average of one car per week of the value of $1500, and lead pipe the same amount, the product having been regular since June 1st.

UTAH COUNTY.

The mining outlook in the American Fork Cañon is very promising, although it must be admitted that the camp is rather slow in showing-up, says a correspondent of the Salt Lake *Tribune*.

The Live Yankee has a very large body of good ore in sight, but is working a small force.

The Silver Bell is working a force of ten men. A tunnel is driving to strike the ledge. The mine is shipping no ore, and probably will not ship any until the tunnel strikes the lower levels, where there is an abundance of ore in sight.

In the Silver Lake District, the Milk Maid is working 16 men, and ships from ten to fifteen tons of ore per week.

West of this property are the Good Hope and Olney mines, both in granite formation, and with shafts from 70 to 80 feet deep. These mines show fine ledges of quartz, assaying from 30 to 40 ounces in silver, from $3 to $10 in gold, and a very small percentage of lead. The gold quartz formation in the ledges of those mines is from one to three feet wide, and appears to grow richer as depth is attained.

WISCONSIN.

The discovery of a large bed of iron ore in the northern part of the State is reported.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED SEPTEMBER 4TH, 1883.

284,177. Process of and Apparatus for Desulphurizing Ores. William Frank Browne, New York City.
284,178. Method of and Apparatus for Desulphurizing Ores. William Frank Browne, New York City
284,181. Furnace. Gottlieb F. Burkhardt, Boston, Mass.
284,233. Process of Dephosphorizing Iron in an Open-Hearth Furnace. Jacob Reese, Alleghany, Pa.
284,246. Bagasse-Furnace. John C. Semones, Minden, Neb.
284,287. Crucible, Muffle, etc. Thomas Egleston, New York City.
284,293. Amalgamating-Pan. Charles Gracey, Contention, Ariz.
284,383. Manufacture of Iron in Blast-Furnaces. Charles Cochrane, Stourbridge, County of Worcester, England.
284,384. Furnace for Reducing Ores. Victor Colliau, Detroit, Mich., Assignor to the Colliau Furnace Company, same place.
284,392 Amalgamator. Joseph C. Dane and William L. Card, La Crosse, Wis.
284,401. Ore-Separating Machine. Orison L. Farnham, St. Johnsbury, Vt., Assignor to John H. Paddock, same place.
284,458. Gas-Retort Furnace. George A. McIlhenny, Washington, D. C.
284,502. Plastic Refractory Material for Repairing Ingot-Molds. Thomas Smith, Alliance, O.
284,550. Process of Annealing Cast-Steel or Iron. James Henderson, Bellefonte, Pa.
284,551. Process of Purifying Solid Iron, producing therefrom Malleable Iron or Steel without Fusion. James Henderson, Bellefonte, Pa.
284,552. Basic Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
284,553. Basic Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
284,554. Basic Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
284,560. Coal-Mining Machine. Richard Johnson, Belleville, Ill.
284,574. Basic Process for the Manufacture of Homogeneous Ingot Iron and Steel. Jacob Reese, Pittsburg, Pa.

GRANTED SEPTEMBER 11TH.

284,589. Purification of Mineral Oils. Alexandre André, Fils, Paris, France.
284,611. Rock Pulverizer. Francis M. Case and Willis Case, Denver, Colo.
284,613. Machine for Separating Stones from Clay. Harvey Cockell, Chicago, Ill., Assignor to Richard S. Reynolds, same place.
284,652. Furnace and Hollow Grate-Bar. Otis B. Morse, Great Falls, N. H.
284,691. Dumping-Car. Matthew Van Wormer, Melrose, Mass.
284,693. Cupel Mold. Henry W. Walker, San Francisco, Cal.
284,700. Rolling-Mill. S. T. Williams, Troy, N. Y., Assignor of one half to Robert W. Hunt, same place.
284,799. Hand-Drill. D. Fletcher Barber, Newton, Assignor of one half to Albert M. Gardner, Boston, Mass.
284,830. Furnace-Protector. David R. Fraser, Chicago, Ill.
284,850. Boring-Machine. Theodore Hofstatter, Jr., New York City.
284,865. Miner's Lamp. Charles A. Lee, Arlington, Tex.
284,895. Apparatus Employed in Sinking Pits or Shafts. Ildephonse Quinet and Arthur Denis, Denain, France.
284,946. Combined Pulverizer and Grader. William Commeans, Lilly Chapel, O.
284,949. Brick Machine. Jonathan Creager, Cincinnati, O.
284,950. Metallic Coal-Oil Barrel. James W. Cuthbertson, Bothwell, Ontario, Can.
284,967. Drill-Rest. Henry C. Laubach, Philadelphia, Pa., Assignor to Edward L. Bartlett, Baltimore, Md.
284,992. Reverberatory Smelting-Furnace. Riley P. Wilson, Cleveland, O.

GRANTED SEPTEMBER 18TH.

285,040. Furnace-Grate. William Kearney, Belleville, N. J.
285,098. Concentrator. David H. Anderson, Butte City, Mont., Assignor of one half to William H. Young and Hezekiah Rondebash, both of same place.
285,110. Ore-Concentrator. William F. Carter and John M. Adams, San Francisco, Cal.
285,111. Dry Gold-Separator. Salathiel C. Chaney, Chico, Cal.
285,113. Continuous Rolling-Mill. George W. Corbett and John E. Cunningham, Chartiers Township, Alleghany County, Pa.
285,232. Ore-Concentrator. Alexander D. Clarke, New York City.
285,297. Air-Compressor. Charles Moore, Philadelphia, Pa.
285,307. Ore Washer. John G. Roberts, Idaho Springs, Colo.

GRANTED, SEPTEMBER 25TH.

285,387. Power-Hammer. John C. Butterfield, Chicago, Ill.
285,388. Stamp-Mill. John C. Butterfield, Chicago, Ill.
285,389. Atmospheric Hammer. John C. Butterfield, Chicago, Ill.
285,390. Atmospheric Hammer. John C. Butterfield, Chicago, Ill.
285,391. Mortar for Stamp-Mills. John C. Butterfield, Chicago, Ill.
285,431. Utilizing Phosphorus and Steel Scrap in the Basic Process. Jacob Reese, Pittsburg, Pa.
285,508. Amalgamating Ores and Sands containing Gold. Almarin B. Paul, San Francisco, Cal.
285,516. Rock-Drill. Alfred Shedlock, Brooklyn, N. Y.
285,522. Regenerative Furnace. William Swindell, Pittsburg, Pa.
285,523. Apparatus for Washing and Separating Gold and Silver from their Ores. William J. Tanner, London, County of Middlesex, England.
285,538. Ore-Crusher. Frank Wheeler and William W. Wheeler, Meriden, Conn.
285,565. Method of Excavating and Apparatus therefor. Frederick Brotherhood, Charleston, S. C.
285,615. Incrustation-Preventive. James B. Hannay, Glasgow, County of Lanark, Scotland.
285,627. Rotating Furnace. J. Burrows Hyde, New York City.
285,628. Apparatus for Boring Rocks under Water. Joseph T. Jones and Joseph H. Wild, Leeds, County of York, England.
285,629. Ratchet-Drill. Robert K. Jones, Liverpool, County of Lancaster, England.
285,638. Process of Producing Babbitt Metal. Amos C. Mann, St. Louis, Assignor of one fourth to Franz Krein, same place.
285,664. Conveyer. Frank I. Pearce, Chicago, Ill., Assignor to the Link Belt Machinery Company, same place.
285,718. Helve of Power-Hammers. Charles W. Willard, Chicago, Ill.
285,726. Drilling-Machine. William F. Barnes and John Barnes, Rockford, Ill.
285,733. Ratchet-Drill. Cemer Thomas Colebrook, Islington, County of Middlesex, England, Assignor to himself and Joshua Rose, New York City.
285,743. Air-Compressor. William T. Fox, Rochester, N. Y.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Oct. 19.

There is no change of interest to report in the mining market this week. Business is still confined to a few fancy stocks, and the transactions outside of these are very limited. Harlem was the most active stock in the market and was a little stronger. A few of the Tuscarora stocks exhibited a little strength, especially Navajo, which sold at very strong prices today. The general tone of the market was steady. A full summary is given below. The total number of shares sold aggregates 152,376, as against 193,710 last week.

The Comstock shares have been moderately dealt in at steady prices. California was quiet and steady, selling from 17@20@18c. Consolidated Virginia was strong, under a small business, selling from 45@56c. Sierra Nevada was also strong; it sold from $4@$4.30. Union Consolidated was quiet and steady at $3.90. Mexican was moderately dealt in at steady prices; it sold from $3.40@$3.75, assessment paid, and from $2.45@$2.25 assessment unpaid. Ophir was strong, with a small business; it sold from $5@$6.25. Hale & Norcross was fairly dealt in and was quite weak; it sold from $2.75@$1.10. Savage sold at $1.10. Yellow Jacket at $3.50, and Best & Belcher at $3. Sutro Tunnel was active and irregular, selling from 16@18@17c.

The Leadville stocks were very quiet at about steady prices. Amie was irregular, under a very active business, selling from 13@9@11c. Chrysolite was quiet and a little weak, selling from $1.20@$1.10. Dunkin was steady at 25@28c. Iron Silver was quiet and steady, selling from $3.15@$3. Leadville sold at 40c., under a small business. Little Chief was moderately dealt in at steady prices; it sold from 60@57c. Little Pittsburg was also steady, under a small business, selling from 62@65@64c. Climax sold from 9@8c.

The Bodie stocks were quiet and steady. Bodie Consolidated was quite strong, with a small business, selling from 59@70c. Standard was quiet and irregular, selling from $6.25@$5.63@$5.75. Consolidated Pacific sold at 45c., and North Standard at 16c.

The Tuscarora stocks were moderately dealt in at strong prices. Grand Prize sold at 47c. Belle Isle was quiet and weak, declining from 50@41c. Navajo was very strong, under a moderate business; it sold from $3.60@$4.60. North Belle Isle was also strong, with a small business, selling from 50@64c. Elko Consolidated was very active at irregular prices; it sold from 2@4c.

In the miscellaneous list, Alice was quiet and steady, selling from $2.65@$2.75. Eureka Consolidated was moderately dealt in at irregular prices; it sold from $5.63@$6.25@$5.50. Horn-Silver was fairly dealt in at steady prices, selling from $6.63@$7. Robinson Consolidated was very irregular under a moderate business; it sold from 36@45@40c. Sierra Grande was quiet and steady at $1.05.

Barcelona was moderately active at irregular prices, selling from 25@30c. Decatur was quiet and steady, selling from 4@3c. Eastern Oregon was fairly active at irregular prices; it sold from 48@41@42c. Harlem continues to be very actively dealt in, and has been quite strong; it sold from 86@93c. Silver Cliff sold from 10@8c. under a small business. Sonora Consolidated was very active at steady prices; it sold from 22@25@24c.

The Homestake Company has reduced its monthly dividends from $50,000 to $25,000.

The Ontario Mining Company, which is at the head of the list as a dividend-paying property, has resumed the payment of dividends, and the one just declared makes a total of $5,000,000 paid to its stockholders since the mine was placed on a dividend-paying basis.

A dividend of twenty cents a share has been declared by the Father de Smet Mining Company. This is the first since last July.

MEETINGS.

The Carbonate Hill Mining Company, No. 115 Broadway, New York City. Annual meeting of stockholders and election of trustees, November 8th, at one o'clock P.M.

The Empire Copper Company, office of M. H. Hoffmann, Room 7, No. 629 Walnut street, Philadelphia. A special meeting of stockholders, for the purpose of authorizing a sale of the pine timber on a part of the company's lands in Keweenaw County, Michigan, November 10th, at one o'clock P.M.

The Resolute Mining Company, office of M. H. Hoffmann, Room 7, No. 629 Walnut street, Philadelphia. Special meeting of stockholders for the purpose of authorizing a sale of a part of the company's lands in Keweenaw County, Michigan, November 10th, at twelve o'clock M.

The Spring Creek & Rockerville Water and Mining Company, office of T. J. Temple, No. 155 Broadway, New York City. Annual meeting of stockholders, November 14th, at three o'clock P.M.

DIVIDENDS.

The Crescent Mining Company, of Utah, has declared dividend No. 4, of $30,000, payable at Salt Lake City, October 31st. The total dividends to date are $150,000.

The Father de Smet Mining Company, of Dakota, has declared a dividend of twenty cents per share, payable October 31st, at the office of Laidlaw & Co., No. 14 Wall street.

The Homestake Gold Mining Company, of Dakota, announces its regular dividend of $25,000 for September, making a total thus far of $2,237,500. The present dividend is payable at the office of Lounsbery & Haggin, transfer-agents, Mills Building, No. 15 Broad street, on October 25th.

The Ontario Silver Mining Company, of Utah, has resumed its regular dividends, and the eighty-eighth, amounting to $75,000, will be paid by Messrs. Lounsbery & Haggin, transfer-agents, at their office, Mills Building, No. 15 Broad street, on October 31st. The above dividend makes a round total of $5,000,000 paid to date.

PIPE LINE CERTIFICATES.

Watson & Gibson, petroleum brokers, No. 40 Broadway, report that the petroleum market during the past week has been dull and featureless.

The flurry in Wall street and decline in prices of meats and breadstuffs in Chicago would naturally have exercised a depressing influence on the petroleum market. That oil has held so steady and firm is evidence that the leading bulls are supporting the market. The news during the week has encouraged the bulls, as Howe No. 11 and Balltown No. 14, were of no value as producers, and reports were circulated that Bradford and Allegheny fields were declining in production. The "runs," so far this month, are about 10,000 barrels daily less than the shipments, and charters continue large. The petroleum market is so stagnant that the public are not inclined to load up, and until the temper of general speculation changes, we do not anticipate any bull movement of importance.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Oct. 13	$1.10¾	$1.11⅞	$1.10	$1.10¼	4,748,000
15	1.10⅝	1.11⅛	1.10½	1.11	3,380,000
16	1.11⅜	1.1 ⅞	1.10⅛	1.10⅛	4,175,000
17	1.10¼	1.10¾	1.09⅝	1.10	4,023,000
18	1.09⅝	1.11	1.09⅝	1.10⅝	2,577,000
19	1.10⅝	1.11¼	1.09¾	1.09⅞	2,816,000
Total sales					21,719,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, October 18.

There is but little to be said regarding the market for mining stocks the past week. There is but very little doing, either in coppers or silvers, and prices have had a downward tendency. Calumet & Hecla is now selling at $239½, ex dividend $5 per share, which is a decline of $½. Quincy declined from $51 to $50 on small sales. Pewabic declined from $1½ to $1¼, with late sales at $1⅜. An assessment of $1 per share has been levied upon this stock, payable on the 23d inst. Osceola sold same as last week at $19. Franklin sold at $12⅞ for a small lot. The rest of the copper list is totally neglected. The whole amount of sales for the week is less than 600 shares, and fully reflects the entire want of activity in the market.

The silver stocks are without any special feature. Catalpa declined from 32½c. to 30c. Sullivan steady at 87½c. Silver Islet sold at $3. San Pedro sold at 15c.

At the Mining Stock Exchange, business continues to rule dull, and, with the exception of Empire prices are lower. Empire is in fair demand, and but little stock offering. Sales were made yesterday at 24@25c.; to-day, 26c. is bid without bringing out any stock. Bowman Silver is dull and no disposition to trade in it; price rules at 12@13c. Massachusetts & New Mexico has almost faded out of sight; occasional sales at 3@4c. In Sullivan, there is more doing than at the old Board, and better prices are obtained. Sales at 87½@92½c. regular, and 97½, buyer 60 days.

3 P.M.—At the afternoon Boards, Empire sold at 28c.; closing 27c. bid. Sullivan steady at 92½@90c., seller 30. Franklin sold at $12. Quincy offered at 50c. Remainder of market unchanged.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Oct. 12.	Oct. 13.	Oct. 15.	Oct. 16.	Oct. 17.	Oct. 18.
Albion	.....	.....	.....	.....	.....	.....
Alpha	.....	2⅛	2⅛	2	.....	2
Alta	1⅝	1½	1½	1½	1½	1½
Argenta	.15	.25	.25	.....	.40	.20
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	1¼	1⅝	.....	1⅝	1⅝	1¼
Belle Isle	.35	.....	.40	.40	.50	.50
Best & Belcher	3¼	3¼	3⅛	3¼	3⅜	3½
Bodie	.50	.55	.60	.70	.70	.65
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
California	.20	.25	.20	.20	.20	.15
Chollar	2⅜	2¼	2⅜	2⅜	2⅝	2½
Con. Virginia	.50	.50	.55	.55	.55	55
Crown Point	1¼	1¼	1¼	1¼	1⅜	1¼
Elko Cons	.....	.....	.....	.....	.....	.....
Eureka Cons	.....	.....	5	4½	4¾	4¾
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	2¼	2¼	2¼	2⅛	2⅛	2¼
Grand Prize	.50	.50	.50	.55	.55	.55
Hale & Norcross	3⅛	2½	2½	2½	2⅞	2⅝
Independence	.....	.....	.....	.....	.....	.....
Martin White	.....	.....	.....	.....	.....	.....
Mexican	2⅝	2⅝	2½	2⅝	2½	2⅝
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	4¼	.....	4	.....	.....	.....
Navajo	3¼	3½	3¾	4	4½	4⅝
Northern Belle	5	.....	.....	.....	.....	.....
North Belle Isle	.....	.....	.....	.....	.....	.....
Ophir	4¾	6⅛	6½	5¾	5⅞	5¾
Overman	.....	.....	.....	.....	.....	.....
Potosi	1	1	1	1	1	1
Savage	1¼	1⅛	1¼	1⅛	1¼	1½
Scorpion	.60	.....	.60	.60	.60	.55
Sierra Nevada	4¼	4¼	4⅜	4⅜	4½	4¼
Silver King	.....	.....	.....	.....	.....	.....
Tip Top	.....	.....	.....	.....	.....	.....
Union Cons	3⅜	3⅞	4	4	4⅛	4
Utah	1⅞	2	2	1⅞	2⅜	1⅞
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	3⅜	3¾	3½	3⅜	.....	3½

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 19.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Oct. 13	50⅞	110½	Oct. 17	51	110¾
15	50⅞	110½	18	51	110¾
16	50 15-16	110⅝	19	51	110¾

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended October 19th, as compiled from various sources, amounted to $218,000, as against $296,000, reported for the previous week. The receipts from January 1st, 1883, to date are $9,163,047.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended October 13th	$272,158
Corresponding week last year	25,700
Since January 1st, 1883	11,550,234
Corresponding period last year	44,327,495

Imports.

Week ended October 13th	$7,022
Corresponding week last year	434,827
Since January 1st, 1883	12,913,242
Corresponding period last year	3,803,812

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £311,000 bullion, and the proportion of its reserve to its liabilities was raised from 42¼ to 43¾ per cent, against 35 11-16 per cent at this date a year ago. October 18th, the bank lost £30,000 bullion on balance. The weekly statement of the Bank of France shows losses of 350,000 francs gold and 360,000 francs silver. The statement of

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the Imperial Bank of Germany shows a loss of specie amounting to 2,260,000 marks.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 or ounce troy; gold at the standard $20.67 per ounce roy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of September.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	.....	$681,587
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal....	15.659	189,660
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	.....	426,967
*Boston & Montana, G.	Mont...	.....	128,830
*Central Arizona, S.	Ariz..	.....	35,845
*Christy, S.	Utah..	20,981	201,715
*Chrysolite, S. L.	Colo....	27.183	311,491
*Consolidated Bobtail, G.	Colo...	.....	47,986
*Contention, S.	Ariz..	79,224	714,637
Crescent, G.	Cal....	.....	13,000
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak...	51,960	335,840
*Derbec Blue Gravel, G. S.	Cal ...	14,097	102,579
Dunkin, S. L.	Colo....	6,113	42,959
Evening Star, S. L.	Colo...	.....	47,061
*Father de Smet, G.	Dak....	32.286	270,876
*Frisco M. and S. Co., G. S. L.	Utah...	.....	$77,084
*Granite Mountain, S.	Mont...	63,834	165,950
Gunnell, S.	Colo...	.....	58,828
*Haile, G., S., C.	S. C....	.....	27,900
*Head Center Consolidated	Ariz..	.....	32,618
*Head Center and Tranquillity	Ariz.	.....	89,108
*Hecla Consolidated, G. S. L.	Mont...	**77,630	633,979
*Homestake, G.	Dak..	81,624	767,596
*Hope, S.	Mont...	19,613	82,060
Horn-Silver, S. L.	Utah...	303,00	2,174,200
*Howell S. and Mg. Co., G. S. L.	Ariz....	23,76)	114,289
Idaho, G.	Cal....	.....	150,642
*Independence, G. S.	Nev....	.....	32,991
Iron Silver, S. L.	Colo...	.....	751,062
*Jocuistita, S.	Mex....	.....	‡258,959
*Kentuck, G. S.	Nev ...	.....	16,866
*Lexington, S.	Mont...	111,005	967,708
*Little Pittsburg, S. L.	Colo....	10,473	64,078
*Marguerite, G.	Cal	3,200	68,794
*Martin White, G. S.	Nev....	.....	136.317
Morning Star, S. D.	Colo...	.....	84,428
*Moulton, G. S.	Mont...	.....	123,288
Mount Diablo	Nev ...	51,709	381,142
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	30,340	505,827
*Ontario, S. L.	Utah...	185.834	1,595,378
*Oxford, G.	N. S....	4,910	50,175
*Phœnix, G.	N. C...	3,500	21,009
*Pinal Consolidated, S. L.	Ariz ...	.....	181.485
*Plymouth Consolidated, G.	Cal ..	68,864	296.082
*Satemo, G.	N. S...	.....	2,500
*Silver Bow, G. S.	Mont...	.....	203.947
*Silver Cord, G. S. L.	Colo...	.....	703.333
Silver King, S.	Ariz ...	.....	367,802
Standard, G.	Cal	95,878	875,222
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah...	17,686	193,791
Syndicate, G.	Cal ..	9,623	56,008
Tintic M. and M. Co.	Utah...	5,554	34,670
*Tip Top, S.	Ariz....	.....	87,868
*Tombstone, G. S. L.	"	.....	548,764
Wyoming Consolidated.	Cal	.....	31,541
Yellow Jacket, S	Nev....	.....	265.885
Total amount of shipments to date			$17,641,331

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. **Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Oct. 19.

Copper.—The lake companies have made an arrangement with the leading companies to extend the contracts about to expire to the end of the year, the price to remain the same, 15c.; and the quantity involved being, it is stated, eight millions of pounds. In other kinds, little has been done, Baltimore selling in a small way at 14⅝c. We quote for Lake 15⅛@15¼c.; and for other kinds, 14¼@14¾c., according to brand. England has again receded, being cabled to-day £60 15s. for Chili Bars. It appears to be becoming a question who will survive in a struggle in the markets of the world, our silver-bearing copper material and high-grade copper from oxidized ores, or the crude copper of Chili. The balance is strongly in our favor, but the time before Chili producers fall off may be a long one.

The trade will learn with sorrow of the sudden death, yesterday afternoon, of Mr. Nathaniel S. Simpkins, Jr., who has been identified with the Calumet & Hecla Company since its inception. His brother, Mr. John Simpkins, was president of the Huron Company when the agent of that company, in building a road, uncovered the Calumet & Hecla conglomerate. The two brothers, with Captain Frue, became interested in the property. They engaged Captain Hardy, of the Quincy, to open out the mine, his successor being Professor Agassiz, who had acted as manager of the Boston & Albany. On the death of his elder brother, who managed the affairs of the company in the East, N. S. Simpkins, Jr., in 1870 took charge, and for many years practically controlled the copper market.

Messrs. James & Shakspeare, of London, have issued the following statistics of copper in England and France, including metal afloat:

	Sept. 1 to 30. Imports. Tons.	Deliveries. Tons.	
Fine foreign, chiefly Australian.	802	$80	London.
Chili Bars	2,629	808	Liverpool and Swansea.
Chili Ingots	340	255	
Chili In ores and regulus	307	5	
American	729	770	
Spanish precipitate and sundries.	4,026	4,145	
Totals, England	8,833	6,963	
American	525	575	France.
Chili bars, ingots, and Barilla	1,535	1,080	
Sundries	95	95	
Total, England and France	10,988	9,293	

	Stocks. Sept. 29. Tons.	Aug. 31. Tons.	
Fine foreign, chiefly Australian	3,900	4,078	London.
Chili Bars	25,155	23,334	Liverpool and Swansea.
Chili Ingots	536	451	
Chili In ores and regulus	2,115	1,813	
American	97	138	
Spanish precipitates and sundries	4,338	4,457	
Totals, England	36,141	34,271	
American	340	390	France.
Chili bars, ingots, and Barilla.	1,922	2,047	
Sundries	30	30	
Total, England and France	38,433	36,738	
Advised by mail and telegram:			
Chili	10,200	11,209	
Australian	900	900	
Stock and afloat, gross totals	49,533	48,845	

	Jan. 1 to Sept. 30. 1883. Tons.	1882. Tons.	1881. Tons.
Imports	71,409	58,458	57,709
Deliveries	68,103	62,606	61,403

The last figures are significant. They show an enormous increase in the imports thus far.

Tin.—The market is quiet, with an undercurrent of weakness. For Spot Straits 20⅝c. is asked. We note a sale of 200 tons, delivery after January, at 20⅝c. London cables £93 7s. 6d.@£93 10s.

Lead.—Under sales in small parcels aggregating 500 tons of Common and Refined, the market has receded from 4·20 to 4⅛c., with Refined at 4·15c. More is offered at these figures, but there are no buyers, the latter maintaining an attitude of reserve. The short season will soon be over, and a falling off in the demand from that quarter is looked forward to. Should the winter prove an open one, the pipe trade will continue brisk; if not, there will be a contraction of the supplies needed for that purpose. It is reported that desilverizers are making very favorable terms with smelters, the offerings of base bullion being very large.

Messrs. John Wahl & Co., St. Louis, wire us as follows to-day:

Sales during the week aggregate 250 tons of Refined at 3·90c., delivered at buyers' works; 400 tons November delivery, at the same figure; and 300 tons of ordinary Missouri to Eastern consumers at 3·80c. Our market closes firm at 3·90 for spot Refined, on account of the railroad switchmen's strike here.

Messrs. Everett & Post, of Chicago, telegraph to-day:

In our market, sales of Refined and Common have been more freely made since our last, and several hundred tons have been placed at 3·90c., 3·92½, and 3·95c. Our market is now heavier, flat, and weak, buyers, as they expect a decline, holding off, and making their purchases only for immediate delivery.

Spelter.—This metal has relapsed into dullness, and is weaker, ordinary Western being procurable under 4½c. European advices are higher.

Sheet-Zinc is very low, selling here for 5⅝@5¾c. in jobbing lots, in spite of the fact that the card rate in the West is 6c., less 11 per cent for cash.

Antimony.—Antimony is a little firmer, at 10½c. for Cookson's, and 9c. for Hallett's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Oct. 19.

American Pig.—The event of the week has been a further reduction by the Thomas Iron Company of its prices of foundry iron, to $20.50 for No. 1 and $19.50 for No. 2, at which figures sales of about 1000 tons were made in the beginning of the week, with no further business during the past two days. We quote $20.50@$21.50 for No. 1 and $19@$20 for No. 2, with mill irons, which are a little more active, at $17.50@$19 at tide. Bessemer pig is dull, foreign being freely offered at $20.50 at tide. Spiegeleisen is quiet at $30@$30.50.

At the Exchange, the following sales were recorded:

Monday, 200 tons American Pig, No. 1, January, $20. Wednesday, 500 tons American Pig, No. 1, Janary, $20; 300 tons No. 1, February, $20¼.

Scotch Pig.—The market continues dull and lifeless, though there is no exceptional cutting. Arrivals are light, aggregating 1200 tons.

We quote ex ship and to arrive: Coltness, $23.25; Langloan, $23.25; Summerlee, $22.50@$23; Eglinton, $21; Glengarnock, $22@$22.50; Dalmellington, $21.

At the Exchange, the following lower cable quotations were received to-day: Coltness, 57s.; Langloan, 56s. 9d.; Summerlee, 55s. 6d.; Gartsherrie, 54s. 3d.; Glengarnock, at Ardrossan, 53s. 3d.; and Eglinton, at Ardrossan, 47s. 6d. Warrants at the Exchange to-day were 51s. 7d.

Rails.—A part of the contracts alluded to last week were 16,000 tons Edgar Thomson and Homestead, at $36.50, delivered at Pittsburg. It is stated that since then a lot of 4000 tons has sold at $34.25 at mill, though the report is discredited. We quote $36.50@$37 at mill.

Old Rails.—There is very little doing, the demand being slack. Sales of Ts have been made as low as $21. We quote $21@$22.

Scrap is dull at $22.50@$23 ex ship.

Philadelphia. October 19.

Erroneous and unjustifiable reports have been circulated concerning the condition of the Pennsylvania iron trade. Very few furnaces have gone out of blast recently, although it is true that several companies contemplate blowing out shortly, partly on account of low prices, and partly in order to make repairs when the market is dull and stocks large. Foundry irons continue dull and weak, and the efforts made to move them at concessions have not resulted in sales of more than ordinary lots. The production of foundry iron will probably fall off, as stocks are large, and buyers are not disposed to cover requirements for the future. Prices range from $19@$22. A number of transactions have taken place at $21 for No. 1 and $19.50 for No. 2; some No. 1 has sold at $21.50 and a little at $22. The tone of the forge iron market is somewhat better, and the stronger companies decline to follow the downward tendency, confident that the market will take care of itself.

Foreign Iron.—Bessemer is offered at $20.50, but bids have been withdrawn, and buyers are not urgent just now. Spiegeleisen is in more active request at $30@$31. A few hundred tons of Scotch iron have been ordered.

Muck Bars.—A few hundred tons have been sold at $33.50@$34. Demand is active.

Blooms.—Quotations are given at $58 for Charcoal, and $47@$48.50 for Anthracite.

Merchant Iron.—Card rates have been changed from 2·30@2·20c., but very little iron sells above 2·10c.; 2c. is all that can be had for most of the iron moving. Some country mills have sold Refined iron under 2c., and the tendency is downward. It is announced that two or three mills will come to single turn next week. Western iron has been shipped into Eastern Pennsylvania, and interferes with trade.

Nails.—Trade price, $2.90; jobbing price, $3; in-

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Oct. 19.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.					2.65				2.75				400
Amie Con., Co.	.13	.12	.13	.12	.12		.12	.11	.12	.09	.11		15,400
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.									.50	.45	.41		500
Bodie Cons., Ca.							.50		.70				400
Breece, Co.	.19												600
Bulwer, Ca.													
California, Ne.	.19	.17	.20						.18				2,525
Cal. & Hecla, Mich.													
Carbonate Hill.													
Caribou Con., Co.											.07		300
Chrysolite, Co.	1.20	1.15	1.20	1.15					1.15	1.10			2,100
Cons. Va. Ne.			.48	.45	.50		.52	.50	.52		.56	.55	2,620
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.	.25										.28		1,100
Eureka Cons., Ne.	5.63		6.25		6.00		5.50						500
Excelsior, Ca.													
Father de Smet, Dk.							3.80	3.75					500
Findley, Ga.													
Gold Stripe, Ca.							.05						300
Gould & Curry, Ne.													
Grand Prize, Ne.			.47										30
Great Eastern, Dk.	.26												
Green Mountain, Ca.													
Hale & Norcross, Ne.			2.75				1.15	1.10	1.15	1.10			850
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.													
Horn-Silver, Ut.	7.00		7.00		7.00		7.00	6.75	6.88	6.63	7.00	6.75	2,515
Hukill, Co.													1,550
Independence, Ne.													
Iron Silver, Co.							3.15	3.00					1,010
La Plata, Co.													
Leadville C., Co.			.40										100
Little Chief, Co.	.60								.60	.59	.52	.52	1,750
Little Pittsburg, Co.	.42		65				.65				.64		800
Martin White, Ne.	.25												323
Moose, Co.													
Navajo, Ne.	3.60		3.75	3.60	4.00		4.00				4.60	4.25	1,350
Northern Belle, Ne.							4.50				4.25		225
North Belle Isle, Ne.	.50				.52	.50	.53		.60		.64	.57	1,900
Ontario, Ut.					33.00								3
Ophir, Ne.	5.00		5.50		6.25								260
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.	6.25												100
Rising Sun, Ca.													
Robinson Cons., Co.	.39	.36	.39	.38	.45	.39	.43	.42	.41		.40		9,300
Saint Joseph's Lead.													
Savage, Ne.					1.10								100
Sierra Grande, N. M.									1.05		1.05		700
Sierra Nevada, Ne.			4.00		4.20		4.30						205
Silver King, Ar.							6.63						25
Spring Valley, Ca.													
Standard, Ca.	5 88	5.75	6.25		5.88		5.88	5.75			5.75	5.63	1,010
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket			3.50										50

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales
	Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Oct. 19.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion													
Alta.													
Am. Flag, s													
Barcelona, g.					.25		.26	.25	.27	.26	.30	.28	.30	.28	3,900
Bear Creek													
Bechtel Con., g.													
Belvidere													
Best & B'icher, g. s.											3.00				40
Big Pittsburg, s. L.													
Bradshaw, s.													
Buckeye													
" pref.													
Bull-Domingo, s. L.													
Bye and Bye													
Calaveras, g													
C'lav'r's W. & M. Co.													
Cal., B. H., g.													
Central Ariz'na, s.													
Cherokee, g.													
Chollar													
Climax, Co.					.09						.08				600
Cons. Imp'ri'l, g. s.													
Cons. Pacific													.45		200
Crowell, g.													
Dahlonega, g.													
Decatur					.04	.03					.04	.03			3,200
Dunderberg													
Durango, g.													
Eastern Oregon	.48	.47	.48								.41		.42	.41	9,300
Elko Cons.	.03		.03				.04	.03	.02		.03		.04	.03	10,400
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, g													
Goodshaw, g.													
Granville, g													
Harlem M. & M. Co.	.87	.86	.89	.87	.93	.86	.93	.90	.92	.90	.93	.90	33,200
Hortense, s													
Imperial													
Lacrosse, g					.06										100
Lucerne													
Mariposa Pref., g													
" Com., g													
Mexican, g. s.	3.45	3.40	3.75		2 45		2.25								675
Miner Boy													
Mono													
North Standard, g							.16						.16		200
N. Horn-Silv'r, s. L.													
Pri'ti & Miller, s.	.07														200
Parnell													
Quartz Creek													
Rappahannock, g					.08										1,800
Red Elephant, s.													
Ruby, of Arizona													
Silver Cliff, s.													.10	.08	900
Sonora Con.	.22		.22		.24	.22	.25	.24	.25		.25	.24	18,100
South Bodie, g.													
South Bulwer, g.													
South Hite													
South Pacific													
State Line, 1 & 4, s.													
" Nos. 2 & 3, s.													
Sutro Tunnel	18	.17	.17		.17		.17	.16	.18	.17			13,300
Taylor-Plumas													
Tioga													
Union Cons.	3 90														100

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 50,361. Non-dividend shares sold, 102,015.

BOSTON MINING STOCKS.

	Oct. 12.		Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Amie											.12		200
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.											1.63		100
Bowman Sil			.13		.13	.12	.13	.12	.12⅛	.12	.12⅛		4,300
Bruns. Ant.													
Bulwer													
California					.18								100
Cal. & Hec.	245		240		240		240	239¼			239⅛		28
Catalpa	.30				.30				.28		.30		1,000
Central Ariz													
Cherryfield													
Co. Virginia			.48										200
Copper Falls													
Crescent													
"Cusi"													
Decatur													
Deer Isle											.04		1,000
Denver City													
Douglas													
Duncan													
Dunkin											.28	.24	600
Empire			.18		.21	.18	.23	.20	.25	.24	.28	.27	6,500
Eureka Con.									6.13				25
Franklin	12.88				12.75						12.00		85
Hancock C.													
Harshaw													
Huron													
Indian Q'n													
Mammoth					.02								1,000
Mass. & N. M.					.04		.04						1,500
Milton													
Napa													
National													
North. Belle			5.13										25
Ontario													
Osceola					19.00		19.00		19.00		19.00	18.50	86
Penn-Breck.													
Pewablo	1.25						1.25		1.25		1.38	1.25	405
Pine Tree													
Plymouth									.12				200
Quincy	51.00		51.25	51.00	51.75		51.75		51.00	50.00	50.00		111
Ridge													
Robinson							.89						100
San Pedro	.15		.15		.16		.15						800
Sierre Nev.													
S'ra Grande													
Silver Islet			3.00		3.00		3.00						160
Simpson Gd													
South Pacl.													
Standard													
Sullivan	81¼				.90		.97½	.90	.92½	.87½	.92½	.90	3,150
Sutro Tun.					.18		.18				.17		700
Twin Lead.													
Vizina													
Sonora			.25						.29				300
Little Pitts.									.65				100
Stewart											.12½		500
Climax											.08		200

PHILADELPHIA MINING STOCKS.

	Oct. 12		Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.18		.18		.18								9,300
Arizona So.													
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati			.09										5,000
Comprom'e.			.13		.13								1,300
Contention													
Con. Virg.													
Dauntless			.02										3,200
Del Monte													
Denver City													
Eureka													
Girard													
Governor	.06												2,000
Grand Uni'n	.03		.03		.03								7,300
Green Mt.													
Gunnison			.16		.15								1,700
Homestake													
Horn Silver													
Iowa Gulch	.04		.04	.03	.04								22,600
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud	.03												1,500
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan													
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.					.10								10,500
Permanent			.02										5,000
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis					.12								1,500
Rara Avis E.	.09		.09		.09								7,100
Record													
Rico Pion'r.													
Sierra Apac.	.27½				.27½								1,600
Sierra Bella					.70								200
Sierra G'nde	1.02½		1.05		1.05								300
Sierra Nev.													
Silver Cord													
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.					.20								100
Tombstone	.87½		.87¼	.85									1,700
Victor													
Yale Mt.													

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side special rates, $2.85. Several car-load lots have been ordered this week, in view of the probability of great activity in building construction throughout the winter.

Plate and Tank Iron.—No large orders have been booked, but several are in sight, and some specifications have arrived which will result in large business within a week. Boat plate is 2·35c.; Tank, 2·40@2·50c. Shell and Flange are without change.

Structural Shapes.—A few more inquiries for fair-sized lots have arrived, and orders will be placed this week. Quotations are 2·40c. for Angles and 3·50c. for Beams and Channels. Some concessions have been solicited and will be extended when large orders are to be had.

Sheet-Iron.—A large amount of sheet-iron has been ordered this week, and inquiries for thin sheets continue active. Card rates unchanged.

Steel.—Merchant steel is in quite active request, especially for the better makes. Competition is active on the low grades.

Steel Rails.—A fair amount of business was transacted in ordinary lots for delivery in November and December, and it is probable that in a few days some heavy business will be placed for winter delivery. Quotations are $37 $38.

Old Rails.—Quotations are nominally $23.50 for Tees, $24.50 for Bridge rails, and $26 for Double Heads.

Scrap.—Quotations, $20@$25, according to quality. Cargo, nominal, at $23.

Pittsburg. October 18.

To-day's probabilities point to an improving demand for pig-iron, because of the gradual diminution of stocks in local furnaces. Nine furnaces are now in blast, and three out. Lucy furnace No. 2 was blown out last Monday, and will be relined and started on January 1st. Isabella furnace No. 2 has been out for a year. The average production of the home furnaces is about 1600 tons a day. Makers of outside iron are in town, offering iron for future delivery at low prices. Several mills are working single turn, and it is said to-day that two or three others will follow suit. A number of buyers are ready to anticipate requirements as soon as assured that lowest prices have been reached. Very little iron is to be found in mill-yards. Sales of Foundry have been made in 50 to 100-ton lots at $20@$21 for No. 1, and $18@$20 for No. 2, on time. Bessemer, $21@$21.50. Forge, $17.50@$18 in 100 to 500-ton lots. Muck Bars are selling at $33 cash. Manufactured iron is still weak and dull at 1·80@1·90c. The consuming interests are prepared to place large orders to run them until the last of the year, as soon as the supply and demand are more nearly equalized. A week or two will probably develop new features and lead to an improvement. Several lots of iron have been shipped East. Nails are quoted at $2.80@$2.90, and are selling in large lots at $2.70. Large lots of pipes have been sold at 75 per cent off list. Between 10,000 and 15,000 tons of steel rails have been contracted for at $36.50@$37. Sheet-iron is in fair request, and galvanized is moving freely. The steel-mills are working as usual, but manufacturers complain of low prices. Old Rails are quoted at $24.25@$24.50. Spikes, 2·60c. Splice Bars, 1·90c. Track Bolts, $3@$3.25. Crop-Ends, $23.50 for American. Scrap, $20@$22. Car-Axles, $31.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Oct. 19.

Anthracite.

The condition of the anthracite coal market is unchanged, no movement whatever, so far as we can learn, having been made to bring about a better condition of affairs. Prices are low, and sales light, so that the excess of coal over that required to fill engagements previously made must be piled up somewhere. The Eastern trade is exceptionally dull, while the river trade, as is usual at this time of the year, is active, the stocking up of the many towns along the Hudson going on now. Some of the dealers of that section are now pretty well supplied, however, and the first ice will divert to this market large quantities of coal. The policy appears now to utilize the time before the closing of navigation, but it may well be questioned whether a considerable quantity of coal will not have to be stored at various points to relieve an excess. The trade of course is disappointed that no effort has been made to protect its interests, and it urged with some force that it is unjust to load dealers up with coal earlier in the season and then allow the price to drop off as it has.

John H. Jones, official accountant, has issued the following statement of anthracite coal tonnage for the month of September, 1883. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	Sept., 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	1,171,187	7,160,876	4,899,125	I. 2,261,751
Central RR. of N. J.	*.....	1,745,399	3,068,630	D. 1,323,231
Lehigh Valley RR.	†606,140	4,568,221	4,237,307	I. 330,914
Del., Lack. & W. RR.	472,933	3,675,135	3,343,633	I. 331,502
Del. & Hud. Canal Co.	‡359,160	2,530,865	2,240,983	I. 289,882
Penna. RR.	273,775	1,999,887	1,747,105	I. 242,781
Pa. Coal Co.	154,129	1,096,595	1,045,970	I. 50,624
N. Y., L. E. & W. RR	47,030	268,542	195,494	I. 73,048
Total	3,084,355	23,035,520	20,778,247	I. 2,257,273

* Included in tonnage of the Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 7761 tons.

‡ In addition, there were 67,728 tons transported from the mines by the Delaware & Hudson Canal Company, during September, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, September 29th, 1883, was 538,490 tons; on August 31st, 1883, 576,132 tons; decrease, 37,642 tons.

Bituminous.

The scarcity of cars is the complaint from a number of quarters, but current business is so slack that it has no effect whatever on values.

Horsford's Acid Phosphate

For Overworked Professional Men.

Dr. Charles T. Mitchell, Canandaigua, N. Y., says: "I think it a grand restorer of brain force or nervous energy."

DIVIDENDS.

SAN FRANCISCO, Oct. 16, 1883.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared

DIVIDEND NO. 29,

of twenty cents per share, payable at the office of Laidlaw & Co., 14 Wall Street, New York, on the 31st inst.

Transfer-books will close on the 23d inst.

H. DEAS, Secretary.

HOMESTAKE MINING COMPANY, MILLS Building, 15 Broad Street,

NEW YORK, Oct. 15, 1883.

DIVIDEND NO. 62.

The regular monthly dividend of TWENTY (20) CENTS per share has been declared for September, payable at office of Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on 25th inst. Transfer-books close on 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

ONTARIO SILVER MINING COMPANY, Mills Building, 15 Broad Street,

NEW YORK, Oct. 15, 1883.

DIVIDEND NO. 88.

The regular monthly dividend of FIFTY CENTS per share has been declared for September, payable at office of Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on 31st inst. Transfer-books close on 25th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

ROTHWELL'S

Great Map of the Wyoming Valley.

This, the most elaborate and accurate topographical map ever made in this country, outside of the Coast Survey, covers an area of TWO HUNDRED SQUARE MILES, and the work upon it cost over $12,000. It represents a coal-field which produced in 1882 over 13,000,000 tons of Anthracite. The Map was constructed altogether from original surveys. Every Road, Colliery, Building, or land or property line existing at the time is accurately located. The surface configuration is shown by CONTOUR LINES TEN FEET APART, VERTICALLY; and the elevation of every point above sea-level is given

But a small edition of this Map was printed, and the plates were then destroyed.

A few copies are for sale

Price: On thick heavy paper $25

On bond paper, for mounting 25

The six sheets can be mounted separately, or in a single roll 15 feet long by 42 inches wide.

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MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch: 9 miles, 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch: 10 miles. Size, 26×30 inches. Pocket form, $1.50: as a wall-map, $2.

SAN JUAN MINING REGION (COLO.).—Kibbe's Geographical and Geological Map of the San Juan Mining Region. 1881. Shows county lines, wagon-roads, stage routes, trails, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half inch to the mile. 22×27 inches. Includes, on same sheet, a reduced Map of the State of Colorado. Printed in colors, with board covers. $1.50.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress: Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats: Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea-level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch: 10·5 miles. Size, 31X40 inches. Pocket form. $1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, $1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26·6 Mexican Leagues to the degree, and 69·16 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53X41 inches. Printed in colors. Pocket form, $5.

MAP OF MINING CLAIMS ADJOINING LEADVILLE, California Mining District, Lake County, Colo. By Edward Rollandet. 1879. Mounted on muslin, $2.50. In cloth-bound covers, $2.

MINING MAP OF UTAH.—Showing the location of the Mining Districts, over an extent of territory 150 miles from North to South. Compiled from U. S. Government Surveys and other authentic sources. Scale, one inch to four miles. Colored. 1879. Pocket form. $1.50.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored, 1878. $3.50.

POCKET MINING ATLAS OF THE MINES OF THE UNITED STATES.—Showing the Mines of NEVADA: the Comstock Lode, the Eureka, Treasure Hill, and Tuscarora Districts; CALIFORNIA, including Map of the Bodie District; COLORADO, including the Leadville, Silver Cliff, San Juan, Caribou, and Central City Districts; DAKOTA, including Map of Deadwood; MONTANA, IDAHO, UTAH, ARIZONA, NEW MEXICO, LAKE SUPERIOR REGION, the SOUTHERN STATES. 1880. Printed in colors, and bound in flexible leather covers. Price, $1.

SAN JUAN MINING REGION (COLO.).—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28 × 38 inches. Pocket form, stiff paper cover. $1.50; or as a wall map, $1.50.

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.C. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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VENEZUELA threatens to become one of the more formidable of the competitors of our Western copper mines in the markets of the world, to judge from the reports of the leading concern, the Quebrada Railroad Land and Copper Company, a fusion of the Bolivar Railroad Company and the New Quebrada Copper Company, in which together £1,000,000 have been invested. In the first six months of the present year, the company shipped to the coast 15,300 tons of ore, 2150 tons of regulus, and 470 tons of "kernels." With a considerably smaller output, the mines had dividends last year amounting to £13,000.

THE programme for the annual meeting of the American Society of Mechanical Engineers in this city next week has been issued. There will be an opening session and supper on Wednesday evening, October 31st, followed by two meetings, in the morning and afternoon of Thursday. On Friday, the society has accepted the invitation of Mr. HENRY R. TOWNE, of the Yale & Towne Manufacturing Company, to visit its extensive establishment at Stamford, Conn. In the evening, the last session will be held, like the others, in the rooms of the American Society of Civil Engineers. For Saturday, the New York, West Shore & Buffalo Railroad has tendered an excursion over its line to Kingston and return. A number of papers are already promised, and vigorous efforts are making to have the meeting a worthy successor of the Cleveland gathering.

A NUMBER of gentlemen prominently connected with mining in Utah, among them R. C. CHAMBERS, O. J. HOLLISTER, W. S. GODBE, J. K. WALKER, J. E. CLAYTON, E. P. FERRY, and E. AUSTIN, have formed an organization called the Salt Lake Mining Institute. Its principal object is praiseworthy, as it is proposed to establish a museum of ores of minerals, and to collect, classify, and preserve all information obtainable respecting the mineral resources of Utah, and other States and territories in a less degree. It is proposed to gather a library, collect copies of reports, plans, specifications, and drawings of machinery, and to publish, at regular intervals, reports on the condition, progress, and output of the mines. The plan is an excellent one, and we are pleased to hear that a building has already been secured for the purpose. With the active co-operation of those interested in mining in the territory, its present officers, Mr. JAMES E. CLAYTON, President ; Mr. O. J. HOLLISTER, Secretary ; and Mr. E. AUSTIN, Treasurer, will be able to make it a model institution, whose success we hope will soon be such as to lead other prominent districts to follow its example. We shall all look forward to its early career with interest, and sincerely wish that it may prove one of lasting utility.

THE battle of the stoves has been and is still raging fiercely in England. The first gun was fired by Mr. EDWARD A. COWPER, of London, the inventor of the Cowper stoves. At the meeting of the Iron and Steel Institute, at Middlesborough, last month, in a somewhat self-congratulatory paper, Mr. COWPER deliberately claimed that his stoves save about 20 per cent of fuel per ton of iron, and increase the make of iron about 20 per cent, and that on coke an average of 100 stoves showed a saving of a little over 5 cwts. of coke per ton of iron, and on raw coal 7½ cwts. He estimated that the stoves pay for themselves generally in a year, and as £460,000 had been expended on the 360 stoves built in different parts of the world, he took unto himself the credit of saving the iron-masters that sum annually. In these extravagant claims, however, Mr. COWPER stood alone, and even one of his urgent supporters, Mr. CHARLES COCHRANE, did not appear to be willing to go so far. At his works, furnaces with a capacity of 7000 cubic feet used in 1855 39·46 cwts. of coke, while in 1882 the largest furnaces, with 34,000 cubic feet capacity, were making iron with 19·38 cwts. Mr. COCHRANE was willing to concede one half of the saving to the higher temperatures of blast, and the other half to the increase in the size of the furnaces. Mr. CHARLES WOOD, another iron-master, stated that he had put Cowper stoves in place of cast-iron stoves, and had found that the fuel consumption fell off from 24 cwts. to 20·75 cwts. ; but the former figure was challenged by Mr. WILLIAM WHITWELL, because it was not a reasonable consumption for a good working furnace. He objected, also, to the testimony of Mr. COCHRANE, when he claimed that one half the reduction in the quantity of fuel used now, as compared with the consumption thirty years ago, was due to the use of brick stoves. His own firm had, with cast-iron stoves, in ten years carried down the fuel consumption from 32 to 24 cwts. of coke per ton of iron. He gave an instance, also, where in this country the enlarging of a bell by eighteen inches had made a furnace a paying investment which had until then been a losing concern. This, and a number of remarks made during the course of the debate, proved that it has been too often the tendency to credit the brick stoves with results that are probably due in part, at least, to many modifications in design of plant and method of working ; and it was repeatedly implied or directly urged by several speakers that, in the heat of the controversy of cast-iron *versus* brick, and COWPER *versus* WHITWELL *versus* MASICKS, and CROOKS *versus* FORD and MERCUR and other designers of brick stoves, other important issues had been neglected. Mr. RICHARD HOWSON in his paper on Blast-Furnace Economy in Relation to Design, discussed at the same time, dwelt particularly on this point. He also avowed himself in some degree a champion of the much-abused pipe-stove, which found a number of vigorous defenders. We believe that in this country there are many furnace-men who are not quite prepared to allow themselves to be carried away by the tide of popular favor in behalf of the brick stoves. It has been apparently nobody's business to break a lance in their behalf, and the evidence in favor of their younger rivals is skillfully marshaled at all times and in all places.

At this meeting, the supporters of the iron stoves came out forcibly. Mr. EDWARD WILLIAMS, of Middlesborough, stated that, with five furnaces, the consumption of fuel, spreading over a long period, was practically 22¼ cwts., and while he would not replace his cast-iron stoves by modern brick stoves for any saving there would be in the operation, he would, in building new works, put in the latter. Mr. T. HUGH BELL did not even feel inclined to go so far, as he thought it would take them weeks of anxious debate, were they to build the Clarence works over again, before they decided in favor of either one or the other. Mr.

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GJERS, an eminent iron-master, quoted his experience with four blast-furnaces built in 1870, for which he had put up twenty-four cast-iron stoves of his own design, at a cost of about one half per furnace more than that of a plant of brick hot-blast stoves. The average of fuel consumption for the first two years was 19·8 cwts.; for the first six years, 20·71 cwts.; and for twelve years, 21·63 cwts.

Taking the evidence submitted, and making due allowance for many other improvements, it may well be questioned whether the decrease of fuel consumption claimed by the advocates of the brick stove is as strong in its favor as they would make the metallurgical world believe, and in many instances it is undoubtedly a close question whether the mere substitution of one for the other form at an old furnace will in itself warrant the increased cost. As Mr. E. WINDSOR RICHARDS pointed out during the course of the debate, the fire-brick stoves are not all perfection. With dry, clean gas they give no trouble; but when ore is used like the Bilbao, carrying 12 and even 15 per cent of moisture, or in spiegel furnaces, the dust deposits are liable to become very troublesome. It is undoubtedly true that, to meet this trouble, their construction has been much improved, and we would note that at St. Nazaire, France, and in Germany, the additional safeguard of putting in dust-chambers is resorted to. Still, the fact remains that the iron stoves are not by any means as bad as some people would make them, and we trust that American iron-masters who have evidence on this point will come forward to their support.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Saving Flour Gold.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I am anxious to get the opinion of some of your correspondents as to the best methods of saving flour gold after passing over plates from the battery. It frequently happens here that professional advice is not available, and in many cases worthless when obtained. M. H.

ALMA, PARK CO., COLO., Oct. 19.

A Market for Serpentine Rock.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you be kind enough to state whether or not there is a market for serpentine rock? I have large quantities of it, and would like to utilize it. S. G. M.

MERIWETHER, S. C.

[Serpentine was formerly extensively used for baths, urinals, etc., and the finer grades for vases, paper-weights, and a large number of similar objects for household purposes. It has, however, of late years given way to other raw material, and, so far as we can learn, its market has contracted rather than expanded. In some instances, it has been used as a blast-furnace lining and as a refractory material in stoves, ranges, and metallurgical furnaces. Its value of course depends entirely upon its color, texture, size of good blocks, etc. It might be worth while for our correspondent to prospect his territory for chrome ore, as that frequently accompanies deposits of serpentine rock.—ED. E. AND M. J.

The Combustion of Fuel.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of the 13th inst., page 230, you state that the German commission on the losses in the combustion of fuel argue that due deduction should be made for the fact that, in the ordinary combustion of fuel, the products of the combustion of the hydrogen are steam, and not water, and that they therefore reduce the calorific power of hydrogen to 28,800 instead of 34,220. It might be inferred from this that they had made a new discovery, or at any rate, that they were calling attention to a fact generally overlooked.

The truth is, that it is perfectly well known that the calorific power 34,220 of hydrogen refers to the heat developed when the steam produced is condensed, and that, if it is not condensed, allowance must be made for the latent heat of evaporation which would have been given out if it had been condensed, and also for the difference between the specific heats of steam and of water, in order to arrive at the useful or available calorific power of hydrogen.

This is elaborately and clearly set forth by Gruner in his *Traité de Metallurgie*, 1875, page 57, and in Percy's *Fuel*, 1875, page 170. Indeed, I had supposed it to be one of the fundamental facts perfectly familiar to every one who had occupied himself at all with heat calculations.

BOSTON, Oct. 19. Yours truly, HENRY M. HOWE.

PROF. J. LAWRENCE SMITH died recently at Louisville, Ky. He was a native of Charleston, S. C., and was born in 1818. He graduated from the University of Virginia, and selected civil engineering as his profession. He was engaged to survey a projected railroad between Charleston and Cincinnati. He studied medicine and was graduated at the Medical College of South Carolina. He studied several years in Europe, and was sent by President Buchanan to Turkey to teach the Turks the cultivation of cotton. He was appointed by the Turkish government Mining Engineer for Turkey, which place he filled four years. In 1857, he invented the inverted microscope. Returning to America, he was appointed Professor of Chemistry in the University of Virginia.

AMONG THE IRON-WORKERS.—CORNWALL.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The most remarkable deposit of iron ore in Pennsylvania, at Cornwall, is but six miles from Lebanon, and to see Lebanon without going to Cornwall would be to explore Philadelphia and leave out Independence Hall. The early morning train leaves Lebanon at half-past six, and as the station is about a mile from the hotel, one must rise quite early if he would catch his train. The Doctor was much interested in iron deposits, but not sufficiently so to make him get up at such an hour, so the student had to go alone. The waiter was to wake me at half-past five; but I had the excursion quite firmly fixed in my mind, and was nearly dressed when the knock came. It is scarcely light by six o'clock in winter, and it is something of an undertaking for a stranger to find his way about town. The student was rather precipitous in his movements, but a fall on the ice slightly checked his speed. It was after some inquiry that the station was reached, and the trip actually begun. It had been but a few weeks since the railroad undertook a passenger service, and the arrangements were then somewhat primitive. Until recently, the Cornwall people had to drive in and out whenever they would visit their county-seat. The manager's office is at the North Cornwall Furnace; so I went directly there in order to present my letter of introduction and make out a programme for the morning's sight-seeing. In the kindness of his heart, the conductor put me off at the junction, and told me to follow the track over to the furnace. I started to carry out his directions; that is, I got out of the car and looked at the track to be followed. It was entirely untrodden, and my low sandals offered little protection against the deep snow. The train had moved off when my examination ended, so I had to trudge after it, until I came to a passable cross-road, and then strike out for the furnace office. The manager was not there when I arrived; but when he did come, business only permitted a few words, and I was put in charge of one of his clerks. The North Cornwall Furnace was the nearest object of interest; so that we visited first. There is but one shaft now in blast, but a second one is in course of construction. The engine-house contained two large blowing-engines, and, like Toddie in *Helen's Babies*, there was great fascination in "seeing the wheels go round." The great throbs that smote with a dull sound on our ears and shook the very building seemed like the pulse of the whole works—and so indeed it was; for were it to cease, the vital current of air would no longer keep up the combustion, and the furnace would become a chill, dead thing. This air, which is thus separated from the general atmosphere at so much expense, has no little work to perform: let us follow its course. From the engine, it is forced through the pipe-stove, and only when it reaches a temperature of about 950 degrees is it considered sufficiently hot to be introduced into the furnace. From the stove, the air is conducted in large pipes to the tuyeres, and, as it gains admittance, accomplishes its work of burning the fuel and reducing the ore. The older furnaces were all arranged with but slight blast, and what they had was cold, so that the amount of iron produced was far inferior to the present. Modern furnaces, when forced to do their best—on show-days as it were—are capable of a daily output of three hundred tons, an amount that seems quite marvelous when we consider that it exceeds the *monthly* product of many of its predecessors. But this of course is as remarkable in its excess as the others in their deficiency. The daily output of the Cornwall furnaces is only from thirty to fifty tons apiece. There would seem to be almost a personal element about a blast-furnace, its good or bad behavior to be regarded as a favor or demerit. The workmen become attached to the objects with which they are associated, even though those objects be inanimate. But a furnace seems hardly to belong to this class; for its uniform operations and productions endow it with an apparent vitality. Its life, each minute, is sustained by the powerful blast and generous fuel, and its energy effects the wonderful transformation of stone and ore into the most useful of all our metals. During our inspection, we went up the elevator, or "lift" as the men call it, and watched the process of charging the furnace. As the conical bell is lowered to allow its charge of ore, fuel, and flux to pass into the furnace, a great cone of flame and smoke rushes skyward. A patent "seal" has been invented by Mr. Weimer, in order to save the outrushing gases, but it is not used at the Cornwall furnaces. When our interest and curiosity had been quite satisfied at the furnace, the clerk kindly drove us over to the celebrated Ore Bank. The comfortable little sleigh and spirited horse were quite a pleasing contrast to the manner of my entrance. The bank, about which I had heard so much, was even more extensive than I had pictured to myself; but unfortunately, the snow-covered ground discovered to us only a part of its treasures. In spite, however, of the wintry weather and not infrequent snow-squalls, the miners were kept busy at work wearing away the massive iron cliffs and shipping the ore to the ever-receptive furnace-mouths. The manager's son kindly took me around the property. The railroad extends its various arms to the different parts of the cliff, and we had a very comfortable view of the workings from the cosy cabin of the locomotive. The depth of the deposit has been tried at various places by borings with the diamond drill. The greatest distance that the borers have gone without striking the rock has been three hundred and forty feet. This, however, must not be taken as its thickness; for the direction of the drilling was oblique to the bedding, and would not, therefore, represent its true depth. Many beautiful specimens of minerals have been taken from this bank, and the large cabinet in the manager's office is largely made up of native specimens. The ore, though so abundant, is but of inferior grade, as it contains large quantities of the sulphurets of iron and copper, and must, therefore, be purified from the obnoxious sulphur by a preliminary roasting. The workmen attain considerable skill in judging of the quality of an ore from its appearance and weight. The sorting of the mine's output is done simply by this practical method, and without chemical analyses. One can gain some idea of this remarkable deposit by picturing to himself a series of black and naked cliffs, whose entire contents, without any rejection of intrusive rocks, is gradually removed by the diligent pick of the miner, and of hills growing each year more serrated and rugged as an increasing industry makes continual demands on their bounty. The ore is chiefly magnetic oxide of iron, and is not easily reducible. This, in connection with the fact that the Cornwall furnaces use part anthracite, explains their moderate output.

Much of the ore is consumed in the neighborhood, and it is like-

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wise sent to Harrisburg, Pittsburg, and other places. Although the deposit has been worked for many years, the supply seems practically inexhaustible. The deposit lies on three hills, and consequently can be worked most conveniently from the intervening valleys.

After thanking my guide, I left him to make my way over to the Bird Coleman furnaces at Cornwall proper. The manager showed me over the works, and gave me some suggestions about correct furnace management. I intended to return to Lebanon in the two o'clock train; but the kind manager would allow no such proceeding, and insisted on carrying me off to dinner with him. Nor did his hospitality end there; for he took me over the old charcoal furnace, and, when I had seen all the interesting points in the place, he kindly put me in charge of a friend who was about to drive to Lebanon. The sleighing was excellent, and the horse far from slow, so that the six miles were quickly passed over, and we found ourselves back in town. The doctor had expected me sooner, so was on the outlook for my return. He looked just a little envious when he saw the sleigh gliding along so rapidly; but I comforted him by suggesting the truth of the old proverb, "The early bird catches the worm." The Doctor is somewhat of an antiquarian, and raves in a mild manner about any thing claiming great age, so I made him still further regret his inactivity by giving him a glowing account of the old cannon and shot that were cast at the charcoal furnace during the war of the Revolution. He would not, however, give me the satisfaction of any audible regret, but then his expression was sufficiently significant.

CARL.

DENVER AS A DISTRIBUTING POINT AND A MANUFACTURING CENTER.

Special Correspondence of the Engineering and Mining Journal.

Denver recently celebrated its quarto-centennial. Twenty-five years ago, "gold-hunters" washed the sands of Cherry Creek, within the present city limits, for the precious yellow metal. They were the first settlers of the Queen City of the Plains. For its first two decades, Denver grew but slowly, and its history was uneventful. But its position made it the key to the Rocky Mountain region; and five years ago, when the discovery of the rich ore-deposits of Leadville gave Colorado mining its great impetus, Denver assumed much importance as a distributing point. Since then, its growth has been rapid and uninterrupted, until now it is not only the distributing point of the Rocky Mountain region, but it is also a manufacturing center of much more importance, perhaps, than Eastern readers of the ENGINEERING AND MINING JOURNAL who have not recently traveled in the West realize.

In the first place, as a distributing point its favorable location has at the same time made it a Western terminus of the great broad-gauge lines of railroad across the plains, and a center from which the narrow-gauge lines radiate to the various mining districts of the State. Of the standard-gauge roads, with Denver either as the terminus of important branches or of the main lines, we have the Burlington & Missouri, the Atchison, Topeka & Santa Fé, the Kansas Pacific, and the Union Pacific. Another trunk line, the Denver & New Orleans, in process of construction, has reached Pueblo, and, when completed, is to give Denver direct communication with the sea-board. Although there is still room for improvement in rates to Denver, these competing lines give to it facilities unapproached by any other city of the region for collecting in wholesale stocks all supplies for the Western markets. Access is furnished to the developed portions of the State by the Denver & Rio Grande, the Denver & South Park, and the Colorado Central, as the most important of the narrow-gauge lines. In the aggregate, they are two thousand miles long, three quarters being contributed by the Rio Grande road. There are but few good districts that they have not already reached, and none to which extensions are not already contemplated. In addition, are two uncompleted narrow-gauge roads, the Denver, Longmont & Northwestern, and the Denver, Utah & Pacific. Thus Denver is seen to possess excellent railroad facilities, unequaled in the West and excelled only by the larger cities of the East.

As to its manufactures, most of the industries which rely upon mining for their support are represented here. Among the well-established machinery firms are Hendey & Meyer, doing an excellent and increasing business. They build engines and boilers for mining and other purposes, engines being a particularly favorite specialty. They also build stamp-mills and all kinds of rolls; their water-jacket lead furnaces are celebrated throughout the West; while ore-cars, slag-pots, and other small yet important accessories to the mining and the smelting industries are turned out in large numbers. Their works comprise four spacious buildings—a machine-shop, a pattern-shop, a foundry, and steam-engine works; and to fill their orders, they are compelled to run their shops night and day for a considerable portion of the year. The proprietors are both practical mechanics, and secure to their patrons a high order of work by giving their business personal supervision. They employ one hundred and twenty men.

Another company, well-known throughout the West by the work it has turned out, is the Colorado Iron-Works. Nearly every mining district, from Mexico to Idaho, has some of its machinery—engines, boilers, pumps, furnaces, crushers, rolls, stamp-mills, etc.—in operation. The capacity is unequaled by that of any similar works this side of the Missouri to the East or the Pacific to the West. The works were established in 1876, and give employment to one hundred and seventy-five men.

A third firm, the Hendrie & Bolthoff Manufacturing Company, long in business here, has gained a wide and enviable reputation. Its pony stamp-mills are very extensively used, its ore-sampling mills used by the largest and the smallest ore-handlers alike, while hoisters and concentrating machinery are also specialties. It also deals in and carries a complete stock of mining supplies at its spacious sales-rooms and warehouse, and has a widely extended trade.

Large shops are just starting by H. N. Nichols & Co., for the manufacture of two specialties—the Sharpneck steam-stamp and the Rouse concentrating-tables. In his steam-stamp, Mr. Sharpneck prevents the shoe striking the die by the automatic use of a steam-cushion, according to the steam-hammer principle. He thereby obviates the excessive jar and wear which have hitherto been the great objection to the steam-stamp. Extended trial has been successful in both of the essentials, durability and economy. The erection of extensive shops for the manufacture of this stamp heralds a competitor promising rapidly to supersede the drop-stamp, so long possessor of the field of milling and concentrating ore.

The Colorado Machinery Company deserves mention. Although its works are in South Pueblo instead of Denver, its Denver house secures to it the advantages of the Denver manufacturers. This company not only builds general mining and smelting machinery, but also carries heavy supplies.

The merchant iron rolling-mills of the Colorado Coal and Iron Company are located in Denver. At the main works of this company in Pueblo, the manufacture of nails is largely carried on. Its Bessemer works and steel rail mills are among the few steel-works of the country whose activity has been unaffected by the abatement of railroad building. At present, with an order from the Burlington & Missouri Railroad which it will require several months to fill, it is taxed to its utmost capacity. The plant consists of two Bessemer converters, each of six-ton capacity; one eighty-ton blast-furnace, and another in process of construction, the steel rail mill, the nail mill, and a foundry. The company owns its own coal mines and coal-fields, and cokes its own fuel. All told, it employs from two to three thousand men. Recently, it has begun the experimental manufacture of spiegeleisen from Colorado ore. The indications are, that it will succeed in making a spiegeleisen that will answer every requirement, although more extended trial will be necessary to completely demonstrate this fact.

Other manufacturers doing an extensive business are F. M. Davis and J. W. Jackson, both builders of general mining and milling machinery; Davis, Creswell & Co., manufacturers of all kinds of brass goods and fittings; and Runkle & Wich, boiler-makers. In refractory materials, the Denver Fire-Clay Company and the Golden Brick Manufacturing Company (works and yards at Golden, Colo.) make fire-clay materials of all descriptions.

In addition to the Denver manufacturers, a number of the large Eastern houses have established Denver branches, where is kept constantly on hand an extended stock of their machinery and manufactured materials. Notable among them are the Pennsylvania Tube-Works, with I. R. Buchanan as agent; and Fraser & Chalmers, represented by L. C. Trent.

In another respect, as a smelting point, Denver is a center of great importance to the Rocky Mountain region. The largest smelting-works of their respective kinds in the country, namely, the Boston & Colorado Smelting-Works, treating gold and silver-bearing copper ores, and the Grant Smelting-Works, treating silver-lead ores, are located here. The Boston & Colorado Smelting-Works, located at Argo, a suburb of Denver, treat all kinds of gold and silver ores, except such as carry a notable percentage of lead, the precious metals being concentrated in a copper matte according to the famous Swansea or South Wales process. It is one of the few Western works which separates and refines the gold and silver. The silver produced each week is sent to one of the Eastern mints in bars 999·8 fine. The gold is sent in bars from 870 to 900 fine. The copper product, after the extraction of the gold and silver, is shipped either to Eastern or to English copper smelting-works in the form of black oxide or as black copper, as either is in most demand. The output of the works for the first three quarters of 1883 was:

Gold	$784,000
Silver	1,846,000
Copper (1052 tons)	345,600
	$2,885,600

It is larger than for any corresponding period in the history of the works.

The Grant Smelting-Works treat free-smelting and lead ores in blast-furnaces by the ordinary Western lead-smelting process. The daily output of five cars of lead bullion is shipped to the Omaha Refinery, which was recently incorporated with the Grant Works under the name of the Omaha & Grant Smelting and Refining Company. The plant in Denver alone treats more lead ore than any other smelter in the country, so that the recent purchase of the Cummings & Finn smelter at Leadville gives the company a capacity far exceeding that of any of its competitors.

Both of these smelting-works get the most of their ores from the mines of Colorado; but large quantities also come from New Mexico, Arizona, Utah, Montana, and Idaho. The excellent smelting facilities of the city have led to the erection of ore sampling-works to which many shippers prefer to send their ores, have them sampled, and then sell to the smelting-works which bid highest, instead of selling directly to one of them. There are at present two in operation, the Colorado Ore Sampling-Works and the Denver Sampling-Works, while a third, the Public Sampling-Works, with a daily capacity of 150 tons, is in process of construction.

The prosperity of the season now drawing to a close may be looked at in two ways. If the aggregate of business done forms an indication, it has been a prosperous season. Shipping mines have been active, and their number is on the increase. As a consequence, machinery has been freely purchased. The ore receipts have been very large with both smelters and sampling-works, especially the past two months, crowding both to their utmost capacity of handling. On the other hand, competition has been closer. With machinery men, the older firms have not done as much business as in previous years, the new supply-houses having come in both for a part of the old trade and a share of the new. The complaint of dull times has resulted. The explanation lies not, however, in the aggregate of sales falling off, but in a distribution of the business between a larger number of firms. If business is not overdone, all the firms may stand. But in smelting, as competition gets closer, the tendency of the weaker works to go to the wall has shown itself. It is not only seen in lead-smelting, by the closing down of two of the Leadville smelters, and the sale of a third to the Grant Company, but in gold-silver-copper smelting also, in the closing of the Miners' Works, at Golden. These works were in operation between two and three years—long enough to prove that a concern with a third of a million capital, in an out-of-the-way place, can not compete with one centrally located, and with six times that amount of capital.

As a city, Denver has, from the latest directory estimates, seventy thousand inhabitants. It is built on the plain gradually rising from the South Platte River toward the east, giving a magnificent view of the front range of the Rocky Mountains. The foot-hills of the range are about twelve or fifteen miles away; but the atmosphere is so clear that

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the distance seems no more than a third of that. The streets of the city are broad and shady. The buildings are well worthy of the pride felt in them by the people of this new city. The generally cool summers and mild winters are very pleasant. The only objection is the light rain-fall, too light the average season to support a vigorous growth of vegetation. In part compensation, there are few dark, lowering days, making every one gloomy and sullen; on the contrary, the sky is almost always clear and the atmosphere exhilarating. Until the present season, the city has always been troubled about its water supply. Badly filtered water containing alkali has been its curse. Strange to say, people went on year after year using while execrating it, without thinking of a crystal liquid but a few hundred feet beneath the surface. At last, it occurred to some sensible person that the rain-fall on the east side of the front range might supply artesian wells at this short distance. No sooner tried than excellent water was struck, so far without any appearance of being limited in quantity. Since the first strike, about six months ago, a great many wells have been sunk, always with the same result—excellent water and an unlimited supply. Thus has a special objection to the city given place to a strong point in its favor. Few cities have as good water as Denver now has—none could have better.

J.

DENVER, Oct. 20.

MINING AT THE BOSTON EXHIBITION.

Correspondence of the Engineering and Mining Journal.

THE NORTH CAROLINA EXHIBIT.

If the modern Athens had nothing to show the visitor except the North Carolina Department of the American Exhibition now held here, that in itself would amply repay him for the time, trouble, and money spent on his trip here. Occupying the center of the spacious building, it richly merits the attention which its conspicuous position insures it. It is to most people a genuine surprise to see the wonderful diversity and great value of the products of the old North State, showing as it does, in addition to its valuable agricultural products, a great variety of most beautiful building and ornamental stones; woods which fairly captivate the eye; immense, lustrous, and most precious gems; iron ores at once rich and pure in large and thick deposits, and at least in some cases in close proximity to coking coal, limestone, and transportation; copper sulphurets, from the common cupreous pyrites to the chalcocite (copper glance) of the Blue Wing mine; gold quartz with most attractive labels, though of course telling little to the eye; and a wealth of other mineral matter, of great promise—graphite, pyrolusite, chrome iron ore, and others.

But, with its wonderfully rich and varied natural resources, North Carolina is "land poor." It needs both capital and skilled labor to enable it to avail itself of its own riches. In sending this wonderful display to our Exhibition, she has taken a wise step, teaching us by an object-lesson not easily forgotten what great opportunities she offers to our capital and enterprise.

Coal-Fields.—The State has two coal districts, the Dan River, mainly in Stokes and Rockingham counties, near the middle of its northern boundary; and the Deep River District, mainly in Chatham County, near the center of the State.

The area of the Deep River field was estimated by Emmons at 300 square miles. Its principal seam is 6 feet thick, or 7 feet 6 inches, if we include a small bed 18 inches thick separated from the main bed by a layer of shale and black-band iron ore, also about 18 inches thick. The coal is a strongly coking one, swelling and melting in the fire. It is said to be excellent for forge use, for steam-raising, and for gas-making. The coke exhibited made from it is very fair, porous, hard, and quite resonant, apparently equal if not superior to the best Colorado coke in its physical properties, and, if we may judge from the analyses of the coal, much freer from ash and sulphur. The following analyses of the Deep River coal speak for themselves:

COALS FROM DEEP RIVER DISTRICT.

LOCALITY.	Fixed carbon.	Volatile.	Ash.	Water.	Sulphur.	Analyst.
Egypt	63·28	25·74	10·14	0·84	1·35	Genth.
Gulf	70·48	21·90	6·43	1·16	1·02	"
Egypt	60·70	32·70	5·30	....	1·30	Schaeffer.
"	59·30	30·50	10·20	....	....	Genth.
Wilcox, near Gulf	63·30	25·70	10·10	....	1·30	Johnson.
Gulf	70·50	21·90	6·50	....	1·00	Genth.

This coal derives great importance from its close proximity to very extensive iron deposits; most of those given in analyses 1 to 9 inclusive, in the table of iron ore analyses below, being within reasonable distance of it. The occurrence of a considerable bed of black-band ore in the coal itself, and of a bed of the same ore, practically six feet thick closely underlying the coal, is in itself a matter of no small importance.

Of the coal of the Dan River District, not so much is known. It is a dry, semi-bituminous coal, and its appearance is by no means as inviting as that of the Deep River coal. Still, its existence in known beds of great extent and of workable thickness in close proximity to the very important group of iron-ore deposits which contains the Rogers bed, No. 12, in the iron-ore table below, at once rich, perfectly pure, and extensive, assures its value. The area of this coal-field is considerably less than that of the Deep River field, and the greatest authenticated thickness of any of its beds seems to be three feet, though it is possible that at least one of the three chief seams may in places exceed this size.

Iron Ores.—Of these, there is indeed a most imposing array, not less than twenty-eight mines being represented by fine specimens. The western half of the State is well dotted over with valuable iron deposits, most of them wholly untouched. We are told by Professor Kerr that iron exists in workable beds in thirty counties; but for convenience, we may group the greater number of the most valuable known mines into four geographical divisions. First, we have the iron regions of Granville, Chatham, Guilford, and Stokes counties, lying to the north of the center of the State, within reasonable distance of the North Carolina coal-fields, and containing among other valuable deposits the thick and pure Buckhorn, Ore Hill, and Chapel Hill beds, and the extensive series of titaniferous deposits of Guilford County, of remarkable thickness, purity, and richness. Next, we have the deposits of Gaston, Lincoln, and Catawba counties, lying to the west of the center of the southern border, with beds like those of the Big Ore-Bank and of Yellow Ridge, reported to run to a thickness of 16, 18, and even 40 feet. In the northwest corner of the State, in Ashe, Caldwell, and Mitchell counties, is yet another series of beds, the famous Cranberry deposit standing at the head, with its almost fabulous thickness and its entire freedom from phosphorus and sulphur. Finally, in Cherokee County, in the extreme southwest corner of the State, we have deposits as yet but little known, but reported to be very thick.

The ores of these western groups have the advantage of being within a moderate distance of the coal-fields of Tennessee.

In the following table are collected the analyses and thicknesses of some of the more important iron ore-beds of the State. Many of the thicknesses appear to be estimated, and many of them no doubt represent the maximum rather than the average thickness of the beds. The number of beds which are at once rich, pure, thick, and comparatively accessible promises much for the future importance of North Carolina as an iron-producing State:

IRON ORE ANALYSES.

No. of analysis.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Analyst				Hanna.	Schaeffer.	Genth.	Hanna.		Genth.	Genth.		Genth.	Genth.
Kind of ore				Black Band	Hematite.	Limonite.		Hematite.					Magnetite.
Mine		Buckhorn.	Buckhorn.	Egypt coal mine.	Evans.	Ore Hill.		Chapel Hill.	Average of 10 mines.	Mountain.	Ormond	Rogers.	Cranberry.
County	Granville.	Chatham.	Chatham.	Chatham.	Chatham.	Chatham.		Chatham.	Guilford.	Lincoln ?	Lincoln ?	Stokes.	Mitchell.
Thickness of bed in feet	3-4	20-36		6	6	Several beds, 10-15.		7-30		4-8	8-15	8	100
Silica	9·10	5·6-14·45	7·50			1·42	3·79	2·63	0·5-12·75	4·47	1·42	0·84	4·16-11·48
Alumina	6·18	0·8-5·2	8 49					1·68	0·5- 8·87			Trace-2·27	0·11-0·77
Ferrous oxide	83·96						0·11	2·45		82·14	86·66	88·56	67·66-92·47
Ferric oxide						82·02	83·69	91·24					80·77-94·37
Lime	0·22					1·19		0·56	0·24- 1·4		0·25	0·37	0·43-1·01
Magnesia						0·11					0·27	0·30	0·16-0·23
Phosphoric acid		Trace.					Tr.	0·04					0·001-0·00
Sulphur	0·03	Tr. to 0.06	0·02		0·14		*0·77	0·11					0·00-trace
Titanic acid						15·26			0·18-3·55	12·86	6·28	4 76	0·00-1·88
Water										0·53	5·12	5,17	Trace.
Oxide of manganese			7·52					0·34					0·06-1·42
Phosphorus			0·04	0·47@5·66	0·94		Trace.		8·07				0·44-8·21
Titanium													
Metallic iron	58·73	56·7-66·5	55·00	14·6@39·6	47·59	57·41	58·67	65·77	54·61	57·5	60·66	61.99	49·03-65·34
													58·49—68.34

* SO_3.

OTHER IRON ORE-BEDS.

Number	14	15	16	17	18	19	20	21
County	Caston, Lincoln, and Catawba.							Caldwell.
Name of mine	Big Ore.	Brevard.	Robinson.	Morrison.	Forney.	Yellow Ridge.	Castner.	
Location								Near Patterson.
Thickness, feet	Up to 18 feet.	4 to 12.	4 to 12	4 to 12		16 to 40	10 to 20	12 to 15
Authority	Hanna. Several beds.	Hanna.	Hanna.	Hanna.	Hanna.	Hanna.	Hanna.	Hanna.

No. 22, Ashe County, near Helton. 9 and 18 feet in thickness; authority, Hanna.
No. 23, Cherokee County, near Murphy. 10 and 25 feet in thickness; authority, Hanna.

Beds numbered 1 to 9 are near the Deep River coal-field.
No. 12 is near Dan River coal-field.
No. 13 has an outcrop reported to be 1500 feet long; it is near the Tennessee coal-fields.
Nos. 21 to 23 are near the Tennessee coal-fields.
No. 5 is from the Gulf coal strata.

Copper Ores.—Of these, there is an interesting display. The most attractive is perhaps the very rich copper glance of the Blue Wing mine of Person County, very free from gangue, and said to be from three to four feet thick. It should be a most excellent smelting ore, and if the information given about it is accurate, the mine should be of very great value.

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Of the Gillis mine, in the same county, great things are told. From the adjoining county, Granville, there are fine-looking ores, siliceous copper glance, which appears to be the characteristic ore of this promising region. From the center of the State, the Cid and Conrad Hill mines of Davidson County, and Clegg's mine, of Chatham County, are represented by rich chalcopyrites, with quartz gangue. From Mecklenburg County, near the center of the southern border of the State, come rich solid cupreous pyrites, free from gangue. The celebrated Ore Knob mine, of Ashe County, is not represented.

It is generally known that a large proportion of the North Carolina gold mines, or mines which at the surface carry only gold, grow rich in copper as they approach the water-line, until, in many cases, copper becomes the metal of greatest value. This is especially true of the gold deposits of Guilford, Cabarrus, and Mecklenburg counties, in and to the south of the center of the State. What with the very considerable deposits of copper alone, and with the extension of the gold mining industry in North Carolina through the application of improved metallurgical processes to the refractory ores which formerly defied the arrastra and Chilian mill, this State should at no distant day become one of our chief copper producers.

Gold Ores.—Of these, there is a large display, chiefly of gold quartz, from which, of course, little can be gained by a superficial inspection, although the labels attached to them produce a cheerful impression. Gold is very widely distributed through the State, being found in workable quantities in no less than twenty-nine counties, covering nearly all but the eastern one hundred miles or so. It is generally found alloyed with silver. The greater portion of the more important deposits is situated on a granitic axis which runs northeasterly across the State, passing a little west of its center, from Mecklenburg County, on the south, to Caswell County, on the northern border. We are told of five more or less important gold reduction-works: The Designolle Works, near Charlotte; the Conrad Hill Smelter; the Davis Chlorination-Works, at Salisbury; the Mears Chlorination-Works, near Mount Pleasant, in Cabarrus County; and a chlorination-works near Mount Tucker.

Gold mining is now most actively prosecuted in Davidson County, which is a little west of the center of the State. Besides several smaller mines which are actively worked, we have here the Conrad Hill, which is said to be the best equipped in the State, having an ore which is said to average from $17 to $20, and smelting its concentrates with Connellsville coke. In addition to their contents in precious metals, the concentrates are said to carry from three to thirty per cent of copper. Here is also the Silver Valley mine, said to be turning out ten tons daily, and having, besides twenty stamps, nine buddles and other concentrating apparatus. The concentrates are said to run from $13.30 to $154.28.

Gold mining is also actively carried on in Rowan County. The Reimer mine, near Salisbury, is from four to eight feet thick, and is said to carry from $11.32 to $126.77. The sulphurets are roasted in fixed reverberatories, treated by the Mears chlorination process, and the gold is precipitated on charcoal. The Gold Hill mine, near Salisbury, is estimated to have produced $2,000.000 in precious metals. It has reached a depth of 750 feet, and is provided with twenty stamps and four amalgamating barrels. Its ore is said to carry from $4.53 to $255.71, as usual rather a broad margin, and we are not told nearest which of these two figures the average lies. The Phœnix mine has an ore said to run from $10 to $85. It is said to have chlorination-works for ten tons daily, with ten stamps and three rotary roasters.

In Mecklenburg County, the Baltimore & North Carolina mine has an ore-body from one to four feet thick, carrying from $20.95 to $31.82, besides considerable copper.

In Ashe County, the Copper Knob mine is 135 feet deep, and from 20 to 42 inches thick. Its concentrates are said to carry $79.75 with 37·5 per cent of copper.

In the following table are collected the reported maximum and minimum assays and the present depths of some of the other more important gold mines:

NORTH CAROLINA GOLD MINES.

NAME OF MINE.	Minimum assay.	Maximum assay.	Present depth in feet.
Lalor, Davidson County	$20.00	$190.00	....
Eureka, " "	25.19	1890.00	....
Silver Hill, " "	6.89	26.01	600
Wellborn, " "	10.88	39.20	....
Southern Belle, Rowan County	17.04	49.61	160
Dutch Creek, " "	10.00	30.00	....
Gold Knob, " "	20.60	108.55	....
Clark, Mecklenburg County	8.34	164.44	70
Rudisill, " "	6.20	130.22	300
Ferris, " "	10.34	512.94	....
Simpson, " "	3.79	70.89	....
Stephen Wilson, " "	4.52	355.96	....
Black, " "	50.16	488.12	....

The first gold mines in the United States were those of North Carolina, and, prior to the discovery of California, the largest nugget of gold ever known was found within its borders, in Cabarrus County, reaching the then fabulous weight of twenty-eight pounds. Had any thing like the energy and intelligence that have so wonderfully developed the resources of California been concentrated on the gold deposits of North Carolina, the treatment of the precious metals there would have been to-day an industry of colossal proportions.

Building-Stones.—There are few things in the Exhibition which so charm the eye as the many and beautiful building-stones in this display. Perhaps the most striking is the beautiful leopardite, from Mecklenburg County, with spots stained with pyrolusite and black as ink, prettily distributed over a nearly white ground. There are two marbles exhibited which deserve the highest admiration—a beautiful flesh-colored marble, from Red Marble Gap, and a delicate gray marble from Valley River. The former is fine-grained, and of a color which rivals the *giallo antico* of Italy in beauty and softness, although of a very different hue. Its tint is really most charming. The latter is of a uniform, very delicate gray, and almost as fine as the Italian Carrara marble, and as beautiful. From Patterson, comes a large block of dark serpentine, highly polished, and of a wonderfully rich deep luster. Perhaps the most beautiful block of granite I have ever seen is here exhibited, from Wadesboro'. It has two beautifully colored feldspars, one pink, the other greenish, with a deliciously transparent yellowish quartz, and a sprinkling of black mica. Besides this, there are several other beautifully polished granites, a very handsome black one from Wanesboro'; a red syenite from Cedar Rock, with a very fine grain; and, what is more striking than any of them, a very strongly marked orbicular granite from Davis County.

Cabinet Minerals.—There are several cases with most fascinating displays of cabinet specimens; crystals of emerald of fabulous size; beautiful hiddenites and smoky quartz crystals, some of the latter with basal planes; gummites of surprising size; enormous mica crystals; sheets of mica perfectly transparent, and as white as any glass; well-shaped garnets over six inches across; and many other rare and beautiful minerals. Truly this must be a mineralogist's paradise. H.

THE PROGRESS OF BILBAO.

The extensive works for the improvement of the port of Bilbao have now been finished, and it may be said that they are most successful. Formerly, the depth of water at the sand-bar, near the entrance to the harbor, was not more than 15½ feet during the spring tides, whereas it now reaches a depth of 23 feet and upward; so that the enormous difficulties attending shipment have been entirely overcome. This has been accomplished partly by the dredging of the river-bed, and also by the erection of an iron screw pile training jetty across the bar. At present, it can not be ascertained how far these improvements will affect exportation of ores, which has steadily increased since the termination of the Spanish civil war. In 1878, the exports amounted to 1,244.118 tons; in 1879, 1,167,138; in 1880, 2,279,225; in 1881, 2,428,936; in 1882, 3,439,674; and in 1883 (up to August), 2,082,487. Despite the general depression which has prevailed in the iron and steel trades since the beginning of the year, the export of ore has been well maintained. Again, the prices of Campanil and Rubio ores, f. o. b. Bilbao, have scarcely fallen, a circumstance which may appear surprising, but for which several reasons may be cited. In the first place, property which some years ago was in weak hands, has been gradually passing into the possession of a few owners whose financial position is invariably sound and reassuring, and who, of course, do not need to make compulsory sales. Further, the cost of working has been increased by reason of the scarcity of labor, no accommodation having been provided for the workmen.

It is not our intention, says *Stahl und Eisen*, to inquire whether the province of Viscaya, especially the vicinity of Bilbao, offers a favorable situation for the development of a Spanish iron and steel trade. No doubt there are many favorable conditions; but on the other hand, there are some important drawbacks which can not be ignored. Efforts have been made to smelt the ore at the place itself, and these endeavors have found expression in the erection of new and the enlargement of existing works. Besides the old works of Ybarra y Ca., the English Company of Cantabria began the erection of two blast-furnaces on a most favorable site near San Nicholas. But the company came to grief, and was eventually obliged to suspend operations. The partially erected buildings went into the hands of the Marquess de Mudela, who finished the two blast-furnaces and added two others. This plant has been working for two years and a half, and it produces monthly about 8000 tons of Bessemer and foundry pig-iron of excellent quality. During the past year, the works of Ybarra y Ca., were transferred to the Sociedad de Atlas Hornos y Fabricas de Hierro y Acero. Besides the three blast-furnaces belonging to this company, it is intended to add some others shortly. The main purpose of the company is the manufacture of railroad material, but it seems probable that the works will extend their operations to all sorts of rolled merchant iron. The capital of the company is divided into 25,000 shares, of £20 each, and the concession lasts for seventy-five years. Besides this, 25,000 bonds, of £20 each, are to be issued, and will bear interest at the rate of three per cent. The total capital of the company amounts to £1,000,000.

Another company, the Viscaya, has also been formed, with the intention of erecting blast-furnaces and Bessemer plant. There is little hope, however, that the works will be started before 1885. This company's capital is fixed at £410,000. The company has arranged with Cockerill, of Seraing, to build two blast-furnaces, each 75 feet high, and of 20 feet diameter, and with a capacity for a daily production of 100 tons. Adjoining is a large dock which is in direct communication with the river.

It is estimated that these three works, when finished, will produce together about 250,000 tons of crude iron annually. The production of crude iron, as well as railroad material, is intended to satisfy the Spanish market; and there can be no doubt that, under the present protective system, the prospects of the companies are favorable.

From the foregoing, it will be gathered that, great activity prevails in the Bilbao District, and that the improvement effected in the harbors augurs well for the future of the port.

THE BICYCLE COEFFICIENT OF SAFETY.—Very little is allowed to escape the inquiring mind of investigators nowadays—a fact which has been strikingly illustrated by a series of able researches. Lieutenant F. I. Drake, U. S. N., has written a very interesting paper on the bicycle co-efficient of safety, his object being to ascertain the conditions under which there is the greatest security against "headers" without materially sacrificing speed. He gives a table of the mechanical force for different velocities and different weights, which ought to convince any reasonable rider, when an accident has happened, that damages to his wheel are not due to defective material or faulty construction. He then investigates the important subject of the rake of wheels, and finds that the expert Columbia is the closest built wheel, the rake for a 54-inch wheel being two inches, although the average loss of weight force does not exceed four pounds. The percentage of gain in the coefficient of safety for the Columbia wheel is found to be increased four per cent by the proportionate rake, while the corresponding loss of mechanical energy to propel the wheel is two and seven tenths per cent, showing an advantage of one and three tenths per cent in favor of the rake as adopted by the Columbia Bicycle Company.

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ON DIFFERENT SYSTEMS OF HYDRAULIC CRANES FOR STEEL-WORKS.*

By R. M. Daelen, Duesseldorf.

Among the hydraulic apparatus which are principally introduced in the mechanical installation of steel-works, the hydraulic crane takes the most important place, because the capacity of production of a steel-works is in a great measure dependent upon the capacity and solidity of the cranes. In order to appreciate the various systems applied to the different purposes of steel-works, it is necessary to study the different methods of construction employed in practice since the introduction of the Bessemer process. The different purposes for which cranes are used in a Bessemer steel-works are the following:

1. Each pit has a center crane to carry the ladle after the pouring of the converter, and also for casting the steel in the molds. For the latter purpose, there is often also a second crane.
2. Outside of the pit, there are a number of cranes to place the molds in the pit, to lift them up with the ingots, and to transfer these to the bogeys.
3. There are also cranes serving different purposes, such as changing the ladles, distributing the ingots, etc.

The question of security against fracture is in all cases of the utmost importance.

The first condition for the efficiency of the center crane is that of facility of movement and exactness in stopping over the middle of each mold.

The usual system is that shown in Fig. 1, and the difficulty of fulfilling the conditions stated increases with the length r of the jib. The friction of the rolls R and the pivot Z is dependent on the proportion: $\frac{Pr}{a}$ The length of the measure a is limited, because the ram M must be cast in one piece. This is the reason that the measure of $r = 18$ feet is not generally exceeded; and although there are performances with $r = 23$ feet, it is undeniable that in this direction an improvement would be of advantage. It is possible to do any thing by the balance-weight g, and there is no scruple about making it very heavy, because, in relation to the total weight to be lifted, the section of the ram M is too large, being calculated for the resistance; but with the moment of turning, the difficulty of stopping the movement of the crane becomes apparent. For the improvement of the center crane, it is not necessary to insist upon the economy of using hydraulic power, because this apparatus does not make more than three or four lifts per operation—that is, 90 feet, or 200 in twenty-four hours; and this circumstance seems to indicate the reason why, in this direction, we find less endeavor at improvement than in the arrangements of ingot cranes, of which the number of lifts may vary from 1000 to 2000 in twenty-four hours. The best way to obtain suitable conditions for a center crane is to apply it mainly for the pouring of the converters and to use another apparatus to carry the ladle while casting the steel in the molds.

The principal conditions required in the construction of ingot cranes are:

(*a*) Great quickness in moving up and down.
(*b*) Facility in turning by hand.
(*c*) The greatest economy in the use of hydraulic power.
(*d*) The lowest minimum of repairs.

These conditions are not all fulfilled by the crane with the simple ram shown in Fig. 2, because (*a*) the total weight to be carried is too great in comparison with the charge. (*b*) There is a considerable friction sideward between the ram and the cylinder, and also in the stuffing-box. (*c*) The consumption of water is too high in proportion to the charge P, the diameter of the ram M being calculated for the resistance to bending, and the weight of the falling parts being greater than the charge P. (*d*) The use of packing material in the large stuffing-box is very considerable. Sir H. Bessemer, as I am aware, was the first to employ the principle of the differential ram (Fig. 3), by which the consumption of water was considerably diminished; but to this arrangement there is the objection that the second stuffing-box is situated underground, and therefore not easily available for observation and repair, so that this system has not been very often adopted.

In the year 1873, Mr. R. Daelen, Sen., found that attaching the ram to the pillar and moving the cylinder was attended with many advantages (Fig. 4). In the system shown in Fig. 3, it was not possible to cast the ram (M and M) in one piece, and so the second piece M is to be considered as indispensable; but this is not the case in Fig. 4, because the ram is shorter for the length a, so that there are, in fact, two guides, $g^1 - g^2$, and it is possible, for greater security to fix the top of the pillar on the walls of the building by three or four bars of iron.

The cylinder being less heavy than the ram, there is here a further saving of water, and this system seems to fulfill all the conditions required in practice. As introduced in several steel-works in Germany, it secures good results; but there is the objection that the great stuffing-box shows considerable friction after having worked for some time. The reason of this is, that the measure h being only 3 feet or 4 feet, all the dust going out of the pillar enters into the packing, and so into the cylinder, where it is not taken away by the water as in the systems shown in Figs. 2 and 3. In the most recent application of this system, the measure h has been made higher, and the pillar has been made from hammered steel, bored out in the under part, so that the diameter is less, and hence the crane is more easy to turn.

One of the most interesting arrangements of ingot-cranes is that of the patented system of Messrs. Tannet, Walker & Co., of Leeds, shown in Fig. 5.

In this system, the main casting A is bored out in the center, to receive the ram or pillar B, and also on each side for the two hydraulic rams C and D, one of which is of such an area as to nearly counterbalance the weight of the center ram B with the jib and the balance-weight E; in short, the whole of the falling parts. Of course, sufficient margin is left for the crane to lower when the attendant who commands the other side ram by means of a valve applies the said valve to exhaust the water of the first-named ram, and turn it back into the accumulator. The important consideration of saving water-power is fulfilled here in a very rational manner, and numerous applications have proved it in practice.

* A paper read before the Iron and Steel Institute at Middlesborough.

If there is any objection to make in reference to this plan, it is, that the pillar B can not be greased in its course, because it can not be rid from the dust which collects on it. It may also be that the pressure upon the two side rams is not equal; for instance, when the hydraulic pressure is varied, as is the case where an accumulator with compressed air is used, or where the section of the pipes is not sufficient. In the first case, it may be that the pressure varies from 17 to 25 atmospheres, and then the ram, having to leave the charge, has to be calculated for 17, while the other balances the falling parts for 25 atmospheres. In this case, the saving of water-power would not be very great.

It must also be remarked that the weight of the falling parts is the greatest objection to all the known systems of hydraulic cranes; and this must be surmounted by a corresponding pressure of water to give the rapidity of action which is demanded.

Another system of cranes, known as the American system, is based upon the principle of making the weight of the falling parts as little as possible, so as to diminish the consumption of water and all liability to friction.

Every system of isolated standing cranes requires a very strong ram or pillar to meet the overturning moment Pr upon the foundation. This is not the case in the ordinary foundry crane (Fig. 6), which has a second support at the top, afforded by the roof of the building. In the American system (Fig. 7), the foundry crane is put on an hydraulic ram, and the top support is changed in a guide, so that the whole structure can move up and down. In both cases (Figs. 6 and 7), the thrust Q is $= \frac{Pr}{h}$; and as Q is the same, the ram M is only required to provide for this and not for Pr, as in the case of the isolated standing crane. The sideward friction between the ram and the cylinder is also reduced in the same proportion. As the balance-weight is not requisite, and the upper part of M is made of wrought-iron, the weight of the falling parts of this crane is very little, so that a highly economical use of water is obtained in this way.

This arrangement would be also cheap in installation, if the second support did not demand a construction of roof strong enough to resist the thrust Q, and also the vertical thrust R, caused by the friction of M in the guide-rods. It is also to be observed that, if there is any little change in the situation of the building or the roof, the cranes supported by these must be regulated accordingly. The system, moreover, is not capable of being applied in existing buildings where the roof is not strong enough, nor in the open air.

As, however, the principle of this crane is a very rational one, I endeavored to apply it to an isolated standing crane. For this purpose, the thrust Q is to be applied to the cylinder, because it is possible to make it strong enough to translate the movement Pr to the foundation without augmenting the consumption of water. This is done by the arrangement Figs. 8 and 9. The cylinder A is fixed on the foundation, and bears the cap B on which the rolls C are fixed, these serving to fill the space between A and B, so that the last can be easily turned. The girders E are fixed on the cap B, and serve to transfer the push Q on the cylinder A. The jib of the crane is attached to the ram F by a pivot, and transfers the push Q on the girders E by the rolls D, on the axles of which the bars H are fixed.

The ram has no side friction, and the turning friction in the stuffing-box is avoided. The rolls are in the best possible condition, because they remain dry, and it is not difficult to protect them against dust and dirt, so that the friction of all the movements is reduced as much as possible.

The weight of the falling parts is not so high as in the American system, and it becomes possible to fix the top of the crane to the walls of the building by three or four simple iron bars T, which should, however, only be done to augment the security of structure. I think that this system will fulfill all the conditions required in practice, to the fullest extent possible and in the most simple manner.

For very heavy cranes, a balance-weight can be added in such a manner that it need not augment the weight of the falling parts by attaching it to the girders. This serves to diminish the friction of the turning movement, which is its duty, because the ram has no side friction.

The following table contains a comparison of the different systems of ingot cranes—principal measures and relations:

Hydraulic presssure	20 to 25 atmospheres.
Charge to be carried	3 tons.
Weight of falling parts	?
Consumption of water per stroke	?
Length of jib	20 feet.
Length of stroke	8·25 feet.

	Weight of falling parts. Tons.	Consumption of water per stroke. Liters.
Diagram 2	3·90	211·0
" 4	3·00	137·5
" 5	4·40	71·8
" 7	1·30	95·0
" 8	1·10	78·5

I have to add that I find that for the jib of an ingot-crane a single girder is the best arrangement, being about a third lighter than two of the same strength, and permitting of only one roll to the traveler, which is more easy to move than two or four. The roll, moreover, should not have borders, being guided sideward by the four rolls. Notwithstanding that the diameter of the roll is very large (about 15 inches to 18 inches), there is no danger of reversing the traveler, because the charge will hold it down, and it travels more easily than the other systems referred to.

MESSRS. HELLER & BRIGHTLY, of Philadelphia, have just issued a little book entitled *Remarks on Engineers' Surveying Instruments*, which many will learn to prize, as it contains, besides indorsements of the instruments of the makers by prominent engineers, and extracts from the technical press, in themselves valuable, a number of very useful tables. Among the latter, we note one giving the variations of the magnetic needle. The special novelty of this catalogue is the skeleton transit and level, with all the parts in detail, so that if an engineer wishes to refer to or order from the manufacturer any special part, to replace a lost or worn one, he can do so understandingly.

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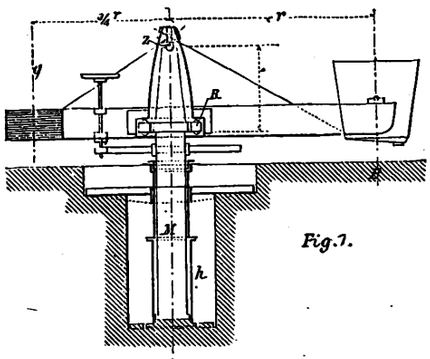


Fig. 1.

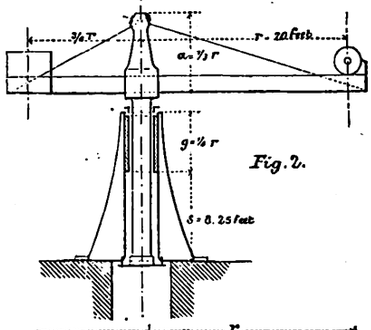


Fig. 2.

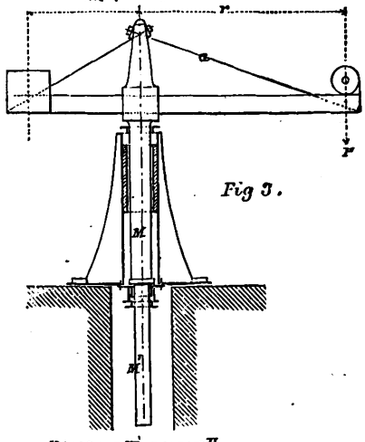


Fig 3.

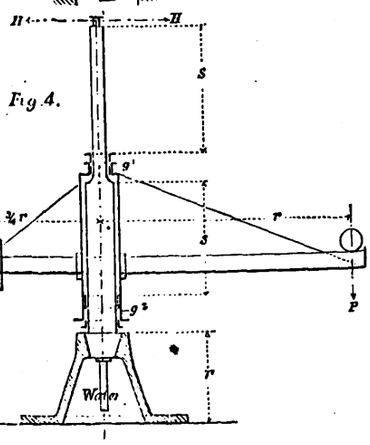


Fig. 4.

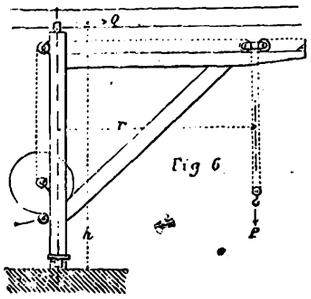


Fig 6

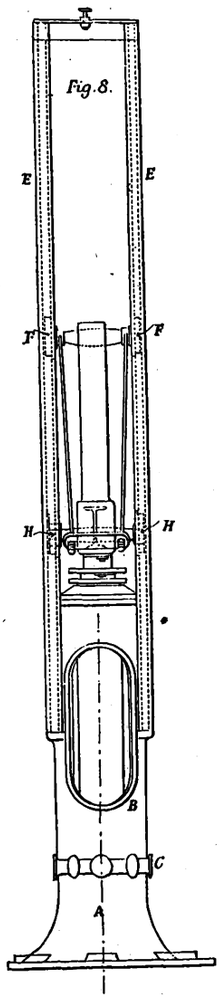


Fig. 8.

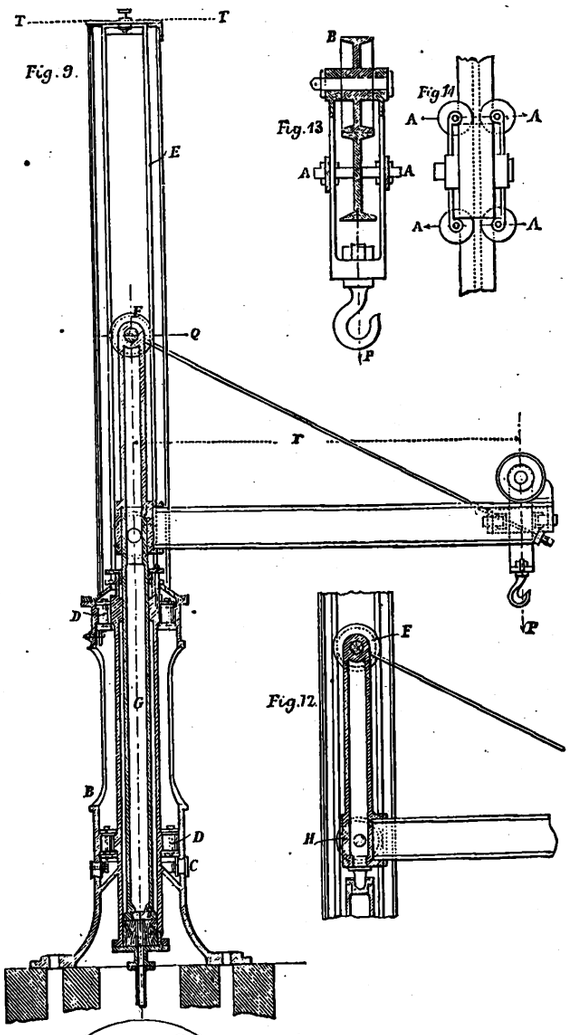


Fig. 9.

Fig. 13 Fig 14

Fig. 12.

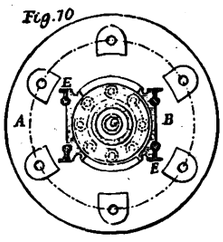


Fig. 10

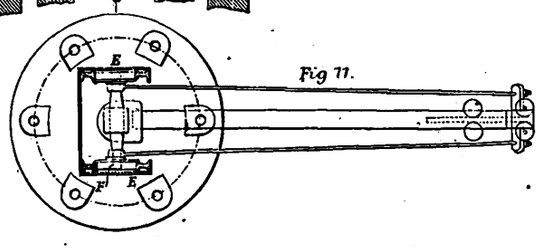


Fig 11.

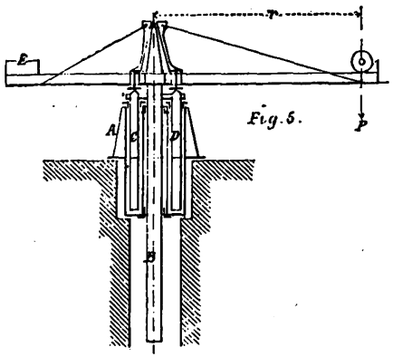


Fig. 5.

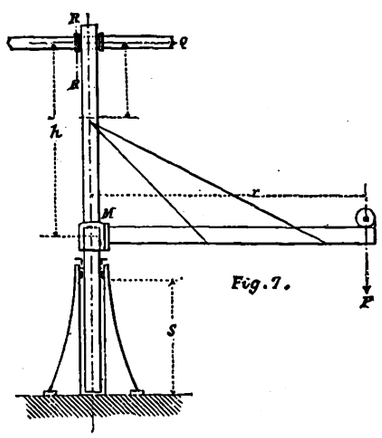


Fig. 7.

NEW PUBLICATIONS.

THE MINERAL RESOURCES OF THE UNITED STATES. Published by the United States Geological Survey, J. W. POWELL, Director; ALBERT WILLIAMS, Jr., Chief of the Division of Mining Statistics and Technology. Washington. 1883. 8vo, pages 813. (*With Index.*) Price, 50 cents.

In spite of the facts that the aggregate of the value of the product of the mines in the United States is greater than that of any other country, and that with rapid strides it is in many other branches overtaking older rivals, we have not, until recently, possessed a bureau which collected the figures marking our march of progress, except so far as the two precious metals were concerned. In every civilized country, the department of mines of the government collects annually statistics of production with more or less painstaking care, and in some instances with reasonable promptitude. Hitherto, in the United States, private enterprise has alone attempted to fill the gap. In some branches, the collection of statistics has been brought to a degree of perfection which may serve as a model to government work anywhere, Mr. James M. Swank's records of the statistics of iron and steel being the most prominent example. The press has made strong efforts in the same direction, in some cases with marked success, while in other industries—for instance, in bituminous coal mining—the only reliable data collected are those of State inspectors or the reports of shipments by railroad or canal. No one will be more ready to concede than those who compiled these figures that at best they are estimates only, and their chief value is, that they furnish, at as early a date as possible after the first of January, an approximate notion of the output. Major Powell, the Director of the United States Geological Survey, deserves great credit for having caused the first well-organized effort to be made to establish a bureau of mining statistics, and the work now before us is the outgrowth of its first year's work. It is only just to the survey and to Mr. Albert Williams, Jr., the Chief of the Division of Mining Statistics and Technology, to say that work was only begun in the early months of the year, and that, in spite of the facts that the entire division had to be organized, and that correspondence over so wide an area as the United States is naturally tedious, the whole of the work was ready for the printer's hands early in July. We are anxious to insist upon this point because it proves that, under Mr. Williams's efficient management, the department is capable of putting before the public the results of its investigations within the first quarter of the year, provided there is no red tape at the printing-office to interfere with its business-like methods. From a practical, commercial point of view, every day, every week, saved in the time of publication is of the greatest value, and it is gratifying to know that in this respect the survey has shown that it is capable of meeting the demands of the country. We do not believe that, considering all the circumstances, any reader of this large volume will deny that the attempt to establish a division of mining statistics and technology has been completely successful, and we trust that the funds will be more ample and will be forthcoming more promptly in the future, so that it may be carried to that state of efficiency which it promises to attain under the present management.

The work of organizing and editing has been done by Mr. Albert Williams, Jr., who has been also the principal contributor. For the statistical department, he has gathered about him a corps of specialists of acknowledged standing, like James M. Swank, for iron; S. H. Stowell, for petroleum; J. B. Randol, for quicksilver; Charles A. Ashburner and F. E. Saward, for coal; C. Kirchhoff, Jr., for lead, copper, and zinc; Otto A. Moses, for phosphates; and George F. Kunz, for precious metals; Messrs. C. G. Yale, of San Francisco, and F. F. Chisolm, of Denver, having special charge of collecting data on a number of subjects in the Pacific and Rocky Mountain divisions respectively. On technical subjects, there is a series of excellent papers by such authorities as James Douglas, Jr.; and Dr. E. D. Peters, Jr., on copper; Eugene A. Smith, on the iron ores of Alabama; O. H. Hahn, on lead; F. L. Clerc, on zinc; Prof. W. P. Blake, on nickel; F. W. Taylor, on cobalt; Daniel T. Day, on manganese, chromium, and tungsten; F. A. Wilber, on clays, marls, and apatite; Henry Gannett, on abrasive materials; E. W. Hilgard, on the salines of Louisiana; John A. Walker, on graphite; while among the special contributions, we find a paper by Dr. R. W. Raymond, on the divining-rod, and a paper on electrolysis in the metallurgy of copper, lead, and zinc by C. O. Mailloux, and a note by Prof. W. C. Kerr on the minor materials of North Carolina. A very useful addition to the work is an elaborate series of tables of the localities of the useful minerals of the United States, compiled by Prof. John C. Smock, Whitman Cross, Joseph Perkins, and D. B. Huntley.

It would lead us too far to attempt a critical review of the work of this array of contributors, among whom Mr. Williams takes a prominent place in his admirable review of the salt trade and other industries embraced in the general title of "structural materials." We have already printed some of the papers in full, and shall present others at a later date. We congratulate the survey, and Mr. Williams in particular, on the excellent manner in which the labors connected with this publication have been carried out, and feel convinced that they will meet with the appreciation and indorsement of the mining and metallurgical industries of the country.

PRODUCTION OF GOLD AND SILVER IN THE UNITED STATES FOR THE YEAR 1882. By the Hon. HORATIO C. BURCHARD, Director of the Mint. Washington. 1883. 8vo, 873 pages. (*With Index.*)

Mr. Burchard's figures for the production of the precious metals in the United States have as usual been given to the public in the form of a summary during the early months of the year; and the fact that his letter of transmittal bears date February 21st shows that they were compiled many months ago. The volume contains the usual review of the mining operations of the different States and territories. Some of them, as the report of Messrs. E. F. Burton and J. R. Hardenbergh, of the San Francisco Mint, possess great value, and may be safely accepted as standards for other departments of the work. The review of mining in California is evidently prepared with the greatest care, with less reliance on a mass of clippings from local newspapers, and with more critical judgment. It is only just to say that other parts of the work show evidences of an improvement which justifies the hope that future efforts will be better directed and the data obtained be more closely scrutinized. Mr. Burchard has succeeded in obtaining the assistance of such local authorities as Mr. O. J. Hollister, of Salt Lake City, for Utah; John W. Eddy and R. B. Harrison, of Helena, for Montana; and H. Silver, of the Denver Mint, for Colorado. Mr. A. M. Lawver, of San Francisco, has personally visited the leading mining districts of Arizona, and is responsible for the greater part of the report for that territory. The first part, chiefly descriptive of progress in the mining districts, comprises 648 pages. We believe that it could be conscientiously cut down to one half that length without very serious injury to the value of the report.

The second part, General Statistics, gives a record of the work of the mints and the production of individual mines.

The third part, Miscellaneous, is largely a very indiscriminate jumble of extracts from newspapers, supposed to have a bearing on the technical working of mines, mills, and smelting-works. Among them we notice with much regret, as a prominent one, the *Mining Journal*, which the compiler of this "miscellaneous" section evidently believes has some standing in the technical department of mining. For his instruction, we may state that most of the new and surprising methods which annually grace the pages of our English contemporary, and are gobbled in good faith by some of its younger imitators in this country, are simply abstracts from the British patent records. Imagine a technical journal in this country giving currency to every wild metallurgical scheme put forth by so-called inventors. We do not believe that it is the province of the Mint to attempt to disseminate knowledge on technical subjects relating to the production of the precious metals by reprinting articles, from whatever source they may come. It can command and should be able to obtain original contributions by the best talent, which would be quoted with cordial approval by the mining community.

THE LEADVILLE SMELTERS—REGULATIONS FOR THE PURCHASE OF ORES.

The Leadville smelters have issued the following circular, dated Leadville, October 11th, 1883, which explains itself:

TO MINE OWNERS AND MINE MANAGERS:

We, the undersigned, engaged in the business of purchasing and smelting ore, having arrived at the conclusion that the methods of assaying and settling for ores heretofore existing are vexatious and often unjust, have agreed that, on all contracts made after this date, the following rules will be strictly adhered to:

First. Assays shall be made by standard scorification.

Second. Moisture shall be determined by our assayers, and no splits shall be recognized.

Third. In silver assays, contents shall be noted only in full and one half ounces, that is, every fraction under one half ounce shall be left off, and every fraction over one half ounce shall also be omitted.

Fourth. Gold in ores shall be noted in pennyweights only, no payments to be made for less than one tenth of an ounce contents per ton.

Fifth. In lead assays, fractions of units shall not be noted, and no payments shall be made for less than five per cent contents per ton.

Sixth. The splitting of assays shall be discontinued, and settlement made on our assays if within one ounce of silver, one twentieth ounce of gold, and one per cent of lead of control assays. If a difference of more than one ounce of silver, one twentieth ounce of gold, or one per cent of lead exists, the umpire sample shall be assayed.

Seventh. No person shall be allowed to serve as umpire unless in the employ of the smelting-works subscribed hereto, or in the employ of the mines.

Eighth. In case it shall be necessary to employ an umpire assayer, the mine-owner or manager shall have the privilege of selecting an assayer from among the smelter assayers. Should the mine-owner or manager prefer to have his ore umpired by a mine assayer, then the smelter shall have the privilege of making the selection.

The American Mining and Smelting Company by F. H. Ketchum, General Manager.

Arkansas Valley Smelting Company by Dr. D. H. Dougan, General Manager.

Harrison Reduction-Works by F. Fohr, Manager.

La Plata Mining and Smelting Company by Henry Coom, Manager.

Omaha and Grant Smelting and Refining Company by Edward Eddy, General Manager.

Manville Smelting Company by A. Sherwin, Manager.

The Colorado Smelting Company by A. Eilers, General Manager.

The Pueblo Smelting and Refining Company by A. W. Geist, General Manager.

THE ELECTRICAL TRANSMISSION OF POWER.—*L'Electricité* gives the following account of M. Marcel Deprez's experiments at Grenoble, which we referred to in a recent note: The generator was placed in the cement-works of Messrs. Damaye & Co., at Vizill-Gare, where a turbine of 80 horse-power is in use. A double silicon bronze wire of ·002 meter diameter was fitted upon ordinary telegraph-poles along the road leading to Champ-Vizille, a third wire of brass serving for telephonic communication. The distance between the market-house at Grenoble and the Damaye works is eight miles 1230 yards. In the market-hall, a small workshop has been set up, in which are an endless band-saw, a circular saw, a printing-press, a Dumont centrifugal pump, etc., all of which are arranged around the receiver. This latter is the same that was used at Munich, but has been repaired. This time, M. Marcel Deprez has endeavored, if not to suppress, at least to greatly diminish, the effects of the distance to be traversed by increasing the electro-motive force, hoping to lessen the dangers of so doing by the insulation of the apparatus. He obtains this result by increasing the length of the wire on the machine, and diminishing its diameter. On the first evening, when the public was admitted by card, it was somewhat disappointed to see only the centrifugal pump at work. This raised 1200 liters of water, and formed a cascade which had a pretty effect. The speed of the generator at Vizille was about 600 revolutions, and it absorbed nearly 14 horse-power. On the Sunday, the committee appointed to make an official report verified the result at Grenoble to be 7 horse-power measured on a Prony brake; and at this time the speed of the generator at Vizille was 1257 revolutions, and it absorbed from 45 to 50 horse-power, which corresponds to a return of 15 per cent.

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THE ELECTRIC CONDUCTIVITY OF METALS.

In a communication by Mr. Killingworth Hedges, on the fire risks of electric lighting, the following facts were submitted: The conductors must be properly proportioned for the current they have to carry; whatever resistance there is in the conductor will cause a corresponding development of heat, which will vary with the amount of electricity passing, and inversely as the sectional area. The material must be free from impurity, otherwise an impure section will increase the resistance. The extraordinary difference in the conducting power of a sample of "commercial" Rio Tinto copper wire, as compared with the pure metal, was shown in an experiment by Dr. Matthiessen—the conducting power being only 13·6, as against 99·95 for pure copper. The continued heating of an impure metallic conductor has a certain effect on its electrical resistance. With the sample just mentioned, the conducting power at 100 degrees Cent. decreased from 13·58 to 13·558 after the wire had been heated for three days. It does not always follow that there will be a decrease in the conducting power, as with alloys the opposite effect is produced. A copper-silver alloy showed an increase of ·264, after having been heated to 100 degrees Cent. for three days, and a tin-copper alloy an increase of ·13.

As the temperature in Dr. Matthiessen's experiments was not increased over 100 degrees Cent., the author has made some further experiments—heating the wires by the electric current from a secondary battery to within a few degrees of their melting-point. The following materials were tried, the wires and foils having such sectional area and so arranged that, on the current being increased by 20 per cent, they were immediately fused. The total length of each experiment was twenty-four hours, during which time the current passing through varied slightly, and the following is a mean of the results:

Material.	Resistance before heating. Ohms.	Resistance of leads. Ohms.	Difference after 24 hours.
No. 1. Commercial tin wire.....	·815	·8	—·003
" 2. Lead, soft.....	·835	·8	—·005
" 3. Copper, soft	·810	·8	No change
" 4. Pure tin-foil	·860	·8	No change
" 5. Tin and lead alloy...	·870	·8	—·160
" 6. Albo alloy, in foil.....	·835	·8	No change
" 7. Aluminium and tin alloy.....	·820	·8	+·0008

The resistances were in all cases taken at the temperature of the air, which averaged 69 degrees. The sign — shows that the metal decreased in resistance, and + that it increased after continued heating. Nos. 1 and 3, tin and copper, were found to scale when heated. A change has been noticed where high-tension currents have been sent through a pure copper wire for some time—the wire in the armature of a Siemens machine which came under the notice of the author appeared to be brittle, and gave a fracture unlike pure copper.

THE RIVERDALE EXPLOSION.

Writing to *Science*, Prof. Robert H. Thurston says: The boiler of the steamer Riverdale exploded on the 28th of August, a few minutes after the boat had left her wharf at New York, and started for her destination on the Hudson River above the city. Several lives were lost, and the boat itself was sunk in sixty feet of water. The boiler was raised and placed upon the wharf near the Delamater Iron-Works; and the boat, a worthless wreck, was towed to the New Jersey side of the river.

The steamer had two "flue-boilers" 25 feet (7·6 m.) long, 6 feet 4 inches (1·93 m.) in diameter, containing four "direct" flues 14 inches (0·36 m.) in diameter, two of 9 inches (0·23 m.) diameter, and five "return" flues of 11¼ inches (0·28 m.) diameter. The shell was of No. 3 iron, and the area of heating-surface was 676 square feet (63 sq. m.). The iron was of good quality, and was in good condition throughout, except along the bottom, where it gave way. The form, proportions, and workmanship of the boiler were good. The builders, Messrs. Fletcher & Harrison, of New York, were among the most reputable constructors of engines and boilers in that city, and were noted for doing good work.

On examination, it was found that the bottom was corroded along its whole length, and had been patched in a number of places where the iron had become dangerously thin, and that in some places the sheets were reduced to one fourth their original thickness. The shell had been repeatedly patched, and five "soft patches" were found on the girth-seams. The rupture seems to have started in the thin parts of the bottom, and to have followed the weakened girth-seams quite around, and divided the mass into two parts of nearly equal size, tearing the middle sheet out of the shell entirely.

A coroner's jury made an inspection, examined such witnesses as could be found and such experts as could be induced to testify, and rendered a verdict to the effect that the boiler ruptured in consequence of the weakness of the sheets on the bottom of the shell, which were unable to sustain the working pressure allowed by the United States inspector; which weakness had been produced by corrosion on the interior, due to the action of the feed-water. It was further asserted, that the boiler was tested in June up to a pressure of 62 pounds (5 atmos. abs.), and burst ten weeks later under a pressure of but 32 pounds (3 atmos.), in consequence of the neglect of the inspector to observe its condition at the time of testing it. The engine-driver and the inspector were censured by a vote which was not unanimous. The jury expressed the opinion that the present law is not sufficiently explicit and mandatory, and that the use of the test by hydrostatic pressure is insufficient to detect and reveal such defects as here existed.

The inspector acknowledged that he did not try the strength of the boiler with the hammer, as is now usual in all thorough examinations by competent engineers, but merely looked it over; and that at previous inspections he had not entered the boiler, but had only looked in at the man-hole. The evidence of the most superficial and inefficient "inspection" was conclusive; and the fact that proper inspection would have revealed the dangerous condition of the boiler was equally well proved. The so-called "inspection" was a farce; and the inspector, in a spirit of indifference or indolence, took the chances of an explosion.

The exploded boiler weighed 27,000 pounds (12,247 kilos), and contained 25,000 pounds (11,340 kilos) of water. The explosion was not remarkably violent, but was what old engineers are accustomed to call a "burst," rather than an explosion. The consequences were, however, sufficiently serious. The energy producing the effects seen in the case of a true explosion may be imagined, when the amount of heat-energy stored up in such a boiler is calculated. The quantity of heat transformed into mechanical energy by a mass of water and of steam of such magnitude, set free, and expanding down to the pressure and temperature of the atmosphere, from the pressure and temperature at which it existed in the boiler of the Riverdale, would amount to above 1,500,000,000 foot-pounds (over 200,000,000 kilogrammètres). This would be sufficient to throw the boiler and its contents, were the heat all utilized, as in a perfect steam-engine, five miles high. This may give some faint idea of the enormous forces at work, and the tremendous energy stored in a steam-boiler, even where the pressure of the steam is very low, as it was in this case.

It will be concluded, from what has been above stated, that a steam-boiler of the most ordinary and least dangerous type has stored within it an inconceivable amount of available energy in the form of heat, which may be at any moment transformed, in part, into mechanical energy with terribly destructive results, both to life and property; that this powerful agent for good or for evil can only be safely utilized when the utmost care, intelligence, and skill are employed in its application, and in the preservation of the vessel in which it is inclosed; that the present code of law relating to the care, management, and inspection of steam-boilers is entirely inadequate to insure safety; that the inspection of steam-boilers, as at present practiced by the employés of the government, is not only liable to be inefficient, but is likely to prove worse than none, as it gives to the owner, and perhaps often to the man in charge of the boiler, a feeling of security which is entirely without basis in fact, and which may therefore cause the neglect of that watchfulness which might otherwise prevent accident; that simple pressure produced by the test-pump, as now provided for by the law, is not a sufficiently effective method of detecting weakness in the boiler, or to be relied upon to the exclusion of other better and well-known methods of test.

The fact that the hydrostatic test is not conclusive as to the safety of a boiler has long been well known and admitted among intelligent engineers. The steam ferry-boat Westfield met with precisely such an accident a dozen years ago; and it was shown at the coroner's inquest, at which the writer assisted that official in the examination of his expert witnesses, that the boiler had been inspected, and had been tested, but a few weeks before, by the United States inspector, who applied a pressure considerably in excess of that at which the explosion took place. The cause of the accident, by which a large number of people lost their lives, was precisely that which caused the explosion of the Riverdale's boiler, and the method of rupture was the same. In each case, proper methods of inspection would have saved the lives of the sufferers.

It is undoubtedly true, that many of the inspectors are conscientious, experienced, skillful, and painstaking men, and do their duty in spite of the defects of the existing law; but it is also true that now and then a careless or incompetent inspector will neglect the simplest details of his work, and that we must expect occasional repetition of this sad experience, until the law is intelligently framed, and so administered that the passing of a defective boiler by the inspector shall become as nearly as possible an impossibility.

A NEW METHOD OF MEASURING THE DEPTHS OF SHAFTS.*

The following method of measuring the vertical depth of a mine shaft was adopted in 1880 by Mining Surveyor Gräfe, of Bernburg. Three men are employed; two of whom stand on the safety-roof or bonnet of the cage, while the third is seated in a chair fixed to the drawing-rope, about 35 feet above the cage. The attachment is formed by a flat iron bar about 8 feet long, curved so as to be about one foot distant from the axis of the rope in the center where the seat is attached. This is an iron bracket, which, in a wide shafting, is placed on the outer or convex side, while in narrow ones it is inside, in order that the operator may reach the pit-guides with his hand. The attachment is made by fish-plates and bolts, the rope being served with spun yarn at the surfaces of contact; and in these cases, where it is necessary to have the seat within the bow, it should be similarly covered above the seat up to the hight of the operator's head, in order to protect him from dropping grease, etc. The measurement is effected by a steel tape 10 meters (32 feet 9 inches) long, which becomes sufficiently straight by its own weight when suspended. Those of greater length have not been found so convenient.

The method of measurement is very simple: One of the two men, B, on the roof of the cage, works a signal line, which is unrolled from a reel on the surface; the man on the chair, C, then applies the ring of the tape, falling to a fixed point on one of the guides. The second man, A, on the cage, then marks the lower end with a fine cut with a penknife, and numbers it with chalk, 10. B then signals the engine-man, who lowers until ten meters are reeled off the line, when the signal is given to stop. C applies the tape to the 10-meter mark, A marks the 20-meter level, and so on. The above method applies to the wooden guides; where they are of iron, the marks are made with a fine three-cornered file; and when of wire rope, by wrapping a fine wire or thread around them. By this method, the engine-shaft at Leopoldshall salt mine was, when the preliminary preparations had been made, measured three times in six hours, with the following results:

First measurement	334·757 meters.
Second "	334·758 "
Third "	334·758 "

In addition to measuring the depth of the shaft, the positions of eight levels, at different hights, were determined by the same operation.

At the Von der Heydt shaft, at Stassfürth, with seven working levels, four determinations of the depth were also made in about the same time. The results were:

First measurement	353·715 meters.
Second "	353·713 "
Third "	353·717 "
Fourth "	353·714 "

* From Abstracts of Papers by the London Institution of Civil Engineers.

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THE NEW TIME STANDARDS.

The proposed new standards of time for the railroads of the country, which are to be established by the General Time Convention of Railroad Managers, has received the approval of the Harvard Observatory, and its co-operation is promised. The railroads centering here acquiesced in the plan on the condition that the time given from the observatory should be correspondingly changed. The consent of Prof. E. C. Pickering, the director of the observatory, being necessary, he was met in New York promptly on his arrival from Europe by Mr. J. Rayner Edmonds, of the observatory, and his hearty approval of the scheme was readily given. Accordingly, a note has been sent to the Secretary of the Chicago Convention, W. F. Allen, to this effect, and assurance given that, if the convention adopts the system, the observatory will be ready to furnish telegraphic signals conforming to the minute and second of the proposed standards.

Under the new system, instead of running the various systems and divisions of systems by as many local standards of time, the continent is to be divided into five broad belts, running north and south, the time for each of which will be one hour slower than that of the next division to the eastward and one hour faster than that of the next division westward. By this plan, the minute-hand of a traveler's watch will not have to be changed, however far he may have to travel or in what direction; but his watch will be just one hour slow when he crosses the imaginary line into the next division to the east, or an hour fast when he crosses the line into the next division to the west. The time now furnished by the Harvard Observatory is the mean solar time for the Boston State House. The new time will be 15 minutes 44·5 seconds—practically 15¾ minutes—slower, and will be the average time for this division, which includes the New England States, New York and Pennsylvania, and the greater part of Canada. North of Lake Erie, the division extends west to Detroit, while south of Lake Erie, Pittsburg is practically on the western boundary of this division. Thus, in the region north of the lake, the standard time will be five hours slow by Greenwich; and south of Lake Erie and west of Pittsburg, it will be six hours slow by Greenwich. The new standard, if adopted, will go into effect on a Sunday noon, and from that hour all the railroads will be run by the new time.

The new time standard was adopted October 11th by 78,000 miles of railroad.

FURNACE, MILL AND FACTORY.

The contract for copper work in the Custom-House at Kansas City, Mo., has been awarded to the Ansonia Brass and Copper Works, of New York.

The Bangor Furnace Company, Bangor, Mich., made a voluntary assignment October 18th. Charles D. Rhodes, of Chicago, president, also made an assignment. He states his liabilities as $130,000; assets, nominally twice this amount.

A dispatch from Cleveland, O., states that some excitement was caused in business circles by the failure of John N. Glidden, secretary of the Republic Iron Company. His failure is said to be solely due to the shrinkage of values in the legitimate iron business. His indebtedness to the company is for ore purchased on his own account and sold to other persons, and for transportation. He also says that in a year and a half he has lost more than $800,000 from this cause. Mr. Glidden's embarrassment will not affect the Republic Iron Company. Its capital stock is $2,500,000, and it is the owner of valuable mining property.

But one blast-furnace in Brier Hill, O., is in operation.

The Falcon and Phœnix furnaces of Brown, Bonnell & Co., are in blast.

The blast-furnace recently started up at Fond du Lac is working with satisfactory results.

The affairs of the Union Iron Company, of Portsmouth, O., have been put into the hands of trustees. The liabilities are estimated at $500,000, and the assets at much less. John Campbell, of Ironton, O., one of the heaviest creditors, has made an assignment to H. S. Neal. These embarrassments affect eight or nine of the largest furnaces in Southern Ohio. Mr. Campbell claims that he can pull through unless his creditors force a sale, in which case he says they will not get more than fifty per cent. It is understood that he holds $150,000 of the stock of the Union Iron Company, and has indorsed its paper to the extent of $200,000.

Randolph Brandt, manufacturer of the Selden patent packing, filled the order for packing the expansion-joints on two miles of 24-inch pipe for the Hydraulic Power Company, at Iron Mountain, Mo. Houses like Edward P. Allis & Co., of Milwaukee, the Knowles Steam-Pump Works, and many of the largest mining and milling companies use this packing on engine and pump-rods.

The Illinois Central Iron and Coal Mining Company has placed an additional order with the Lechner Manufacturing Company, Columbus, O., for chain-elevators for elevating coal at its mines at St. John's, Ill. This company has also received orders for chain-elevators and roller chain belting from the Nelsonville Coal and Coke Company, for its mines at Buchtel, O.

The new works of the Marchand Manufacturing Company, at Pittsburg, are now in operation, and are turning out about 40 per day of their rotary self-measuring pumps.

H. R. Worthington, through his Western agency, is putting in place for the Chamberlain (Dakota) Water-Works a half-million compound pack plunger-pump, and also for the Sandwich Water-Works, Sandwich, Ill., a pump having a capacity of 1,000,000 gallons in twenty-four hours. This house has also furnished a two-and-a-half million compound pumping-engine to the Kankakee Insane Asylum.

The Morgan Engineering Company, of Alliance, O., shipped the other day to the Motala Steel-Works, Sweden, one of the leading establishments in that country, a complete open-hearth hydraulic steel plant, including Wellman's patent hydraulic cranes, stock-hoists, accumulator, Critchlow's valves, etc. This company has also recently shipped one of its 1250 pound single-stand steam-hammers to Vera Cruz, Mexico.

A 60-inch by 16-foot tubular steam-boiler has just been furnished to the Cheyenne Electric Light Company, at Cheyenne, Wyoming, by Fraser & Chalmers, who are now busy on eight Frue vanners and other machinery for the Sierra Valley Mining Company, at Lake Valley, New Mexico. This firm has also just built three Frue vanners for Elling & Morris, Virginia City, Montana, and eight additional vanners for the Germania Company, of Colorado, making eighteen built for that company. Orders for two more vanners have just been booked for the Bullion Cañon Mining Company, of Utah.

The Baugh Steam Forge Co., Detroit, is running its bar, guide, and puddle-mills single turn, and its axle department night and day, with an output of one hundred axles per diem. This company makes a specialty of car-links and pins. At a recent test, its D standard links were found to bear the extraordinary strain of 164,300 pounds, and its 1⅛-inch square links stood 139,500 pounds.

The Allentown *Chronicle* says: The new water-jacket furnace in Reading, Pa., owned by Henry S. Eckert, has now been in blast about one week, and up to this time the result has been very satisfactory; thirty tons of iron are made daily, but it can be increased to forty. This is the only furnace of the kind in the United States. It was designed and built by David Campbell, the superintendent of the furnaces. The jacket surrounds the furnace to the height of 19 feet 9 inches. It is made in sections, so that if an accident should occur to either section, it could be replaced. Between the outer and inner plates of the upper section, is a thickness of five inches of water, and in the lower section four inches. The fresh water is constantly running in above, and is allowed to flow off below through pipes. The experiment is watched with great interest by furnace-men throughout the country.

The Joliet Steel Company, Joliet, Ill., is rolling rails without heating the ingots in the bloom-mill furnaces. Two hundred and fifty rails were recently put at once through the rolls and finished without losing a rail or sending back a single bloom. It is said that the rails worked just as well and as easily as they do when reheated. The soaking-pit process is also to be adopted. This will do away with both rail-mill and bloom-mill furnaces.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

GIRARD.—Work on the 200, 300, and 350-feet levels continues. The ore in the latter has completely changed from a sulphuret to a carbonate. Shipments of high-grade carbonate ores to Benson have begun. In the upper levels, the ore is rather low grade, not rich enough to bear shipment, but sufficiently valuable to secure a handsome profit if treated at one of the local smelters. As soon as the Woronoco smelter starts up again, work on those levels will be commenced.

PEDRO CONSOLIDATED.—The tunnel on these properties is in a distance of 470 feet, and, in order to strike the ledge met with in the shaft sunk on the hillside, it is thought that a farther distance of 40 feet will have to be made. The breast of tunnel shows a streak of good ore, and in its course several streaks have been met with, the assays proving them to contain $16, $28, and $33 per ton in silver.

RANDOLPH.—Work has been resumed.

TOMBSTONE MILL AND MINING COMPANY.—It is officially reported that the company has just reached the 5th level in the West Side mine, where the ore runs about 70 ounces silver per ton and carries more lead than the ore in the upper levels. The 3d and 4th levels are supplying most of the ore from the mine, and a discovery in the former gives assays of 820 and 848 ounces per ton. The company has also received telegraphic advices of a rich strike of which no particulars have yet been received by letter.

VIZINA.—A new and very important strike is reported.

YAVAPAI COUNTY.

BLACK WARRIOR.—This mine continues to yield a steady output of ore sufficient to keep the company's mill supplied. The mill is making an exceptionally good record this month. The first week of the month, the ore milled averaged 117·4 ounces, and the chlorinations 92·6 per cent; and the second week, 121·75 ounces, and 91·4 per cent. The company's October bullion product promises to be the largest for any month in its history. Development-work is prosecuted on the company's Tuscumbia mine. Supplies are storing with the view of running the mill during the winter.

CALIFORNIA.

INYO COUNTY—SWANSEA DISTRICT.

INDIANA.—It is stated that ten tons of silver ore from this mine were recently sold in San Francisco for $3200 net. The ore will go to Europe for reduction.

MONO COUNTY—BODIE DISTRICT.

Since the pumping at the Lent shaft has ceased, the water, says the Bodie *Free Press*, has filled the drift at the 1000-foot level and risen pretty nearly up to the 800-foot level. October 12th, it began to show its strength in the 1200 of the Standard. The Standard pump was unable to handle it, and the next morning the level filled up and the miners were driven out. It was not at first thought that the stopping of the Lent would be felt so quickly. It is to be hoped that some arrangement will be made between the two companies whereby work may be resumed in the lower levels of both mines.

STANDARD CONSOLIDATED.—At the request of many Standard stockholders, the superintendent of the company has made a report, dated October 5th, of the present condition of the mine, prospects, etc., from which the following items are taken: East cross-cut, 1200 level, which is 575 feet long, is in soft rock, an indication that the veins may soon be cut which are on the 1000 level, where they show good ore in spots, but are broken and irregular. On the 1000 level, prospecting-work has been steadily pushed ahead. There is quite an improvement in the character of the ore which is taken from uprise No. 2 in south drift No. 2. North drift, on the Fortuna vein, is in 200 feet, and shows the vein 18 inches wide; average assay, $52. The vein, however, is very much broken. On the 700 level, the main north drift, in 375 feet from east cross-cut, shows the vein about 100 feet wide, broken and mixed with clay, and at present low grade. It is improving as it is driven northward, and it is believed will make a large body of milling ore. On the 500 level, the main north drift is in 600 feet. This drift is on the foot-wall vein, which is eight feet wide; then there are about 12 feet of horse matter, beyond which the vein carries about 15 feet of good milling ore, running from $15 to $40 per ton. This portion of the mine is opening out well, and assures an immense quantity of ore for a long time. The level looks well throughout its entire length, and the milling ore gives every promise of extending to the north drift, 700 level. On the 385 level, the ore-body continues to look well, and there is yet a great deal of ore, both in the north and south stopes, running from 20 feet wide in the north to eight feet wide in the south end of the mine. The machinery at the mine is in first-class order. The new 20 by 36 Corliss engine is in place in the Standard mill, and both mills are in good repair.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GARFIELD.—This mine now is under the complete control of W. J. Reynolds. Men have been put to work to get the mine in complete working order.

GOLD STRIPE.—All outside work is suspended for the present. Six miners will be kept at work all winter prospecting.

GREEN MOUNTAIN.—The boiler has been moved from the Cherokee mine to Green Mountain, in order to furnish power for the air-compressor, should the water in the reservoir be exhausted. This will insure the continuance of work in the main tunnel in any event, and, when the new supply of water comes, in all probability the drift will be in or very near the Blake chimney.

SIERRA COUNTY.

ALASKA.—The hoisting and pumping-works building to replace those destroyed by fire several months ago will be completed shortly. The shaft had reached a depth of 457 feet when the fire occurred. As soon as the water is pumped out, the extraction and milling of ore and running of new drills will begin.

COLORADO.

CLEAR CREEK COUNTY.

GENEVA MINING AND SMELTING COMPANY.—These properties have been sold to Judge Wilschire and Major Lanigan, of Arkansas, and General Semmes, of New Orleans. The mine has not been worked for a year. The developments made consist of 2783 feet of tunnels, 3351 feet of drifts and levels, and 1120 feet of shafts sunk upon veins. There is about $500,000 worth of ore in sight and 300 tons on the dump. The Britannic, now in 1050 feet, will be driven 300 feet ahead through the mountain to the Pacific slope near Decatur.

HUKILL.—At a sheriff's sale held in Georgetown, October 16th, the Hukill, Whale, and other mining properties, together with all of the real estate, build-

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ings, and other property belonging to this company were sold to Mr. George E. McClelland, of Idaho Springs, who has resold the entire property to Mr. J. W. Mackey on private terms. This sale is one of great importance to Idaho Springs. It is said that large ore-bodies lie in the under-working of the Hukill mine. The mine will be put in working order at once.

DOLORES COUNTY.

GRAND VIEW.—The smelter has probably been started by this time. About 250 tons of ore had accumulated from the mines of the Grand View group, the Little Maggie, Butler, Silver Belle, Hope, Cross, South Park, and Clyde mines.

RICO REDUCTION COMPANY.—The capacity of the mill will be enlarged. The operations this season were somewhat restricted by experimental workings with some of Rico's most refractory ores.

LAKE COUNTY.

The Leadville *Herald* gives the following notes about the smelters: The roasting-kilns at the Harrison smelter are in operation and working very satisfactorily. The establishment is receiving considerable desirable smelting ore, and will be prepared to blow in about the first of next month.

The ore supply at Cummings & Finn's smelter is rapidly diminishing, preparatory to transferring the works to the Omaha & Grant Smelting and Refining Company.

The premises of the Arkansas Valley sampling-mill contain about three thousand tons of ore.

The Elgin works, operated by the Manville Smelting Company, are proving quite a success. The company is rapidly accumulating ore, and has now on hand nearly three thousand tons of ore. The preparations for erecting a third furnace are advancing.

The Omaha & Grant Smelting and Refining Company has about 10,000 tons of ore stacked on its premises along the Rio Grande Railroad, in California Gulch.

The work of overhauling and remodeling the La Plata Smelting-Works is making fair progress. The receipts of ores at this smelter are still small, and the establishment up to the present time has not accumulated over 3000 tons of ore. There is little doubt, however, that by the time the La Plata is ready to resume smelting, which will be November 5th to 15th, it will have enough ore on hand, and reliable contracts assure its beginning a campaign with the assurance of maintaining it.

The American Smelting-Works are running along very quietly, and are evidently doing well. The company has from 15,000 to 20,000 tons of ore on hand, costing in the neighborhood of half a million dollars. All the furnaces of the establishment are in blast.

At the Arkansas Valley works, five large furnaces are in blast, and they are expected to smelt 6500 tons of ore this month. The yards and ore-bins contain about eight thousand tons of ore.

ADAMS.—The Clontarf mine, on Carbonate Hill, is pursuing work actively, but producing only a limited amount of ore. The drift designed to connect the Clontarf shaft with the Brookland has about 200 feet still to advance to effect a connection. The Clontarf workings are entirely free from water. In the Brookland shaft, there are about 18 feet of water, which will be cleared shortly. The work of placing pumps in the Wolf Tone shaft is progressing satisfactorily.

ANTIOCH MILL.—Mr. Fruby, who is making practical tests with a concentrating machine at this mill, reports meeting with excellent success in the treatment of Leadville ores. He states that a lot of 18-ounce ore from the Lowland Chief mine has been concentrated, the headings returning a value of $310 per ton. A test on 14-ounce ore from the Venture resulted in concentrates containing 138 ounces in silver to the ton.

BOREEL.—The Gonebrod mine, the property of this company, is now worked. The present resources of the property are confined to large bodies of iron ore, from which regular shipments are made. The probability of opening new ore-bodies are fair.

CHRYSOLITE.—The annual report shows that the mine shipped during the year ended October 1st last, 8055 tons, 1618 pounds of ore, yielding 213,711 ounces of silver and 1,421,050 pounds of lead. From this ore, they have obtained from the smelters $191,974.13. The amount of work done during the past year amounts to 6620 feet of drifts, 993 feet of winzes and rises, and 108 feet of shafting; making a total of 7720 linear feet of underground work. The total amount of workings amounts to 49,347 feet, or, say, nine miles.

EVENING STAR.—The mine is shipping from 35 to 40 tons of ore a day. Included in the shipments is considerable ore ranging in value from 150 to 200 ounces to the ton. The resources of the mine are still quite large. The company has about $86,000 in its treasury, and the expensive new pumping plant for the upper shaft is paid for. The work of enlarging and retimbering the upper shaft has just been completed. Operations on this shaft have advanced very rapidly, and within the next thirty days the pumps will be in working order, and the sinking of the shaft again in progress.

GOLD CROWN MILLING AND MINING COMPANY.—On this property, situated on the Bird's Eye Gulch slope of Mosquito Range, just below the Little Corinne mine, the vein shows a crevice from two inches to three feet in width, filled with pay-rock, from which assays have been obtained running as high as four and three quarter ounces in gold to the ton. Up to the present time, eighty tons of ore have been extracted, returning on an average sixty one dollars per ton. The developments of the mine consist of two tunnels, each sixty feet in length, and an open cut fifteen feet deep. The property of the company consists of a location and an extension on the gold vein, eighty acres of placer ground, and a five-acre mill-site.

LITTLE PITTSBURG.—The properties are doing fairly well. The bins at No. 9 shaft show some very fine ore, including specimens covered with native silver; but its appearance indicates that it is the product of seams and pockets. A boiler is getting into position on No. 10 shaft, and the task of straightening the shaft and preparing it for work will be commenced soon.

MAY QUEEN AND MOYAMENSING.—The controversy between these two claims remains unsettled. Both sides are still producing ore, and the May Queen is reported shipping large quantities of ore ranging in value from $60 to $120 per ton. The Moyamensing is also shipping considerable ore, but of inferior grade.

MORNING STAR.—An average of eighty-five tons of ore a day is shipped. The workings of the mine throughout are looking well, and ore is disclosed to view in a score of different points through the mine. The Waterloo, McHarland, and the old main shafts are all producing largely.

PARK COUNTY.

NESTOR.—The property is now actively developing. The consolidation embraces a mill-site and eight locations, as follows: The Winchester, Montgomery, Robert Keeley, Gold Leaf, Silver Leaf, Illinois, Ensign, and Blue Grass, covering a strong vein for a distance of 2500 feet. Twelve openings have been made on the vein, ranging in depth from 15 to 130 feet. These developments show the vein to have a northeast course, with a dip to the southeast of about sixty degrees from the horizon. The average width of the fissure is from six to seven feet. Sample assays gave returns as follows: At a depth of thirty feet from the surface, one half-ounce of gold, thirteen ounces of silver, and sixty per cent of lead. At the surface, one half-ounce of gold, fifteen per cent of lead, and eight ounces of silver. At 120 feet, the mineral is a clear sulphide, consisting of galena, iron and copper pyrites, free gold, and sulphide of silver, possessing an average value of $60 per ton. The gangue rock accompanying the vein at this depth also shows a profitable value, returning $25 per ton without sorting. The main shaft is located on the Keeley claim, and has a depth of 130 feet, with cross-cuts to the vein at 25, 65, and 120 feet from the surface. The vein can be traced for several thousand feet, and is unquestionably the principal vein in this section of the country. Parallel to the vein, about 300 feet to the eastward, is a second vein, generally known as the Susquehanna vein. It is opened by an adit showing a width of from four to five feet of a promising nature. The lead is also developed in the Susquehanna lode, an adjoining property, and demonstrated to possess great value. There are now about 1000 tons of ore in bins and on the dumps, from which a lot of eleven tons was selected and shipped without sorting, returning $23.55 per ton in silver and gold, no account being taken of the lead and copper. There are also about 6000 tons in sight in the mine, ready for extraction.

SOVEREIGN.—Buildings are now going up to aid in continuing work through the entire winter. The result from the late mill-run has been very satisfactory.

PITKIN COUNTY.

A correspondent of the Denver *Tribune*, speaking of the mines around Ashcroft, says that the character of the mineral is principally galena, gray copper, and silver glance, in quantities sufficient to justify steady developments. The lack of capital in the county has thrown quite a number of valuable properties on the market at exceedingly reasonable figures, and several sales are now making. Among the most promising mines in the district that are now worked, with mineral awaiting the whistle of a smelter, are the Minneapolis, Congdon, Leona, Osburne, Cummings, Boulder City, Keno, Eureka, of the Paradox group, Pearl, Highland Chief, Wichita, Gray Eagle, Yellow Boy, Michigan, Rainstorm, Dauntless, and many others.

Several good strikes were recently made fifteen miles east of Ashcroft, the most important being the New York. A mill-run of 1900 pounds lately shipped to Leadville gave a return of 793 ounces of silver to the ton. The ore is chloride and native silver.

SAN JUAN COUNTY.

A correspondent of the Denver *Republican* reports on the various mining districts as follows:

RED MOUNTAIN DISTRICT.

The Yankee Girl has shipped over 4000 tons in the past ten months. The National Belle is shipping about twenty-five tons per day, averaging $80. These ores go to Denver via Silverton. But the low transportation offered by the Mears system of roads and iron rail tramways—$7 per ton laid down at Montrose—will bring the ores through Ouray for the Denver market. It will be a saving of about 50 per cent. In the same district, are also Orphan Boy, Robinson, Genesee, Champion, and Guston—known as the Yankee Girl Group—all shipping ores. Guston is shipping ten tons per day, this averaging $70. Within this district, are the American Girl, Congress, Senate, Humboldt, Ivanistan, Bobtail, Comet, Great West, and McIntyre mines; also, the celebrated Jed mine, the Pennsylvania, the Carbonate King, Sailor Boy, and Carbonate Queen properties; the Saratoga, Albany, Maud S., Belle of the West, Brooklyn, Bonanza King, H. A. W. Tabor, the Guadalupe & Black Raven, the Galena Lion, Mountain King, and Sunshine. Some of these mines ship fron 5 to 10 tons per day, averaging from $55 to $75. Many are undergoing development and have large quantities of ore on the dumps awaiting shipment.

SAN MIGUEL DISTRICT.

On the other side of the mountain, from Virginius Basin, are the Sheridan, Smuggler, Mendota, Union, and Cimarron. The ore of these mines contains native and brittle silver, galena and gray copper, and are of a high grade, and carry some gold. They have been shipping all the season by way of Telluride and Ouray to the Denver & Rio Grande at Montrose; but as soon as the Mears roads reach over into Marshall Basin from Red Mountain, these mines, together with all the producing mines in the basin, such as Argentine, Hidden Treasure, Cincinnati, Baby Elephant, Alamo, and many others, will take this shorter route and lower rate of transportation and ship to Ouray exclusively, where concentrating and reduction-works will most likely be built next season by Senator N. H. Hill.

SNEFFELS DISTRICT.

In Imogene Basin, are the Yellow Rose, Agnes, Declaration, Hidden Treasure, Hancock, and Imogene. These have high-grade gray copper, with galena, and run well in silver and to a considerable extent carry gold.

On Ruby Mountain, are the Wheel of Fortune, Potosi, Revenue group, Stonewall Jackson, Neptune, and Highland Chief. These show high-grade gray copper, galena, brittle silver, and some gold.

In Cumberland Basin, are the Cumberland, Nashville, Banker, Atlas, Sidney, and Monarch, carrying mostly galena.

In Virginius Basin, are the Terrible, Tornado, Bank of San Juan, Virginius, Monongahela, Blue Grass, Raleigh, Shamrock, and Spotted Tail. These exhibit galena and gray copper, with native and ruby silver. The mills-runs from some of their claims are as high as 500 ounces of silver to the ton and 43 per cent lead. In the Virginius, the ore is galena and gray copper. It has sold $75,000 worth of ore.

UNCOMPAHGRE DISTRICT.

About four miles from Ouray, up the Uncompahgre, are the Silver Link, Climax, Epoch, Tidal Wave, and Silver Star. These mines are in a continuous ore-body, from which mill-runs have given 160 ounces of silver and 20 per cent of copper per ton.

Near Mineral, at the terminus of the Mears road to that place, are the Challenge, Confidence, Friend, Grand Junction, and Crystal. These mines run well in silver, with little copper, and carry some gold.

In Poughkeepsie, and on that branch of the road, are the Royal Albert, Alaska, Mickey Breene, Flag-Staff, and Grand Era. These ore-bodies show large quantities of gray copper, and run well in silver.

On Bear Creek, about three miles from Ouray, are the Belle of Ouray, Bismuth, Toledo, Black Bird, Black Prince, Leviathan, Union, and Monitor, carrying large quantities of gray copper and brittle silver.

SUMMIT COUNTY.

ROBINSON.—Mr. Greer, the lessee, is reported as meeting with poor results in the development of new ore-bodies in the lower levels. The ore in the face of the lower incline has deteriorated in grade, until it will no longer pay for extraction and treatment. From other portions of the mine below the tenth level, Mr. Greer succeeds in extracting almost a car-load of ore a day. The sub-leasers on the property are said to be doing well. Mr. Horten, who has the upper levels, shipped ten car-loads of ore during September, amounting to about ninety-five tons, which averaged over seventy-five dollars to the ton. A car-load from the same lease is now at one of the Leadville works, and the output from this source will aggregate from six to eight cars this month, of fair ore. Sub-leasers on other portions of the mine and on the dumps are also reported doing well, and obtaining considerable ore of fair grade.

DAKOTA.

FATHER DE SMET.—The superintendent reports, October 8th: Golden Gate south header still keeps in ore and is showing as well as usual. Where we are breasting across, the ore looks well and seems to be quite extensive. East cross-cut, third level, has gone into ledge-matter, which, I think, must belong to the Golden Gate ledge; but as yet, it is mixed up considerably with slate and samples low. The rest of mine does not show up quite so well this week, as we have been compelled to break down a lot of very low-grade ore, but shall pull up again next week. The mill is running well, and every thing is going ahead in full blast. The report for the week ended October 14th shows: Ore extracted from first level, 900 tons; second level, 800 tons; third level, 400 tons. Ore milled, 2100 tons. Golden Gate cross-cut, third level, advanced five feet. Golden Gate south header, second level, advanced seven feet.

HOMESTAKE.—According to the Deadwood *Times*, the Giant & Old Abe mine,

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at Lead City, the property of this company, has the finest and most expensive hoisting and pumping machinery east of the Rocky Mountains. It was completed two years ago, at an expense of $150,000, and since that time has been almost idle. The machinery is so complete and perfect that it can be put down 2500 feet without any additional machinery. The shaft is down 444 feet, the deepest one in the Hills, and it is all the way in ore, or nearly so, and there has been none milled from this mine except what came from the shaft, and a small portion on the 100-foot level of the Homestake mine. The superintendent will soon put on a force of men, day and night shift, and sink the shaft 200 feet deeper, regardless of what may be encountered. The shaft is a three-compartment.

IDAHO.

PHILADELPHIA.—The two new fifty-ton furnaces of this smelting company at Ketchum are running regularly, and turning out between 30 and 50 tons of bullion per day. These furnaces will continue to work until January, when one stack only will be operated during the rest of the winter.

SILVER KING.—The parties who held a working bond on this mine, situated in Beaver Gulch, about three miles above Sawtooth, have purchased the same for $125,000. The purchasers are also owners of the Davitt mine on Deer Creek.

VIOLA.—The syndicate which bought this claim on Willow Creek has been pushing work for several months, and is shipping ore at the rate of 600 tons per month. This ore, averaging forty-five per cent lead and forty ounces silver, is hauled to Camas station on the Utah & Northern, and thence shipped to Kansas City. Some has been shipped to Salt Lake City, and has been smelted at the Hanauer smelter. The success of this property will have the effect of opening up others in that district. There are over 30,000 tons of ore in sight.

MAINE.

PORTLAND SMELTING-WORKS.—The company has purchased of Messrs. Jones and others the right to use their patent vapor fuel process, and will adapt the works to said process, under the personal superintendence of Mr. Jones, who guarantees the smelting of all ores at less than one third of the present cost for fuel, thereby making it possible to smelt exceedingly low-grade ores at a profit.

STEWART.—Recent developments are reported to be of a most interesting character. In the bottom of No. 3 shaft, at the depth of nearly 300 feet and in the copper-bearing rock, the workmen have come upon a vein of quartz heavily charged, as it appears, with antimonial sulphuret of silver. Apart from this recent discovery, says the Bangor *Journal*, the outlook at the mine is encouraging, so far as the character of the ground and progress of the work are concerned. The southern cross-cut is reported to be in fair copper, and the vein in the northern cross-cut is rapidly improving. The latter has reached a distance of some eighty feet from the shaft, being considerably more than half-way to the open cut which it was started to reach.

MEXICO.

The San Rafael, near Zacatecas, is continuing to pay dividends at the rate of $75,000 per month.

The Cinco Señores Company is erecting the first stamp-mill in the State of Zacatecas, with a capacity of from 25 to 30 tons per day. It will treat as much ore as the present hacienda, which employs 600 animals and has cost $200,000, while the new mill requires only an outlay of $50,000.

MICHIGAN.

CALUMET & HECLA.—"Superior," the monster engine of this company, was recently started up, making as high as fifty-five revolutions per minute. Connection has been made with the air-compressors.

CENTENNIAL.—Work has been suspended for lack of funds. The Houghton *Mining Gazette* states that the late Jesse Hoyt, of New York, was a large owner in the mine, and his executors do not see their way clear to advance any more money, while the other owners are not disposed to continue work under the circumstances. The discontinuance of operations at this time was unfortunate, for the reason that the Osceola lode, which was worked, was developing copper ground equal to the average taken from this deposit.

HOUGHTON.—An assessment of one dollar and a half has been levied, for the purpose of sinking shafts and extending levels.

LAKE ANGELINE.—The exploration of the diamond drill on the ground west of the old mine workings has showed such good results that a shaft has been sunk, and numerous other developments made. About 11,000 tons have been raised since hoisting began two months ago, and this was all taken from the drifts and cross-cuts of preparatory nature. In quality, the mineral stands at the head of the hematite mines of the region. An assay lately made shows 68·30 in metallic iron and ·024 in phosphorus.

STANLEY IRON MINING COMPANY.—This company, which has been exploring the east half of section 26, 40-30 has suspended all work there for the present. At three different places on the property, an attempt was made to get the ledge with a churn-drill, which resulted in failure. A test-shaft was sunk some 30 feet, but so many boulders were met with that the work of sinking was exceedingly slow and expensive. The property is looked upon as a most promising one by old explorers, and work upon it will undoubtedly be resumed in a short time.

ST. LAWRENCE.—The mine has been closed down. This was done on account of the condition of the market and the low grade of the ore. It is probable that mining operations will be resumed the coming spring; and in the mean time, some exploring will be done in hopes of finding ore of better quality.

STURGEON RIVER IRON COMPANY.—All operations have been discontinued on section 7, town 39, range 28.

MONTANA.

SILVER BOW COUNTY.

Some recent reports state that a 100-ton custom smelter will be located in Butte by a syndicate of Eastern capitalists.

MONTANA COPPER COMPANY.—The work done at the Calusa mine is reviewed as follows: The shaft is now down 400 feet. Several thousand feet of levels have been run. The ore product is about 100 tons daily, and could be doubled for an indefinite period simply by increasing the working force. Five matting-furnaces and one blast-furnace are in constant and successful operation. The company is shipping an average of 20 tons of matte every day, as well as a large amount of crude ore from Colusa and Liquidator (the latter on contract), the total daily shipments being about fifteen car-loads, or in the neighborhood of 75 tons.

MOUNTAIN VIEW.—The work of development has steadily progressed, and the shaft, a vertical one, has been sunk to a depth of 514 feet. At a depth of 300 feet, a cross-cut was driven south from the station for a distance of 200 feet. This cross-cut, at a distance of 150 feet from the shaft, tapped the foot-wall of the vein, which has been penetrated for 50 feet without, as yet, encountering the hanging-wall. Throughout the enormous width of the ledge, so far as explored by this cross-cut, bunches and streaks of copper ore constantly occur, as they did above the main copper deposits in the St. Lawrence and Anaconda, leaving very little doubt that at an increased depth the entire space between the widely separated walls will be filled with pay-ore identical both in quality and amount with that of the above-named properties. At the 400-foot station, a cross-cut south has penetrated the country-rock for a distance of 75 feet, but the ledge has not yet been encountered. Driving south vigorously progresses. At a depth of 500 feet, two cross-cuts have just been started, one to tap the main ledge on the south, the other to intersect a vein which crops on the surface north of the shaft.

NEVADA.

EUREKA COUNTY.

EUREKA CONSOLIDATED.—At the annual meeting of the stockholders, held in San Francisco recently, the following Board of Directors was elected for the ensuing year: Solomon Heydenfeldt, Charles Simpkins, Captain Knowles, A. McKenzie, and J. McKenzie. The three first-named gentlemen are from California, and the two latter from New York. The Board of Directors met and elected T. J. Read Superintendent, and P. Jacobus Secretary. Reports from the mine show that the furnace is running, and that the water in the Locan shaft was reduced, October 16th, to within 30 feet of the station at the bottom, and the indications are, that the flood has been overcome. At the present rate of pumping, the bottom will soon be reached. It seems as though the underground reservoirs from which the flood came had been pumped pretty nearly dry.

EUREKA TUNNEL.—Several stockholders dissatisfied with the management recently held a meeting. A committee was appointed to investigate the affairs of the company.

LYON COUNTY.

The old French mill, the last mill but one remaining intact in Silver City, is, says the Virginia City *Chronicle*, to be dismantled. The work has begun. One by one, all the quartz mills that used to be in Gold Cañon have disappeared. Silver City, which once was a hive of mills, now contains but one, the old Sherman mill, a small concern.

STOREY COUNTY.

ALTA.—Excellent headway is making in draining this mine, and the time is not far distant when the miners will again be at work in the lower levels.

BELCHER & CROWN POINT.—It is expected that the mines will start up with a full force shortly. At the Crown Point, about eighty men are employed.

NORCROSS.—There are rumors of an improvement on the 2700 level.

SUTRO TUNNEL.—The report for the week ended October 8th shows that the following temperatures were observed:

	Air.
Tunnel entrance, water 118	58
Shaft, No. 1 east	79
" " 1 west	80
" " 2 east	90
" " 2 west	55
" " 3	88
" " 4	89
Combination Shaft connection	81
Gould & Curry	96
C. & C.	84
Julia Shaft connection	100
Yellow Jacket	90
Forman connection	84

Flow of water in standard gallons per twenty-four hours, 8,852,600.

WHITE PINE COUNTY.

A San Francisco company has been engaged for some time in erecting a mill for the purpose of working the ores of the Linton and Monroe mines. The mill is located at Cabin Springs, and an abundance of water and timber can be had to supply it. The ore runs $80 in gold, and a large amount of it is already out awaiting the completion of the mill, which it is thought will be ready to drop stamps about the 20th of December. This district is tributary to Salt Lake, and during the placer excitement, years ago, a market was found for the gold in that city by the placer miners. At present, but little is doing in the placer mines, but the ground is rich, and when appliances are secured for working them, they will start up again.

NEW MEXICO.

LINCOLN COUNTY.

HARDSCRABBLE.—The present owners have purchased a large amount of machinery, among which is a stamp-mill which will be erected soon.

SAN ANDRES.—Assays and mill-runs recently made of copper ores from this mine justify the erection of a smelter.

SOCORRO COUNTY.

The report has often been circulated, says the Socorro *Sun*, that we are destitute of iron ore in this vicinity. This is a fallacy which should be corrected, and the statement is usually made by parties who are envious of our prosperity and innumerable resources. In addition to the vast bodies of ore heretofore discovered, a very extensive body of iron has just been discovered within a few miles of Socorro. The nearness of this latest strike will materially diminish the cost of smelting ores at this point. The new find is situated in the south end of the Socorros.

TEXAS.

HARDEMAN COUNTY.

Denver papers report that ex-Senator Tabor has completed the purchase of the beds of carbonate of copper, lying in this county. The deposits of this ore cover an area of from 160,000 to 170,000 acres, and the purchase price was $250,000. For three years, the matter has been under negotiation, and now a company has been organized and will begin immediately the work of developing the tract. The company is known as the Copper Syndicate, composed of ex-Senator Tabor, of Colorado; Yates Ferguson, Dr. C. R. Bissell, B. F. Dalton and several other capitalists of New York City. The syndicate has put itself into correspondence with the Denver & New Orleans Railroad. The proposed lines of this road run within fifteen miles of these copper ore-beds, and the proposition is that, if the company will extend its line to that place, a shipment of 500 tons of copper per day is assured. A meeting of the directors is to be called to look into the project. It is stated that this assured shipment of 500 tons per day is fully sufficient to pay the company to make the extension. The shipment is to begin six months after the road is completed, and to continue indefinitely.

UTAH.

BOX ELDER COUNTY.

BROOKLYN.—This company, operating the property formerly known as the Martin mine, at Bingham, is working on a body of ore twenty feet wide, on the 900-foot level, and is sending to the smelters nearly 1000 tons of ore per month. The value of this ore has improved with depth.

LEAD.—Good news is reported from this mine at Bingham. All former workings have been in low-grade ore, which required concentrating, and the concentrates were nearly all lead with a small percentage of silver. The foot-wall has been tested, and a car-load of this quartz ore assayed forty ounces silver and only one per cent lead. Hand samples running as high as from 200 to 300 ounces have been tested.

SUMMIT COUNTY.

MINNIE WHEELER.—The shaft has reached a depth of 55 feet, and for over 30 feet the miners have been cutting little veins and seams of ore.

UTAH COUNTY.

SILVER BELL.—This property, consisting of seven patented claims, has been developed by a shaft 385 feet deep, and by a tunnel in 1300 feet. The shaft was sunk from a point high up the mountain, and went through good ore all the way down, but operations from that point were difficult and expensive. To obviate this and at the same time open up the other six claims, a tunnel has been run in a distance of 1300 feet, and a contract has been let to extend this tunnel 1200 feet more. When it is finished, the tunnel heading will be under the shaft, and 1200 feet below the surface, making it one of the deepest mines in Utah. It is proposed then to continue the tunnel 1000 feet farther, in all 2500 feet, cutting clear through the hill. Besides the tunnel contract, another was made to run 400 feet of cross-cuts. So far, $80,000 have been spent on the property. At the foot of the shaft, the vein is 55 feet wide, six feet of which is milling ore running 54 ounces silver. Over 3000 tons of such ore are on the dump.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Oct. 26.

The mining market this week has been very dull and almost featureless. Outside of the fancy stocks, there has been but a very small business. The Comstock shares were a feature of the market on account of their weakness. The Leadville stocks were quiet and steady. Horn-Silver was quite weak to-day, selling as low as $6. We give a full summary of the market below. The total number of shares sold aggregates 136,750, as against 152,376 last week.

The Comstock shares were very quiet, and were inclined to weakness. California sold from 15@12c., assessment paid, and at 9c. assessment unpaid. Consolidated Virginia was quite weak, under a small business; it sold from 54@48c. Sierra Nevada was also weak, selling from $4.50@$3.65@$3.85. Union Consolidated was weak, selling from $4@$3.65. Mexican was moderately dealt at steady prices; it sold from $3@$3.40@$3.30. Best & Belcher sold at $3.90. Sutro Tunnel was quite active, and was a little weak; it sold from 18@16c.

The Leadville stocks were also very quiet, and prices are steady. Amie Consolidated was quiet and steady at 11@12c. Chrysolite records a small business at about steady prices, selling from $1.15@$1.10. Dunkin sold at 26c. Iron Silver was moderately dealt in at steady prices; it sold from $3.95@$3. Leadville sold at 37c. Little Chief was irregular under a small business; it sold from 55@65@57c. Little Pittsburg was quiet and steady at 61 58c. Climax showed a little strength, under moderate business, selling from 8@14 11c.

The Bodie stocks were almost neglected. Bodie Consolidated sold at 55c., and Standard was quiet and steady at $5.88@$6.

The Tuscarora stocks were quiet and steady. Grand Prize was moderately dealt in at 50c. Argenta sold at 20c. Belle Isle was steady, with a small business, selling from 42@47c. Navajo was dealt in to the extent of 100 shares at $3.25. North Belle Isle was a little weak, under a moderate business, selling from 65@60c. Independence sold at 40c. Elko Consolidated was very active at irregular prices; it sold from 3@6@8c.

In the miscellaneous list, Alice was quiet and steady at $2.65. Bassick was a little weak, selling from $10 @$9 under a small business. Eureka Consolidated was quiet and weak, selling from $5@$3.90. Hall-Anderson was moderately dealt in at steady prices, selling from $1.15@$1.10. Horn-Silver was quite weak, with a moderate business, selling from $7 @ $6. Robinson Consolidated was very quiet and was steady, selling from 42@47c. Sierra Grande was also very quiet and steady; it sold from $1.10 @$1.05.

Barcelona was quiet and steady at 28@27c. Bradshaw sold at 21c. Decatur was moderately dealt in at irregular prices, selling from 4@2@3c. Eastern Oregon was very active at steady prices; it sold from 42@45c. Harlem was also very actively dealt in, but it was irregular; it sold from 92@95@91@92c. Lacrosse was quiet and irregular at 8@6@7c. Sonora Consolidated was but moderately dealt in at steady prices; it sold from 23@25c. Castle Creek sold to-day to the extent of 1000 shares at $1@$1.05.

There is considerable grumbling among the stockholders of Alice at the difficulty in getting any reliable data as to the financial condition of the enterprise. Since the suspension of dividends, the mine has been turning out silver at the rate of more than $100,000 per month, which must be very much more than the expenses amount to. The net earnings must have been during that period sufficient to pay the floating debt, the purchased price of the Magna Charta, and the cost of pumps and other improvements.

An official report from the South Yuba Water and Mining Company states that the profits of the company have been expended in improving the property, and that it is expected that the earnings this year will be over $100,000.

The Board of Trustees of the Chrysolite Silver Mining Company has issued the following circular:

In view of a possible delay of several weeks in the preparation of the full annual report, including the statement of the general manager, treasurer's accounts, etc., it is deemed advisable to present a brief general summary of the operations of the last year.

The estimated surplus at the end of September was a little over $200,000; and practically, therefore, the work of the year has resulted in no profit; in other words, a very large amount of prospecting and deadwork has been done and the expenses have been paid out of the proceeds of ore mined. Included in these expenses is a sum of $2500 paid for the outstanding one quarter interest in the Kit Carson and All Right claims, an interest which, since the organization of the company, has been held by outside parties and for which a large sum was formerly demanded. Patents have been obtained for these two claims; and the legal title being now beyond further attack, prospecting is actively going on in this ground.

The prospecting-work of the year, details of which will be given in the annual report, has demonstrated the existence of three layers of iron-bearing material under the upper layer which contains the old workings. In all these layers, the iron has been proved by numerous assays to contain some silver and lead, and constitutes therefore the matrix in which pay-ore may occur. Sundry pockets of ore have been found here and there, but as yet no continuous bodies of profitable grade.

The most important and expensive of these explorations has been made in the second layer by the incline from Colorado Chief shaft No. 2, referred to in the last annual report. The bottom of this incline is still about 200 feet from the Roberts shaft, and therefore from the region in which the largest and richest accumulations of ore in the upper layer wereencountered. This region, it will be remembered, it was attempted to explore by sinking the Roberts shaft. The incline has advanced somewhat slowly, because the work of sinking it has been interrupted from time to time, to permit the exploration by winzes and drifts of the ground through which it was passing. These explorations have yielded in the main only low-grade iron. As will appear more fully in the annual report, the undeveloped ground of the company has been by no means exhaustively tested, and there are several points in which both the indications of our own workings and the results obtained in the neighboring mines permit us still to indulge in reasonable hopes of finding profitable ore-bodies. Meanwhile, the old bodies which have furnished the dividends of former years have proved unexpectedly extensive, although the remaining portion which has been worked during the past year has been of low grade. It is of course impossible to say how long these sources of income will continue; but there is undoubtedly a considerable amount, both of this low-grade ore and of the richer ore scattered here and there through the old workings, which is removed by lessees on terms very favorable to the company.

In addition to these resources, the value of the dumps should be considered. A contract under negotiation by which the iron dumps would have realized without expense to the company a net value of about $100,000 was unfortunately not concluded in time to permit the erection by the contractors of the necessary works during the present season. It is not certain that the same parties will renew their offer next spring; but the careful and extended experiments by which the gross value of the dumps has been accurately determined justify the assurance that such an arrangement can be made on terms satisfactory to both parties, or, on failure thereof, the company can treat its own dumps with a somewhat larger profit. The trustees preferred, on the whole, the proposed contract, because it relieved the company of the expense of erecting works.

It must be admitted that the failure during this year to discover new bodies of pay-ore is to that extent discouraging; but the indications still continue sufficiently favorable to warrant a further prosecution of explorations with energy, and with hope; and for the thorough execution of this work the company possesses ample means.

A visit to the offices of the different Leadville mining companies in this city shows that their present financial condition is better than for some time past, and that in many instances their prospects are brighter for the future. Amie, after paying the dividend just declared, will have a surplus of about $9000 on hand. Reports from the mine state that No. 5 shaft is worked steadily and that good ore has been encountered. The Morning Star Company recently declared a dividend of $25,000, and has a good surplus on hand. The Chrysolite Company has in its treasury between $203,000 and $204,000. The Iron Silver has $100,000 on hand. The product of the mine for September realized $144,016.83. The Little Pittsburg Company has $43,000 on hand. The mine is reported to be in good condition. The Little Chief Company has $50,000 in government bonds and about $10,000 cash available. The reports from the mine are of a very favorable character. The Leadville Company reports a surplus of about $15,000 after paying the dividend recently declared.

MEETINGS.

The Chrysolite Silver Mining Company, No. 18 Wall street, New York City. Annual meeting of stockholders and election of trustees, November 7th, at twelve o'clock M.

The Colorado Central Consolidated Mining Company, No. 25 William street, rear, New York City. Annual meeting of stockholders and election of trustees, November 8th, at eleven o'clock A.M.

The Idaho Consolidated Gold and Silver Mining Company, No. 114 Wall street, New York City. Annual meeting of stockholders and election of trustees, October 31st, at twelve o'clock M.

The Penobscot & Snow-Drift Consolidated Mining Company, office of company, Vestel, Montana. Annual meeting of stockholders and election of trustees. The proposition as to whether or not the company shall be dissolved and disincorporated is also to be discussed; and in case it shall be decided by a vote of two thirds of all of the stockholders to disincorporate and dissolve the corporation; then proceedings will at once be instituted to do so.

DIVIDENDS.

The Calumet & Hecla Copper Mining Company, of Michigan, has declared its regular quarterly dividend of $5 per share, or $500,000, making the total amount paid to date $24,350,000.

The Silver Cord Combination Mining Company, of Colorado, has declared dividend No. 3, of ten cents per share, payable November 1st, 1883, at Room D, No. 305 Walnut street, Philadelphia. Transfer-books close October 27th, and reopen November 2d.

The Morning Star Mining Company, of Colorado, has declared a dividend of $25,000.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report that during the past week, until Thursday, extreme dullness prevailed in the petroleum market. The market seemed to have got into a rut, and the trading was so light and fluctuations so small that there was no temptation to the public to speculate. On Thursday, however, the rumor that the monthly report would be bullish, infused new life into the market, and prices rallied under a very active market. The market to-day was very active, but prices ruled weaker and closed unsettled.

The production of Balltown and Cooper tracts, though less than two weeks ago, holds up remarkably well. The shipments from the oil regions to the seaboard exceed the receipts from the wells by about ten thousand barrels daily, which insures a reduction of stocks again this month.

The price of refined oil has remained unchanged during the month at 8½ cents.

Messrs. Watson & Gibson have issued a small pamphlet, giving full information as to the situation on the oil-field, the influences governing the market, statistical facts, etc., which may be had on application.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Oct. 20.....	$1.10	$1.10¼	$1.09¼	$1.10⅛	1,892,000
22.....	1.10⅛	1.10¾	1.09¾	1.09⅞	3,318,000
23.....	1.09⅞	1.09⅞	1.09¼	1.09¼	2,390,000
24.....	1.09	1.09½	1.08⅞	1.09¼	1,886,000
25.	1.09⅛	1.11⅛	1.09½	1.11¼	3,388,000
26.....	1.11½	1.11½	1.10⅛	1.10⅜	3,454,000
Total sales.					16,328,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, October 25.

There has been but little doing in mining shares the past week, and prices show very little change. The market is so dull and inactive that it is difficult to get quotations for the general market, sales being confined principally to a few of the leading copper stocks which are bought for investment, and there is no speculative demand. Calumet & Hecla is firm at $239, but only four shares changed hands the past

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week. Franklin, on sale of 100 shares, declined from $12 to $11¾. Quincy sold at $50, same as last week. A single share brought $52. Osceola declined from $18½ to $18, but later rallied again to $18½ on small sale. Pewabic declined from $1⅜ to $1¼, at which price all offered was taken; later, assessment ($1) paid, it sold up to $2⅜@$2½.

In silver stocks, the market shows no improvement, either in prices or activity. Bonanza declined from $1¾@$1½, with sales of 700 shares at that figure. Catalpa was steady at 30c. Silver Islet declined from $3 $2. Sullivan advanced from $⅛@$1, with sales at the Mining Exchange at $1.02@$1.05. The reports from the Sullivan are said to be promising, and its friends predict higher prices for the stock in the near future. The stock is largely held by a few individuals, and it is not a stock to sell short to any extent, as it might be difficult to cover at short notice. Bowman Silver and New Mexico seem to have gone to sleep, the transactions being extremely limited and no disposition to operate.

3 P.M.—At the afternoon Board, Calumet & Hecla sold at $239, and bid. Sullivan, $1. Atlantic, $11 bid, $12 asked. Franklin, $11 bid, $11¾ asked. Quincy, $51 bid, $53 asked. Osceola, $18 bid, $18½ asked. Pewabic, $2⅝ bid, $3 asked. Closing prices: Allouez, $1½@$2; Bonanza, $1⅝@$1¾; Silver Islet, $1½@$3.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Oct. 19.	Oct. 20.	Oct. 22.	Oct. 23.	Oct. 24.	Oct. 25.
Albion	.....	.....	.....	.....	.....	.....
Alpha	2⅛	.....	.....	2⅛	2⅛	2⅛
Alta	1½	1⅜	1⅜	1⅜	1¼	1⅜
Argenta	.20	.15	.15	.15	.15	.15
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	1¼	1¼	1⅛	1⅛	1⅛	1⅛
Belle Isle	.40	.40	.....	.....	.40	.35
Best & Belcher	4	3¾	4	3⅞	3¾	3⅝
Bodie	.....	.65	.55	.50	.50	.10
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
California	.20	.....	.10	.10	.10	.10
Challar	2⅝	2½	2⅝	2½	2½	2¼
Con. Virginia	.60	.55	.55	.55	.45	.45
Crown Point	.....	1¼	1¼	.....	1¼	1¼
Elko Cons	.....	.....	.....	.....	.....	.....
Eureka Cons	4½	.....	.....	4¾	4¼	3⅞
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	2⅜	2⅛	2¼	2	1¾	1¾
Grand Prize	.50	.55	.50	.50	.50	.45
Hale & Norcross	2⅝	2½	2½	2½	2¼	2⅛
Independence	.45	.45	.....	.....	.....	.....
Martin White	.....	.....	.....	.....	.....	.....
Mexican	3½	3¼	3⅜	3⅜	3¼	3⅛
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	.....	.....	.....	.....	.....	.....
Navajo	4⅛	3½	3¾	3¾	3⅝	3½
Northern Belle	4¼	4	4¼	4	4	4
North Belle Isle	.....	.....	.....	.....	.....	.....
Ophir	5¾	5⅝	5⅝	5⅝	5⅝	5⅝
Overman	.....	.....	.....	.....	.....	.....
Potosi	1	.90	1	.....	.90	.....
Savage	1⅛	1⅛	1⅛	1	1	1
Scorpion	.60	.55	.55	.55	.50	.55
Sierra Nevada	4½	4	4	3⅞	3⅝	3¾
Silver King	.....	.....	.....	.....	.....	.....
Tip Top	.....	.....	.....	.....	.....	.....
Union Cons	3¾	3¾	3⅞	3¾	3⅝	3½
Utah	2	1⅞	1⅞	2¼	1⅞	1⅞
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	3¾	3⅛	3¼	3⅜	3⅜	3¼

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 26.

The London market has been weak since our last postings, and sterling exchange has also marked lower figures the past week, affecting our market for silver as per accompanying table. A slight rally in each, is shown in our rates for the day, but the market is uncertain.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Oct. 20	51	110¾	Oct. 24	50⅞	*
22	51	110¾	25	50⅞	*
23	50⅞	*	26	50 15-16	†

* 110⅝@110½. † 110½@110⅝.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended October 26th, as compiled from various sources, amounted to $153,000, as against $218,000 reported for the previous week. The receipts from January 1st, 1883, to date are $9,316,047.

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £408,000 bullion, but the proportion of its reserve to liabilities was raised from 43¾ to 43 15-16 per cent, against 36 11-16 per cent at this date, 1882. October 25th, the bank lost £13,000 bullion on balance. The weekly statement of the Bank of France shows losses of 4,050,000 francs gold and 2,275,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of September.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	$97,512	$779,099
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont	"	.....	12,604
Bodie, G. S.	Cal	15,659	189,660
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	.....	426,967
*Boston & Montana, G.	Mont	6,277	135,107
*Central Arizona, S.	Ariz	.....	35,845
*Christy, S.	Utah	20,981	201,715
*Chrysolite, S. L.	Colo	27,183	311,491
*Consolidated Bobtail, G	Colo	.....	47,986
*Contention, S.	Ariz	79,224	714,637
Crescent, G.	Cal	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak	51,960	335,640
*Derbec Blue Gravel, G. S.	Cal	14,097	102,579
Dunkin, S. L.	Colo	6,113	42,959
Evening Star, S. L.	Colo	.....	47,061
*Father de Smet, G.	Dak	32,286	270,876
*Frisco M. and S. Co., G. S. L.	Utah	.....	§77,084
*Granite Mountain, S.	Mont	63,884	165,950
Gunnell, S.	Colo	.....	58,828
*Hale, G., S., C.	S. C.	.....	27,900
*Head Center Consolidated	Ariz	10,629	43,247
*Head Center and Tranquillity	Ariz	.....	89,108
*Hecla Consolidated, G. S. L.	Mont	**77,630	633,978
*Homestake, G.	Dak	81,624	767,596
*Hope, S.	Mont	19,613	82,060
Horn-Silver, S. L.	Utah	303,000	2,474,200
*Howell S. and Mg. Co., G. S. L.	Ariz	23,769	114,289
Idaho, G.	Cal	.....	150,642
*Independence, G. S.	Nev	———	32,991
Iron Silver, S. L.	Colo	.....	751,062
*Jocuistita, S.	Mex	.....	‡258,959
*Kentuck, G. S.	Nev	1,730	18,596
*Lexington, S.	Mont	111,005	967,708
*Little Pittsburg, S. L.	Colo	10,473	64,978
*Marguerite, G.	Cal	3,200	68,794
*Martin White, G. S.	Nev	.....	136,317
Morning Star, S. D.	Colo	.....	84,428
*Moulton, G. S.	Mont	.....	123,288
Mount Diablo	Nev	51,709	381,142
*Navajo, G. S.	"	———	411,642
*North Belle Isle	"	———	2,153
Northern Belle, S.	"	30,840	505,827
*Ontario, S. L.	Utah	185,834	1,595,378
*Oxford, G.	N. S.	4,910	50,175
*Phœnix, G.	N. C.	3,500	21,009
*Pinal Consolidated, S. L.	Ariz	.....	181,485
*Plymouth Consolidated, G.	Cal	68,864	296,082
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont	.....	203,947
*Silver Cord, G. S. L.	Colo	.....	703,333
Silver King, S.	Ariz	.....	367,802
*South Yuba, G.	Cal	2,567	37,272
Standard, G.	Cal	95,878	875,222
Star, S.	Nev	.....	27,095
*Stormont, S.	Utah	17,686	193,791
Syndicate, G.	Cal	9,623	56,008
Tintic M. and M. Co.	Utah	5,554	34,670
*Tip Top, S.	Ariz	.....	37,868
*Tombstone, G. S. L.	"	.....	548,764
Wyoming Consolidated	Cal	.....	31,541
Yellow Jacket, S	Nev	.....	265,885
Total amount of shipments to date			$17,794,751

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (———) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

Purchase of Silver.—The Treasury Department, October 25th, purchased 425,000 ounces of fine silver for delivery at the Philadelphia, New Orleans, and San Francisco mints.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended October 20th	$522,918
Corresponding week last year	59,762
Since January 1st, 1883	12,078,152
Corresponding period last year	44,387,257

Imports.

Week ended October 20th	$628,812
Corresponding week last year	141,371
Since January 1st, 1883	13,542,054
Corresponding period last year	3,945,188

METALS.

NEW YORK, Friday Evening, Oct. 26.

Copper.—As usual, the supplying of manufacturers and dealers by the extension of the former contract to the end of the year has left the market for Lake in a very dull state, only small parcels changing hands at 15⅛c. It is a matter of surprise to many in the trade that the smaller companies allow the Calumet & Hecla to continue to run their business so far as the sale of their product is concerned. As we have reached the export basis, they can have little to fear from any attempt of their big rival to break the market, and it has not now any real power to force them into submission. Many of them would probably be able to do better now by themselves.

In other brands, there is little doing, and while the offerings of furnace material to the refiners are light, the inquiry for this copper is not very large. We quote, 14¼@14¾c., according to brand.

England cables $61 15s. for Chili Bars, and £88 for Best Selected, an improvement over late quotations.

Tin.—The market is very dull, so far as large line are concerned, and futures are freely offered at 20¼c. There is a fair jobbing demand at 20¾c. spot cash for Straits. London cables £94 2s. 6d.

Lead.—The market is very dull and lifeless, nothing but jobbing sales at 4·20c. being reported.

Both Common and Refined are offered at 4·18c. and for future shipment quotations go close to 4c. The lower figures at which bullion is selling have a depressing effect.

Messrs. John Wahl & Co., of St. Louis, send us the following dispatch to-day:

Our market is unchanged, being firm at 3·90c. for Refined, and 3·92½c. for Chemical.

Messrs. Everett & Post, of Chicago, wire to-day:

Our market remains about the same, being if anything a trifle weaker, with prices nominally, at 3·90c. There has been scarcely any fresh business since our last report, and sales do not aggregate more than 300 tons.

Spelter.—The market continues dull and lifeless, with Common and Domestic nominally at 4½c., which, however, could probably be shaded.

Antimony.—This metal is firmer, with Cookson's at 10¼c. and Hallett's at 9⅛c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Oct. 26.

The following have been the exports from Great Britain to this country during the first nine months of the current year:

	1881.	1882.	1883.
Pig-iron	308,933	384,715	218,994
Old iron for re-manufacture	66,153	71,445	39,340
Steel unwrought	87,446	118,141	25,364
Tin plates	129,586	164.249	162,934
Hoops and sheets	29,304	28,735	24,679
Bar, angle, bolt, and rod	9,454	16,143	7,80

American Pig.—So far as the volume of business is concerned, it has been slightly better this week than last, but the tone of the market can not be said to have improved in any manner. Consumers do not complain of prices, but their requirements are limited, and such is their apathy that a further decline appears inevitable unless the restriction of the output begins to tell at an early date. We quote $20.50@$21.50 for No. 1, and $19@$20 for No. 2, with mill irons, which are more active, at $17.50@$18.50, all at tide-water. Bessemer pig is dull, with a weakening tendency, due to lower advices from abroad. We quote nominally $20.50. Spiegeleisen is quiet, being offered at $30.25.

At the Exchange, the following sales were recorded:

Wednesday, 100 tons No. 1, at $19¾.

Scotch Pig.—The demand here is light, and the advices from the other side rather discouraging. On the other hand, arrivals are light and are generally disposed of before they reach this port. Importers claim that they can not shade current prices without loss.

We quote ex ship and to arrive: Coltness, $23@$23.25; Langloan, $23@$23.25; Summerlee, $22.50@$23; Eglinton, $20.50@$21; Glengarnock, $22; Dalmellington, $21.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Oct. 20.		Oct. 22.		Oct. 23.		Oct. 24.		Oct. 25.		Oct. 26.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.											2.65		100
Amie Con., Co.	11		.12	.11	.12		.11				.12		5,100
Argenta, Ne.					.20								100
Bar. & Walker, Ut.													
Bassick, Co.			10.00		9.00								600
Belle Isle, Ne.	.46	.42	.47										400
Bodie Cons., Ca.			.55										200
Breece, Co.													
Bulwer, Ca.													
California, Ne.			.15	.12			.09						2,400
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Chrysolite, Co.	1.10		1.10		1.10				1.15		1.10		1,800
Cons. Va. Ne.			.52	.50	.54	.52	.51	.50	.48				3,900
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.											.28		200
Eureka Cons., Ne.							5.00	4.60			4.00	3.90	225
Excelsior, Ca.													
Father de Smet, Dk.									3.00				20
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.													
Grand Prize, Ne.					.50						.50		400
Great Eastern, Dk.													
Green Mountain, Ca.													
Hale & Norcross, Ne.													
Hall-Anderson, N. S.	1.15	1.10			1.10								1,500
Hibernia, Co.													
Homestake, Dk.													
Horn-Silver, Ut.	6.88	6.75	6.88	6.63	7.00	6.75	6.63	6.50	6.63		6.50	6.00	2,930
Hukill, Co	.07						.05				.05		700
Independence, Ne.	.40												550
Iron Silver, Co.	2.95		3.00		3.00	2.95	3.00		3.00				1,510
La Plata, Co.													
Leadville C. Co.											.37		100
Little Chief, Co.	.56	.55	.59	.57	.62	.59	.65	.59			.57	.56	2,400
Little Pittsburg, Co.	.61										.58		200
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.			3.25										100
Northern Belle, Ne.													
North Belle Isle, Ne.	.65	.60			.60								455
Ontario, Ut.													
Ophir, Ne.													
Plumas, Cal.													
Prussian, Colo.													
Quicksilver Pref., Ca.							31.00						100
" Com., Ca.							6.00	5.50	6.00				300
Rising Sun, Ca.													
Robinson Cons., Co.			44						.47	.42			2,800
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	1.10		1.05						1.05				500
Sierra Nevada, Ne.	4.50	4.25			3.85		3.65				3.85		900
Silver King, Ar.													
Spring Valley, Ca.													
Standard, Ca.	6.00				5.88		6.00						115
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													
.....													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Oct. 20.		Oct. 22.		Oct. 23.		Oct. 24.		Oct. 25.		Oct. 26.		SALES
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion.													
Alta-Montana.											.03		400
Barcelona, G.							.28		.27		.27		600
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'licher, G. S.	3.90												100
Big Pittsburg, S. L.													
Bradshaw, S.											.21		200
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G.													
Clav'r's W. & M. Co.													
Cal., B. H., G.													
Castle Creek											1.05	1.00	1,000
Central Ariz'na, S.													100
Cherokee, G.							.20						1,000
Chollar							.02						
Climax, Co.	.08						.14	.10	.10		.11		3,700
Cons. Imp'r'l, G. S.													
Cons. Pacific.													
Crowell, G.													
Dahlonega, G.							.02						100
Decatur	.04	.02	.03										5,700
Dunderberg													
Durango, G.	.04												100
Eastern Oregon	.43	.42	.44	.43	.44	.43	.45	.43	.45	.44	.45	.44	20,000
Elko Cons.	.03		.04	.03	.04	.03	.06	.04	.04	.03	.04	.03	21,400
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Hariem M. & M. Co.	.94	.92	.95	.93	.94	.92	.95	.93	.94	.92	.93	.91	26,800
Hortense, S.							.11				.10		300
Imperial													
Lacrosse, G.	.10		.08		.08						.07	.06	2,100
Lucerne													
Mariposa Prel., G.													
" Com., G.													
Mexican, G. S.	3.20		3.00		3 40		3.30						645
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S. L.													
Ori'nt'l & Miller, S.	.07												300
Parnell													
Quartz Creek											.07		1,100
Rappahannock, G.			.07										
Red Elephant, S.													
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.24	.23	.24		.24		.24				.25		8,500
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.			.03										1,000
" Nos. 2 & 3, S.													
Sutro Tunnel	.18	.17	.17		.17		.17		.17		.16		10,500
Taylor-Plumas													
Tioga													
Union Cons.					4.00		3.75				3 65		500

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 30,805. Non-dividend shares sold, 106,145.

BOSTON MINING STOCKS.

	Oct. 19.		Oct. 20.		Oct. 22.		Oct. 23.		Oct. 24.		Oct. 25.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.													
Amie	.12								.12				500
Atlantic													
Aztec													100
Bodie Con.	.70								1.63	1.50			900
Bonanza D.					1.75				.18	.12¼	.12		2,400
Bowman Sil	.12				.12		.12						
Bruna. Ant.													
Bulwer													100
California.							.13						
Cal. & Hec.	.239						239				299		13
Catalpa.			.30				.30		.30		.30		1,200
Climax							.14						200
Co. Virginia							.53		.53				300
Copper Falls													
Crescent													
"Cusi"													
Decatur					.03								400
Deer Isle									.04				1,000
Denver City													
Douglas													
Duncan													
Dunkin					.28				.28				2 0
Elko Con									.04				500
Empire	.31	.30			.28		.26		.26		.28	.27	3,400
Franklin	12.00								11.63		11.75		130
Hancock G.													
Harshaw													
Horn Silver							6.88						15
Huron													
Mammoth													
Mass. & N.M.													
Milton													
Napa													
National													
Ontario											18.50		39
Osceola	18.50		18.00										
Penn-Breck.													
Pewabic	1.25		1.25		1.32	1.25	2.38	1.25	2.50	2.38			1,258
Pine Tree					.09						.08		500
Plymouth											.10		500
Quincy			50.00		50.00				52.00				58
Ridge													100
Robinson					.40								200
San Pedro							.15						200
Stewart	.13				.14		.14				.14		2,000
St'a Grande													200
Silver Islet	2.00				2.00				2.00				
Simpson Gd													
Sonora Con													
South Paci													
Standard											6.00		15
Sullivan	.92½				1.05	1.00	1.05	1.00	1.02¼	1.00	1.02½	1.00	2,850
Sutro Tun.	.17				.18								300
Twin Lead.													
Vizina													
Sonora													
Little Pitts.													
Climax													
.....													
.....													
.....													

PHILADELPHIA MINING STOCKS.

	Oct. 19.		Oct. 20.		Oct. 22.		Oct. 23.		Oct. 24.		Oct. 25.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.									.20		.24	.21	36,900
Argent.	.18	.17	.18	.17	.18								
Arizona So.									.03				3,000
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati									.09	.08	.08		2,800
Comprom'e.													
Contention													
Con. Virg.													
Dauntless	.02												1,000
Del Monte													
Denver City	.13		.14		.14		.16	.15			.24	.18	16,350
Eureka													
Girard					.02						.03		2,700
Governor	.05	.04			.05						.03		1,900
Grand Uni'n	.03		.03		.03		.03		.03		.03		23,600
Green Mt.													
Gunnison	.16		.17				.18	.16			.19	.18	3,100
Homestake													
Horn Silver													
Iowa Gulch	.04	.03			.04		.04		.04		.05	.04	31,800
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud	.03								.03		.03		3,100
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan			.02		.02		.03		.03		.03		3,900
Navajo.													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina			.10				.05						300
Penn-Breck.	.09				.08		.09		.10		.10		11,700
Permanent													
Pizarro													
Pizarro Ex.							.01						5,500
Potosi													
Rara Avis							.12						900
Rara Avis E.	.09				.08		.08		.08		.06		16,200
Record													
Rico Pion'r.													
Sierra Apac.	.27½				.25		.27¼				.27½		2,400
Sierra Be.la.	.75		.72½		.70				.72½				1,500
Sierra G'nde	1.10	1.07½	1.07½	1.05	1.05		1.05		1.05		1.02¼		5,600
Sierra Nev.													
Silver Cord.													
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.													
Tombstone					.90		.95		.95				1,500
Victor													
Yalo Mt.													
.....													

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At the Exchange, the following lower cable quotations were received to-day: Coltness, 55s. 6d.; Langloan, 56s.; Summerlee, 54s. 6d.; Gartsherrie, 53s. 9d.; Glengarnock, at Ardrossan, 53s.; and Eglinton, at Ardrossan, 46s. 9d. Warrants at the Exchange to-day were 45s. 1d.

Rails.—Sales are reported of 8000 tons of rails; one lot of 3000 tons, at Pittsburg, at $37, which also is given out as the figure for the other lot. The market has a weakening tendency, as the mills are approaching the time when their orders are exhausted, and it is feared that then, in their eagerness to secure business, they will be ready to accept lower figures, which, indeed, rumor has repeatedly announced, and which we have reason to believe is not far from wrong. The mills will probably be loath to shut down, and therefore lower figures are looked forward to. We quote nominally $36.50@$37.

Old Rails.—Business light, with quotations at $22.50@$23 at tide-water for Ts.

Scrap.—We quote $23 ex ship.

Philadelphia. October 26.

Several holders of inferior pig-iron are endeavoring to crowd stocks on the market at concessions from the rates prevailing heretofore, which are $21@$22 for No. 1 Foundry and $19.50@$20 for No. 2; $18@$18.50 for Forge. Schuylkill irons have been sold at $17, shaded at furnace. A few small lots have sold at this price and with options for larger lots, which will probably be placed during the coming week. The market is very weak and dull, and three or four companies announce it to be their intention to blow out more furnaces. The movement in Foundry is still in small lots, at $21@$19.50, although there are sales at $20.50@$19.

Foreign irons are very weak. No sales of Bessemer have been reported, and the offers made a week or two ago have been withdrawn. Handlers of Scotch iron are selling a little more freely, but at concessions of 25 cents.

Merchant bar iron is still weak and dull, and a further restriction in output has taken place during the week. Mills in the interior are taking fewer orders, although they are offering to take business at concessions even from the low rates current. There is no difficulty in getting iron at 2c. Store demand is falling off, and the orders at mills are for small lots. Some offers have been made for large lots, but the terms are not acceptable. Western iron has been heard of once more in this market, and has been delivered under 2c. A few sales of skelp are probable this week. Sales of common iron have been made at 1·75c.

Plate and tank iron are moving steadily, and mills are well supplied with orders. Prices are 2·30@2·40c. for Plate; Shell, 3c.; and Flange, 4c.

There is a fair movement in structural iron, and heavy deliveries on summer contracts are going on. Two or three specifications have arrived this week, and business will probably be closed next week for winter delivery. Beams and Channels are 3·40c., and some sales have been made at a little less. Tees, 2·75c.; Angles, 2·40c.

There is a disposition to take a little less for steel rails for winter delivery, and it is probable that business will be done next week at $37, shaded; $36.50 is likely to be taken for large lots. Buyers appear determined to pay no more.

Sales of old rails have been made at $23.25, to arrive. Average quotations, $23.50. Double Heads have been offered at $25.50, and offers have come in at $25. Crop-Ends are nominal at $23.25, with offers at 50c. less.

Pittsburg. October 24.

There are indications of more labor troubles in iron-making and in mining. The Edgar Thomson management has discharged 100 men, and it is said that wages will be reduced at the opening of the year. Workmen have been discharged from quite a number of mills, and there are rumors of a probable restriction of output, unless demand should improve during the next thirty days. Sales of pig-iron have been made at $17.50 as an average for Gray Forge and White and Mottled, $20@$21 for Foundry, $21 for Bessemer, and $29 for C. B. charcoal. But little anthracite and charcoal is selling, the preference being for lake ore iron, smelted with coal and coke. City furnaces are asking $17.50@$18, and have refused lower offers. The outlook for forge is better, but foundry continues weak and dull. Muck Bars have declined to $33. Manufactured iron is in better demand; assorted bars, 1·80@1·90c. Nails, $2.70. Buyers are covering only current requirements. There are offers for large lots at $2.60. Several good sales of wrought pipe have been made. Old rails are quoted at $24.50. Steel rails, $37.50. Merchant steel is weak and dull. Railroad track supplies are active at $2.60 for spikes and $1.90 for splice bars. The glass trade is unchanged. The coke trade is improving, and prices at ovens are $1.10. There are now 1094 ovens idle and 8102 at work.

COAL TRADE REVIEW.

NEW YORK, Friday, Oct. 26.

Anthracite.

With the exception of steam coal, for which there is some demand on the basis of about $4.25, there is very little that is new in the trade. It continues dull and lifeless, with some pressure to sell and very little disposition to buy. About the beginning of December, the trade usually falls off considerably, and prices weaken. The indications now are, that the heavy output of the current year will bring the opening of this season fully a month earlier, and well informed observers of the trade look for a further easing up in the first week of November. It remains to be seen whether the pressure will become so great as to necessitate a restriction of the output. Buyers apparently cling to the conviction that they will have an opportunity to purchase to better advantage then, and are persistently keeping out of the market, with the exception of those who must stock up before navigation closes.

Bituminous.

Except occasional rumors of low prices, there is nothing to disturb the apathy of the bituminous coal trade. To all but a few, the season has been very disappointing.

Cleveland.

There is a great commotion in the Massillon District just now, over the discovery of coal at 400 feet below No. 1, or the lower coal measure, as given by the geological reports. Having noticed reports asserting that a six-foot vein had been discovered, I took the trouble to go to Canal Fulton, and learn all about the "great find." I learned that two men, John McFadden and John Campbell, both miners and living at Fulton, having heard that a man who sunk a hole in that vicinity some sixty years ago, in prospecting for salt, had gone through several feet of coal, had secured leases on about 1000 acres lying along the Tuscarawas River to the north and west of Canal Fulton. They selected a spot about one and a half miles up the river and on the west side, in a run bottom, and began drilling in an abandoned hole then about 200 feet deep. After working "on and off" all summer, they finally struck what they thought to be coal, and after some preliminary arrangements and agreements with lessors had been effected, took a number of reputable citizens with them to witness the work of drilling through the coal. I talked with Mr. Campbell and two or three of the men who witnessed the work, which was done on Monday, the 15th inst. All report six feet of coal, and samples of the drillings which I saw indicate a good bituminous coal, resembling in general appearance the Massillon or No. 1. Mr. Campbell says that they found nothing resembling or answering to the Waverley stone; but I found that, on account of the rude character of the drilling apparatus and want of technical knowledge of the workmen, no definite idea of the formation could be obtained. Two or three prospecting companies have been formed, and the lands "all round about" have been leased, and no doubt some more systematic prospect-work will be done. It is to be hoped that a diamond bit drill will be used next time, and the cores preserved. Some of the old heads think it a freak of nature, and that further investigation will prove the area very limited; but no one who knows the parties or witnesses doubts that a bed of coal was struck as reported. It would seem to be a very capricious freak of nature to deposit from five to six feet of coal at that depth in a small pocket; but time and thorough investigation will bring out the facts.

Pittsburg.

Coke is steady and unchanged at former prices, $1.05@$1.15, free on board. There have been no more "gobbles" by Frick & Co. since my last, and the next freight pool is as far from settled as ever. The illness of President Roberts, of the Pennsylvania Railroad, has interfered with the meetings of the pool lines. Meanwhile, the Vanderbilt end of the Pittsburg & Lake Erie Railroad, the Pittsburg, McKeesport & Youghiogheny Railroad, began, on Friday last, the running of regular coke trains over its substantial and costly line. The rates were not different from those previously in force, the new road operating as an extension of a pool road, the Pittsburg & Lake Erie. Those in the best position to know state that a new freight pool can be ultimately arranged between the lines without danger of a rupture, but that there are so many matters to consider and so many complications arising that a number of meetings must be held and an unusual amount of time consumed. The demand for coke is good, and cars are reported very scarce for West-bound coke.

Horsford's Acid Phosphate.

Unanimous Approval of Medical Staff.

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But a small edition of this Map was printed, and the plates were then destroyed.

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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LAST week, we printed in a letter from a correspondent a report of the alleged discovery of coal near Clinton, Summit County, O., which was causing considerable excitement throughout that State. The opinion was advanced by Professor ORTON that possibly it might be albertite, while others held that it might be the lower coal of the slate series. Mr. ANDREW ROY, the State Mine Inspector, however, believes that the hole was salted, and some of the points he brings forward certainly make it look as though such an operation had been attempted in a very crude way. They pump a material conta ning 80 per cent of carbon out of the hole in pieces as large as the thumb, a size which no true borings could furnish.

AN anonymous correspondent has requested us to insert a price-current of "the numerous minor metals, which, though not largely dealt in, are generally matters of considerable interest to those having to do with ores and metallurgy." We are fully aware of the interest attaching to this subject, and to show how such figures may occasionally become important, we may state that only recently a gold company has entered the market with arsenic products, which it now offers for sale. We shall be pleased to make an effort to collect the data which our correspondent desires to obtain, if he will give us a list. It must be stated, however, that the minor metals are generally controlled by a few parties, who allow very little correct and complete information to reach any but a limited public.

THE reports of the discovery of tin ore in different parts of the country are multiplying. The Alabama mines, now we believe temporarily idle for want of additional working capital to carry out some improvements, have been followed by the Black Hills tin deposits, so elaborately described by Professor BLAKE in these columns. Some time since, there floated to us rumors of discoveries of the same metal in Virginia. They are now authoritatively confirmed by Prof. HARRY D. CAMPBELL, of the Washington and Lee University, Lexington, Va., who has reported on the subject in a letter to *The Virginias*, an advance-proof of which has been kindly sent to us by Major JED HOTCHKISS, the editor. The ore, which was seen in place by Professor CAMPBELL, is found on Painter Mountain branch of Irish Creek, Rockbridge County, Va., about one and a quarter miles from the Nelson County line. It is cassiterite in a vein running east and west, several inches thick. The country-rock consists principally of large crystals of quartz and feldspar, smaller crystals of mica, and some mica.

FROM California come again strong complaints concerning the present status of the quicksilver industry, which is languishing under low prices, apparently brought about principally by the extensive importations in anticipation of the duty of 3·6 cents per pound under the new tariff. During the first six months of 1882, the imports were 4781 flasks ; for the entire year, the heavy importations of the second half carried them up to 13,116 flasks ; and in the first six months of 1883, they ran up to 12,982 flasks. It might be argued that the depression due to this heavy stock would be likely to be only temporary. But the course of prices abroad discourages any such hopes. In September of last year, the price in London was £6, but it has since declined to £5 5s., while here it has dropped to 34·5 cents per pound. Nor does there appear to be any prospect of an early recovery, because there are fully 100,000 flasks of quicksilver in stock in England. Under such pressure, the mines in this country are steadily losing ground. The production, according to the leading authority on the subject, Mr. J. B. RANDOL, of San Francisco, has been as follows since 1873 :

PRODUCTION OF QUICKSILVER IN CALIFORNIA.

	Flasks.		Flasks.
1873	27,642	1878	63,880
1874	27,956	1879	73,684
1875	50,250	1880	59,926
1876	75,074	1881	60,851
1877	79,396	1882	52,732

For the first nine months of the year 1883, the production of the different mines was as follows :

	Flasks.		Flasks.
New Almaden	21,819	Great Eastern	1,377
Napa Consolidated	4,482	New Idria	1,132
Great Western	3,104	Various mines	1,67
Sulphur Bank	2,182		
Redington	1,573	Total	35,836

At this rate, the total production of the year will probably not be higher than 48,000 flasks, and this is only reached because the largest miners are straining their capacity to make up in their returns by a heavy output for the falling off in price. The result may be readily foretold. Nearly all the mines will stop dead-work, exhaust their resources, and close down, or will continue to make as heavy drains on the purses of their shareholders as the latter will submit to. The producers see only one way out of the dilemma to save the heavy amount invested in mines and plant and now threatened with ruin. They will probably ask, and it is hoped will obtain, an increase in the duty to 10 cents per pound.

THE meeting of the American Society of Mechanical Engineers, held in this city this week, was fairly successful. The number and standard of the papers was not so high as those interested in the welfare of the society might wish ; but this, we happen to know, is due principally to the fact that a number of very interesting papers were withdrawn a short time before the meeting, because the authors could not complete them.

There is one matter which occupies entirely too much of the attention of the meetings not to affect the interest and therefore the future of the society unfavorably. There are eternal bickerings as to its by-laws. There is altogether too general a disposition among the members to take a share in tinkering with the constitution, insisting on its being carried out to the letter, however unimportant the points raised may be. The Society of Mechanical Engineers should follow the example of the Mining Engineers—elect a good council, have faith in its wisdom and zeal, and leave the management of the affairs of the society to it. As it is now, hardly a session is passed without some unprofitable discussion, which at best discourages those intrusted with executive functions, because they are subject to a constant and often captious criticism. While we have no doubt that the motives of all are the very best, and while it is true that generally young societies struggle to some extent with questions of organization, it looks to the unbiased spectators as though the greatest danger to

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the future of the society comes from those who are so anxious to make its organization their ideal of perfection. The Council of the Society of Mechanical Engineers is composed of gentlemen many of whom have had a wide experience in the affairs of kindred associations. Throw upon them the responsibility of executive details, and devote the time of the sessions to the business that members have come long distances for. Engineers do not travel hundreds of miles to listen to a debate on some amendment to the by-laws. They want to learn what the best of their fellow-engineers have accomplished; in what direction they are working; how they are going at it; what obstacles they have met, and how they propose to overcome them.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Water-Jackets versus Brick Furnaces in Copper Smelting.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In Mr. Douglas's interesting paper on the metallurgy of copper, printed in *Mineral Resources of the United States*, Washington, 1883, he says: "The data are not yet available for determining the consumption of fuel in water-jackets and brick furnaces, respectively." When we were considering that question, Mr. Douglas gave it as his opinion that water-jackets were at least as economical as brick furnaces. We have come to believe they are more so, and offer these results from one we have in operation here. Jacket, 44 inches diameter at bottom, by 48 inches at top; hight, 84 inches. Six tuyeres of 2¼-inch opening. Blast, 7 ounces per square inch. Smelting roasted sulphurets. Charge, 700 pounds ore and 80 pounds Connellsville coke; both weighed for each separate charge. With this burden, the furnace melts about 80,000 pounds of ore daily. During the week just past, we used a mixture of equal parts of Boston gas-coke and Connellsville coke. Including loss in wagon transport and otherwise, the week's account showed this furnace had melted 7·85 pounds of ore with one pound of mixed coke. And besides, it melted about 18 tons of slag from matte smelting, for which no fuel was allowed in the charge.

We should like to see some results from brick furnaces on similar ore.

WILLIAM GLENN, Agent
SOUTH STRAFFORD, VT., Oct. 31. Elizabeth Mining Company.

Desilverization o Refined Lead.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: At the works of a certain smelting and refining company, where the Parkes process is used, when the silver in lead goes down to less than 0·2 ounce per ton, the operation is considered finished, as it would not pay to attempt any further desilverization with zinc. The assayer then usually sends a written order to the kettle-men to "steam 15 or 30 or 45 minutes and tap," the time for steaming depending on the amount of silver left in the charge.

The other day, the foreman of the refining department, who had had much practical experience in silver smelting and refining, first conceived an idea that when a charge of base bullion, after repeated zinckings, had come down to 0·4 or 0·5 ounce of silver per ton, he might dispense with the usual zinc at this point and substitute the use of steam, in hopes that he could save the zinc as well as four or five hours' time. I then had daily charge of the chemical analyses and "kettle assays" which control all the operations in the refining department; and that day I gave an order for the usual quantity of zinc for say 0·3 or 0·4 ounce of silver per ton, which I had just found by assay. But the foreman reversed my order, and directed the kettle-men to steam 45 minutes instead. At the end of that time, samples were sent right off to me to assay, to see if the amount of silver left had been successfully reduced to below the specified minimum of 0·2 ounce per ton. In nine out of ten cases, such samples assayed much too high, very often as high as 2 or 4 ounces, and sometimes even higher. That the lead could become richer after steaming, should be considered ridiculous and absurd, even though experiments on other charges, under some conditions and circumstances, gave similar results; and I was at a loss how to account for such high assays, especially as I was told that they had taken off the skimmings before sending their samples to the assay-office.

I have been thinking carefully over the matter ever since, and am now strongly of the belief that those samples I assayed had been taken out too early, and out of a kettle while yet too hot. In the melted lead, when heated by steam, quite or nearly all of its silver contents will go upward and be more concentrated in the upper part of the lead; and as samples are necessarily taken out from the top, they will assay too high, and therefore can not represent the average value of the soft metal in silver. If they wanted to procure fair samples, they must have waited until the kettle became sufficiently cool, when the silver would have been uniformly distributed throughout the lead again.

Exceedingly hot and moderately hot lead will assay differently, as any one can find by careful experiments; the former invariably giving higher results than the latter. But the latter is correct and truthful as to the average richness of the metal.

It has recently occurred to my mind that, if silver is really concentrated in the upper part of the lead when steamed, this fact might be utilized with financial profit. When the kettle becomes exceedingly hot by means of steam, you may ladle the uppermost portion (say one half, or rather, one quarter) of the charge out of that kettle into a fresh kettle; when the latter becomes full from subsequent operations on other charges, you will have the lead rich enough to allow the use of zinc for the extraction of an additional quantity of the precious metal. In the former kettle, you may tap the remainder of the lead at once, and send it to the market as "extra refined lead."

GEORGE T. DOUGHERTY.
2623 TEXAS AVENUE, ST. LOUIS, MO., Oct. 20.

The Electrolytic Process, as Described by C. O. Mailloux.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The volume just published by the United States Department of the Interior, *Mineral Resources of the United States*, contains so many excellent monographs that Mr. A. Williams, Jr., Chief of Division of Mining Statistics and Technology, deserves much praise for his good judgment in the selection of the men who have assisted him in his difficult task. There is one article, however, which I shall take the liberty of criticising, namely, "Electrolysis in the Metallurgy of Copper, Lead, Zinc, and other Metals," by C. O. Mailloux.

The literature on this subject is exceedingly poor, and entirely worthless, as far as practical application of this process is concerned. Those who know something about it keep their experience a secret, and those who know nothing about it are the most eager to rush into print. Mr. Mailloux belongs to the latter class, and I propose to discuss the most glaring misstatements of his paper.

Page 639: "*Copper by Electricity at the Oker Mine.*—In Germany, at the royal mines of Oker, the extraction of copper out of the solutions resulting from the working of copper mattes is done at present by the agency of electricity. . . . Three Siemens machines are run day and night, the current being passed through ten or twelve precipitating-vats containing the solution. The anodes and cathodes used are of lead or other metal not soluble in the solution. The average product is 25 kilograms of metallic copper per vat per twenty-four hours, or between 250 and 300 kilograms for each machine, with an expenditure of from 8 to 10 horse-power per machine."

In the first place, there are no "royal mines of Oker." The metallurgical works at Oker are the principal ones which reduce the ores from the Rammelsberg mine, near Goslar. The process, as described, only exists in the imagination of the writer. He is fully justified in asking: "Why use the current from an external source at all? etc. . . . . It would be better to use more vats, and larger ones, and substitute the process of MM. Dechaud and Gaultier." But I ask myself: Why use the process of MM. Dechaud and Gaultier, when the copper can be precipitated by simply bringing the solution into contact with scrap-iron? The electrolytic works at Oker part copper, containing silver and gold, which were formerly (and are, in part, now) granulated and dissolved in dilute sulphuric acid for the manufacture of copper vitriol. There are five Siemens machines, each requiring eight horse-power, and capable of precipitating each 300 kilograms of copper in twenty-four hours.

Page 641: "*The Elkington Process.*—The current causes the copper to be dissolved out of the matte plates; and, at the same time, it is deposited at the cathodes in equal amount. Almost all the impurities ordinarily present in the anode are insoluble in the solution, except iron." . . .

Here the idea is conveyed that at Elkington's works anodes of copper matte are treated. This is not correct. The only material which can be, and is, treated by the electrolytic process with economy is metallic copper. It is even unprofitable to subject black copper to the process. The copper, before being cast into anodes, should be, and is, first refined, and made as pure as possible for various reasons, namely: 1st. To get smooth anodes. 2d. Because pure copper is a better conductor, and polarization is reduced to a minimum. 3d. On account of conserving the solutions as long as possible. Mr. Mailloux does not seem to be aware of the fact that arsenic goes into solution, and is, indeed, the greatest enemy of the process. Arsenic is precipitated on the cathode when it obtains even a moderate concentration in the solution. It has been found that, with very low volts of the current, arsenic commences to precipitate sooner than if a current of higher volts is used. Bismuth will also go into solution, and precipitate on the cathode, if the copper, in refining, has been "over-poled." If the copper contains antimony and oxygen, the bismuth will be found as a precipitate of antimonate of bismuth.

Page 644: "Thousands of tons of Chilian copper mattes, containing traces of gold and silver, find their way to Swansea, and the greatest portion of them is refined by electrolysis. The production amounts to several tons of pure copper a day in each place."

Will Mr. Mailloux oblige the readers of the JOURNAL by giving the names of the works at Swansea in which such large quantities of copper "with traces of gold and silver only" are refined by electrolysis?

Page 644: "Only a little labor is required for attention in such accessory operations as casting the plates, emptying and filling vats, etc. The power required need not be very great. An expenditure of 20 horse-power would, no doubt, suffice to produce enough current by means of dynamo-electric machines to refine as many tons of copper a day, without necessitating a plant of undue or undesirable size. The solution, it is seen, is not costly; moreover, it is durable. It undergoes no changes by use, except that it becomes charged with iron and other impurities derived from the crude copper."

This statement is astonishing on account of its absurdity. It is surprising that Mr. Mailloux could make it after giving, in previous pages, a correct *exposé* of the effect produced by connecting the electric cells "parallel" or "in series," and after stating the injurious effect of polarization. It is to be presumed that at Oker, where a few tons more of copper in rotation would be no object, they have reached a practical limit of arranging the plant "in series." Hence, we may assume that it is not practicable to precipitate with an expenditure of 20 horse-power much more than 750 kilos of copper in twenty-four hours. Mr. Mailloux, however, has no doubt that he can precipitate with 20 horse-power 20 tons of copper per day, and that without necessitating a plant of undue or undesirable size. Taking the experience at Oker as a basis for calculation, works of 20 metric tons daily capacity would require 67 *Siemens machines*, 536 *horse-power*, and an *area* of about 20,000 *square meters* to set up the plant. Concerning the durability of the solution, I have already stated that it depends principally on the absence or presence of arsenic. That the labor of attending to such an extensive plant forms also a considerable item of cost, requires no further demonstration.

On page 646, we find a rather long and superfluous discussion of Cassel's process. Any person familiar with the subject who reads Cassel's patent specification will see at once that there is nothing in it, and that it is not worth three pages of criticism. But here again the facts are not correctly stated in some respects. The electrolytic plant put up in 1882 at Mathey & Riotte's metallurgical works for the purpose of refining silver and gold bullion was constructed by P. Holder, a Mr. Hamilton furnishing the capital for the enterprise. Mr. Holder, as agent for André, had

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previously carried out a series of experiments in the electrolytic refining of copper at the works of Pope, Cole & Co., Baltimore. The Siemens machine, imported at the time by Pope, Cole & Co., was the one set up at Mathey & Riotte's. Mr. Holder had adopted a modification of André's plant. On account of financial difficulties, this plant was never completed or operated by Holder. How much Messrs. Mathey & Riotte experimented with it I do not know. One fact only is certain, that they never obtained a sufficient quantity of bullion to experiment on a large scale. The same plant was subsequently bought by the United States Bullion Refining Company, and set up in Cortlandt street by Cassel, with the addition of his supposed improvements. It proved to be a total failure, as stated by Mr. Mailloux.

The account of Keith's process for desilverizing lead bullion is the most interesting and best chapter of the paper. It is to be hoped that when the new works at Rome are in operation, Mr. Keith will be able to demonstrate to lead refiners the economy of his ingenious process, which, so far, he has not done.

In concluding his paper, Mr. Mailloux refers to electrolytic assaying. He says: "A French chemist, M. Alfred Riche, has applied the idea successfully to the assay of copper, lead, zinc, manganese," etc. It would have been more appropriate to state that the electrolytic method of assaying, so far as copper is concerned, is now generally introduced everywhere. That M. Riche is not the originator of this method, but only one of the many co-workers in its perfection, is well known to all who are familiar with the literature of this subject.

Finally, I wish to state that an electrolytic plant of 800 pounds daily capacity is in successful operation at Balbach's works, Newark, N. J., where copper rich in silver and gold is parted. Mr. Balbach uses the pure electrolytic copper for precipitating cement silver in refining silver-gold bullion by the sulphuric acid process. C. A. STETEFELDT.

THE NEW YORK MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The widespread interest shown in the work of this young society is evidenced by the comparatively high percentage of its members attending the meetings, fully one third taking part in them. At the opening session, fully one hundred gentlemen gathered in the rooms of the American Society of Civil Engineers, hospitably tendered for the purpose. After a few words of welcome from the President, Dr. E. D. Leavitt, Jr., of Cambridgeport, Mass., Mr. Thomas R. Pickering, of Portland, Conn., read a paper on

AMERICAN MACHINERY AT FOREIGN EXHIBITIONS,

in which Mr. Pickering, who has been a commissioner at almost every leading international exhibition for the last quarter of a century, gave a series of reminiscences. He dwelt upon the advantages which have accrued to manufacturers of machinery and the country at large. He gave some striking instances of the lack of faith of official representatives of the United States in the work of their own country. Thus, at the Paris Exhibition, its representative asked that power be furnished by a French engine firm, as he evidently believed that American engines could not be depended upon to furnish power with regularity. A French engine did actually drive the machinery of the American exhibit, yet a Corliss engine, although hidden by it, attracted more attention and obtained a gold medal, and its French rival was awarded only a silver medal. He dwelt on some striking cases of piracy, which a number of the gentlemen present referred to in the discussion following.

Mr. A. C. Hobbs, of Bridgeport, Conn., told a number of amusing stories concerning his experience in showing European lock-makers how difficult it was to baffle the ingenuity of an American mechanic.

At the invitation of the local members, the society partook of a supper served in the rooms of the Society of Civil Engineers.

Among those present at the meeting we noticed the following: George J. Alden, Worcester, Mass.; T. R. Almond, Brooklyn, N. Y.; W. S. G. Baker, Baltimore, Md.; W. J. Baldwin, New York City; S. W. Baldwin, New York City; W. M. Barr, Cleveland, O.; P. Barnes, Springfield, Ill.; J. C. Bayles, New York City; T. Bergner, Philadelphia; A. Betts, Wilmington, Del.; Charles E. Billings, Hartford, Conn.; G. M. Bond, Hartford, Conn.; W. G. Cartwright, Hoboken, N. J.; Z. B. Coes, Altoona, Pa.; A. W. Colwell, New York City; A. B. Couch, Philadelphia; D. P. Davis, New York City; C. P. Deane, Holyoke, Mass.; J. E. Denton, Hoboken, N. J.; W. W. Drummond, Louisville, Ky.; W. F. Durfee, Bridgeport, Conn.; T. Egleston, New York City; C. E. Emery, New York City; Faber du Faur, New York City; John Fritz, Bethlehem, Pa.; Francis E. Galloupe, Boston, Mass.; Edmund le B. Gardner, Passaic, N. J.; A. A. Goubert, Jersey City; John J. Grant, Flushing, N. Y.; Howell Green, Jeanesville, Pa.; Robert Grimshaw, Philadelphia; A. F. Hall, Boston; F. A. Halsey, New York City; S. A. Hand, Tough Kenamon, Pa.; F. F. Hemenway, New York City; M. P. Higgins, Worcester, Mass.; H. A. Hill, Boston, Mass.; J. C. Hoadley, Boston, Mass.; J. L. Hornig, Jersey City; R. W. Hunt, Troy, N. Y.; F. R. Hutton, Secretary, New York City; W. Johnson, Lambertville, N. J.; H. C. Jones, Wilmington, Del.; C. Kirchhoff, Jr., New York City; L. G. Laureau, New York City; E. D. Leavitt, Jr., President, Cambridgeport, Mass.; W. Barnet le Van, Philadelphia; L. F. Lyne, New York; De Courcy May, Cambridge, Mass.; George W. Maynard, New York City; Alexander Miller, New York City; Thomas R. Morgan, Sen., Alliance, O.; William H. Odell, New York City; E. H. Parks, Providence, R. I.; W. E. Partridge, New York City; T. R. Pickering, Portland, Conn.; C. T. Porter, New York City; T. W. Rae, New York City; W. J. Root, Brooklyn, N. Y.; Joshua Rose, New York City; P. B. de Schweinitz, South Pueblo, Colo.; W. N. Shock, Washington, D. C.; G. H. Smith, Providence, R. I.; Oberlin Smith, Bridgeton, N. J.; G. S. Strong, Philadelphia, Pa.; J. E. Sweet, Syracuse, N. Y.; H. R. Towne, Stamford, Conn.; R. H. Thurston, Hoboken, N. J.; J. B. Webb, Ithaca, N. Y.; S. Webber, Manchester, N. H.; S. S. Webber, Lawrence, Mass.; A. Webster, Waltham, Mass.; G. W. Weeks, Clinton, Mass.; W. H. Weightman, New York City; S. T. Wellman, Cleveland, O.; F. M. Wheeler, New York City; W. H. Wiley, New York City; Alfred R. Wolff, New York City; Horace B. Miller, New York City; Carl Angstrom, Worcester, Mass.; William Betts, Wilmington, Del.; W. T. Capen, Stamford, Conn.; A. Sinclair, New York City; and J. F. Holloway, Cleveland, O.

It will be noted that this list contains a large number of representative men.

THE SECOND SESSION

was held on Thursday morning, the first hour being occupied by routine business, a brief report by the council, a more lengthy document from the treasurer, and a report by the Committee of Tests, presented by Professor Egleston, who urged the appropriation of $200 for the republishing for distribution of the report at the Philadelphia meeting of the society. The low condition of the treasury of the society gave rise to some doubts as to the advisability of incurring this additional expense, and led to a somewhat rambling debate in which, incidentally, the question was raised by Mr. Towne, whether it would not be best to increase the fees to $12 per annum, to provide for current expenses. Mr. J. Bogart, Secretary of the American Society of Civil Engineers, gave a statement of the action of his society in the matter. He gave some account of the conferences held with General Benét, Chief of the Ordnance Department, whose co-operation was secured. The society now takes the position that it will do all it can to aid the Chief of Ordnance in his work of testing, until a bill can be passed for the appointment of a Tests Commission. Finally, after some talk, the grant of $200 asked by the Test Committee was voted.

After a report by the Publication Committee and the Committee of Gauges and Standards, Mr. James C. Bayles addressed the meeting in behalf of the Holley Memorial Committee. He stated that the treasurer had collected the amount necessary to build the monument, the subscription having reached the required sum, so that the execution is now assured. Mr. Laureau, of New York City, formerly associated with Mr. Holley, is now working on designs for the base. Mr. Bayles submitted a letter received from Dr. Raymond, which the committee did not feel authorized to reply to. Upon motion, the council was given authority to instruct the committee to co-operate with the American Institute of Mining Engineers and possibly the Society of Civil Engineers, in reference to the publication of the Holley Memorial Volume.

Mr. Bayles also spoke of the possibility of a visit of the British Iron and Steel Institute to this country in 1884, the members coming to this country after attending the meeting of the British Association in Canada, and a resolution to issue an invitation to them was passed.

THE AFTERNOON SESSION

was opened by a paper by Mr. W. F. Durfee, of Bridgeport, Conn., on

A POWER CRANE

of six-ton capacity, designed by him in 1867 for the machine-shop of the Milwaukee Iron Company, which was probably the first crane of that capacity built in this country.

The paper was highly commended by Mr. Towne, of Stamford, Conn., who, in the light of the present state of the art, had only a criticism to offer on two points of minor importance.

Mr. Carl Angstrom, of Worcester, Mass., explained the construction of

A NEW VALVE MOTION,

belonging to the class, like those of Joy, Brown, and Marshall, known as "radial valve motions." The motion is generally accomplished by an arm, two points of which move in different curves. One point moves in a closed curve, such as a circle or an ellipse, this motion being derived from an eccentric, crank, or from the connecting-rod. The other point again moves either in an open or a closed curve, and this motion is accomplished either by levers or slides, or both combined. In the Angstrom valve motion, the difference from those previously mentioned consists chiefly in the mechanism for giving motion to the last-mentioned point of the valve actuating arm. Mr. Angstrom believes that this motion can be used with advantage on engines running chiefly in one direction. The pendulum links and connections could then be proportioned so as to give a good steam distribution and equal cut-off at each end of the stroke.

Prof. R. H. Thurston, of the Stevens Institute of Technology, and others, asked Mr. Angstrom a series of questions, and dwelt upon special features of the design.

Prof. Robert H. Thurston, of the Stevens Institute of Technology, Hoboken, N. J., presented a paper on

THE PRESSURE ATTAINABLE BY THE USE OF THE DROP-PRESS,

now so extensively employed in the process of "drop-forging" and in the manufacture of small parts of sewing-machines, fire-arms, and light machinery.

In the course of an investigation of the efficiency of drop-presses lately made by the Mechanical Laboratory of the Stevens Institute of Technology, it was found that the most efficient presses experimented with had an "efficiency," as the term is technically used, of 90 per cent. A few figures from a table given were computed upon the assumption that this efficiency can be reached, and exhibits the mean pressure attained when the piece attacked is crushed to the amount of $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ inch respectively. These figures are seen to be simply enormous, and the power of this form of press is evidently limited only by the rigidity of its parts and their strength.

The figures given for the pressures reached when the compression is one sixteenth of an inch can only be obtained when the anvil is so set and of such material that the yielding there occurring can not absorb more than the allowed 10 per cent of the total work of the falling mass. The same remark applies to the table generally; but the loss may always be expected to fall within the assumed figure for the smaller weights and lesser hights fallen through; if the machine is well built and the anvil and foundation are of ample size and rigidity for good work, it is improbable that the higher figures can be readily obtained; also, if proper precautions are taken in the setting of the press.

The intensity of pressure attainable is evidently determined by the area of the surface exposed to the action of the drop, and this in turn determines the distance through which crushing may occur. The figures given in the table are total pressures, and the mean intensity of pressure corresponding to these amounts is to be obtained by dividing the total pressure as shown in the table by the area of section of the crushed piece, or by the mean area opposed to the crushing action during the operation. The proper comparison is that of the energy of the falling weight with

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the "resilience," elastic or total, or both, of the mass on the anvil or in the dies.

PRESSURES OF THE DROP-PRESS.—(EFFICIENCY 90 PER CENT.)

Fall of drop in feet and inches.	Compression in inches.	WEIGHTS OF DROP.					
		Pounds. 50.	Pounds. 200.	Pounds. 400.	Pounds. 800.	Pounds. 1000.	Pounds. 2000.
0′ 3″	1-16″	2,160	8,640	17,281	34,562	43,202	86,405
	⅛″	1,080	4,320	8,640	17,281	21,601	43,202
	¼″	540	2,160	4,320	8,640	10,800	21,601
1 0″	1-16″	8,640	34,562	69,124	138,249	172,811	345,622
	⅛″	4,320	17,281	34,562	69,124	86,405	172,811
	¼″	2,160	8,640	17,281	34,562	43,202	86,405
2′ 0′	1-16″	17,281	69,124	138,249	276,498	345,622	691,244
	⅛′	8,640	34,562	69,124	138,249	172,811	345,622
	¼″	4,320	17,281	34,562	69,124	86,405	172,811
3′ 0″	1-16″	.....	103,686	207,373	414,747	518,433	1,036,866
	⅛″	.....	51,843	103,686	207,373	259,216	518,433
	¼″	.....	25,921	51,843	103,686	129,608	259,216
4 0″	1-16″	.....	.....	276,498	552,996	691,244	1,382,488
	⅛″	.....	.....	138,249	276,498	345,622	691,244
	¼″	.....	.....	69,124	138,249	172,811	345,622
5′ 0′	1-16″	.....	.....	.....	691,245	864,056	1,728,112
	⅛″	.....	.....	.....	345,622	432,028	864,056
	¼″	.....	.....	.....	172,811	216,014	432,028

The limit to the resistance of any mass on the anvil is found at the pressure at which the metal will "flow" continuously. This pressure varies with not only the kind of metal, but with every variation in the chemical composition, the physical structure, or the form and method of support of the piece. For general use, the value of this "modulus" may be taken at about the value of the shearing resistance of the material. For soft wrought-iron, for example, it may be taken at about 50,000 pounds per square inch (3515 kg. per sq. cm.), for moderately hard iron at a figure 20 per cent higher, and for pure copper at about one half the latter figure. There is, however, a great difference in the behavior of the two metals under pressure. The former has a distinct elastic limit in its original state which becomes "exalted," as was shown by Professor Thurston some ten years ago, when the piece is distorted, and becomes approximately equal to the maximum force, producing change of form, remaining permanently altered. The metal thus transformed does not yield subsequently to any less pressure. It will not flow under any pressure less than that which is required to produce distortion immediately upon its application. Copper, however, has no true and measurable elastic limit in its original condition as found in the market, and it does not flow under the continued action of forces far less than those required to produce rapid and continuous distortion by steady pressure. A load which produces no visible effect when first applied will after a time be found to have caused a very decided and often a very extensive alteration of the form of the mass. This is also a now well-known property of some kinds of brass and of many other metals belonging to what Professor Thurston has called the tin class, to distinguish them from the metals of the iron and steel class, which do not exhibit this treacherous behavior. This difference is of some importance, not only as indicating the best method of working them, but also as showing that the first of these two classes is a safer class to deal with where the metal is to be used in the carrying of heavy and unintermitted stress than is the second class.

Another important distinction between these two classes is, as indicated by the results of investigations made by Professor Thurston, that the "iron class," which includes all the irons and all of the steels, offers more resistance as the rupturing action is slower, while the "tin class," which includes nearly all the other metals and very nearly all of the alloys that he had ever tested, yields the more readily the more slowly the distortion goes on. The second class is thus subject to that singular kind of change of form under heavy, continuous stress which is illustrated in the movement of all viscous solids—ice, for example, as seen in its flow in the glacier. This, it seems probable, may often occur under pressures far within those which are required to cause change of form in the testing-machine in the ordinary methods of test. Iron has been found by Vicat, and later by Professor Thurston, to exhibit something such a phenomenon, but only when the pressures are considerably above one half those usually found for the moduli of rupture, and this action is only seen in serious degree when the iron has been annealed and thus softened. Common merchant iron does not show any tendency to such slow and imperceptible yielding under moderate loads.

The bearing of these facts upon the value of the drop-press as a means of working iron and other metals into shape is obvious. Change of form can only begin when the elastic limit of the material is passed, and flow can only progress steadily and uninterruptedly when the pressure applied is in excess of the maximum resistance of the metal to shearing. The soft metals which belong to the "tin class" are best attacked by processes which cause a comparatively slow motion of their particles in changing form; iron and steel, on the contrary, being less resistant at high than at low velocities of flow, are best worked by methods which produce rapid distortion. Professor Kick, of Prague, has shown very plainly that this difference in the amount of work demanded by the soft metals under the two kinds of treatment may amount to a very important quantity. He finds that the distortion of bodies by the action of the hydraulic press and by the action of a hammer dealing a succession of blows to produce the same change of form consume power in the ratio, in some cases, of one to ten. It is thus evident that the hammer or the drop is to be used for those special cases in which the pressures desired can not be reached by ordinary methods, and that it is best adapted to the working of iron and steel. The hydraulic press and automatic machinery are to be preferred where they can be conveniently and cheaply used. For much of the work that is now done in our smaller kinds of manufacturing, the drop has been shown by experience to be the only machine which will give the required enormous pressures and do the work rapidly and cheaply.

The maximum area of surface exposed to pressure which will be allowable for any given amount of compression can be determined approximately by dividing the total mean pressure due to the action of the drop with the given fall, and the proposed compression by the maximum resistance of the material. The maximum area which will permit any action upon the surface is to be ascertained by dividing the same maximum pressure due the fall of the drop by the elastic limit of the metal in compression. The total work done in any permanent change of shape is proportional to the volume affected and to the maximum resistance of the material to such deformation.

What figures shall be adopted for the resistance to be calculated upon in the production of flow in metals subjected to the action of the drop-press is a question which can not be as yet answered definitely. It would seem probable that the effect of the blow may be, in the case of cold metal somewhat similar to that of cold-rolling, and this being the case, the initial resistance to flow must be taken as at least 70,000 pounds per square inch (4921 kg. per sq. cm.) and the resilience during flow at as high as 70,000 inch-pounds per cubic inch (4921 kg. m. per cubic centimeter) for good common wrought-iron. It may be safe to take the figure for hot iron, as usually worked, at less than one half this amount; for copper, in the absence of exact data, it would be well to take the work of deformation to be two thirds that of iron for pieces of small section, and expect a great increase of resistance with either metal when the surface acted upon by the drop becomes large in proportion to its thickness. Probably no very reliable figures can yet be given. Whatever the resistance may be, the drop will be very certain to overcome it, and the variation in its amount will simply determine how many blows must be struck to obtain a given amount of change of form.

Mr. Towne and Mr. Morgan, of Alliance, spoke at length on the subject of the paper, the former dwelling on the difference in different work of using a small weight and a high drop, and using a heavy weight and a low drop. The latter emphasized the same point, and called particular attention also to the necessity of guiding light hammers more carefully. Much of the loss of efficiency is chargeable to the lightness of the anvil. In this country, the general practice is not to go much beyond a ratio of one to ten of hammer to anvil weight. Krupp, in his work, increases this as high as twenty to one.

The last paper read was on

SHOP ALGEBRA,

by Oberlin Smith. It elicited no discussion.

After a number of announcements by the secretary, a debate was begun on an amendment to the rules; but in view of the late hour and the importance of the subject, it was decided to postpone the matter to the Friday night session.

The tellers then announced the following as the list of officers elected:

President.—John E. Sweet, Syracuse, N. Y.

Vice-Presidents.—A. B. Couch, Philadelphia; W. R. Eckart, San Francisco; J. V. Merrick, Philadelphia.

Managers.—W. F. Durfee, Bridgeport, Conn.; Oberlin Smith, Bridgeton, N. J.; C. C. Worthington, New York.

Treasurer.—C. W. Copeland, New York.

After the election of a number of members, Mr. J. C. Hoadley was called upon to read his paper on

A TILTING WATER-METER FOR PURPOSES OF EXPERIMENT.

Having had to make, in the course of the year, a great number of experiments in pumping water filtered through sand under various prearranged conditions, in quantities ranging from little more than one gallon in an hour to eight or ten gallons in a minute, he soon found that all commercial water-meters were wholly unsuitable for his purposes. There was required an instrument which would measure and record with all possible accuracy, and without liability to important error, the quantity of water flowing in a continuous, but pulsating and sometimes variable, stream, in accurately ascertained intervals of time. As constructed and used, the instrument is very simple and inexpensive.

Two V-shaped cups, each embracing an angle of 60 degrees, are joined together by a common side, which is, in fact, a mere partition between them, so that the two cups together embrace an angle of 120 degrees. This double cup is supported in a case upon pivots directly under the partition, turning in hollow, adjustable screws in nuts attached to the case, one on each side. When one of the outside plates of the double-V cup is in a horizontal position, supported in that position by two cork stops on which it rests, the partition between the two V-cups makes an angle of 30 degrees with the vertical, and the outside plate of the upright cup makes an angle also of 30 degrees with the vertical, but at a little greater distance horizontally from a vertical plane passing through the axis of the pivots, on account of the curve by which the outside plate is joined to the partition and to the outside plate of the prostrate cup at its lower end. But for this greater horizontal width on the outer side, there would be no tendency to tip—the upright cup would simply fill up and overflow, and there would be an end. But as the water rises in the upright cup, the prism of water outside of a plane passing through the axis of the pivots and making an angle of 30 degrees with the vertical acquires constantly increasing preponderance over the equipoise of the wedge-shaped body of water bounded by planes, each making an angle of 30 degrees with the vertical, and intersecting in the axis of the pivots. When this preponderance becomes sufficient to overcome the mechanical advantage of the prostrate cup itself over the upright cup—an advantage due to its greater leverage with equal weight—the cup will tilt, the water in the upright cup, nearly filling it, will be poured out into the case to run away through its spout, and the now empty cup, lying prone on its cork stops, will become the prostrate cup, with the greater leverage—its center of gravity being at the greater horizontal distance from the axis of the pivot. The other cup, now upright, will be filled in its turn and repeat the tilting process, and so on alternately as long as the stream flows into the cups.

The tip is very sudden, and is made with considerable force. A light spring of sheet-brass, attached to the case in the middle of its length by a piece of wood which insulates it, is connected by a binding-post with one pole of a battery, and the case itself is in like manner connected with the other pole. A bit of sheet-brass soldered to the outside of the tilting double cup, directly opposite the partition and above the case, forming a sort of cam, comes into contact with the spring in passing. This completes the circuit interrupted by the block of wood which supports the spring, and records each tip by a dot or short dash. The cam does not

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come into contact with the spring until the tilting cup has acquired considerable momentum, so that the tilting is not sensibly retarded.

Mr. Hoadley had two of these meters, substantially alike, and adjusted them by flowing water through them into a tub placed on scales, counting the tips, and taking the weight and temperature of the water. He then placed one of the meters directly over the other, supported upon the tub by a suitable frame, and flowed a stream through both, the electric register recording the tips, and the scales accounting for the quantity of water. The first tip of the upper meter did not fill the lower meter to the tipping point by about one sixteenth of an inch, a little water adhering to the cup and case of the first meter; but the second tip of the first was instantly followed by the first tip of the second, and so on until the tub was filled. A repetition of this experiment gave substantially the same result—61 tips in 202¼ pounds = 3·33 pounds per tip, and at 80 degrees Fahr., 0·4 gallon per tip—231 cubic inches per gallon.

The electric register also recorded upon the same half-inch strip of paper the beats of a seconds pendulum, and, when two pumps were used, the strokes of the pumps and the tips of each meter. It was also easy to note the tips by the ear while watching the second-hand of a horse-timer, by which means the interval of time between tips could easily be observed to quarters of a second. This is not an instrument of precision. It is, perhaps, a little more accurate than a gallon measure at all practicable speeds; at slow speeds, probably decidedly more accurate, and, with proper care, no considerable error is likely to occur. When operated very rapidly, the swaying of the surface tends to accelerate or retard in a small degree the tipping of a cup nearly full, but there is no tendency to accumulation in such errors, which therefore may be presumed to balance each other, at least in some degree. The sloping covers at the ends of the case were an afterthought to prevent spattering, and were kept a sufficient distance apart to admit of taking out and replacing the tilting double cups. The curved wings under these sloping cups were a second afterthought for the same purpose, and, as it stands, the case arrests all water—there is no spattering. Of course, a suitable funnel is generally desirable to collect the water from a pump and to convey it into the cup in a stream as steady as possible, and vertically over the axis of the pivots. It is also necessary that the meter should be level, both when adjusted and when in use.

This instrument substantially weighs the water of a flowing stream, and may possibly prove useful, if strongly and delicately made, nicely adjusted, and suitably proportioned to the quantity to be recorded, for keeping the record of water used during tests of steam-engines and boilers.

The paper was discussed at some length, and in a somewhat rambling way, by Messrs. Grimshaw, Odell, E. D. Leavitt, Jr., Wolff, Emery, and others.

Prof. T. Egleston, of the School of Mines, Columbia College, New York, read a paper entitled

A MACHINE FOR OBSERVING THE PHYSICAL CHANGES OF METALS,

which was designed primarily to investigate those peculiar phases of changes in the physical properties of metals and alloys, which Professor Egleston has called the "fatigue" of metals. The machine was designed after indications of Professor Egleston, by Mr. Smith, of Messrs. Browne & Sharpe. It is like a planer, with a bed and uprights. On the bed, there is a movable carriage, which has a chuck with rotary motion, and two slide-rests to carry points. It has also a drilling-machine, to determine what Professor Langley calls the abrasive resistance, or what is too frequently called by that loose term, "hardness."

The discussion quickly drifted away from the subject of the paper, and Messrs. Hobbs, Durfee, Egleston, Leavitt, Towne, Grimshaw, and others talked about the very striking inequalities noticed in the resistance and quality of brass in a manufactured state and in the process of manufacture. The blame was partly attributed to carelessness in refining the copper, to crude methods of making the alloy, to ignorance in the design of annealing furnaces. Some very exaggerated statements, in our opinion, were made concerning differences in the quality of copper. We feel convinced that, in spite of what is said about the refining in ordinary reverberatories, and the advantage of Siemens regenerative furnaces, the raw material is not the main or even leading cause of the troubles of which brass manufacturers complain. Mr. Towne made some interesting observations as to the efforts made to secure uniformity of color of copper, zinc, and tin alloys. They picked their metal, melted the portions most closely approaching in color, went through the same operation again, and a third time, and then only they got a material fairly uniform in color.

An invitation was received from Mr. G. W. Maynard, of the Bower-Barff Process Company, to visit the Hecla Iron-Works at Brooklyn, and witness the work of coating iron with a protecting oxide.

PHOSPHORUS-MANGANESE-TIN-COPPER ALLOY.—Messrs. Cockshott & Jowett, of Thornton-road, Bradford, England, have, after a long series of experiments, succeeded in alloying manganese with phosphorus and tin and copper, producing a metal which, for tensile strength and durability, they think will be found superior to any alloy in the market. This phosphor-manganese tin may be used exactly in the same manner, and in similar proportions, as phosphor-tin—though it is better to cast at a little higher temperature—but the result will be found much superior both as regards hardness and tensile strength. Phosphor-manganese tin will be found a very convenient form in which to have the combination of manganese and phosphorus, as it will enable the brass-founder to produce the bronze of a quality exactly suitable to the purpose for which it is required by adding a greater or less proportion of copper, etc., accordingly as the bronze is required to be tougher or harder. This phosphor-manganese bronze is made in two qualities, No. 1 and No. 2, both the same price. The former is very tough and suitable for purposes where the castings are required to withstand a great strain. Mr. Kirkaldy, of London, has found this alloy to withstand the enormous strain of 34,754 pounds per square inch. The latter is for bearings and wearing parts of machinery, and is exceedingly hard, but at the same time very tough, the tensile strength being, according to Mr. Kirkaldy, 29,979 pounds per square inch.

MINING AT THE BOSTON EXHIBITION.

Special Correspondence of the Engineering and Mining Journal.

THE TENNESSEE EXHIBIT.

The extensive coal-fields of Tennessee are represented by handsome cannel coal; by some immense lumps of bituminous coal, from the Etna mines of Marion County, and the Roane Iron Company, of Rodswood, Roane County; and by some very superior coke. The coke is hard, compact, brilliant, and quite resonant, looking not unlike Connellsville coke. It is in large pieces, one lump being over three feet long. Unfortunately, no analyses of it are given.

These important coal-fields run entirely across the State in a direction about northeast by north, in a band from some twenty-five to forty-five miles wide, with a total area of 5100 square miles, containing from one to seven workable seams. The eastern edge of this field is from fifty to sixty-five miles from the North Carolina frontier. The main seam, the one which yields at present the greatest amount of coal, is called the Sewanee, and has an average thickness of 4 feet 6 inches, its greatest thickness being reported at 10 feet 4 inches, and its smallest at two feet.

The largest coal mining operations are carried on by the Tennessee Coal, Iron, and Railroad Company, which does extensive work at Tracy City, where it has 600 ovens, besides having coal mines and coke-ovens at Victoria. The output of coal for the State is stated to have been 600,000 gross tons in 1880, 750,000 in 1881, and 850,000 in 1882. In J. D. Weeks's census report, it is stated that coke was made in four establishments in 1880, with a capital of $200,021, employing 144 hands, to whom were paid $38,820 in wages, consuming 179,311 net tons of coal, worth $124,137 and $8092 worth of other materials, producing 91,675 net tons of coke, worth $212,493. This represents a yield of 50·9 per cent of coke from 100 of coal, and a profit of $41,444, or upward of 20 per cent on the capital represented, or about 45 cents per ton of coke.

From these figures, we may deduce the cost of making a ton of coke as follows:

COST OF PRODUCING ONE TON OF COKE IN TENNESSEE.

Material.	Quantity.	Rate.	Amount.
Coal	1·89 tons.	$0.69 per ton.	$1.37
Miscellaneous	...	...	0.09
Days' labor	0·5	$0.82 per ton.	0.42
Total cost			$1.88
Profit per ton			0.45
Value of one ton of coke			$2.33

Making a similar calculation on Mr. Weeks's figures for the Pennsylvania coke production for the year ended May 31st, 1880, we arrive at the following:

COST OF PRODUCING ONE TON OF COKE IN PENNSYLVANIA.

Material.	Quantity.	Rate.	Amount.
Coal	1·56 tons.	$0.56 per ton.	$0.87
Miscellaneous	....	.....	0.09
Days' labor	0·38	$1.11 per ton.	0.42
Total cost of one ton of coke			$1.38
Profit per ton			0.43
Value of one ton			$1.81

The figures here given for the rate of wages and the number of days' work per ton of coke are inaccurate, being based on the assumption that each hand worked 365 days. They give, however, a rough idea of the state of things.

The following analyses, taken from Macfarlane's *Coal-Fields*, give a rough idea of the character of the greater part of the Tennessee coal:

County.	Place.	Analyst.	Fixed carbon.	Volatile.	Ash.
Grundy	Sewanee mine.	Stewart.	63·50	29·9	6·6
Hamilton	Chattanooga.	T. S. Hunt.	63·90	26·8	9·3
"	Salt Creek.	Stewart.	56·75	40·7	2·5

Iron Ores.—The iron deposits of the State may be conveniently grouped into three geographical districts: The East Tennessee, comprising a narrow strip adjoining the eastern boundary, in the northeastern part of which a considerable quantity of charcoal pig-iron and of blooms have been made; the Cumberland Mountain region, extending from near Chattanooga (near the southern border and considerably to the east of its center) to Hancock and Claiborne counties on the northern border, immediately adjoining the eastern side of the coal-field, and running parallel with it; and the Western Tennessee region, forty miles wide, running north and south, in which considerable charcoal pig-iron is made in four counties, from three hot-blast and three cold-blast furnaces.

The Cumberland Mountain region includes Chattanooga and South Pittsburg, the rolling-mills and the seven coke-furnaces of the State.

The ores now mined are the fossil red hematite, locally called dyestone in the Eastern and Cumberland regions, and limonites in the West Tennessee region. The Eastern region also contains beds of dense, hard hematites and of beautiful compact crystalline magnetites like those of Lake Champlain and of the Cranberry ore-bed in North Carolina, which closely adjoins them. These ores are all exhibited; but it is stated that the magnetites and compact hematites have not yet been mined to any considerable extent. They occur in the extreme northeastern part of the State.

Several very extensive and workable beds of siderite (spathic iron ore) are said to accompany the coal-beds, which have not yet been worked.

The following statistics of the pig-iron manufacture are on the authority of Mr. J. M. Swank:

Year.	1872.	1876.	1881.	1882.
Charcoal pig, tons	43,094	10,068	19,046	37,611
Coke pig, tons	3,360	14,517	68,360	99,991
Total	47,454	24,585	87,406	137,602

The increase in the output of coke iron was to be expected, but the rapid decrease of the charcoal pig make from 1871 to 1876 seemed to

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threaten its extinction; yet it has rallied, and in 1882 actually stood higher than in 1872. The following figures are from the same author:

IRON AND STEEL PRODUCED IN TENNESSEE IN 1882.

	Net tons.
Pig-iron	137,602
Rolled iron, including iron rails and rail plates	38,770
Iron rails	19,610
Steel rails	5,780
Steel ingots and other crude steel	4,000
Blooms from pig and scrap-iron and iron ore	700
Bar, rod, hoop, skelp, and shaped iron and iron axles	10,589
Cut nails, 171,413 kegs	8,571

Zinc Ores and Spelter.—Messrs. Edes, Mixter & Heald here exhibit their zinc ores and metallic zinc in slabs, and rolled down and sheared across the grain, to show its strength. No figures of the zinc industry are given, but we learn from the Compendium of the Census of 1880 that, in that year, 3699 tons of zinc ore were mined in Tennessee.

Marbles and Building-Stones.—Those who were at the Centennial Exhibition will not be surprised to learn that Tennessee makes a very telling display of most beautiful polished marbles. They are mostly of the familiar red and white mottled kind, reminding one somewhat of Castile soap, as a fair sister may remind you of an ugly one. There are also many beautiful drab and dove-colored marbles. Among the localities represented by particularly beautiful marbles may be mentioned Indian Camp Spring, in Maury County, which has several different kinds; Charleston, which has a very striking "green peanut" marble, so-called; and Chattanooga and Knoxville. They are all surpassed by a most brilliantly mirror-like slab from Red Triangle (at least it is called "Red Triangle marble"). The Tennessee marbles are extensively sent to New York and even to Boston. Those who have visited the new capitol at Albany must have been charmed with the beautiful marbles from this State, of which the governor's room is built.

The principal seat of the marble industry is in Hawkins and Knox counties, in the Eastern and Northeastern parts of the State. For the year ended June 30th, 1881, there were shipped over the East Tennessee, Virginia & Georgia Railroad about 3,651,000 pounds of marble from Hawkins County, and above 10,000,000 pounds from Knox County, and it is estimated that some 80,000 cubic feet of this stone are annually sent out of the State. In the census year, thirteen quarries of marble and other stones were worked with a capital of $131,700, producing 792,621 cubic feet of stone worth $192,695. From the Crescent marble of Knoxville, comes a very beautiful white marble shaft, thirteen feet high, and apparently entirely free from flaws. Each of the four sides is finished in a different way, to illustrate the different effects which can be readily produced. It is stated that this company can furnish shafts one hundred and fifty feet long without a flaw.

The Missouri Pacific Railroad sends a great number of galena and other ores from Arkansas; but, as is too generally the case with displays of ores, no ready way is offered of acquiring valuable and trustworthy information about them. A very beautiful and close-grained novaculite, deliciously white, tells its own story as regards its quality; but its quantity and the manner of its occurrence are left to the imagination of the beholder.

Here I may remark that it seems strange that mine-owners and managers, railroad and land companies, and others who take great pains and spend considerable money in sending ores to public exhibitions, should not go to the slight additional trouble of adding to their displays the few statements which are needed to enable them to convey any important information to the visitor. It does one little good to know that Arkansas has galena, that Arizona has malachite, that Greenland has cryolite: what the visitor wants to know is, in general, the commercial importance of the deposits, and this could be clearly conveyed to his mind by a few simple statements. He wants to know how much galena the State, the region, or the particular mine in question has; how rich it is in silver; how deep the mines have gone so far; how near they are to transportation; what is the nature and size of the deposits; are they pockets, gash-veins, fissure-veins, stockwerk? what is the composition? if a smelting ore, what fuel is available, and at what price? etc. Even if all this information can not in every case be given, in most cases some information can be; and going to the trouble of displaying minerals without taking the little additional pains needed to make that display effective, seems to me like erecting a town-clock, but omitting the hands.

Pyrolusite from Polk County, Arkansas, is exhibited, stated to be from the largest deposit of this mineral in the world. The evidence on this point is hardly overwhelming, and it should be received with a pinch of the beautiful salt which is (perhaps for this purpose) conveniently exhibited near by.

About the beautiful woods here exhibited from Arkansas there need, however, be no difference of opinion. Both in their variety and in their beauty, they are indeed bewildering. Many of them take a very high polish, and not a few are of very great value from their intrinsic merits apart from their beauty. Among those which particularly charm the eye may be mentioned the black cherry, the live-oak, the ailantus, the iron-wood, and the mesquite. The latter two are of especial interest to those of us who have vainly endeavored to shield ourselves from the shriveling sun of Arizona and New Mexico, in what would be their shadow, if they had any, and have cursed their nakedness.

Texas Products.—The same railroad, the Missouri Pacific, also exhibits some very handsome woods from Texas, which vie with those from Arkansas and North Carolina in beauty. The pecan and live-oak struck me as especially attractive, as is also the finely-polished, deep-hued red cedar, as beautiful as mahogany, and not unlike it. From the same State, are also displayed a number of valuable and finely-polished building-stones, granites, both red and gray, with a fine sheen, and many others. A very handsome dove-colored marble, with an exceedingly fine grain and an excellent polish, deserves great admiration.

We are informed of the existence of the refractory material industry in this distant State by some fire-bricks made by the Fire-Brick and Tile Company, of Kosse. Their appearance is creditable, but no analyses or other data are furnished to enable one to judge of their merits.

The Union Pacific Railroad has an extensive display of minerals, but, as in the case of the Missouri Pacific, there is no cooling draught of statistics to slake the visitor's parching thirst for accurate information. Many and beautiful agates there are, and what are attractively labeled "crystallized trees." With dendritic crystallizations of another kind we are already familiar. There is also quite a display of cabinet minerals and of fossil fishes, said to come from the Yellowstone Park.

Of the Northern Pacific Railroad display, much the same must be said. There are many and various ores of copper, gold, silver, and lead; but whether epresenting minute or gigantic deposits we are not told. From the Bismarck Artificial Stone Company, of Bismarck, Dakota, come several fine-looking tiles, blocks of artificial stone, fire-bricks, etc. The tiles are in excellent taste, well executed, and altogether most commendable, and they indicate a state of progress in this industry which is highly creditable to this distant city.

The Canadian Pacific Railroad exhibits some handsome, lustrous, pure-looking bituminous coal from the coal-fields west of Manitoba; they are just across the Canadian line from Montana, and immediately east of the main chain of the Rocky Mountains. Four mines are now worked in this Canadian coal-field, supplying the railroad and local consumption. Considering how lately the road has reached their neighborhood, and that the first of these mines was opened this summer, this speaks well for the future of coal mining here. Gold quartz is also exhibited from a number of gold mines which are said to be actively worked in the Lake of the Woods District, among them those of the Argyle Gold Mining Company, the Winnipeg Consolidated Gold Mining Company, and several others.

Rhode Island Granite.—From the Smith Granite Company, come some beautiful pieces of very fine granite work, made from the famous granite of Westerley, Rhode Island. Many of the designs are very beautiful, and the highest praise is deserved both for their workmanship and for the material itself, some of which is worked into shapes none too easy to attain even with the finest statuary marble. In a handsome life-size statue made from this granite, even the nails are beautifully, delicately, and truthfully cut, showing a fineness of grain, uniformity, and trustworthiness not often seen in a material so coarse and so treacherously flaky and cleavable as granite.

Connellsville Coke.—It may seem like carrying coals (or cokes) to Newcastle to tell your readers much about this famous product; but I fancy that comparatively few of them know to what an extent it is already replacing anthracite even in the New England foundries, which are so very much nearer to the anthracite than to the coke region. But here we have the Frick coke from Connellsville, in our Exhibition, triumphantly telling us that a very considerable proportion of our most intelligent foundrymen already pay allegiance to it, and that with the others it is simply a question of a little time. No less than eight important foundries in Boston and its suburbs now use it, and such important and ably-managed concerns as the Bridgeport Malleable Iron Company, Tuttle & Whittemore, of Naugatuck, the Pratt & Whitney Company, J. B. & J. M. Cornell, and the Barnum-Richardson Company, of Lime Rock, are large consumers of it. Most of these concerns consider that some thirty per cent more iron can be melted with a pound of coke than with one of anthracite, the best regular practice being from 6 to 6·5 pounds of iron per pound of anthracite, and from 8 to 9 pounds per pound of coke. The low melting duty in foundries, compared with that of the Bessemer works, is due mainly to the large proportion which the bed in foundry work bears to the total charge of coke. It is also generally admitted that a much lighter blast is required, in itself no small advantage, and that coke melts much more rapidly than anthracite, as is also the case in iron blast-furnaces and in lead and copper smelting cupolas. Some intelligent founders consider that it does not take more than two thirds as long to melt with coke as with anthracite. Finally, some concerns which are so situated that coke costs as much as anthracite per unit of melting capacity, prefer it on the ground that it makes much softer castings. This point is not so well established as the others, and probably only certain grades of iron or certain classes of castings are softer when made with coke than when anthracite is employed. In some foundries, anthracite is used for the bed and coke for the rest of the heat. To sum up, the advantages claimed for coke over anthracite for foundry purposes are: 1. A duty 30 per cent higher than anthracite. 2. A rate of smelting from 30 to 50 per cent higher than that of anthracite. 3. A less powerful blast is needed. 4. The castings are softer. This is not clearly established.

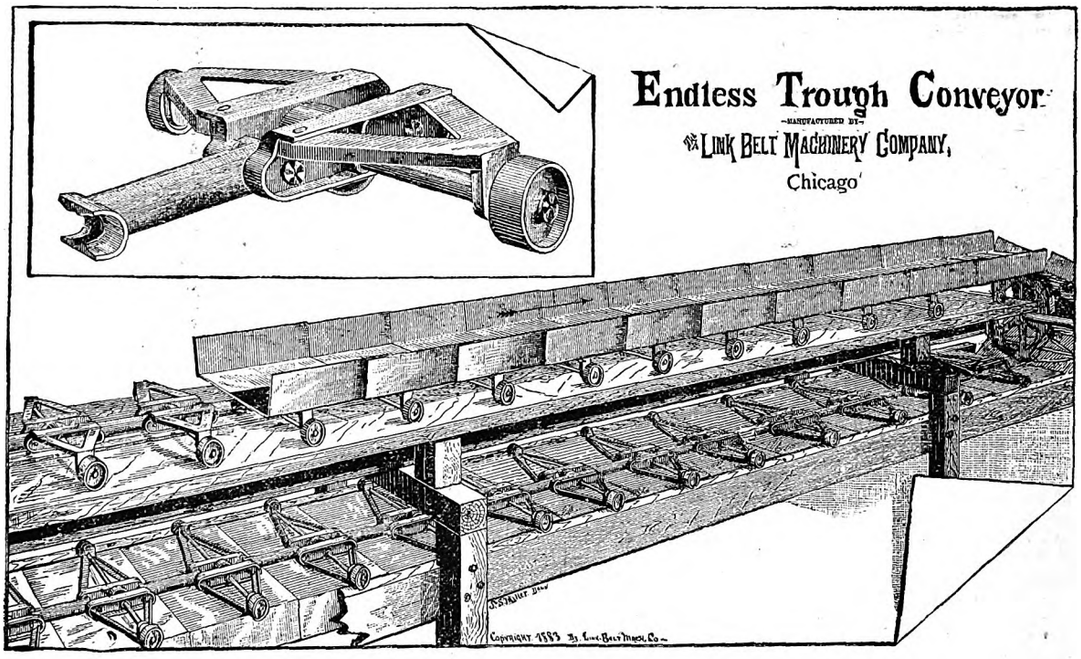
Asbestos.—Of the many interesting applications of asbestos exhibited by the H. W. Johns Manufacturing Company, I should have considerable to say had you not already lately discoursed at length on its uses on page 228 of the present volume. Still a few words must be said: First, we have many different and agreeable colors of wholly fire-proof paint, made without oil, and said to contain only completely oxidized and hence absolutely incombustible substances. Certain it is that it is incombustible in the ordinary sense of the word. Next, we have several sizes and kinds of packing, some large, some small. The fine twine packing for small valves is especially attractive and soft, and appears wholly free from grit, as its reputation leads us to believe that it is. Next, we have the unwrought asbestos fiber, which looks as soft and fleecy as eider-down; nor is one disappointed in its softness on submitting it to the ordeal by touch. Then there is the mill-board, as it is called, which is like pasteboard in appearance and feeling, except that it is tougher and does not peel into layers. This is shown of many thicknesses, the thinnest being hardly thicker than ordinary Irish linen or other heavy linen writing-paper. This is extensively used for making joints, being unaffected by heat, moisture, and by scarcely any chemicals. The asbestos employed comes almost wholly from Canada, where it occurs abundantly, frequently associated with serpentine. It is of comparatively short fiber, say from three to four inches long, compact, and of a dark green, and is very unlike the beautiful white, long-fibered mineral from Italy, there so common that Dolomieu packed his minerals with it. One would think that the compulsory use of asbestos paint, or some other form of really fire-proof paint, in such wooden cities as San Francisco and Leadville, would considerably diminish the now very serious danger of an uncontrollable and exterminating fire, such as swept wooden Chicago. H.

SALE OF NORTH CAROLINA LAND.—The State sold on October 31st 30,000 acres of land known as the Big Swamp, situated in Robeson County, on the Carolina Central Railroad, to O. H. Blocker, of North Carolina, and George S. White and W. N. Jennings, of Pennsylvania, for 27½ cents an acre.

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AN ENDLESS TROUGH CONVEYER.

The endless trough conveyer is one of the latest applications of link-belting, consisting primarily of a heavy chain belt carried over a pair of wheels, and in the intermediate space a track on which the chain runs. This chain or belt is provided with pans, which, as they overlap, form an endless trough. Power being applied to revolve one of the wheels, the whole belt is thereby set in motion and at once becomes an endless trough conveyer. The accompanying engraving illustrates a section of this conveyer. A few of the pans are removed, to show the construction of the links; and above this, a link and coupler are shown on a larger scale. As will be seen, this link is provided with wings, to form a rigid support for the pan to be riveted to it. To reduce friction, each link is provided with three rollers, as will be seen in the engraving. This outfit makes a fire-proof conveyer which will handle hot ore from roasting-kilns to crusher, and convey coal, broken stone, or other gritty and coarse material. The Link-Belt Machinery Company, of Chicago, is now erecting for Mr. Charles E. Coffin, of Muirkirk, Md., about 450 feet of this conveyer, which is to carry the hot roasted iron ore from the kilns on an incline of about one foot in twelve up to the crusher. This dispenses with the barrow-men, and at an expenditure of a few more horse-power becomes a faithful servant, ready for work in all weather and at all times of day or night. This company also manufactures ore elevators of any capacity, which, used in connection with this apparatus, will handle perfectly any thing in the shape of coarse, gritty material. It might be added that the endless trough conveyer is no experiment. Although comparatively new in this country, it has been in successful operation for some time in England, the English manufacturers of link-belting having had great success with it.



AMONG THE IRON WORKERS.—STEELTON.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: A few miles from Harrisburg is an establishment of some note in industrial matters. It is the works of the Pennsylvania Steel Company. The locality was formerly known as Baldwin's station, but has recently been changed to the highly appropriate name of Steelton. Here it is that many of the thousands of steel rails that are annually produced first take their shape. The Doctor and I had seen the sights of Lebanon pretty thoroughly, and decided to start for Harrisburg in the early train that leaves at six o'clock; but in this we were disappointed; for as the awakening knock came only eight minutes before train time, we could scarcely hope, in spite of our recognized activity, to dress, pack up, and breakfast, while the clock ticked out its four hundred and eighty seconds. Being somewhat philosophic, we spared ourselves any vain regrets about the matter, and coolly prepared for the next train, leaving about half-past eight. Though the distance down to Steelton is so short, yet it was not till nearly twelve that we reached the place, and introduced ourselves to one of the blast-furnace draftsmen. It is a very pleasant feature to record of these various establishments that the inquiring stranger is treated most cordially, and the employés put themselves to almost any trouble that their visitors may see and hear to their full content. We found our guides very attentive and intelligent gentlemen. The works, even if one visits them unattended, are absorbingly interesting; but the pleasure of our examination was chiefly due to the kindness and intelligence with which all the various processes were pointed out and described. Though by this time we had seen much of blast-furnaces in other parts of the State, yet we found a great deal to interest us in the drafting-room at Steelton. Two large furnaces were in course of erection at the time of our visit, and the designs were of the latest pattern. But the parts which most claimed our attention were in connection with the steel production. Neither of us had ever seen the operation, and it was with mingled admiration and wonder that we gazed upon the huge Bessemer converters, and watched the apparently easy transformation of the pig-iron into the more useful steel. It takes a stranger some little time to accustom himself to the noise and glare of the Bessemer apparatus, and to really examine the process thoroughly. The attendant appearances and phenomena are so striking in their character that they divert the attention from the truly essential points in the process. In company with the manager, we picked our way over the heaps of old iron and *débris* that invariably accompany an iron establishment, and having gained our destination, a large gloomy-looking building, we entered, and applied ourselves to learn the secrets of the Bessemer invention. It was a strange sight that met our eyes: showers of sparks, great volumes of flame, and clouds of steam combined to rival the most brilliant pyrotechnic display, while the large and still red-hot ingots of steel, the diminutive locomotives, the numbers of attendant men and boys seemed mixed together in utter confusion. But the disorder is only apparent; for under all there run the most perfect order and discipline. And, indeed, it is most essential that it should be so; for any confusion and failure in one of the numerous details of the process would bring delay and disaster upon the whole. The huge Bessemer converter, made of iron, and lined with fire-clay, is, at Steelton, capable of treating ten tons at a time. It is mounted on massive iron trunnions, so that it may be turned on its side at pleasure when filling with the liquid pig-iron, or when, at the end of the process, the resulting steel is run out into the large iron molds waiting to receive it. The whole process is intensely interesting, and it is one that has succeeded only after many struggles with practical difficulties. All honor to Bessemer, Kelly, Holley, and the other brave spirits who, in the face of so many obstacles, have achieved such grand results! We will follow the metal in its course from the state of pig-iron to that of steel. In the upper portion of the building, and at a level above the converters, there is a series of small blast-furnaces arranged in convenient position. These "cupolas" serve to melt the pig-iron and spiegel, and thus prepare it for its introduction into the converters. These, red-hot and glowing, are turned on their side and are ready for the charge of metal. The clay-lined channel that leads into these capacious mouths brings down the molten iron from the cupolas above. The bottom of the converter is slightly contracted, so that the bulge of the vessel when turned on its side is sufficient to contain the molten pig-iron and keep it below the level of the perforations in the bottom. These tuyeres admit the air-blast that is to burn out the silicon and carbon, and thus convert the iron into steel. The blast having been turned on, the recumbent vessel, with its molten contents, is raised to a vertical position, and the transformation begins. As the converter slowly swings to its upright place, the air-blast carries minute particles of iron out into the air, and these oxidizing, produce showers of innumerable sparks. It is an exhibition of great beauty, and in an age more superstitious than our own would not inappropriately be considered as the breath of the iron genii. The vessel having been righted, the twelve-minute "blow" begins. The flame that first issues from the mouth of the converter and rushes noiselessly up the chimneys is small and compact, though intensely hot: it is the burning silicon. But gradually the flame increases in volume and brilliancy; it lightens up the entire building in spite of the rivalry of the sunlight: the carbon is now consuming. Formerly, the various stages of the Bessemer flame were watched and studied by means of the spectroscope, an instrument which analyzed the flame, and revealed the spectrum of the burning elements. Practice, however, has now made the workmen so proficient in determining the end of the process that the spectroscope is but seldom employed. The carbon flame gradually increases in intensity, reaches its hight, and gradually diminishes. When the volume becomes quite small, thus indicating that the greater part of the carbon has been consumed, the flame shows the brownish appearance of burning iron. The process is now ended, and the converter is again turned on its side. As the blast must not be removed until the metal is below the level of the tuyeres, the blow ends with a second grand shower of sparks, and the breath of the genii vanishes. As the blast of air has removed the greater part of the carbon, the metal remaining in the con-

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verter must be partially recarburized. This is accomplished by adding a certain percentage of spiegeleisen. The resulting steel is then poured out into a large ladle, and from this is distributed into the ingot molds. As soon as the metal becomes at all chilled, a stream of cold water is poured into the top of the mold, and the ingots cooled off as rapidly as possible. The water, coming in contact with the red-hot metal, is at once converted into steam. As the large clouds rise from the casting-pit, obscuring the workmen and all the apparatus, they form an effective pedestal to the vast volume of flame that is belching forth from the mouth of the again active converter. It is a very impressive sight, and, once seen, can scarcely be forgotten. There was much to interest us at the immense works; but we had arranged to go to Altoona in the evening, so after a hasty glimpse at the bloomaries and machine-shops, we bade our kind guides farewell, and boarded the western-bound train. Mrs. Stowe begins *Old-Town Folks* with the apology that even the most commonplace life, if faithfully recorded, affords ample material for an elaborate romance, and in like manner, the modern traveler might find his excuse for long letters in the fact that the most ordinary journey is crowded with many incidents, amusing or pathetic as the case may be. It is our misfortune, when traveling on the Pennsylvania Railroad, almost invariably to be detained from some cause or other; and on the few hours' ride that separates Harrisburg from Altoona. we lost about two hours from a freight smash-up which had occurred so recently that the wreck still encumbered the roadway. We were obliged, in consequence, to run on the left-hand or eastern-bound track, and the necessity caused a very sad accident. One of the company's trackmen, as he trudged over his dreary round, was struck by the locomotive and thrown aside. When the train backed to the spot, we found that death had been more rapid than we, and we could only carry the poor dead body back to its home. The man had probably heard the warning whistle, but being so confident that the train was on the other track, he had entirely disregarded it, and hence the accident. It caused a momentary gloom to settle over the passengers, but what the sensations of the engineer were at the time of the contact we hardly cared to imagine. The delay and the accident together made the travelers inclined to be neighborly. The little drummer in the seat ahead of us was particularly irrepressible. He began with the weather and matters in general, but it was not long before he drifted to the subject evidently the nearest to bis heart—his intended visit to his *fiancée*. He had not seen her for some four or five months, and he was evidently too full of the subject to remain silent, so he favored us with his confidence and even showed us her photograph; but the half twilight that pervaded the car gave us little opportunity to judge of the beauty of one whom "he thought more of than he did of himself"—to chronicle the intensity of his devotion in his own words. CARL.

INVESTMENTS IN MEXICAN MINES.

Special Correspondence of the Engineering and Mining Journal.

The current of speculation has for several years past set violently toward Mexico; but unless the mysterious laws which seem to regulate finance be revised, the tide will ebb as strongly as it has flowed. The result, as it affects mining, will be a suspension of the most legitimate projects, as unreasonable as has been the crazy confidence with which money has been thrust upon the dishonest and ignorant promoters of the most extravagant delusions. It is not to be wondered at that Mexican mining schemes should receive support, appealing so forcibly as they do to the imagination of the purchaser, and affording, as they believe, such unlimited scope for the play of imagination on the part of the seller. Mexico has produced $3,000,000,000 of silver, and still pours forth $30,000,000 annually. The inference that mere common sense might draw from the first figures would be that, in the nature of things, there must be little eft in store whence so much has been taken; but the second figures contradict this conclusion. Nevertheless, as preference is given to the one ine of argument or the other, will capital be refused or granted for the more important and costly mining claims.

The enormous output of the past affords undoubtedly, when coupled with the large output of the present, proof positive that the wealth which Mexico inclosed within her mountain ranges is by no means exhausted; but it does not necessarily prove that the old mines whence this wealth was extracted will pay if rehabilitated. Some perhaps will, some certainly will not. The history of the last days of some, if it reached the ears of the investor, would determine him to keep his money in his pocket. The facts ascertainable about the closing scene of others make it justifiable to risk heavily in reopening them; but the same romantic story is told in almost every case of rich ores, which the imperfect Mexican method failed to beneficiate, but from which Yankee machinery will extract their full value; of revolutions which depopulated the region, and therefore closed the mines; of water which flooded them in the face of the puny appliance with which the Mexicans fought it; of rich workings closed because devils haunted them or priests cursed them, and so on and so on.

It is unquestionably true that mining was often checked, and some good mines closed, as one of the baneful results of revolutions; it is equally true that the horse-whim failed to cope with the water; and that in many cases good mines could not find capital to pay for steam-pumps. But it is not true that Mexican metallurgical methods are both costly and defective, and that all old mines were killed by external violence rather than by internal disease.

What is too generally true is, that an unscrupulous man, with ready wit and a glib tongue, goes south to Mexico, either denounces abandoned mines or buys an old languishing one for a trifle, concocts his romantic tale, and sells the history and the mine in the North for as many hundreds as he expended units. What follows is perhaps the necessary corrollary of the first act of folly. As the valuable mine was abandoned because its ores would not yield to Mexican treatment, therefore American treatment must be applied, and a mill built; but as amalgamation failed, in the Mexican *patio* process, therefore leaching must surely be the thing, and accordingly a roasting-furnace and tubs are put up. Skill to conduct the operation is the last thing thought of. Already the cost has far exceeded the estimates, and economy must be practiced, and as usual, economy at this point means cheap management. A director of a Mexican company boasted how admirably they saved the salary of a metallurgist. They had employed a man at a figure high in their estimation. He was taken mortally ill on his way South, and arrived at the mine a doomed man; but during the few remaining days of life, the superintendent tortured him into imparting all he knew, and that so effectually that, when death released his victim, the inquisitor felt himself to be a fully equipped metallurgist and competent to run the leaching-works. How the leaching-works succeeded need not be told. A clever fellow christened Parral the Leadville of Mexico. The misnomer created a smelting plant big enough to reduce in one day all the lead ores Parral could produce in a twelvemonth. But whoever lost the money, the epigram-writer probably did not. A still cleverer man discovered, by *a priori* reasoning, the existence of tin in Durango some centuries after it had been worked. He described a course through Cornwall, Queensland, and Penang, and, projecting it across the American continent, the line struck Oregon. His subsequent application of the experimental method in Oregon showed no tin there. So he revised his chart, and the curve fell on the Conito tin-field of Durango. Perhaps, after all, his first iso-stannic line was the correct one; for had he continued it across the continent, it might have led him to the tin-field of the Black Hills and Alabama. Such charlatanism is not confined to Mexico; yet it seems to be most seductive when practiced on minds already predisposed to believe the marvelous, as most people are when they invest in foreign mines.

The records of the great mines of Mexico are matters of history. The condition of some of those mines below water-level is only matter of tradition. To put into working order such mines as Sombrete and Fresnillo, will admittedly cost hundreds of thousands of dollars. Those who decide to resuscitate these great enterprises do so with full knowledge of the facts and of the risk they run. They know the fate which befell so many similar enterprises in the hands of Englishmen, sometimes through palpable mismanagement, at others through the poverty of the mines; but they count in their favor the accessibility which railroads will give to their property, and the salutary effect of closer supervision on their superintendents, and they depend for dividends on the cheapness with which the railroad enables them to equip their mine and mill with efficient machinery. We admire the courage of these adventurers, and every one interested in mining wishes them the rich reward they deserve. But no sympathy is due to the sufferer who has eagerly swallowed the fly decorated by some promoter with ridiculously gaudy feathers. Correct and honest information is within the reach of every investor, if he is willing to pay for it. He only offers a premium to dishonesty by investing his money without inquiry. Of this he may be pretty sure, that, as the Mexican is a good miner and a good metallurgist, if he abandons a small shallow mine, his doing so affords strong presumptive evidence of its worthlessness. The Mexican does not conduct his underground operations on the same system, and does not break down ore from large veins as cheaply and with as little damage to the mines as we do; but he can trace with unerring instinct the course of the rich ore, and he removes only what it will pay him to treat. There may be some profit in mining and milling his leavings; but the profit will generally be scanty. Another fallacy which enters the stock in trade of a Mexican promoter is, that we can always make profit out of ores which the Mexican, with his clumsy methods of treatment, has to reject. In certain localities, this is true; but it is by no means always so. At points near the railroads, we can undoubtedly smelt lead and copper ores with coke more cheaply than he can in his little furnaces, so expensive in labor and fuel. But we must recollect that heretofore labor has been one third or one quarter cheaper than it will hereafter be in the vicinity of the railroads, and this will go far to reduce the advantages which cheap freights will give us. But it is questionable whether in localities where fuel and water are scarce ore mill processes and machinery will reduce free silver ores more economically and with less loss than the *patio*. It is of course inapplicable to very base ores, and, in handling these, a leaching process may in some cases be preferable to amalgamation after a chloridizing roast, or to the usual Mexican method of fusion with lead ores and litharge. But it is unwise to start with the assumption that Mexican methods are crude and inefficient, and that we can of course make money where they, in their ignorance and unskillfulness, failed. It is also hardly necesary to contradict the ridiculous stories of the richness of the ores. There is everywhere very rich ore, confined to very small veins or bunches. The average of very large bodies is comparatively low. J. D., JR.

MINING MATTERS IN CHIHUAHUA.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Though mining in New York appears to be sleeping "the sleep that knows no waking," we are far enough distant to be out of reach of the soporific influences that attach to the business there. Although we are by no means under the influence of a boom at present, yet there is a lively interest evinced in all mining matters, which is well sustained by such events as the arrival, on the 14th ult., of the monthly "conducta" from Batopilas with 100 bars of silver. This was the result of twenty-seven days' work, and is the largest conducta ever sent out from that district.

There are a numer of Americans in the city at present, and foreign capital is slowly but surely taking hold in this State. I say slowly, not merely on account of the lagging in business transactions peculiar to the country, but from a variety of other causes, chief among which may be counted the fact that a demand for an article increases its value ten, even a hundred, fold in a Mexican's eyes, and especially now, since the influx of Americans, when many think they have but to ask in order to receive. The unfortunate affair at Pinos Altos, the killing of Mr. Hepburn, the manager there, last winter, is said in one case to have deterred English capital from taking hold; while others disposed to invest wait first to see the success of the principal railroad schemes, knowing the importance of their bearing toward mining. Therefore, our progress is slow, but undoubtedly as sure as slow, and the caution engendered is a most desirable and beneficial factor in placing mining here on the solid basis it occupies, and in promising it a certain and greater measure of success.

While there are but few mines in the immediate vicinity of Chihua-

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hua, the fact that the city is the railroad center has made it also the mining center for all but the most northwestern and southern districts of the State. From Pinos Altos to Batopilas and Urique, bullion is sent in for coinage and shipment to the United States, while from the east outputs may be looked for in a reasonable time, as American companies have recently been formed to work the Guadalupe gold placers of the Conchas River, and the Santa Domingo galena and carbonate ores of the same district, which are similar in formation to the Santa Eulalia ores here; that is, pocket or chamber deposits in limestone. These Santa Eulalia mines, situated about nine miles east of Chihuahua, are about reaching a successful stage of operations, and keep eight 4½-ton wagons busy daily carrying ore to the mill. Two miles east of the city, on the south bank of the river, this latter is situated, and it has but just been put in operation, every thing working most admirably. Built by Fraser & Chalmers, the mill consists of 20 stamps, 24 wooden settling-tanks, 12 pans, and 6 settlers, with buddle and Frue vanner for concentration of slimes. A 250 horse-power condensing-engine from the Kensington Works, Philadelphia, drives the mill, and lifts the ore up an inclined plane to the crusher above the stamps. A retort and melting-room and an assay-office are erecting adjoining the mill, and the plant will shortly be in full working order. At Cosihuiriachic, two days' ride east of Chihuahua, the new Howell-White roasting-furnace has at last been set to chlorinating successfully under the direction of Mr. Riotte, and the leaching-works are now giving a steady output. The ore, gray copper, galena, and pyrites, is produced entirely from the San Bartolo shaft, now over 600 feet deep, being hoisted in a half-ton Cornish kibble. The rich smelting ore is sorted for shipment to New York, while the lower grade, averaging about 60 ounces, is crushed under 20 stamps, chlorinated and leached, the roasted precipitate being also shipped.

In the more western districts, work is pushed in quite as energetic and successful a manner. At Pinos Altos, 45 stamps are busy, and report puts the mine in a most satisfactory condition, while the bullion shipments arrive regularly, consigned to Norwald & Co., of this city.

At Yoquivo, the San Francisco and Pertenencia mines, yielding chlorides and native silver, are worked to but a small proportion of their capacity by 15 stamps with Hendey concentrators. The mines are very promising, and it is probable will change hands before long.

The Carmen & Batosagichic Company, at Guazapares, has recently taken hold of a property there consisting of thirteen mines, of which the principal ones are the Carmen, San Miguel, and Santa Clara. The company is about to enlarge its 20-stamp mill, having put a steam hoist in the Carmen mine, now 300 feet deep, and bought up the old Santa Clara mill, which was erected some years ago and fitted with 24 barrels, for barrel amalgamation. A small cupola-furnace enables it to make use of the old iron for mill castings, and work is rapidly pushed under the direction of Joseph McNulty, E.M.

Twenty miles west of Guazapares, at Palmarejo, a new California mill of ten stamps, with pans and vanners, has just been erected, for the treatment of ores holding principally chlorides, and is working side by side with the old Mexican arrastra mill, which is also kept busy. At Santa Rita, one half-mile below Guazapares, there is a five-stamp mill and small leaching-works; and at Uruapa another, while from here the high-grade ores are shipped to the coast and to Germany.

In Cententrion, there are large deposits of low-grade ores, at present worked by arrastras run by water-power, but an American company is negotiating for their possession, intending to work them on a large scale, there being an abundance of wood and of water-power, and the town lying on the route of the projected Texas, Topolovampo & Pacific Railroad.

Farther to the south, lies Batopilas, and this district at present rather leads the rest in the output of silver. This output is obtained just now entirely from the small mill of 15 450-pound stamps used for crushing the rich first and second-class ores only. The large mill is undergoing repairs and being doubled in capacity by the addition of 15 more stamps, alongside of the others. These take the ore directly from the cars run down from the San Miguel mine, nearly a mile up the river. This ore is low grade, consisting of zinc-blende and galena, with occasional specks of native and black silver in a gangue of spar and dioritic greenstone, and is concentrated on twelve Frue vanners, the headings, assaying from 220 to 300 ounces, being panned, while the tailings, which never assay over five ounces and seldom above three, are run into the river. The settled slimes from all the pan amalgamation, whether from headings or rich native silver ore from the small mill, are roasted and lixiviated by the hyposulphite of lime process.

Two "Fortschaufelungs-Ofen," undoubtedly the cheapest roasting-furnace for these districts, chlorinate the ore for this latter process, the plant for which is yet small, consisting of eight 15-ton leaching vats, three precipitation-tanks, with necessary filter and pump-tanks. The past week, there were received at the Hacienda of San Miguel over eight tons of first-class ore produced from the San Miguel and other mines under Governor Shepherd's management; and first-class ore assays anywhere from $2000 to $10,000 per ton, seldom under the former figure. The mines giving the greatest amount of rich native silver at present are the San Miguel, Camuchin, Roncesvalles, and Ballinas. The tunnel of the former mine, nearly 1400 feet long, cuts 13 large veins, and the principal of these, which have already given large bonanzas of silver, though still holding simply immense areas of unexplored contents, are the Mesquite, Veta Grande, Carmen, and San Antonio.

The vein of San Antonio de los Tachos of the Camuchin Silver Mining Company's property has given rich silver since last June, when communication was established between the tunnel, 700 feet long, and the air-shaft, 340 feet deep, and the mine put into workable shape.

The Ballinas air-shaft, 280 feet deep, the deepest vertical shaft in the district, has also been connected with the old tunnel, 780 feet long; and in Roncesvalles, the lower tunnel, 536 feet long, with the upper one, 150 feet above it, a continuous product of native silver being obtained from this mine, beginning almost with the first blast put in it.

But a detailed account of the several good mining properties of Batopilas would take far too much of your space, on which I have already trespassed.

I would speak of one more district in good production before closing, and that is Urique, forty miles west of Batopilas, where the Becerra Brothers have struck an ore-body at a depth of little more than 500 feet in their Rosario mine, that has yielded largely the past year, and continues the entire width of the vein, six feet between walls. The ore is a very rich galena and tetrahedrite, flaked often with native silver, and is crushed under 15 stamps and smelted and cupelled in six Mexican "vasos," that is, adobe cupel furnaces.

T. H. L.

CHIHUAHUA, MEXICO, Oct. 2.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

A Knotty Coal Case.—The case of Kerr and Fowler and Carleton, claimants for coal land in Wyoming, in which case the points of both the secretary and commissioner were published in this journal when made, having come before the commissioner again in another shape, his last decision has sufficient points of interest to warrant a pretty full statement of the case. Kerr and Fowler appealed from the decision of the local officers at Evanston, refusing to allow them to purchase and enter certain coal lands, the first having made application upon his own D. S., and the latter as assignee of James Buzzo's D. S. In the former contest, the following facts were developed: December 19th, 1881, George W. Carleton applied to purchase and enter the land covered by his coal D. S. Kerr and Fowler, among others, contested his application at a hearing which was decided in favor of Carleton. Upon appeal to the General Land-Office, the decision of the register and receiver was affirmed. Upon appeal to the secretary, the commissioner's decision was modified as follows: It was held that Carleton was not, at the date of his application to complete his entry, in occupation and possession of the land covered by his coal D. S.; that he had, by the operation of a bond entered into with the Utah-Wyoming Improvement Company, transferred all his interest in said land to that company, and was therefore not entitled to patent. "If, however," said the secretary, "the Utah-Wyoming Improvement Company can show its right to prove up and purchase as assignees of Carleton, it will be permitted to do so." January 5th, 1883, Kerr and Fowler applied to purchase, claiming that, as the application of Carleton had been rejected, "there remained of record in the land-office at Evanston only the coal D. Ss. of the appellants, which remain intact, as they have not been canceled by the Hon. Secretary of the Interior, as it is not asserted that the appellants had failed to comply with the law.' The commissioner, in his present decision, says he does not regard the view taken by the appellants as correct. "It was decided by this office, from the evidence presented, that Carleton, by reason of the character and amount of his improvements, was entitled to enter the land embraced in his coal D. S. instead of Kerr and Fowler. This finding of *fact* was not disturbed by the Hon. Secretary; but he decided, as a matter of *law*, that Carleton's assignees, and not Carleton himself, were *entitled* to make entry upon filing the necessary proofs. This being the case, the register and receiver properly refused to allow the appellants to enter the land. The D. S. of Carleton not having been canceled, entry by any other party could only have been allowed after notice to him. The only effect would have been to inaugurate another contest upon the merits of the case, between the same parties or their privies, involving the same matters of fact which had been already decided. The claims of Kerr and Fowler, therefore, as against Carleton and his assignees, were *res adjudicata*, and could not be revived. Moreover, I do not consider that the decision of the Hon. Secretary of December 11th, 1882, relegated the Utah-Wyoming Improvement Company to the position of one who holds, under a coal D. S., but has not yet applied to make entry. If the decision of this office had been affirmed *in toto*, Carleton would have had the right to purchase and enter the land without further objection, upon filing the necessary proof. The decision of December 11th, 1882, merely substituted the company for Carleton, and his status became theirs in all respects. His application to purchase, and the decision of the resulting contest, inured to their benefit. There was, therefore, on January 5th, 1883, a prior application to purchase, which was an appropriation of the ground embraced therein, until finally disposed of. And the applications of the appellants were, on this ground, rightfully rejected. The appeals of Kerr and Fowler are therefore dismissed."

The application of the applicants having been rejected, the Utah-Wyoming Improvement Company was allowed on January 16th, 1883, to enter and purchase as assignee of Carleton; and the commissioner proceeds to say "that the register and receiver erred in allowing this entry. Their action in rejecting the applications did not become final until the thirty days allowed for appeal had expired. The record shows that within such thirty days, namely, on January 27th, 1883, said Kerr and Fowler did appeal to this office, which appeal has just been considered. Inasmuch, however, as the appeal has been dismissed, and as the applicants have no standing before this office as parties in interest, since a decision adverse to their rights has been rendered by the Hon. Secretary, the entry will not be canceled on that ground, but will be allowed to proceed upon its merits. Coal entry No. 11 being allowed to the said Utah-Wyoming Improvement Company, the appellants appear in the character of protestants, and ask the cancellation of the entry on two grounds: First, that the company has not shown its right to purchase as assignees of Carleton; and second, that it is disqualified to purchase under the law and regulations of this office. Second. The records of the office show that one Charles M. Gilberson filed in the land-office at Salt Lake City, Utah, coal D. S. No. 342 (same section), January 21st, 1882, and that the latter filing is now a matter of contest in this office, upon appeal from the decision of the register and receiver in favor of said Gilberson. The sworn statement of Franklin Barnard, Secretary of the Utah-Wyoming Improvement Company, shows that Charles M. Gilberson was a stockholder in said company from May 7th, 1881, to June 15th, 1882. John W. Kerr, one of the protestants, makes affidavit that the above parties are one and the same person. The Utah-Wyoming Improvement Company files no formal proof of an assignment to it by Carleton. It is evident, therefore, that they rely upon the decision of the Hon. Secretary, declaring the bond given by Carleton to be in fact an assignment. That bond was executed on December 20th, 1881, as shown by a copy thereof certified to by the clerk of Uinta County, Wyoming. That date must, therefore, be held to be the date of the assignment under which the company claims. From December 20th, 1881, then, until June 15th, 1882, the company had among its members a person who was disquali-

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fied to claim coal land under the laws providing for its disposal. Counsel for protestants claim that this disqualification attached to the corporate association itself under the regulations, and Section 2350 Revised Statutes. The record shows, however, that the said Gilberson sold his stock on June 15th, 1882, and that entry was not made until January 16th, 1883. It has not been shown that any of the stockholders at the date of entry were disqualified. I can not accept the protestants' construction of the law and regulations. The Hon. Secretary affirmed the validity of Carleton's claim, and the rights of the company are their rights under Carleton. The land is therefore held by Carleton's original claim or filing, and not primarily by direct claim of the company. The disqualification of a stockholder in the company while the land was so held could not affect the validity of the claim. I must, therefore, decline to hold the entry for cancellation on that ground, as requested by the protestants. The evidence, in my opinion, fails to show the disqualification of two other stockholders of the company, E. H. Murray and H. A. Van Proag, as alleged by protestants, nor has the identity of the Utah-Wyoming Improvement Company with the Black Diamond Coal and Coke Company been satisfactorily established. The proof filed by the company in support of its claim is, however, deficient in several particulars. No affidavit of the individual members of the company at date of entry affords the information required by official regulations. The claimant is required to file additional proof covering these points.

Parties Interested in Application for Patent.—"A" made application for patent, and the abstract of title developed the fact that he was not the sole owner of the claim, and the local officers were notified and called upon to show why the other parties interested should not be joined with the claimant when patent issued. Such call is always the practice in the General Land-Office under similar circumstances. In reply, it was stated that the names of the other parties had been inadvertently omitted. Under the circular of July 6th, 1883, a patent can not issue for the interests of other parties in such cases, because they are not applicants nor assignees of applicants for patent. This is in accordance with a decision of the secretary in the case of the Grampian Silver Mining Company. But although parties in interest are ignored by the applicant for patent, and, filing no adverse claim to assert their rights, have waived them by failure to file such adverse claim, still those rights are not a subject for consideration by the General Land-Office in passing upon the regularity of the proceedings by the claimant in the case; and while he is in this instance unable to comply with the office regulations in showing exclusive right of possession, and, by former decisions, the entry must be held for cancellation, still the case comes under the secretary's decision that, "if antecedent publication and attendant proceedings have been regular, all that might have been set up by suit in court has been adjudicated in favor of the applicant." This so perfects the title that "A" will obtain patent if the application is regular in all other respects. Again, if "A" files a written statement that the parties were excluded inadvertently, patent will issue to them, together with "A," upon final proof of the claim.

The Right to Open Mines in School Sections.—The General Land-Office, in reply to a recent query made as to the right to open mines in sections reserved for school purposes in the States and territories, replies affirmatively. The Hon. Carl Schurz, while Secretary of the Interior, settled this question, in so far as Dakota was concerned, when called upon to determine the right of the United States to bring an action for trespass upon Sections 16 and 36 of public lands reserved in Dakota by Congress for the use of schools. He said: "The lands are public lands, although reserved for a particular purpose. The United States has not granted the title to such lands, but has reserved them, in order that, at some future time when a State shall be erected out of such territory, the same may be granted to such State."

The Supreme Court of the United States, in the case of the Mining Company *vs.* Consolidated Mining Company, held that a grant of public lands to the State of California by the act of March 3d, 1853, for school purposes, "was not intended to cover mineral lands, but such lands were excluded from that grant, as they were from all others, by the settled policy of the government on that subject." The operative words of the California act are, "shall be and hereby are granted," and there was no question raised as to the intent of Congress to grant to the State of California the lands, other than mineral, therein specified. The department says now: "It appears settled that it was never the intention of Congress to grant to a State or territory any mineral lands for school purposes, and it follows *a fortiori* that it can not be presumed to have been its intention to *reserve* any portion of them to be applied in the future to such purposes. It is proper to remark further, that, since in case of the lands in question the United States never parted with its title, it was entirely competent for Congress to exclude the mineral portion thereof (even conceding that a reservation of the same land had been made) from such reservation, by the mining act of July 4th, 1866." This construction of the act is also in keeping with that of Secretary Delano, in the Keystone case, which issues afterward came up to the Supreme Court in the Mining Company *vs.* Consolidated Mining Company, and in keeping with the judgment of the court therein.

The case just considered by the department is a coal land entry from Utah. The act of September 9th, 1850, to establish a government for that territory, says: "When the lands in said territory shall be surveyed under the direction of the government of the United States, preparatory to bringing the same into market, sections numbered sixteen and thirty-six in each township in said territory shall be, and the same are, reserved for the purpose of being applied to schools in said territory and in the States and territories hereafter to be erected out of the same."

FURNACE, MILL AND FACTORY.

The Boston & Colorado Smelting Company, of Argo, Colorado, has placed an additional order for roller chain belting with the Lechner Manufacturing Company, Columbus, O. This company has also received orders for chain belting from the Yazoo City Oil-Works, Yazoo City, Mich., for propelling steamboats. In addition to the above, it has furnished the following firms with tan-bark conveyors: W. W. Kellet & Co., W. Hickory, Pa.; D. Gensemer & Co., Pine Grove, Pa.; Francis Hammond, Coudersport, Pa.; and others.

The Cummer Engine Company, of Cleveland, O., has opened a branch office at 34 South Canal street, Chicago, under the management of W. B. Pearson.

The North Chicago Rolling-Mill Company's mill, at South Chicago, was the scene of a terrible explosion about eight o'clock on the evening of the 21st, which fortunately resulted in no loss of life. It being Sunday night, no work was doing in that locality, otherwise the loss of life would certainly have been great. The tunnel leading from the gas-house to the rail-mill, built of brick, exploded, sending masses of brick and mortar in all directions. The tunnel was eight feet in diameter, and was destroyed, as well as the ceiling overhead. As soon as the *débris* was cleared away, fifty masons were at once set to work, who completed the repairs Monday night.

The Catasauqua *Dispatch* says: Messrs. Crump & Berden, of Philadelphia, have had manufactured at the Union Foundry and Machine-Works, this place, an ingenious machine for cutting slate, marble, granite, and other materials. One just completed has been placed in use near Siegfried's Bridge, and is working very satisfactorily. An immense saw revolves with lightning speed and slits the slate, and saves the labor of many workmen. It is also used in sawing slabs for pavements, mantels, etc. The Union Foundry and Machine Company has a large planer in course of construction for the patentees. It has orders for two more sawing-machines, and prospects for numerous other orders from the same parties.

An explosion occurred at half-past one on the 19th ult., at Blast-Furnace No. 2, of the Pennsylvania Steel Company, Steelton, Pa., which shook the houses for squares around. The breast of the furnace was entirely blown out, and the molten metal flowed around promiscuously.

In a week or ten days, the barb wire mill and galvanizing building, erected along the canal in South Easton by the Iowa Barb Wire Company, will be ready for service. The main building is a frame structure, 45 feet wide, 260 feet long, and two stories in hight. Some of the machinery for this part of the works has already arrived. The upper story will be used for manufacturing the barbed wire. The lower story will be a machine and manufacturing room. The galvanizing building is also a frame structure, 40 by 80 feet. This building is also nearly completed. Another building, which will be used for painting wire that will not be galvanized, is now in course of erection. It is said that the average product of the works will be 4500 tons a year.

At the Vulcan Boiler-Works, of James McPeil & Brother, Pittsburg, a battery of boilers has been made for the Pittsburg Manufacturing Company. A large battery has been made by this firm for the Pullman Iron and Steel Company at Chicago, and also a 400 horse-power engine.

At the Atlas Works, Pittsburg, a pair of large blooming-shears are now making for the Edgar Thomson Steel-Works. The bed-plate of it will weigh 32 tons, and is the heaviest casting ever made at these works. They are also making an ax poll machine for Hubbard, Bakewell & Co., a hoisting-machine for Graff, Bennett & Co., and one for the Pittsburg Steel and Casting Company. They are also making a complete plant for manufacturing glass bath-tubs, including all the machinery, hydraulic accumulator, presses, and a great variety of other machinery.

At the Keystone Boiler-Works, W. Manchester, proprietor, Pittsburg, the manufacture of steel anvils will be again started.

A Pittsburg firm has leased the Pennsylvania Furnace, located on the line of the Lewisburg Central & Tyrone Railroad, in Franklin township, from W. Lyons & Co., the owners, and will put it in operation as soon as the necessary supplies of material can be obtained. This furnace has been idle for more than six years.

With the exception of one or two departments, the mills of the Mahoning Valley Iron Company are on full-time.

Mr. June Dunbar, foreman of the machine-shop of Brown, Bonnell & Co., has invented a self-feeding nail machine which he has just patented. In construction it is much less complicated than other machines.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

BLUE JACKET.—It is rumored that extensive work in this mine will be soon resumed.

CONTENTION.—Rapid progress is made in placing the pumping machinery. It will probably be in working order by the first of December.

GIRARD.—Since the mine started up, a month ago, the ore output, although only ten men are at work, has amounted in value to somewhat over $3000. The mine is more than self-supporting. The lower levels show a large body of sulphuret ore containing a large percentage of zinc. The Benson smelter not being able to handle such refractory ore, it has so far been useless to extract it; but arrangements have been made with the Pueblo (Colo.) Smelting and Refining Company, for the treatment of the ore.

GRAND CENTRAL.—Nearly all the work done is in the upper levels. The 200-foot level is worked the most extensively at present. There is hardly any ground above the water-level that is not prospected. Sinking will be resumed as soon as the pumps have started.

INGERSOLL.—The mine has been leased and work will be commenced soon. Although the ore is very refractory, carrying a large percentage of zinc, it contains enough silver to bear shipment to Colorado, should local smelting-works be unable to handle it.

TOMBSTONE MINING AND MILLING COMPANY.—A small force of men is employed on the Good Enough ground, mining some very high-grade chloride ore. The workings on this claim are mostly very near the surface, the ore being taken out wherever it shows itself, without doing much prospecting for it. The company's main workings are on the West Side, where a depth of 450 feet has been attained. At Charleston, the company has just completed the erection of four new concentrators. The flux used at the furnace is manganese ore derived from the Lucky Cuss and Luck Sure mines. As it carries from 40 to 50 ounces of silver to the ton, it is by far the best and cheapest flux that could be obtained.

PIMA COUNTY.

ESPERANZA.—The mill is almost completed.

FRANCO-AMERICAN.—A rich strike has been made. A test-run of 20 tons of the ore will be made by the Orion mill.

ORION.—The mill is working successfully on ore from the Mountain mine, belonging to this company.

PINAL COUNTY.

RAY COPPER.—For the week ended October 21st, the superintendent reports: Our last week's working in the Ray continued to show very favorably. Winze No. 3 from station 100-foot level is down 19 feet, carrying glance ore. Have started to drift from station, 100-foot level, west, to cut the native copper deposit we had above. This drift is now in five feet from station and in native copper, the same body we had in winze No. 1 and north drift 50-foot level. The cross-cut in the south drift in front of winze No. 3 is in 48 feet; the face is in copper glance. Cross-cut, north drift, 50-foot level, is in 35 feet; the face is in red oxide, copper glance, and fine native copper. The cross-cut in tunnel level

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is in 25 feet, and also looks well in red oxide and copper glance, one seam in the face being very rich indeed. Shaft No. 1—a shaft sunk outside of all former workings and 50 feet from the mouth of the tunnel—is down 15 feet. We intend to do all our hoisting through this shaft, and the same will be connected with the 50 and the 100-foot levels as soon as possible. We have a steam hoist now on the road from Tucson to put up over this shaft. I expect now to be able to put 4000 tons of ore on the new dump.

CALIFORNIA.

INYO COUNTY.

ARGUS RANGE SILVER MINING COMPANY.—Thirty tons of ore produced 137 ounces of bullion, worth about $2200. The mill is now shut down for want of water. It is stated that the company will soon place enough funds at the disposal of the superintendent to pay off all indebtedness.

CHRYSOPOLIS.—The machinery for a five-stamp mill is on the road, and will be put in place as soon as the work is enough advanced.

SAN DIEGO COUNTY—POOR MAN'S DISTRICT.

This comparatively new district was discovered in 1864, and worked in a small way for galena. The mines were abandoned, however, and in 1881 contractors began assessment-work on the Luz mine. Re-location of the abandoned claims was made, and in 1882 other claims were located.

AMELIA.—This claim has been opened to a depth of 180 feet by shaft on the foot-wall, showing ore from the surface and at intervals to the floor of the shaft, from which level a cross-cut of 40 feet has been run, tapping the hanging-wall. The chloride streak, four feet in width, is here uncovered, and chloride of the green horn-silver variety found in quantity. From the surface, a shaft, now at a depth of 40 feet, is pushed on the hanging-wall, to connect with the 180-foot cross-cut, and the rock extracted is pay-ore. Negotiations are pending for the purchase of this mine by California capitalists.

SAND-STORM.—A strike has been made in two feet of solid argentiferous galena, white and yellow carbonate. Chloride also is found on this location, as also on the Nameless, the extension of the Sand-Storm.

CANADA.

PROVINCE OF NEW BRUNSWICK.

BELLIVEAU ALBERT.—Borings recently have reached a depth of 680 feet. As the operations have proceeded, oil has been met with at times. It is stated that the flow of oil is continuous. The oil is remarkably pure.

COLORADO.

The United States Central Railroad Company, organized under the laws of Colorado, has filed articles of incorporation. The capital stock is $75,000,000, divided into 750,000 shares of the par value of $100 each. The time of the commencement of the company dates from the 1st day of October, 1883, and the company is to continue fifty years. The object is the construction of a railroad from Denver across the State of Colorado, the territory of Utah, and the States of Nevada and California to the city and county of San Francisco, in the latter State. The incorporators are A. D. Sharon, R. H. Floy, Charles Kohler, Lyman Bridges, D. L. Randolph, W. L. French, M. Skelley, Frances Bridges, J. P. Manrow, Sampson Tams, Samuel McCullough, J. Bluxome, Robert Turner, Samuel Grove, H. H. Pearson, San Francisco; E. T. Wells, William C. Miller, and Edward Rundall, Denver; and William Walker, Cedar Rapids, Iowa. There will be a meeting of the directors in San Francisco soon, at which time the officers will be elected. As soon as the organization is effected, a survey in Colorado will be made, and then work will be begun at both ends of the road.

ARAPAHOE COUNTY.

INTERNATIONAL PYRITES SMELTING COMPANY.—This company has filed articles of incorporation which define the purposes of the company to be to carry on in the State of Colorado and elsewhere the business of amalgamating, treating, and refining precious metals. The capital stock of the company is fixed at $500,000, divided into 20,000 shares, and the following are named as directors: Homer Pennock, Dennis Sullivan, James V. Dexter, George H. Corbin, and Edward O. Wolcott. The place of business of the company will be in Denver.

CLEAR CREEK COUNTY.

CASHIER.—This mine, at Empire, has lately been examined in the interest of Chicago capitalists. Reports were so favorable that forfeit money was paid down and the Chicago parties allowed the privilege of sinking a shaft on the lode.

COLORADO CENTRAL.—The mine is looking well. Several new ore-bodies are opening up. A large amount of dead-work has been done on this property, and exploration has reached the west end of the claim. In No. 2 level, west from the engine-shaft, a new and apparently rich ore-body has been encountered.

DOLORES COUNTY—RICO.

Mr. Linwood O. Towne, of Rico, sends us the following notes:

GRAND VIEW.—The company is working the usual force of men on its mine, obtaining ore mainly from the Phœnix and Grand View. The large furnace at the smelter has been recently blown in, about 300 tons of ore being on hand at the time. These have been and are being obtained not alone from Rico mines proper, but also from Ophir and Mount Wilson.

SOUTH PARK.—The usual force is working. Recent shipments of lots to Grand View Smelter gave the following results: Silver, 410, 122, 225, and 990 ounces, and lead on same 30, 11, 20, and 14 per cent, respectively.

CROSS.—Shipments to the smelter during the month past were 60 tons, running from 72 to 220 ounces of silver, and from 8 to 25 per cent lead. This mine has lain idle a long time, but the owners are now pushing things, employing from 15 to 20 men.

NEWMAN GROUP.—The company owning this group, which includes the Newman, Swansea, Chestnut, etc., started work early in October, running day and night shifts. At present, the mines are being put into good shape by extensive development-work; they have not been worked except by lease for over a year, during which time a large quantity of high-grade mineral was taken out. The practical superintendence of the mine is under Mr. F. W. Reed, a former lessee. Mr. A. B. Burnham, manager, is in town giving the business of the mine his personal attention.

LITTLE MAGGIE.—Upward of 75 tons have recently been shipped to the smelter. Work is pushed mainly on the tunnel.

INTRA MUROS.—An offer has been made by this company on the Little Pittsburg claim, and if the purchase is concluded, the mine will be worked extensively in connection with other properties owned by the company in the same vicinity. The claim is developed by a tunnel 300 feet long and a shaft at 225 feet in, 22 feet deep on the Aztec Gulch side of Expectation Mountain. From the opposite side, another tunnel is run 100 feet and a shaft is sunk 40 feet. The 300-foot tunnel is in lime and porphyry all the way. Properties already owned by the company are the Mohegan, Blue Bird, and Stranger. The first-named has a cross-cut tunnel 160 feet and a drift on the vein of 134 feet, showing a large vein of carbonate ore.

GILPIN COUNTY.

FRONTENAC.—A lease of this mine, more familiarly known as the Clifton, has been taken by Dr. Henry Paul, who has ten miners at work in developing and opening up new ground. This vein is situated near the head of the south fork of Willis Gulch, Russell District, and heretofore has been worked quite extensively.

GUNNISON COUNTY.

BONANZA.—This group of mines, consisting of the Bonanza, Amie, Little Eva, Ground Hog, and Bonanza No. 2, situated on the southeast side of Gold Hill, in Quartz Creek Mining District, was sold for the sum of $70,000. The Bonanza and Amie are patented claims. They were located in 1879, and have a large amount of development. Recently, a large body of high-grade carbonate ore was struck in the Bonanza.

JEFFERSON COUNTY.

MINERS' SMELTING AND REDUCTION-WORKS.—It is pretty thoroughly understood in Golden that these works have been sold to the Boston & Colorado Smelting Company, of Argo, and in all probability will soon be closed.

LAKE COUNTY.

ADLAIDE.—The lessee who recently took charge of the property has directed his attention to more thoroughly opening the mine and extending exploration work into new ground. In consequence, although from 28 to 30 men have been continually employed, the production of the mine has been small. Operations are carried on through both the Ward and Adlaide No. 2 shafts.

AMIE.—The northern portion of this mine, and also the workings contiguous to the No. 2 shaft, are worked by the company with encouraging results. The northern workings disclose fair indications of a good body of ore, and some good shipping mineral is obtained from them. Shipping ore is also extracted from the No. 2 shaft. Shafts Nos. 4 and 1 are worked on royalty. So far, however, the lessees have taken out very little, nearly ten months of work having yielded only about one thousand dollars. The Deer Lodge shaft is worked on a lease, and while producing some ore, has so far failed to disclose a bonanza.

ARGENT.—The increased production of the Vining mine is the result of several new developments recently made, giving the mine extensive resources in sight, as well as ore-bodies that promise great permanence. The shipments of the mine are sorted into two classes, the first netting about thirty dollars per ton above smelting charges, while the second class ranges from eighteen to twenty dollars. The principal ore-body of the mine is to the southwest of the shaft. The present developments show a breast of ore twenty feet in width, eight feet in hight on an average, and open for a distance of thirty feet.

CHRYSOLITE.—Carbonate and galena ore has been found in the Muldoon shaft, located on the southern portion of the Chrysolite property. The mineral was encountered at a depth of 140 feet. The shaft is worked on a lease. The new strike, if equal to expectations, opens up a new field for prospecting. It is quite likely that the ore-body developed recently in the Luzerne shaft is connected with this ore-body, in which event the four or six hundred feet of intervening ground will contain some very respectable bonanzas. If the ore-body is really a large one, it will improve the chances of both the Little Pittsburg and Chrysolite mines.

CLIMAX.—Shafts Nos. 1, 3, 6, and 7 are working under leases with varying results. No. 1 shaft so far is the only one that has yielded any quantity of ore and more than paid expenses.

COLONEL SELLERS.—A contract for a year has been made with the Harrison Reduction-Works, to take 750 tons of ore a month. The operations at the mine are confined to exploration-work. The sinking of the No. 2 shaft is still in progress, although it has passed through fifty feet of ore. The Accident shaft is also pushing down at a rapid rate, and has attained a depth of 170 feet. Levels are also extending and prospect-drifts driving in various directions.

IRON SILVER.—The No. 5 shaft of the Stone claim is producing about 40 tons of ore a day. No. 6 shaft on the same location is turning out about 160 tons a day, making a total daily production for the California Gulch mines of the Iron Silver Company of two hundred tons. The Moyer shaft is closed down entirely, pending the receipt of a new pump. The surface improvements of the company are nearly completed. Exploration-work is still in progress from the McKeon shaft, driven on the line of the fault from the Iron mine incline. The workings show several fair streaks of ore, and the value of the product is equal to the expenses.

OPULENT.—The suit of the Opulent and Australian lodes, involving conflicting territory, has been decided in favor of the Opulent mine. The case was tried in the United States Circuit Court at Denver, and the jury was out nearly three days before arriving at an agreement.

RUBY.—The principal developments of this consist of a main west level, 345 feet in length, in which good ore has just been struck. At 295 feet west of the shaft, and about forty feet above the plane of the main level, there is an ore-body, the mineral of which consists of gray sand carbonates ranging from 40 to 65 per cent in lead, and from fifteen ounces upward. The ore-body, as far as developed, discloses a thickness ten feet and over, a width of about fifteen feet, and a length of forty feet, with fine ore in the breasts on three sides. At a distance of 100 feet west of the shaft, an incline has been driven to the southward on the contact, showing in the face a fine breast of mineral four feet in thickness, from which the principal output of the mine is at present secured. In a drift running to the northwestward, 65 feet from the shaft, a natural cave has been opened 30 feet deep, 70 feet long, and 15 feet wide, the bottom of which is covered with ore running fifteen ounces to the ton.

TWIN LAKES PLACER MINING COMPANY.—A large force is employed on the Clear Creek ditch, of which about 5000 feet have so far been completed. Of the flume grade, 16,000 feet, or nearly the entire length, has been finished. A contract has also been let for driving a tunnel, of which about 500 feet have been run up to the present time. The entire work is advancing as rapidly as practical, and will be completed in season for work in the spring. No changes have been made in the line and none is contemplated.

PARK COUNTY.

EAST LEADVILLE.—This company, which has recently purchased the Mudsill and other mines in Horse Shoe Gulch, has put a force of fifteen at work on its property. The company contemplates erecting a stamp-mill early next spring. The ore possesses value of from 25 to 30 ounces in silver to the ton.

LONDON.—The mine is producing regularly, and the flue twenty-stamp mill of the company is kept running at its full capacity. Unless the deep snows of that section should interfere with the operation of the railroad, the mine and mill will continue turning out gold bullion and high-grade concentrates during the entire winter. The mine is looking well, and the resources and available stoping ground are daily increasing, notwithstanding that regular shipments have been made for months past.

DAKOTA.

A dispatch from Fargo states that a mining company with a capital of $500,000 has been formed by leading citizens of that place, and a claim has been filed for 200 acres of the town-site of Lisbon. Work will be prosecuted vigorously on the arrival of machinery, which has already been ordered.

CLIMAX.—The shaft at this mica mine has attained a depth of 90 feet. At present, seven men are at work in the mine, and produce nearly 200 pounds of cut mica per week.

FATHER DE SMET.—The superintendent writes: Ore extracted from first, second, and third levels, 1885 tons. Ore milled, 1975 tons. Golden Gate east cross-cut, third level, advanced 5 feet; Golden Gate south header, second level, advanced 6 feet. Under date of October 18th, he reports: I herewith inclose express company's receipt for bar No. 169, containing 748·70 ounces of gold, the result of run of mill for the first half of October. At the mine, every thing seems to be looking as favorable as usual, and we see nothing to prevent us making fair shipments all winter, and at a reduced rate of expenses, as we have a full supply of every thing in the material line on hand, and nearly paid for. Golden Gate south header shows no change; in fact, for the last 65 feet, the quality has not varied at all, and if the ledge proves to be of any size, will make a very fine chamber. East cross-cut, third level, does not look so promising. The face is in ledge-matter yet, but of scarcely no value. The rest of the mine

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shows the usual amount and quality of ore. The mill continues to work well, and gives no trouble.

HOMESTAKE.—A rich strike, it is said, has been made in the Old Abe shaft, which has attained a depth of 450 feet. At present, the workings are 135 feet only from a level with Whitewood. The shaft is in ore of good quality almost the entire distance, but for the last 100 feet it has steadily increased in richness, until, at a depth of 440 feet, the workings entered a body of ore, the general character of which is far superior to any thing heretofore encountered. The shaft will be sunk to a depth of 550 feet.

ORO FINO.—It is stated that the superintendent has received from his company ample means to liquidate all indebtedness; consequently, there will be no cessation of work in mine or mill.

ROCHFORD.—Eastern capitalists, it is said, have a two-years lease of mine and mill, with the privilege of buying at the expiration of that time for $175,000.

UNCLE SAM.—The 25-stamp mill continues in successful operation on an excellent quality of ore. A 60-stamp mill will probably be erected next year.

GEORGIA.

LUMPKIN COUNTY.—During the present season, says the Dahlonega *Signal*, there have been erected in this district something over 100 stamps, and 20 more are now to be added to the number already in the field. Prospectors have been busy, and new territory is constantly added to that worked and known to contain gold in paying quantities. Negotiations are now in progress for the purchase of a considerable tract of mining territory, by a company of Northern capitalists, which, if completed, will add greatly to the prosperity of this section.

SINGLETON.—Developments in the tunnel are of a favorable character. The vein at this point is three feet thick, and prospects well. A force is at work stoping the ore. A railroad has been laid from the stopes to the mill, and self-dumping cars convey the ore directly to the feeders.

IDAHO.

ELKHORN.—The new developments have placed in sight bodies of high-grade galena in the breast of tunnel No. 1, in the stope between tunnels 1 and 2, in winzes Nos. 2 and 3, and in rises Nos. 1 and 2 for the winzes. This shows a large continuous body of first-class ore. The average net receipts for every ton of first-class ore shipped to the Philadelphia smelters are said to be $165. This is after the deduction of transportation and reduction. Besides a regular daily shipment of 12 tons of ore, much is done to give the mine a complete drainage by means of a tunnel from the east hillside, which will tap the vein at a depth of 500 feet. This will also be the main working tunnel.

STAR.—The new strike made in this mine, in Star Gulch, within two miles of Hailey, consists of three streaks of ore. One of these is four inches wide, of gray copper and galena, which assays high in silver. The drift is in 20 feet on the new find, which seems to improve as run upon.

MEXICO.

SCHLEY MINING AND MILLING COMPANY.—This company owns seven splendid mines near Pachuca, the Ida, Robert E. Lee, Washington, New York, La Reina, Savannah No. 1, Savannah No. 2. Of these mines, the Ida, La Reina, Robert E. Lee, and both Savannahs are in good honest paying ore, and these ores are not in pockets, but in true fissure-veins, which, when worked on a large scale, will pay bonanza profits to the stockholders. All that is now wanting in this district is a first-class reduction-mill, as the ores have to be shipped eighteen miles to be reduced.

MICHIGAN.

The following table exhibits, in gross tons, the total lake shipments of iron ore from upper peninsula ports the present season, up to and including October 24th, together with the amount shipped from the same ports during the corresponding period of last year:

Name of port	1882.	1883
Escanaba	1,579,846	1,281,885
Marquette	846,240	628,101
L'Anse	60,780	59,395
St. Ignace	49,062	48,078
Total	2,535,928	2,017,459

EMMET.—The shaft which is sinking on the tract adjoining the Ludington, where it is expected to strike the Chapin vein, is down 140 feet. The shaft, it is believed, will strike the Chapin vein at a depth of about 600 feet.

ERIE.—It is rumored that this mine has been sold to Cincinnati capitalists.

FINLAND.—Articles of incorporation were recently filed at Lansing. The capital stock is $2,125,000.

GREAT WESTERN.—A small force is now worked, getting the mine in shape for economical production.

PEWABIC.—Another assesment has been levied. The superintendent says: It seems to me the best thing we can do is to sink another lift, then push along the 33d and 34th levels north and south, to prove up the ground that we are gaining from Franklin and Quincy. With Quincy rich on one side, and Franklin showing well on the other, our chances for finding some good paying ground, if the openings are pushed along as stated above, are very good indeed; and if we do not make some good bunches of copper long before this time next year, it will be very strange. There is nothing new at the mines.

WEST CHAPIN.—Indications point to the early development of a workable deposit of first-class ore.

MONTANA.

MISSOULA COUNTY.

The first reports received from the gold-fields in the Cœur d'Alene Mountains were greatly exaggerated. The latest information is, that the prospects will not justify any great excitement, but that there will be paying diggings. Some 220 or 300 people are in the camp. Most of the claims, comprising twenty acres each, have been taken by Palouse farmers, and very few miners have secured ground. The ground on Beaver Creek and other streams in the vicinity of Pritchard Creek has been taken up; but the work of development will be very slow this winter, and paying returns may not be expected before next July. As yet, but four claims have paid any thing, and none of them at present makes more than wages. One party sold part of a claim, five acres, for $1000. The neighborhood has every indication of being a good quartz region, and a couple of ledges have already been opened on Beaver Creek, six miles from Pritchard Creek.

SILVER BOW COUNTY—SUMMIT VALLEY DISTRICT.

ALICE.—The pay-chute has been struck and stoping begun on the 800-foot level. The width of the ore-body at present is three feet, averaging 57 ounces, and is increasing in width. The vein at a point 130 feet west from the bottom of the winze is 47 feet wide. The south vein is opening up on the 400-foot level east of the main shaft. On the 300-foot, stoping is vigorously prosecuted on the new south vein. The ore-body is extending east and west, and is rich, averaging 100 ounces. The foundations for the new hoist on the Magna Charta mine are finished, and the new engines will be set, the old engines being much too light for the service required of them. The mills are running very regularly, and crush 100 tons per day.

BLUE WING.—This claim has been leased on the following terms: The lessee is to have all the ore taken out in sinking and drifting, and four fifths of that taken out in stoping.

GOLD FLINT.—A two-thirds interest in this mine was sold to W. A. Clark for $13,000. This mine lies two miles west of the Moulton, and is the outlying mine westward on this mineral belt. The ore is high-grade. One shaft is down 90 feet and another 60 feet, both in good ore.

LIQUIDATOR.—Active developments have begun again, and about 100 tons of first, second, and third-class ore are produced daily. The first-class averages 35 per cent of copper; the second-class averages 27; the third class, 18. Most of this heavy production is left on the dump, but regular shipments have recently been made; and since July 1st, the sum of $36,000 has been realized from the sale of crude ore on the dump, and which has been shipped to Swansea under contract to New York parties. The amount previously realized from the sale of first-class ore only was $8000. A conservative estimate of the amount of third-class ore on the dump at present is 7000 tons, the sale of which has been arranged for. There is also a considerable amount of second-class ore on hand. Under the new schedule of freight rates, the superintendent states that 26 per cent ore, which a year ago would not pay to ship, is now available for transportation even as far as Swansea, and pays a profit above all costs. The Liquidator is not a full claim, being only about 650 feet long, but like a good many other fractional claims in this district, according to the Butte *Inter-Mountain*, it is one of the most productive and valuable properties in the camp.

MOULTON.—The 400-foot level is driving west, and has greatly improved in the character of the ore. The battery samples are from 100 to 125 ounces. This body of ore is about five feet wide in the stopes.

NEVADA.

ELKO COUNTY.

ELKO CONSOLIDATED.—Depth of shaft No. 2, 170 feet. There has been a favorable change in the formation, it now being porphyrite, and carrying small stringers of ore.

GRAND PRIZE.—The prospects are said to be very encouraging. The mill will start up on the 5th of next month.

ESMERALDA COUNTY.

COLUMBUS CONSOLIDATED.—The extraction of ore has been resumed.

HOLMES VS. NORTHERN BELLE.—Some of the lawyers and witnesses in the Northern Belle suit are beginning to arrive in Carson. The suit is brought by the Holmes Mining Company to recover the value of ore, estimated to be worth $1,000,000, taken out of ground claimed by the Holmes Company. It is alleged that the Northern Belle people went over their end boundary-lines in taking the ore. The case will be called on the 6th of November, and will bring about one hundred jurors to the city.

MOUNT DIABLO.—The drift below lower winze No. 2 shows a strong ledge, which is turning out some $45 quartz. The stope from this winze is yielding considerable $55 ore. The stope below the third level, and near winze No. 1, shows a strong ledge of $50 ore. The cross-cut running directly south of the shaft is extending to prospect the ground below, to ascertain the depth of the Tipton ledge.

EUREKA COUNTY.

EUREKA TUNNEL.—The committee appointed to report on the general and financial condition of the company states that the present indebtedness, as it appears on the books, is $51,719. It advises the stockholders to contribute fifty cents a share, for the purpose of liquidating the indebtedness and starting the company on a clear and sound basis. The money may be sent to Paxton & Co., bankers, at Eureka.

STOREY COUNTY.

KENTUCK.—This is the only mine in Gold Hill which did not shut down this season on account of the low water in the Carson River, and the consequent stoppage of the mills.

NEW MEXICO.

BERNALILLO COUNTY.

There is a movement on foot to establish a Mining Exchange in Albuquerque and this movement is regarded as one of more than ordinary importance.

Charles L. Hubbs has transferred to Frank Huning *et al.*, all his right, title, and interest in and to the smelter property below Albuquerque. It is understood that some move will be made in the near future to put the works in active operation.

A party of prospectors have recently discovered in Tyeras Cañon, about sixteen miles east of Albuquerque, a gold lead which gives promise of being rich and extensive. The lead runs nearly north and south, and crosses the cañon about three miles from the mouth. The vein has an iron cap, some ten or twelve feet in thickness; and after going through this, an ore-body is struck which carries gold from the start, and steadily improves as depth is gained.

DONA ANA COUNTY.

SIERRA BELLA.—It is reported that the Columbia mine, at Lake Valley, has been sold at auction to the Sierra Bella Company for $30,500. The Sierra Bella Company owned two thirds and Hon. John D. Miller one third.

GRANT COUNTY.

PYRAMID.—The rearranging of the machinery of the mill is nearly completed, and it is expected to start up soon. The company under the new management is making every necessary improvement on the workings.

GOLDEN RULE.—The mill continues to run steadily, crushing from fifty to sixty tons per day. The mine is looking well. The ore in stopes and drifts maintains its usual grade. Four to five tons of concentrations from the mill tailings are made every day. Over sixty men are employed at the mill and mine.

HARPER.—A portion of this group of mines, in Hanover Gulch, was sold at sheriff's sale recently. The successful bids were as follows: The Superior, $175; Mountain Boy, $90; Pylmira, $70; Gray Eagle, $68; Mastodon, $84; and Milton, $64. The Mastodon prospect is a valuable claim, and cost Harper over $1000 when purchased of the original locators.

PENNSYLVANIA.

NORTHAMPTON COUNTY.

The quarries of Bangor, East Bangor, and Pen Argyl are increasing in productiveness daily. They are, says a correspondent of the New York *Sun*, hampered only by the scarcity of skilled labor. So many quarries are opening that labor is scarce. In the entire region, there is great demand for all kinds of labor. Ordinary day laborers earn from $1 to $1.35 per day, and often more, according to the exigencies of the occasion. Carpenters earn from $2.25 to $3.25. Bricklayers find work, but most new buildings are frame. Machinists are sought after daily, and make good terms, because practical men to work at the opening of new quarries and the erection of machinery are scarce. Slaters (splitters and dressers) earn from $2.50 to $4 and $4.50 per day by the piece. Quarrymen can always find remunerative employment. The growth of the industry has been very rapid.

UTAH.

WASHINGTON COUNTY—SILVER REEF.

BARRY CONSOLIDATED.—The object of this company, recently incorporated, is to operate and work the Barry group of claims, located north of the Crescent Company's property at Park City. The claims to be operated are the *Morions*, Del Norte, Rickwah, Wakell, Capell, Weilchpeck, Areata, Lagoon, Aztec, and Fountain. Salt Lake is named as the chief place of business, and the capital stock is placed at $2,500,000 in shares of $10 each, par value. A large amount of work is to be done on the property this winter.

BARBEE & WALKER.—Rumor has it that the company's mines have been closed down for an indefinite period.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 2.

There is nothing of interest in the mining market this week to report. Business continues to be very dull and uninteresting, and is confined to two or three low-priced fancy stocks. A full summary of the market is given below. The total number of shares sold aggregates 117,935, as against 136,750 last week.

The Comstock shares were very quiet at steady prices. California sold at 31c., assessment paid, and at 8c., assessment unpaid. Consolidated Virginia was moderately dealt in at irregular prices; it sold from 47@50@45c. Sierra Nevada was quiet and steady, selling from $3.75@$4. Union Consolidated was weak, under a small business, selling from $4.35 @$3.55. Mexican sold at $3.25, and Ophir at $5.25. Best & Belcher sold to the extent of 100 shares, assessment paid, at $4. Sutro Tunnel was fairly dealt in at irregular prices; it sold from 17@15@16c.

The Leadville stocks were also quiet and steady. Amie sold from 11@12c. under a small business. Chrysolite was steady, selling from $1.20@$1.15, with a business of 2400 shares. Dunkin was quiet and steady at 26c., and Breece sold at 18c. Iron Silver was moderately dealt in at steady prices; it sold from $2.95@$3. Leadville was quiet and steady at 38@40c. Little Chief sold to the extent of 1200 shares at 56@54c. Little Pittsburg was steady, selling from 58@56c. under a small business. Climax was quiet and steady at 7@6c.

There was no change of interest in the Bodie stocks. They remain very quiet at about steady prices. Bodie Consolidated sold to the extent of 300 shares at 15c. Standard was quiet and steady at $6@$6.25. Bulwer sold at 50c., and North Standard at 14c.

The Tuscarora stocks were quiet and steady. Grand Prize was strong, selling from 48@60c. with a moderate business. Belle Isle sold at 40c. Navajo was quiet and strong at $3.90. Elko Consolidated was quiet and steady, selling from 18@17c. assessment paid, and from 3@2c. assessment unpaid.

In the miscellaneous list, Alice was very quiet at $2.65. Eureka Consolidated was quite weak, under a small business, selling from $6.50@$4. Horn-Silver was moderately active at irregular prices; it sold from $6.25@$5.88@$6. The trustees of this company have decided to reduce their dividends hereafter from $300,000 to $200,000, or from seventy-five to fifty cents per share. Robinson Consolidated was quiet and irregular, selling from 42@45@43c.

Barcelona was irregular, under a small business, selling from 27@25@26c. Caledonia was moderately dealt in at weak prices; it sold from 31@30c. Decatur was very quiet at 3c. Eastern Oregon was actively dealt in and was irregular; it sold from 46@40@44c. Harlem was also very active and was steady; it sold from 92@96c. Oriental & Miller was quiet and steady at 8@7c. Rappahannock sold from 8@9c. with a fair business. Sonora Consolidated was very active at steady prices; it sold from 25@27c. Castle Creek was fairly dealt in and was steady; it sold from $1.10@$1.05.

MEETINGS.

The Clifton Hydraulic Company, No. 14 Wall street, New York City. Annual meeting of stockholders December 4th, at ten o'clock A.M.

A meeting of the stockholders of the Green Mountain Mining Company was held in this city this week, and it was announced that the company was in debt to the amount of $74,000.

The San Pedro and Cañon del Agua Company, Hartford, Conn. Annual meeting of stockholders December 3d, at one o'clock P.M.

DIVIDENDS.

The Evening Star Mining Company, of Colorado, has declared dividend No. 56, of fifty cents a share, amounting to $25,000. The total dividends paid by this company to date now reach the figure of $1,400,000.

The Horn-Silver Mining Company, of Utah, has declared a dividend (No. 11) of $200,000, being two per cent on the capital stock, payable on and after November 15th.

The Standard Consolidated Mining Company, of California, has declared its monthly dividend of twenty-five cents per share, payable November 12th at the office of the Farmers' Loan and Trust Company.

The United Verde Copper Company, of Arizona, has declared a dividend.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, No. 49 Broadway, report that the petroleum market during the past week has been exceedingly dull. The public has taken very little interest in it, and the fluctuations have been so small that there has been no encouragement to trade. The market has lost a little each day, notwithstanding the bull talk as to the future.

The monthly report was bearish for October work, and makes the following showing:

	October.	September.
Wells completed	320	300
Wells drilling	336	310
Rigs up and building	251	206
New production	4,576	4,700
Average per well	14·30	14·43

There has been a falling off in Balltown production during the past two weeks, but the total production in the oil-field is still in excess of the consumption. The pipe line returns for the month of October will show a loss of about 150,000 barrels in gross stocks, but the shipments are about 200,000 barrels less than for September. The exports were less in October than in September.

The market needs a leader, and if no one comes in to stir it up, the chances are, that prices will go still lower. If there should be a decline to say 107 or 108, we should consider oil a good purchase for a turn.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Oct. 27	$1.10¼	$1.11¼	$1.10¼	$1.10⅝	3,035,000
29	1.10⅞	1.11⅜	1.10½	1.10½	2,642,000
30	1.10¾	1.10⅞	1.10⅛	1.10⅛	2,018,000
31	1.09⅞	1.10¼	1.09⅛	1.09¼	2,679,000
Nov. 1	1.09¾	1.09⅞	1.09⅛	1.09¼	2,158,000
2	1.09¼	1.09½	1.08⅞	1.09⅛	3,430,000
Total sales					16,562,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Oct. 26.	Oct. 27.	Oct. 29.	Oct. 30.	Oct. 31.	Nov. 1.
Albion	...	...	...	...	...	...
Alpha	2⅛	...	...	1⅞	2	1⅞
Alta	1¼	1⅜	1½	1½	1½	1⅜
Argenta	.15	...	.15	.20	.20	...
Bechtel	...	...	...	...	...	...
Belcher	1⅛	1⅛	1⅛	1⅛	1⅛	...
Belle Isle	.40	.45	...	.40	...	...
Best & Belcher	3¾	3¾	3¾	3¾	3⅞	3⅞
Bodie	.25	.25	.35	.35	.35	.40
Bullion	...	...	...	...	...	...
Bulwer	...	...	...	...	...	...
California	.10	.10	.10	.10	.10	.30
Challar	2¼	2⅜	2⅜	2⅜	2⅜	2¼
Con. Virginia	.50	.50	.50	.50	.55	50
Crown Point	1⅛	1⅛	...	1¼	1¼	1
Elko Cons	...	...	...	...	...	...
Eureka Cons	4⅛	4¼	...	4⅛	...	4⅛
Exchequer	...	...	...	...	...	...
Gould & Curry	1¾	1⅞	2	1⅞	1⅞	1¾
Grand Prize	.45	.55	.60	.55	.60	55
Hale & Norcross	2¼	2¼	2⅜	2⅜	2⅜	...
Independence	...	...	...	...	...	...
Martin White	...	...	...	...	.25	...
Mexican	3⅛	3⅛	3¼	3⅜	3¼	3⅛
Mono	...	...	...	...	...	...
Mount Diablo	4	...	...	...	...	...
Navajo	3⅝	3⅝	3⅝	3½	3½	3⅝
Northern Belle	...	...	4¼	...	...	...
North Belle Isle	...	...	...	...	...	...
Ophir	5⅝	5¾	5¾	5¾	5⅝	5⅝
Overman	...	...	...	...	...	...
Potosi	.85	.90	.95	.90	.90	.90
Savage	1.00	.95	.95	.95	.95	.85
Scorpion	.50	.50	.50	.55	.50	.50
Sierra Nevada	3¾	3¾	4	4	4	3⅞
Silver King	...	...	...	...	...	...
Tip Top	...	...	...	...	...	...
Union Cons	3½	3⅝	3¾	3¾	3¾	3¾
Utah	1¾	1¾	1¾	1⅞	1¾	1¾
Wales Cons	...	...	...	...	...	...
Yellow Jacket	3⅜	3½	3½	3½	3⅜	3⅜

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, November 1.

The market for mining stocks continues to rule extremely dull and inactive, and there is no material change in quotations. There has been rather more Calumet & Hecla sold than usual, showing that, while some holders are willing to sell, there are others ready to take their places on a stock which is sure to pay liberal dividends for many years to come. Sales this week range from $239@$238½, mostly at the latter rates. Franklin declined on a small lot from $11¾@$11, but a sale to-day of 50 shares brought the former price. Quincy has been very quiet, with sales at $52 early in the week, but subsequently declined to $50, at which it is now offered. Pewabic steady at dull at $2½. Osceola sold at $18½, same as last week. Brunswick Antimony declined from $15 July to $10.

In silver stocks, there is absolutely next to nothing doing. A sale of 1200 shares Catalpa at 27½c. nd 100 shares Sullivan at 96⅞c. comprise all the ansactions at the Boston Stock Exchange for the week.

At the Mining Board, there is more activity n livan and a better range of prices. Salesat 97½c.@$ regular, and $1@$1.07 buyer's option. Bowman ver, dull at 11@12c. Empire, 27@28c. unkin 25@28c.

3 P.M.—At the afternoon Board, Calumet & advanced to $240. The rest of the list was unchanged.

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 26.

The London market has declined in rate and one the past week, and with a weak sterling exchange market here, silver has fallen in our market, and dull at the figures of our table.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y Cents.
Oct. 27	50 15-16	110⅝	Oct. 31	50 15-16	110½
29	50 15-16	*	Nov. 1	50 15-16	110½
30	50 15-16	110⅛	2	50⅞	110⅝

* 110⅛@110⅝.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended November 2d, as compiled from various sources, amounted to $247,000, as against $153,000 reported for the previous week. The receipts from January 1st, 1883, to date are $9,563,047.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended October 27th	$255,807
Corresponding week last year	56,620
Since January 1st, 1883	12,328,959
Corresponding period last year	44,443,877

Imports.

Week ended October 27th	$599,793
Corresponding week last year	335,736
Since January 1st, 1883	14,141,847
Corresponding period last year	4,280,919

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £449,000 bullion, and the proportion of its reserve to liabilities was reduced from 43 15-16 to 43⅛ per cent, against 36 15-16 per cent at this date, a year ago. November 1st the bank gained £9000 bullion on balance.

METALS.

NEW YORK, Friday Evening, Nov. 2.

Copper.—The market continues quiet. Manufacturers who are doing a fair business, so far as volume is concerned, are well supplied, and enter the market only for small lots, for which they decline to pay more than 15c., while holders ask 15⅛@15¼c. Other brands are nominally 14⅛@14¾c. There is some dissatisfaction among manufacturers as to the freights on coal, ore, and metals. London is falling off again, the latest cable quotations being £61 2s. 6d for Chili Bars and £67 for Best Selected.

Tin.—The market is dull and weaker, with spot Straits quoted at 20¼@20⅜c.; and London down to £92 2s. 6d. The following statistical statement has been cabled to the Metal Exchange from London:

MOVEMENT OF TIN IN OCTOBER.

	1883.	1882.
Shipments:		
Straits to Great Britain	1,350	1,350
" " America	230	540
Total Straits	1,580	1,890
Australia to Great Britain	950	950
" " America	100	50
Total Australia	1,050	1,000
Total shipments	2,630	2,890
Deliveries from London	1 250	1,257
" " Holland	900	666
Total	2,150	1,923
Of which shipped to America	100	...
tock in London Nov. 1st	4,400	4,958

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DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Oct. 27. H.	Oct. 27. L.	Oct. 29. H.	Oct. 29. L.	Oct. 30. H.	Oct. 30. L.	Oct. 31. H.	Oct. 31. L.	Nov. 1. H.	Nov. 1. L.	Nov. 2. H.	Nov. 2. L.	Sales.	
1	Alice, s. c.	Mont	$10,000,000	400,000	$25	*				$400,000	Dec.	1881	.10			2.65										100	
2	Amie Con., s. L.	Colo.	5,000,000	500,000	10	*				330,000	Oct.	1883	.05	.12	.11	.12		.12								4,800	
3	Atlantic, c.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	220,000	Feb.	1883	$2.00														B.
4	Argenta, s	Nev.	10,000,000	100,000	100	275,000	Jun.	1883	.25	40,000	Feb.	1880	.20														
5	Barbee & Walker, s.	Utah	1,000,000	100,000	10	*				60,000	Nov	1880	.10														
6	Bassick, G. S.	Colo.	10,000,000	100,000	10	*				200,000	Jun.	1883	1.00														
7	Belle Isle, s.	Nev.	10,000,000	100,000	100	85,000	May	1883	.20	300,000	Dec.	1879	.25			.40										300	
8	Belcher, G. S.	Nev.	10,400,000	104,000	100	2,588,000	Apl	1883	.25	15,397,000	Apl.	1876	1.00														
9	Birdseye, G.	Cal.		15,000							Dec.	1882															S.F
10	Black Bear, G.	Cal.	3,000,000	30,000	100	15,000	Sept	1879	.50	895,000	May	1883	.20														
11	Bodie Con., G.	Cal.	10,000,000	100,000	100	225,000	Aug	1883	.50	1,295,000	Nov	1882	.20			.15										300	S.F
12	Bonanza Developm't	C&M	3,000,000	300,000	10					135,000	Oct.	1882	.15														
13	Boston & Mont, G.	Mont	2,000,000	200,000	10	*				310,000	Jan.	1883	.05														
14	Breece, s.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01					.18								1,600	P.
15	Bulwer, G.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	165,000	July	1883	.15					.50						.50		1,000	
16	California, G. S.	Nev.	54,000,000	540,000	100	962,000	Sept	1883	.20	31,320,000	Dec.	1879	.50	.31				.08								650	B.
17	Calumet & Hecla, C.	Mich	2,500,000	100,000	25					24,350,000	Oct.	1883	5.00														
18	Carbonate Hill, s. L.	Colo.								60,000	July	1883	.05														
19	Caribou Con., s.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10	.07						.07						500	
20	Carolina Queen, c.	N. C.	200,000	100,000	2					8,000	Oct.	1882	.02														
21	Castle Creek, G.	Idah.	100,000	100,000	1					51,000	Oct.	1883	.03														B.
22	Catalpa, s L	Colo.	3,000,000	300,000	10	*				240,000	Jun.	1883	.10														
23	Central, c.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,670,000	Feb.	1883	3.00														
24	Christy, s.	Utah	6,000,000	100,000	100	12,000	Sept	1883	.20	90,000	Jan.	1883	.10														B.
25	Chrysolite, s. L.	Colo.	10,000,000	200,000	50	*				1,600,000	Dec.	1881	.50			1.15		1.15		1.15		1.20		1.20	1.15	2,400	
26	Con. Bobtail, G.	Colo.	1,136,630	227,326	5	*				147,762	Mch	1880	.10														
27	Con. Gold Mining, G.	Ga.	500,000	100,000	5	*				112,000	Aug.	1883	.04														S.F
28	Con. Virginia, G. S.	Nev.	54,000,000	540,000	100	1,005,000	July	1883	.20	42,930,000	Aug.	1880	.50	.48	.47			.50				.50		.48	.45	5,250	
29	Contention, s.	Ariz.	12,500,000	250,000	50					42,461,500	Jun.	1883	.25														
30	Copper Queen, C.	Ariz.	2,500,000	250,000	10	*				1,225,000	Oct.	1883	.50														S.F
31	Crown Point, G. S.	Nev.	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00														
32	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*				4900,000	Jan.	1883	.10														B.
33	Dunkin, s. L.	Colo.	5,000,000	200,000	25	*				210,000	Oct.	1883	.05					.26		.26						660	
34	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	800,000	Sept	1883	.50	4,767,500	July	1882	.25	6.50						4.30	4.25			4.00		430	S.F.
35	Evening Star, s. L.	Colo.	500,000	50,000	10	*				1,275,000	Aug.	1883	.50														
36	Excelsior, G.	Cal.	10,000,000	100,000	100	363,000	Aug	1883	.60	875,000	Oct.	1880	.25														
37	Father de Smet, G.	Dak.	10,000,000	100,000	100					630,000	Oct.	1883	.20														
38	Findley	Ga.																									
39	Franklin, G.	Mich		54,000		360,000	Jun	1877		240,000																	
40	Freeland, s.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.25														
41	Fresno Enterprise, G	Cal.	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10														S.F.
42	Gem, s	Colo.	125,000	125,000	1					23,750	May	1883	.02														S.F.
43	Glass-Pendery, s. L	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10														
44	Glen, s.	Colo.	100,000	100,000	1					7 000	May	1883	.01														
45	Gold Stripe																										S.F.
46	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	3,530,000	Jun.	1883	.50	3,826,000	Oct.	1870	10 00														
47	Grand Central, s.	Ariz.	1,000,000	100,000	10					625,000	Dec.	1882	.25														
48	Grand Prize, s.	Nev.	10,000,000	100,000	100	470,000	Jun.	1883	.25	450,000	Sept	1880	.25			.48		.50				.60	.58			1,000	
49	Granite, s.	Colo.	125,000	125,000	1					6,250	May	1883	.01														
50	Great Eastern, G.	Dak.	300,000	300,000	1	*				16,000	July	1880	.01														
51	Great Western, Q.	Cal.	5,000,000	50,000	100	35,500	Aug	1873	.15	262,500	Oct.	1882	.25														
52	Green Mountain, G.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½														
53	Hale & Norcross, G. S	Nev.	11,200,000	112,000	100	4,118,000	Sept	1883	.50	1,598,000	Apl.	1871	5.00														
54	Hall-Anderson, G.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.05														S.F
55	Hecla Con., s.	Mont	1,500,000	30,000	50					522,500	Oct.	1883	.50														B
56	Henriett, L.	Colo.		270,000						27,000	Feb.	1883	.10														
57	Hibernia, s. L.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40														
58	Holyoke, G.	Idah.	200,000	200,000	1					48,000	Oct.	1883	.02														
59	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	2,237,500	Oct	1883	.20					13.50						10.00		500	
60	Hope, s.	Mont	400,000	8,000	50	*				113,036	Oct.	1883	1.50														
61	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				2,600,000	Aug.	1883	.75	6.13	6.00	6.25	6.00	6.13	6.00	6.13	5.88	6.00		6.00		4,330	
62	Howell S. & M. Co.	Ariz.	375,000	187,500	2	*				3,750	Aug.	1883	.01														
63	Hukill, G. S.	Colo.	1,000,000	200,000	5	*				210,000	Dec.	1878	.10					.05		.05						500	
64	Idaho, G.	Cal.	310,000	3,100	100					3,390,850	Oct.	1883	1.00														
65	Independence, s.	Nev.	10,000,000	100,000	100	245,000	May	1883	.30	225,000	Sept	1879	.25														B.
66	Indian Queen, s.	Nev.	250,000	125,000	2					368,750	July	1883	03														
67	Inyo, G.	Cal.	500,000	100,000	5	*				45,000	Apl.	1882	.05														S.F
68	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	*				1,200,000	Oct.	1883	.20	3.00		3.00		3.00		3.00	2.95					4,400	
69	Jocuistitta, s.	Mex.	10,000,000	100,000	100					900,000	Aug.	1883	.50														
70	Kentuck	Nev.	3,000,000	30,000	100	342,000	Nov	1881	.30	1,264,000	July	1883	.10														E.
71	La Plata, S. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30														
72	Leadville, S. L.	Colo.	4,000,000	400,000	10	*				310,000	Oct.	1883	.05			.40	.38							.40	.39	800	S.F.
73	Leeds, s.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15														
74	Little Chief, S. L.	Colo.	10,000,000	200,000	50	*				720,000	Oct.	1883	.10			.56		.56	.55					.54		1,200	
75	Little Pittsburg, S. L	Colo.	20,000,000	200,000	100	*				1,050,000	Mch	1880	.50			.58		.56						.50		406	S.F
76	Marguerite, G.	Cal.	500,000	25,000	20					18,750	Oct.	1882	.25														B.
77	Martin White, s.	Nev.	10,000,000	100,000	100	1,025,000	Sept	1883	.25	90,000	July	1879	.30														
78	Minas Nuevas, S.	Mex.	300,000	100,000	3	*				20,000	July	1883	.10														
79	Morning Star, S. L.	Colo.	1,000,000	100,000	10					615,000	Oct	1883	.25														
80	Mount Pleasant, G.	Calf.	150,000	150,000	1	*				60.000	Sept	1883	.15														
81	Mt. Diablo, s.	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	37,500	Oct.	1883	.25														
82	Napa, Q	Cal.	700,000	100,000	7					290,000	Jan.	1883	.10														
83	Navajo, G. S.	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	225,000	May	1883	.25							3.90						100	
84	New York Hill, G.	Cal.	5,000,000	50,000	100	55,000	Mch	1378	.20	215,000	Aug.	1882	.10														
85	New York & Colo., G.	Colo.	1,250,000	50,000	25					25,000	July	1879	.10														B.
86	Northern Belle, s.	Nev.	5,000,000	50,000	100					2,400,000	Apl.	1883	50					4.00								100	
87	North Belle Isle, s.	Nev.	10,000,000	100,000	100	95,000	May	1883	.20	30,000	Aug.	1851	.15														
88	Ontario, S. L.	Utah	15,000,000	150,000	100					5,000,000	Oct.	1883	.50									30.00				50	B.
89	Ophir, G. S.	Nev.	10,000,000	100,000	100	3,645,000	Aug	1883	1.00	1,595,000	July	1882	1.00											5.25		100	
90	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	935,000	Oct.	1883	50														
91	Oxford, G.	N. S.	100,000	100,000	1	*				30,000	Aug.	1883	.05														S.F.
92	Pleasant Valley, G. S.	Cal.	10,000,000	100,000	100	30,000	Sept	1883	.15	30,000	Dec.	1882	.05														
93	Plymouth Con., G.	Cal.	5,000,000	100,000	50	*				250,000	Oct.	1883	.50														
94	Polonia, s.	Colo.	200,000	8,000	25					12,000		1882	1.50														
95	Prussian, S. L.	Colo	1,500,000	150,000	10					132,000	Jan.	1883	.10														P.
96	Quicksilver, pref., Q	Cal.	4,300,000	43,000	100					654,000	July	1882	6.00													150	
97	" com., Q	Cal.	5,700,000	57,000	100					151,000	July	1882	.40					6.50	5.50								S.F.
98	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,584,900	July	1883	3.50														
99	Renfrew, G.	N. S.	60,000	30,000	2					4,800	July	1882	.02														E.
100	Richmond, S. L.	Nev.	1,350,000	54,000	25	*				4,042,587	May	1883	1.25														
101	Rising Sun, s.	Dak.	750,000	150,000	5	*				52,000	May	1881	.07¼														
102	Robinson Bar, G.	Idah.	100,000	100,000	1	*				9,000	Dec.	1882	.03														
103	Robinson Con, S. L.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50			.42		.45	.43	.45	.41	.41	.43			5,800	
104	Robert E. Lee, S. L.	Colo.	250,000,000	500,000	500					100,000	Dec.	1882	.10														E
105	San Francisco, C.	Cal.	5,000,000	50,000	100	45,000	Sept	1880	.50	20,000	Feb.	1883	.05														B.
106	Savage, S.	Nev.	11,200,000	112,000	100	5,540,000	July	1883	.50	4,460,000	July	1869	3.00														
107	Shoshone, G.	Idah	150,000	150,000	1					7,500	Apl.	1883	.01														
108	Sierra Buttes, G.	Cal.	225,000	22,500	10					1,450,933	Oct.	1883	.25														E.
109	Sierra Grande, S.	N. M.	10,000,000	400,000	25					700,000	Oct.	1883	.25														
110	Sierra Nevada, G. S.	Nev.	10,000,000	100,000	100	5,350,000	Aug	1883	1.00	102,000	Jan.	1871	1.00	3 75		3.95								4.00		400	P.
111	S'a P'mas Eureka, G	Cal.		40,625							Apl.	1882															B.
112	Silver Cord, G. S. L.	Colo	4,500,000	450000	10					180,000	Aug	1883	.25														S.F.
113	Silver King, S.	Ariz.	1,000,000	100,000	100					1,275,000	Jun.	1883	.25													100	
114	Silver King, S.	Colo.	1,000,000	500,000	2					50,000	Aug.	1881	10														
115	Smuggler, S L.	Colo.	660,000	66,000	10					66,700	Aug.	1883	.25														B.
116	Socorro, C.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾														
117	South Yuba, G.	Cal.	2,000,000	40,000	50	*				150,000	Oct.	1881	.75														
118	Spring Valley, G.	Cal.	200,000	200,000	1	*				50,000	Jan.	1881	.25														
119	Standard, G. S.	Cal.	10,000,000	100,000	100					4,250,000	Oct.	1883	.25			6.00		6.00				6.25				260	
120	Stormont, S.	Utah	200,000	200,000	1	*				155,000	Nov	1881	.05														
121	St. Joseph, L.	Mo.	1,000,000	100,000	10	*				390,000	Dec.	1882	.20														
122	Tip Top, S.	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov	1881	.20														B.
123	Tombstone, G. S.	Ariz	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10														
124	True Fissure, G. S. L.	Utah	1,500,000	150,000	10	*				75,000	Jun.	1883	.15														
125	United Gregory, G.	Colo	300,000	300,000	1					42,000	Apl.	1883	.25														E.
126	United Gold Min. Co.	Colo.									Oct.	1883	.05														B.
127	Vizina, S.	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1882	.10														
128	Yellow Jacket, G. S.	Nev.	12,000,000	12,000	100	5,358,000	Feb.	1882	1.00	2,184,000	Aug.	1871	1.50														
129	Yuba, G.	Cal.	5,000,000	200,000	25					4,000	Sept	1881	1.00														

*Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ This company, as the Western, up to December 10th, 1881, paid $1,475,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British companies. ‖ Total number of shares, 500,000; 50,000 shares have never been issued, and are still held by the company. Dividend shares sold, 38,025.

Lead.—Under sales aggregating between 300 and 400 tons, the market for Common lead declined from 4·10 to 4·05c. during the week, until to-day it was announced that 500 tons of Refined lead had been sold at 4c. The fact that this transaction has been completed is questioned in some quarters, but it is indicative of the state of the market that no surprise was manifested as to its having been done in well-informed quarters. With lead at this figure, it

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.	Capital Stock.	Shares. Number.	Par Value.	Assessments. Total levied to date.	Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Oct. 27. H.	L.	Oct. 29. H.	L.	Oct. 30. H.	L.	Oct. 31. H.	L.	Nov. 1. H.	L.	Nov. 2. H.	L.	Sales.	
1	Advance M & M. Co.																					
2	Albion, S. L.	Nevada	$15,000,000	150,000	$100	$622,500	July	1883	.50													S. F.
3	Alloucz, C.	Michigan	2,000,000	80,000	25	200,000	January	1883														B.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.5													S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	2,137,200	July	1883	.25													S. F.
6	Alta-Montana, G. S. L.	Montana	5,000,000	500,000	10																	
7	American Flag, S.	Colorado	1,250,000	125,000	10	30,000	June	1877	.25				.03	.02							3,100	
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*				.27	.26		.26	.25	.26		.26	.25	.26		4,900	
9	Battle Creek																					
10	Bear Creek	California	300,000	300,000	1																	
11	Beauce																					
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10													S. F.
13	Best & Belcher, G. S.	Nevada	10,080,000	10,800	100	1,446,[illegible]90	Septemb'r	1883	.50						4.00						100	S. F.
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																
15	Black Jack, G.	California	250,000	100,000	2½																	
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																
17	Bonanza King, Cons.	California	2,000,000	200,000	10	*																
18	Bondholder	Colorado	500,000	200,000	2½				.25													
19	Boston Con., G.	California	10,000,000	100,000	100	9[illegible],000	October	1882														
20	Boulder Con.	Colorado																				
21	Bradshaw, S.	Arizona	2,250,000	225,000	10																	
22	Buckeye	Colorado	2,000,000	400,000	5	*																
23	" preferred	Colorado				*																
24	Bull-Domingo, S. L.	Colorado	10,000,000	200,000	50	*																
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,767,000	May	1883	.20													S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																
27	Calaveras, G.	California	500,000	500,000	1	*																
28	Cal. W'r & M. Co., G.	California																				
29	Caledonia, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15	.31				.31	.30						2,300	
30	Castle Creek									1.10	1.05	1.10	1.05	1.10	1.00	1.05		1.05		1.05		3,800	
31	Catskill, S.	Nevada	1,500,000	30,000	5																	
32	Central Arizona, S.	Arizona	10,000,000	100,000	100																	B.
33	Chapparal	California																				
34	Cherokee, G.	California	1,500,000	150,000	10																	
35	Chollar, S.	Nevada	11,200,000	112,000	100	633,000	August	1883	1.00													S. F.
36	Climax											.07					.06				700	
37	Colorado Central, S.	Colorado	3,000,000	300,000	10																	
38	Columbia Con., G. S.	Nevada	5,000,000	100,000	50																	
39	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05													
40	Con. Pacific, G.	California	6,000,000	60,000	100	150,000	March	1883	.15													
41	Crescent, S. L.	Colorado	3,000,000	300,000	10	*																B.
42	Crowell, G.	North Car.	500,000	500,000	1																	
43	Dahlonega, G.	Georgia	250,000	250,000	1	*																
44	Dardanelles, G.	California	1,000,000	100,000	10																	
45	Decatur																.03		.03		7,900	
46	Dunderberg, S.	Colorado	1,500,000	150,000	10	*																
47	Durango, G.	Colorado	500,000	500,000	1	*																
48	Eastern Oregon																					
49	Elko Con., S.	Nevada					October	1883	.15	.03		.18		.02		.17		.17		.17		5,100	
50	Empire, S.	Utah	10,000,000	100,000	100																	B.
51	Enterprise	Colorado																				
52	Exchequer	Nevada	10,000,000	100,000	100	650,000	June	1883	.20													
53	Fannie Barret, S.	Colorado																				
54	Globe Copper	Arizona																				
55	Gold Placer, G.	Colorado	5,000,000	200,000	25	*																
56	Goodshaw, G.	California	10,000,000	100,000	100	210,000	June	1883	.10													
57	Granite Mountain, S.	Mont.	10,000,000	400,000	25	*																
58	Granville, G.	North Car.	300,000	300,000	1	*																
59	Harlem M. & M. Co., G.	California								.94	.92	.93	.92	.94	.9[illegible]	.95	.93	.95	.94	.96	.94	12,100	B.
60	Harshaw, S.	Arizona	10,000,000	100,000	100																	
61	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20													
62	Hortense, S.	Colorado	2,000,000	200,000	10																	
63	Julia, G. S.	Nevada	11,000,000	110,000	100	1,405,000	April	1883	.10													
64	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15													
65	Lacrosse, G.	Colorado	1,000,000	100,000	10	*																
66	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25													
67	Lucerne, S.	Colorado	5,000,000	500,000	10	*																
68	Mariposa pref., G.	California	6,000,000	60,000	100	1,687,500	December	1881														
69	" common, G.	California	10,000,000	100,000	100	1,975,000	February	1883	.25													
70	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20													
71	Mayflower, S.	Nevada	1,000,000	100,000	100	35,000	February	1883	.10													
72	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,420,200	Septemb'r	1883	1.00										3.25		100	S. F.
73	Michoacan Synd.	Mexico																				
74	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																
75	Miller	Nevada	5,000,000	200,000	25																	
76	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20													S. F.
77	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																
78	Moulton, G. S.	Montana	10,000,000	400,000	25	*																
79	Nevada Syndicate																					
80	North Standard, G	California	10,000,000	100,000	100	20,000	November	1881	.10	.14				.14		.14					400	
81	North Horn-Sil., S. L.	Utah		400,000																		
82	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00													S. F.
83	Old Dominion, C.	Arizona	3,000,000	300,000	10	*																
84	Oriental	Nevada	2,000,000	200,000	10																	
85	Oriental & Miller, S.	Nevada	10,000,000	400,000	25											.08	.07				300	
86	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25													S. F.
87	Parnell																					
88	Potosi	Nevada	10,200,000	112,000	100	640,640	Septemb'r	1883	.25													S. F.
89	Quartz Creek			100																		
90	Rappahannock, G.	Virginia		250,000		*																
91	Red Elephant, S.	Colorado	500,000	500,000	1	*																
92	Retort M. & M. Co.	Colorado		10																		
93	San Pedro, G. S. L.	New Mex.		400,000																		
94	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*							.15								500	B., P.
95	Silver Islet	Canada	1,000,000	40,000	25																	
96	Sonora Con.	Mexico								.26	.25	.26	.25	.27	.26	.27		.27	.26	.27		11,000	
97	South Bodie, G.	California		100,000		100,000	March	1882	.15													
98	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25													
99	South Hite	California	10,000,000	100,000	100		January	1883	.05													
100	South Pacific	California			5																	
101	State Line, No. 1, S.	Nevada	200,000	200,000	1																	B.
102	" No. 2, S.	Nevada	5,000,000	200,000	25																	
103	" No. 3, S.	Nevada	5,000,000	200,000	25																	
104	" No. 4, S.	Nevada	5,000,000	200,000	25																	
105	" Nos. 1 and 4, S.	Nevada			25																	
106	" Nos. 2 and 3, S.	Nevada																				
107	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25													
108	Sutro Tunnel	Nevada		2,000,000		*						.16	.15	.15		.16	.15	.17	.15	.16	.15	9,300	B.
109	Taylor-Plumas	California			10																	B., P.
110	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10													
111	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15													
112	Unadilla, S.	Colorado	50,000,000	500,000	100	*																
113	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,720,000	October	1883	.50			4.35				3.70	3.60			3.55		410	
114	Utah, S.	Nevada	2,000,000	20,000	100	1,440,000	October	1883	1.00													S. F.
115	Vandewater	Nevada	20,000,000	200,000	100	*																
116	Washington	Arizona	2,000,000	200,000	10																	
117	Whalen Copper	Nevada	2,500,000	100,000	25																	
118	Wide West																					
119	Willshire	California	250,000	50,000	5	*																

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 79,910. Total shares sold, 117,935.

behoves the producers to look to the freight rates, a lowering of which can alone give them relief.

Messrs. John Wahl & Co., of St. Louis, wire us to-day as follows:

Our market has declined slowly since our last report, there being but little doing, with the demand regulated by a hand-to-mouth policy. Sales for the week sum up over 200 tons of Refined at 3·85c., and 100 tons Common at 3·80c.

Messrs. Everett & Post, of Chicago, telegraph to-day:

We note a gradual decline in our market. Business has been quiet and of a limited character, with quotations at 3·82½@3·85c. The stocks in the hands of holders are limited, and offerings are therefore on a moderate scale only. Sales aggregate 250 tons.

Spelter.—The market continues dull and lifeless, with Common and Domestic nominally at 4½c., which, however, could probably be shaded.

Antimony.—This metal is firmer, with Cookson's at 10½c. and Hallett's at 9½c.

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IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 2.

The protracted dullness in the iron trade in this and all the other civilized countries in the world has seemed to many inexplicable. A few figures quoted by the London *Economist* will, we believe, go far toward removing much of the mystery that is supposed to cling about our present condition. The production of the three principal producing countries, Great Britain, the United States, and Germany, for the years 1868, 1873, 1877, and 1882, throw a flood of light on the subject:

PRODUCTION OF PIG-IRON.

	1868.	1873.
United Kingdom	4,970,206	6,566,451
United States	1,603,000	2,868,278
Germany	1,053,260	2,174,737
Total	7,626,466	11,609,466
	1877.	1882.
United Kingdom	6,608,664	8,493,287
United States	2,314,585	5,178,121
Germany	1,421,667	3,170,957
Total	10,344,916	16,842,365

With such figures, it is rather a matter of surprise that the reaction has not been much more violent. It will be noticed that the figures for 1868 and 1878 show a very heavy growth, which, during the period 1873-1877, received a check, and, in some instances, was followed by a decline. Then came another era of wonderful expansion, which, as we know, reached its climax last year. We, as well as others, have overshot the mark, and it is a very encouraging indication of the permanent growth in the demand for crude and manufactured iron, that the reaction has been as healthy as it has proved to be.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has the following returns to November 1st. It will be noticeable that they are in greater detail, and though the number is necessarily limited on account of the early date, it is instructive: Fourteen anthracite furnaces—four in blast, ten out of blast.

Grades.	Stocks. Oct. 1.	Stocks. Nov. 1.	Production. In Sep.	Production. In Oct.
No. 1	1,080	775	664	706
No. 2	483	412	361	405
Bessemer, with forge and lower grades	814	3,410	1,565	907
Grade not specified	3,646	.....	654	539
Total	6,723	4,597	3,244	2,557

Thirteen bituminous furnaces—four in blast, nine out of blast.

Grades.	Stocks Oct. 1.	Stocks Nov. 1.	Production In Sept.	Production In Oct.
No. 1	5,910	5,000	250	300
No. 2	350	.....	200	100
Bessemer, with forge and lower grades	4,454	3,800	644	700
Grade not given	500	500	2,000	1,900
Total	11,214	9,300	3,094	3,000

Fourteen charcoal furnaces—ten in blast, four out of blast.

	Stocks. Oct. 1.	Stocks. Nov. 1.	Production. In Sept.	Production. In Oct.
All grades	8,242	8,129	2,535	2,650

Forty-one furnaces, all kinds—eighteen in blast, twenty-three out of blast.

All grades.	Stocks. Oct. 1.	Stocks. Nov. 1.	Production. In Sept.	Production. In Oct.
Anthracite	6,723	4,597	3,244	2,557
Bituminous	11,214	9,300	3,094	3,000
Charcoal	8,242	8,129	2,535	2,650
Grand total	26,174	22,026	8,873	8,207

American Pig.—The market is fair, with a moderate business doing compared with the absolute stagnation of the past month. For this season of the year, the transactions are decidedly limited, and October has passed by with no better features than November, and there seems no immediate prospect of a revival in the demand. Foundry iron remains $20 $22 for No. 1 and $19@$20 for No. 2, with Gray Forge at $17.50@$18.50 at tide-water. Bessemer pig is dull, and with the lower prices for rails, will not find buyers except at very close figures. We quote $20@$20.25. Spiegeleisen is quiet at $30 for 20 per cent.

At the Exchange, the following sales were recorded: Friday, 100 tons No. 1, $19.50.

Scotch Pig.—There is very little to report, the situation remaining unchanged, with a light business and moderate supplies.

We quote ex ship and to arrive: Coltness, $23; Langloan, $23@$23.25; Summerlee, $22.50@$23; Eglinton, $20.50@$21; Glengarnock, $21.75@$22; Dalmellington, $20.75@$21.

At the Exchange, the following cable quotations were received to-day: Coltness, 56s. 3d.; Langloan, 55s. 6d. · Summerlee, 53s. 6d.; Gartsherrie, 54s. 6d.; Glengarnock, at Ardrossan, 53s.; and Eglinton, at Ardrossan, 47s. Warrants at the Exchange to-day were 44s. 10d.

Rails.—To-day, the Lackawanna Company announces the sale of 30,000 tons of steel rails at mill at $35 for winter delivery, the result of the feeling which we foreshadowed in earlier reports. This means simply that the best located mills in the country are determined to run full by securing the business. At such figures, some of the mills must close down to wait for better times, and in confirmation of this we are informed that the Troy works have temporarily closed their Bessemer works, which will run only at intervals to supply the merchant steel department, which does not call for its full capacity.

Other agents claim to have sold this week several lots at as high as $37 at mill, but it is not probable that buyers, under the circumstances, will henceforth place orders at more than $35@$35.50 at mill, according to time of delivery, section, etc.

Old Rails.—The market has shown more animation under lower figures. We quote $21@$22 for Tees.

Scrap.—We quote $23 ex ship.

Philadelphia. November 1.

Pig-Iron.—Between 12,000 and 15,000 tons of low-priced irons have been sold during the past few days, and there are inquiries in hand at present writing which will probably result in the placing of several additional large lots, although prompt delivery will not be insisted upon. There is more speculative feeling in the market this week than for many months. The reason of the increased activity is not owing to increase in consumption so much as to the belief prevalent in well-informed iron circles that the present exceedingly low prices are the lowest probable, and that now is the proper time to buy. This feeling has brought out several large consumers, and will result in the covering of requirements for a few weeks a least. An upward tendency would develop a further activity in the better grades. Thus far, business has been confined to low-priced irons chiefly. There are rumors of a further drop of 50 cents on special and standard makes, but inquiries show that there were only some shadings of about 25 cents on large lots. A few special brands are still held at outside prices, but most of the business done in specials is at the rates prevailing three or four weeks ago. Ordinary quotations are $20.50@$21.50 for No. 1 Foundry, and $19@$20 for No. 2. There is no difficulty in obtaining supplies of desirable iron at $19@$20.50, and sales have been made at lower figures. The activity referred to has been especially in mill irons, and prices range from $17@$19, tide-water, though very little is selling at the latter figure. A large amount of white and mottled iron has been sold at inside quotations, and some speculative inquiry prevails, and Western iron is offered for delivery in Eastern Pennsylvania.

Foreign Irons.—Bessemer is quoted at $20@$21. Sales can be made at $20, and negotiations are in hand at that price, but for moderate-sized lots. The attempt to move large lots has failed, even with the offering of heavy concessions. American Bessemer is finding more acceptance, and orders for foreign are hard to place. Brokers of Scotch irons are in receipt of a number of orders for small lots for delivery in Eastern Pennsylvania. Spiegeleisen is $30@$31. A few small lots have been asked for, but business is moderate.

Blooms.—A weakening of 50 cents in Blooms has brought out orders for a few hundred tons for delivery next month, especially of anthracite.

Steel Rails.—Sales have been made at $36.50. Small lots, $37@$38.

Merchant Bar.—The same unfavorable condition continues, and nothing new can be stated. There is some speculative inquiry, but, so far this week, offers have not been excepted, and neither holders nor sellers seem anxious to do business in the present condition of the market. Manufacturers argue that a change for the better is not far off, and that the present policy of reducing output will bring about an improving tendency in a very short time. As long as iron can not be sold at more than cost, the restriction will continue. Business has been done in 50 to 100-ton lots; card rate, 2·20c.; but iron can not be sold above 2·15c., and considerable quantities have been sold at 2c., and even below this figure in country mills. The car-works are calling for retail lots of iron, and pay from 1·75c.@1·90c. Business is promptly accepted at the best terms that can be had.

Plate and Tank Iron.—No large orders have been placed, but the average run of business is fair for delivery during the next two months. Buyers do not anticipate any further decline. Quotations, 2·35@2·40c. for Boat Plate; 2·40@2·50c. for Tank. Quotations for shell and flange are fluctuating, and inside prices can not be given for some large lots which have been ordered. Small lots of Shell, 3@3·25c. Flange, 4@4·25c.

Structural Iron.—Some brokers have had scattering inquiries for large and small lots, but no large business has been done, although there are evidences that the requirements known to exist will bring buyers into market during the present month for large lots. A great deal of bridge iron will be wanted this fall and winter. While other departments of the iron trade are suffering, the structural mills seem to be receiving a fair volume of business.

Nails.—There is less activity in nails this week, because of the fact that jobbers have quit ordering. Quotations, $2·80@$2·90. Some interest is felt as to the probable action of the Western nail-makers, who will meet in ten days to determine the question of restriction.

Old Rails.—Nominal quotations are $23.50 and $25.50 for Foreign, and $24 asked for American.

Pittsburg. November 1.

Pig-iron remains dull and unchanged. Demand is very light, and orders are placed for pressing requirements only. No. 1 Foundry sells at $20@$21; No. 2 at $18@$20, with better inquiry, but no large moving. Gray Forge, $17.50@$18.50, four months. There is no prospect of any improvement for some time to come, but no further decline is apprehended at present. Steel rails are quoted at $38@$38.50 for small lots, November and December delivery, but $37 has been taken for several good-sized lots for delivery during the early part of next year. The long talked of suspension of nail production has again been postponed, as the stocks are found to be quite light. Carload lots sell at $2.70, and smaller lots $2.80@$2.85. The usual amount of business is done. There is an increased activity in Merchant Bar, but prices are as usual, 1·80@1·90c., and no requirements are anticipated. Muck Bars are in moderate demand, and some sales have been closed at $33 cash, but $33.50@$34 time. Bessemer is quoted at $21@$21.50. There is no improvement in old rails or scrap. The whole trade is dull, and there is no immediate prospect of any improvement either in demand or prices.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 2.

Anthracite.

Our local market is very dull, and shows a decidedly weakening tendency, under the pressure of threatened accumulations. With the exception of some kinds of stove coal, the shading is increasing, and good buyers have little trouble in driving good bargains. The old-time threats, so often repeated, have no effect nowadays on the buyers, who have learned by experience during the past few years how much there is in them. There seems little prospect that any action will be taken during this month to carry out the policy of restriction, though it would be idle to deny that insisting upon full-time work must strain what is so often called the harmonious relations of the companies.

Much is made of the demand for the coal in the West, and there is no doubt that many of the dealers there are behind in their orders. Anthracite has been pushed further Westward this year than ever before, and though the quantity has been heavy, the nearer-by points like Chicago are a little behind. How much of the urgency of the Western dealers is due to the fact that they are anxious to get coal contracted for months ago at the prices and freight rates then ruling is another question. In any case, the lack of cars puts a limit to this source of relief to this market, and, in spite of the cries from the West, coal accumulates here. The Lehigh & Wilkes-Barre Company, we may here note, has also begun shipments to the West this week.

Bituminous.

The trade continues dull, the only feature being a stiffening in freights.

Horsford's Acid Phosphate.

For Lemons or Lime Juice,

is a superior substitute, and its use is positively beneficial to health.

HORN-SILVER MINING COMPANY, 44 WALL STREET, New York.

DIVIDEND NO. 11.

A dividend of $200,000, being two per cent on the capital stock, will be payable to stockholders of record on and after November 15th, at the office of the company. Transfer-books will close Wednesday, November 7th, and reopen November 16th.

W. S. HOYT, Secretary.

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.C. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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THE reduction of the price of steel rails to $35 at mill, which we announced in our last week's issue, has created a good deal of comment. To our minds, the most serious feature in connection with it is, that it throws an unfavorable light on the future rather than the present condition of the iron trade. Rails, more than any other specialty in the iron and steel trades, are ordered generally many months ahead, and the rail business, therefore, may be said to reflect, more accurately than any other, what will be the requirements of the most important consumer, the railroads. People are apt to point with satisfaction to the fact that, in the first ten months of the year, the mileage of our railroads increased 5000 miles. Unfortunately, the great bulk of all the iron-work needed for such new roads has probably long left the mills and foundries. The business they are doing at present confirms the conclusions one can not help drawing from the condition of affairs in the financial centers of the country, that the iron and steel trades can not look for much relief to the railroads and the many allied industries dependent upon them.

LEAD producers are beginning to show alarm at the course of values, and of late there have been a good many conflicting statements as to stocks, production, consumption, etc. It has been repeatedly stated that, through the maliciously inspired reports, notably of Eastern newspapers, a very false impression has been conveyed to buyers, and that much injury to legitimate trade has thus been wrought. So far as we can judge by an impartial survey of the situation, some of the "bear" articles referred to have been exaggerated. On the other hand, it is ridiculous on the part of producers—who profess with angry vehemence that the trade is in an ideal position, and quietly sell their metal right and left—to expect their statements to be accepted as gospel. The lead trade has, during the past few months, learned how dangerous is a little knowledge in the hands of outsiders. The times have passed by when the state of a large and important industry can be wrapt in mystery, and the lead producers and refiners would do well to accept the situation and guard against future troubles by a simple measure. They should form an association, something like the American Iron and Steel Association, which in critical times gives to the public absolutely reliable data as to the statistical position, watches the course of developments here and abroad, and at all times defends and protects the interests of the industry it represents. Such an association ought not to attempt to regulate prices or production. The sorry attempts made years ago by the association at St. Louis proved how little chance there is of success in that direction.

MODEL MINERAL STATISTICS.

In a recent issue, we referred to the first attempt made by a department of the government, the United States Geological Survey, to collect annually statistics of the production of the mining and metallurgical industry of the country. The work, considering the circumstances under which it was done, was very well performed indeed, and, from the expressions of approval coming from different quarters, has met with much appreciation. Yet few in this country probably have any idea of the completeness to which such statistical work has been brought elsewhere. Under the circumstances, we have believed it appropriate to quote at length from the report of the Prussian Department of Mines, a simple abstract of which we have generally printed in years past. We simply tabulate the footings, to show how far the inquiry of the government statisticians extends. Beginning with coal, lignite, etc., we have the following for 1882 :

	Bituminous coal.	Lignite.
Non-producing mines :		
Mines in course of development.....	14	6
On account of alterations.....	3	....
Hoisting waste rock only.....	....	1
Stopped for other reasons.....	....	4
Mines producing :		
Mineral mentioned as main product.....	382	419
Mineral mentioned as by-product.....	1	1
Total production, tons.....	47,097,376	10,798,091
" " value, marks....	232,724,491	29,570,722
Quantity used for own purposes, or wasted on dumps.....	2,960,988	907,213
Value thereof, marks	32,927,465	2,633,011
Marketable product, tons.....	44,136,388	9,890,878
" " value, marks.....	218,797,026	26,937,711
Value per ton, marks.....	4·96	2·72
Number of persons employed, total.....	171,610	20,108
Under ground.....	135,970	10,508
Above ground, men.....	32,416	9,258
" " women.....	3,224	342

In a similar manner, full details are given concerning graphite, which was mined to the extent of 38 tons ; asphaltum, of which 12,996 tons was produced ; petroleum, the wells yielding 5989 tons ; rock-salt, of which two mines turned out 210,129 tons ; kainite, which was produced to the extent of 141,272 tons ; and other alkali salts, figuring up to 553,029 tons. The iron and metalliferous mines had a record, from which we cull the following data :

	Mines producing.	Net output dressed ore.	All men employed.	Men below ground.
Iron ore.....	679	3,987,273	30,475	20,736
Zinc ore.....	115	693,369	12,750	6,976
Lead ore.....	121	155,803	18,562	10,130
Copper ore.....	84	558,850	12,787	10,966
Silver and gold ore.....	2	114	219	170
Cobalt ore.....	1	66	69	62
Nickel ore.....	7	14	..	..
Antimony ore.....	1	42	20	12
Arsenic ore.....	2	451	64	41
Manganese ore.....	23	4,130	238	70
Pyrites.....	25	157,960	827	454

The work of the salines is accounted for in a like detailed manner ; but what interest us particularly are the statistics of the production of the metallurgical works of the kingdom. We can, in our own country, boast of the elaborate and accurate figures published by the American Iron and Steel Association, and Mr. SWANK brings out some valuable features which we miss with our German friends. The following is a summary of the pig-iron statistics of the latter, which, we may add, the

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labors of the German Iron Manufacturers' Association are now supplementing in some points:

	Charcoal.	Coal or coke.	Mixed fuel.
Number of works	23	77	2
Men employed	1,488	15,730	29
Women employed	4	887	5
Output as main product	31,623	2,205,571	2,837
Output as by-product	231	226,905	380
Total product	31,854	2,432,476	3,217
Total value, marks	3,653,309	145,933,838	215,404
Value per ton, marks	114·69	59·99	66·94
Materials used:			
Domestic ore, tons	76,011	4,748,438	7,727
Imported ore, tons	822	712,645	.....
Of total ore received in roasted form	3,989	754,192	1,100
Domestic scrap	362	17,089	.....
Imported scrap	82	1,600	.....
Limestone	5,002	1,671,391	1,561
Domestic cinder	1,065	530,796	135
Imported cinder	.....	7,331	.....
Blue billy	.....	7,239	.....
Miscellaneous	108	528	.....

Figures such as these present a better estimate of the average yield of ore in the furnace than that which was attempted some time since in England, without taking into account the scrap, cinder, etc., the use of which is now largely increasing everywhere. It is to be regretted that no effort is made to add the quantity of fuel consumed.

The statistics of the spelter industry are particularly interesting, because Germany is the most dreaded of our competitors. We therefore reproduce the figures by districts:

	Silesia.	Westphalia.	Rhine Provinces.	Total.
Number of works	24	2	5	31
Men employed	4,031	1,348	1,550	6,929
Women "	1,243	6	11	1,260
Total product, tons	69,846	13,346	25,089	113,271
Domestic ore used, tons	502,166	36,272	56,760	595,197
Imported ores used, "	2,202	2,462	17,971	22,635
Including roasted ores	45,368	96	17,066	62,521
Other materials	9,863	57	165	10,085
Total ores and materials	514,231	38,791	74,895	627,918

These figures clearly show the distribution of the enormous spelter industry of Germany. They prove how largely the Rhine Provinces are dependent upon foreign supplies. The average yield of the ores and materials worked is about 20 per cent, their percentage of metal of course being considerably higher.

We can not now enter into details as to the production of lead, which footed up to 86,811 tons of pig-lead and 2739 tons of litharge. Nor can we do more than note in passing that the copper produced has reached 14,886 tons, of which the Mansfeld District is credited with 11,724 tons. One works in the Rhine Provinces made 2019 tons of copper from 63,963 tons of roasted imported pyrites, presumably Rio Tinto stuff, and 9940 tons of domestic material, using 2140 tons of iron, 6087 tons of salt, and 1713 tons of hydrochloric acid. The product of silver of Prussia was 161,519·82 kilograms of silver and 81·74 kilograms of gold, while the yield of nickel was 121 tons. Prussian acid-works turned out 211,824 tons of sulphuric acid, using 124,241 tons of domestic and 40,144 tons of imported pyrites, and 1234 tons of saltpeter.

Special returns are made in reference to the iron industry, which we summarize as follows; leaving out the details of the furnaces running on charcoal and mixed fuel, as of minor importance:

	Coal or coke.	Total.
Number of furnaces	206	237
Furnaces in blast during year	170	197
Total time of running, weeks	8,055	9,080
Product:		
Foundry pig	107,403	120,252
For steel manufacture, including spiegel	998,585	1,000,570
Forge pig	1,303,678	1,307,485
Direct castings:		
Machinery	746	918
Pottery	403	6,982
Pipes	6,500	6,504
Other castings	10,164	14,885

It will be noted how small a proportion of the pig produced is used for castings made directly from the furnace, and how small is comparatively the quantity of foundry pig made in Germany, in spite of the fact that, as the following figures, unique in their kind, show, the foundry business is one of magnitude:

THE PRODUCTION OF PRUSSIAN FOUNDRIES.

Number of foundries	137
Foundries connected with iron-works	85
Foundries connected with other works	436
Total	658
Hands employed	25,293
Plant:	
Cupolas, total number	1,256
" working	777
Reverberatory furnaces, total number	112
" working	89
Other furnaces, total number	280
" working	234
Material:	
Domestic pig, tons	181,617
Imported " "	158,899
Domestic scrap "	141,222
Imported " "	6,493
Total material	488,231
Product:	
Machinery castings	195,844
Pottery	30,290
Pipes	56,193
Chilled castings	11,963
Malleable castings	5,370
Miscellaneous castings	125,320
Total castings	424,979

The details in regard to the manufacture of wrought-iron are similarly elaborate:

Total number of works	263
Hands employed	46,152
Plant:	
Finery fires, total number	143
Finery fires working	110
Puddling-furnaces, total number	1,985
Puddling-furnaces, working	1,614
Rotary puddling-furnaces, total number	2
Rotary puddling-furnaces, working	1
Welding-furnaces, total number	1,064
Welding-furnaces working	809
Reheating furnaces, total number	543
Reheating furnaces working	477
Other furnaces, total number	219
Other furnaces working	192
Material used:	
Domestic forge pig, tons	1,528,053
Imported forge pig, tons	13,905
Loups and muck bar purchased	101,337
Scrap and old material purchased	158,823
Product:	
In finery fires, tons	18,599
In puddling-furnaces, tons	1,389,217
In other furnaces, tons	77,704
Marketed:	Tons.
Loups and muck bars	61,907
Rails	4,228
Track material	7,136
Railroad axles	219
Railroad wheels	6,505
Tires	2,857
Iron railroad ties	26,945
Fastenings therefor	2,227
Merchant bar	326,643
Fine bar	118,802
Coarse shapes	104,425
Shapes for bridges, ships, etc	105,429
Forgings	9,845
Parts of machinery	4,735
Boiler-plate	131,805
Sheet-iron, above 0·04-inch gauge	62,095
Sheet-iron, below 0·04-inch gauge	48,161
Tin plate	10,109
Wire	239,915
Tubes	6,400
Other kinds	30,019

The most noticeable figures are the insignificant quantity of rails, the large amount of iron sleepers or ties, and the heavy quantity of wire, in which the German iron industry leads the world.

The details of the steel industry are of particular interest:

Number of works	64
Hands employed	27,288
Plant:	
Bessemer converter, total number	61
" " working	48
Open-hearth furnaces, total number	59
" " " working	40
Crucible furnaces, for making steel, total number	6
" " " " " working	4
" " for melting steel, total number	285
" " " " " working	143
Cupolas, total number	120
" working	90
Reverberatories, total number	22
" working	4
Reheating furnaces, total number	581
" " " working	362
Other auxiliary furnaces, total number	49
" " " working	38
Material used:	
Domestic pig, tons	795,038
Imported pig, tons	120,354
Spiegeleisen, tons	130,139
Ferro-manganese, tons	5,165
Wrought-iron, tons	1,199
Steel purchased, tons	110,097
Old iron and scrap, tons	186,350
Steel purchased for crucible steel, tons	8,450
Iron purchased for crucible steel, tons	4,026
Product:	
Bessemer steel, tons	911,316
Open-hearth steel, tons	154,214
Other kinds, tons	5,096
Crucible steel, tons	36,215
Marketed as:	
Billets, tons	67,887
Crucible steel, tons	10,293
Rails, tons	479,093
Track material, tons	26,510
Axles, tons	17,846
Wheels, tons	28,871
Tires, tons	37,818
Sleepers, tons	47,116
Material for sleepers, tons	27
Ordinary merchant bar, tons	9,148
Fine steel, tons	13,673
Shapes for bridges, etc., tons	1,819
Machinery, tons	9,532
Guns and projectiles	12,176
Forgings	633
Ingots and blooms	71,388
Plates	1,350
Boiler-plate	3,241
Sheet-steel	4,341
Wire	123,532
Castings	151
Other articles	68,531

In all cases we have given merely the totals. The original report contains the same details for every one of the sixteen government districts, and these furnish a very close idea of the geographical distribution of the various industries without revealing private business. We do not wish to imply that it would be possible, even if it were desirable, to go into such detail in this country. We believe that it would in all cases be better to sacrifice absolute accuracy to prompt publication. A well-conducted census every ten years would be ample for all practical purposes, so far as the mass of less important data is concerned. It is humiliating, however, to be forced to confess that, so far as a large number of important industries are concerned, we have not, until this year, even made the attempt to collect them officially. It is to be hoped that in the future, figures for at least their total product will be gathered annually.

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THE NEW YORK MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

On Friday morning, special cars took the members to

THE WORKS OF THE YALE & TOWNE MANUFACTURING COMPANY, AT STAMFORD, CONN.

The party first visited the iron and brass foundries, in a well-lighted and ventilated building, containing a five-ton Weston jib crane, the construction of which was described by Mr. Towne. Special attention was directed to the furnaces with independent draught, used for brass melting, to the brass molding from ornamental and very light patterns, and to the use of band-saws for cutting off the gates of the castings. After visiting the cleaning, pickling, and tumbling rooms, the party went to the pattern-shops, for both wooden and metal patterns, on the second floor of the foundry extension, and then entered what is known as the "Post-Office" building, from the fact that it is devoted to the manufacture of post-office equipments, chiefly wood-work. The wood-working machines are on the lower floor, and the upper floor is used for erecting. In busy times, this floor frequently contains six or eight post-offices, in different stages of completion. The metallic fronts for lock-boxes are made in the lock department and fitted to the wood-work in the "Post-Office" building. Special attention has been given to guarding against fire by the application of the overhead steam heating system in the east end of this building, and the use of overhead automatic sprinklers. Crossing the yard, the pulley-block shop was next visited. This is devoted to the manufacture of the Weston differential pulley-blocks, and the chief point of attraction is the chain-shop, in which are made all the chains used in the Weston pulley-blocks, cranes, and hoists. The smaller sizes are all made from Norway rods, and the larger sizes from American iron of high ductility. The gauges used by the chain-makers are slightly below standard pitch. After being forged, the chains are brightened by rattling, and then stretched in a special machine up to the final pitch or gauge. The strain thus applied is within the elastic limit, but has the effect of bringing the links to a permanent bearing with each other, and of giving such set to them that, when used within the intended limit of load, they will not alter their length. In this way, a chain of uniform and permanent pitch is obtained, and one having the high qualities necessary for crane work. The members were next conducted to the old "crane-shop," now fitting up for testing-machine and scale work. They were here shown a six-ton Weston hand traveling crane, which was operated and its construction explained, after which lunch was served.

After lunch, the visitors were conducted to the engine-room and boiler-house, containing a 20 by 42-inch Harris-Corliss engine, running 72 revolutions and developing about 125 horse-power; also the pit containing the hot-well, into which the condensed water from the entire heating system of the works is returned, and containing also Worthington duplex pump, Berryman heater, etc.; also a battery of six tubular boilers, built by Beach & Son, of Hartford, with patent water-fronts (dispensing with all brick setting about the fire-door), and Jarvis furnace setting, by means of which slack coal and other refuse is used as fuel, the present mixture consisting of one part of bituminous slack to four parts of anthracite pea and dust.

The party next entered the crane-shop by the gallery containing the coat and wash-rooms, from which an excellent view of the shop was obtained. The shop is 100 feet wide and 300 feet long, is divided into three aisles or bays, the center one having a clear span of 50 feet, and being used for heavy work and erecting and shipping purposes, the side aisles containing benches and light machine tools. Two Weston power traveling cranes, one of 20 tons and the other of 30 tons capacity, are in operation here, and their mechanism was explained by Mr. Towne. An exhibit of hand-hoisting appliances was also inspected. A short visit to the new —not quite completed—hammer-shop followed, and then the party were conducted successively through the small lock department, devoted to the manufacture of rim and mortise door-locks, large use being made of profiling machines; the tool-room, where special tools and appliances required in the lock department are made; and the "wheel-room." In the latter, some twenty-four men are employed in emery-grinding, and it is to be noted that the atmosphere of the room is perhaps more free from dust than that of any other room in the works. The removal of the injurious brass and emery dust is accomplished by large exhaust-fans in the basement, the peculiar form of the hoods covering the wheels, and of the orifice leading from these to the exhaust-tube, being important features.

Ascending another stairs, a brief visit was made to the plating department, the first room of which contains the acid and soda-tanks, etc., the second the buffing-lathes for polishing by means of rag wheels, and the third the plating appliances, including the depositing-tanks, dynamo-machines, etc. Leaving the plating-room, the party entered the room in which the 75-ton Emery hydraulic testing-machine is temporarily erected, and where a short series of tests of materials was made in the presence of the members. The testing-machine is similar in general principles to the 400-ton government machine at the Watertown Arsenal, but is of the upright type. It has a straining capacity of 151,000 pounds, applicable to tests of tension, compression, and transverse loads. It will receive specimens for tension up to 74 inches in length, and for compression up to 88 inches in length, with ample allowance for elongation. The supports for transverse strains can be separated 84 inches, and specimens of any length can be inserted. The construction and action of the machine were explained verbally during the process of making the tests.

THE EVENING SESSION.

After a brief discussion of the plan proposed to elect the officers of the society, Mr. C. J. H. Woodbury presented a lengthy paper entitled

EXPERIMENTS UPON NON-CONDUCTING COVERINGS FOR STEAM-PIPES,

giving the details of tests made by Professor Ordway, for the Boston Manufacturers' Mutual Fire Insurance Company. We may have occasion to refer to this paper at some future period. Suffice it to say, that its conclusions were attacked on the ground that these were not carried out on a larger scale, and by methods more closely approximating actual practice. Mr. Emery held that even their value as giving comparative data was open to doubt, and he gave some interesting figures to show how small the condensation was in four miles of the pipe, two thirds of it over 15 inches in diameter, of the New York Steam Heating Company in this city, the underground pipes of which are covered with mineral wool.

Mr. E. D. Leavitt, Jr., consulting mechanical engineer of the Calumet & Hecla Mining Company of Lake Superior, cited the fact that at those mines 8-inch pipes more than five hundred feet long were used to carry steam from the boilers to the engine. Formerly, when laid in a simple launder, the condensation in them amounted to several hundred gallons per hour. He covered the pipe with a mixture of plaster of Paris and sawdust, costing approximately 12½ cents per square foot. Before the covering got dry, the condensation increased; but when once thoroughly dry, it decreased until it was less than one per cent of what it had been before. This kind of covering was first introduced by Chief-Engineer Isherwood at an iron-works in Baltimore, where, with 1 inch of hair felt over it, there was a decrease of 95 per cent of the condensation. Mr. Leavitt now applies it for boilers generally, putting on a 2½-inch layer of a mixture of one part, by volume, of plaster of Paris, and two parts of saw-dust, made into a mortar, and putting above that a 1½-inch layer of felting, and in spite of the fact that at the Calumet & Hecla the temperature runs below zero only a few feet from the boilers, there is no noticeable increase in the quantity of fuel consumed, in summer or in winter.

By special request, Professor Thurston gave a brief abstract of his paper on the Theory of the Turbine, lack of time preventing a thorough consideration. Professor Hutton, the secretary, then read the following papers by title, Motive Curves for the Slide-Valve, by A. W. Robinson, and Compression as a Means of Governing Engines, by Harris Tabor. Before adjournment, the customary resolutions of thanks were offered.

On Saturday, the members, by invitation of the New York, West Shore & Buffalo Railroad, took a trip over the road to Kingston, N. Y., inspecting the exceptionally extensive terminal facilities at Weehawken, and the generally high character of this new road, which has had to contend with so many engineering problems in its construction.

A NEW GLOSSARY OF MINING TERMS.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: At first thought, it would seem that this field had been so often gone over and so fully ransacked that little room was left for a fresh compilation. But a glance at the new glossary published in the Report of the Director of the Mint on the Production of Gold and Silver in the United States for 1882 (pp. 753–763) will show that such a view is erroneous. This contains much that will be novel to mining men, and many of the definitions are so strikingly original that it is worth while to append some of the best:

"ADIT-LEVEL.—A tunnel driven for effecting the general drainage of a mine, being designed to receive and carry off the water, both above and below its level."

"ALLUVIAL [*sic*].—Deposits of mud, sand, gravel, etc., made by running streams, more especially the deposit left along their banks during high water."

"AMALGAMATION.—The process by which metals are separated from their ores by mixing them with mercury."

"APRON.—A canvas-covered frame set at such an angle in the miner's rocker that the gravel and water in pouring over it are carried to the head of the machine." No reference to the aprons of gold mills.

"ANTICLINAL.—The line of a crest above or underground, on the two sides of which the strata dip in opposite directions."

"ARRASTRA.—A Mexican contrivance for crushing and amalgamating ores by means of a heavy stone dragged around upon a circular bed." This single-drag apparatus is something rare.

"BAR.—A band of hard stone or rock crossing a lode."

"BASE METALS.—The metals not classed *as valuable* or precious." Not copper? Nor lead?

"CAGE.—A *box* or platform used for hoisting in a vertical shaft."

"CAP.—A vein is in a 'cap' when it is much contracted."

"CAP-ROCK.—The uncertain upper rock that covers the older bed-rock."

"CHILIAN MILL.—An improved arrastra, in which a heavy stone wheel is rolled around the circular bed." How about the iron ones?

"CREVICE.—A narrow opening resulting from a split or fissure." Or from a fault?

"DAMP—BAD AIR.—Choke-damp; fire-damp."

"DEPOSIT.—Mineral deposit, or ore deposit, is used to designate the natural occurrence of mineral or ore sufficiently rich to warrant its being worked."

"EPIDOTE.—A mixture of alumina and silica forming a variety of granite; often of beautiful color and shape."

"ERUPTIVE.—The name given to rocks that have burst through other rocks in a molten state, *or that have been thrust up bodily*."

"EXPLOSIVES.—The explosives used in mining are gunpowder, *nitro-glycerine*, dynamite, etc."

"FEEDER.—A small vein joining a large one at nearly right angles."

"FIRE-DAMP.—Light carbonated hydrogen gas. . . . ."

"FISSURE-VEIN.—A fissure or crack in the earth's crust filled with mineral."

"FLOURING.—The covering, in the course of using, of the globules of mercury used in gold" [and silver?] "extraction with a thin film of the sulphide of some other metal by which the gold" [or silver?] "is lost; sometimes called sickening." The compiler evidently does not believe in mechanical flouring.

"FLUME.—An artificial water-course."

"FLUX.—Any substance that is favorable to fusion, oxidation, or reduction by fire." Wax?

"FREE-MILLING ORE.—Ores in which the precious metals are free from combination with other substances, and can be reduced by crushing and amalgamation without roasting or chemical treatment." Horn-silver, argentite, etc., should therefore be roasted or subjected to "chemical treatment."

"GALENA.—Sulphide of lead; the ordinary lead of commerce."

"GRIZZLY.—A grating to catch and throw out large stones from sluices." Not used in mills, apparently.

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"GROUND-SLUICE.—A long box with suitable chinks for retaining the gold, used by gravel miners for washing away large quantities of auriferous *débris*."

"HEADING.—The under side of a lode or vein above a drift."

"HORN-SILVER.— . . . So called because it has a horn-like surface."

"HORSE.—The dead or barren rock or ground by which a vein is sometimes split horizontally into two."

"HUNGRY.—Hard, barren vein matter, *like quartz*."

"IN PLACE.—An ore-deposit occupying the place in which it was originally found."

"LEVEL.—A horizontal passage or drift into or in a mine."

"MATTE.—The product of the first incomplete reduction of an ore."

"MILL.—Works for reducing ores by other means than smelting."

"MULLER.—The iron shoes dragged around in an amalgamating pan to mix and further pulverize the pulp."

"NODULAR.—Having a blistered appearance . . . "

"ORE.—The parts of a vein containing a useful or salable metal."

"PAY-STREAK.—In placer mining, a rich strip of gold-bearing gravel."

"RIFFLE.—A *groove* in the bottom of a sluice to hold the quicksilver and catch the free gold."

"ROASTING.—Ores submitted to the action of flame until sulphurous and arsenious fumes cease to be given off."

"ROCKER.—A long sluice-like box for washing away gravel from gold by cradle-like rocking."

"ROCKING.—The process of separating ores by washing on an incline plane."

"SCREEN.—A sieve of wire-cloth or perforated sheet-iron, used to sort ore according to size."

"SHAFT.—A pit, or well-like excavation, sunk from the surface."

"SLAG.—The melted gangue from furnace smelting and assaying of ores."

"STOPING.—Excavating ore from a vein by driving horizontally upon it a series of workings, one immediately over or under the other."

"SUMP.—A pit sunk from the bottom of a mine, either to probe a ledge or collect water."

"TAILINGS.—. . . or what passes away from reduction-works after any systematic treatment."

"TUNNEL.—A level driven at right angles to the vein which it is desired to reach."

"UNDERLIE.—The departure of a vein or stratum from the vertical."

"VEINOUS.—Rock or matter from the vein, and not 'bed-rock' or 'country.'"

"WATER-COURSE.—An artificial channel for passage of water."

The compiler has exercised a critical selection of terms, introducing such obscure names as cañon and gulch, yield and output, alloy, anneal, assay, caved, crushing, *ingot*, etc., and carefully omitting all lingo common to the tender-foot; as, for example, skip, skeet, whip, compressor, blower, fan, reel, drum, sheaves, gallows-frame, baby-hoist, cable, Cornish pump, water-jacket, speiss, pan, settler, agitator, table, sluice, slime, giant powder, exploder or cap, fuse, slickens, names of rocks and ores, etc. This feature adds to the convenience of reference. We note with sorrow, however, that the printer has taken liberties with some of the definitions. Thus batea appears as "bateau," a fault is described as a "discoloration," hose becomes "horse," etc. It is too bad that typographical errors should be allowed to mar the beauty of this unique work. ‡

AMONG THE IRON WORKERS.—JOHNSTOWN.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: At Altoona, I asked a Johnstownian about the hotels I would find at his native place, and his description I afterward found to be too true. "There are but two hotels of any pretensions," said he, "and whichever one you go to, you will wish that you had taken the other." Thus encouraged, I sought out the Merchants' Hotel, when I reached Johnstown on Saturday evening. At the station, I asked for directions to take me to mine inn, and with rather a vague idea, I started out to follow them. Their want of definiteness, however, soon became too apparent, and I had to apply to a young traveler for further information. After getting the desired directions, I asked the young fellow if this were not the best hotel, and had my purpose well-nigh upset by his answer, "No, indeed, the other is much better;" and not content with directing me thither, he started out to accompany me. It struck me that such unusual attentions might not be disinterested, so I thanked my would-be guide, and said that I would first get my mail and search for a hotel afterward. He proved the kindness of his purpose, however, by taking me to the office, and, having given me very full directions, he bowed himself off. Though the Merchants' fulfilled its description entirely, yet I was not sorry that I had carried out my original intention; for at the supper-table, I was fortunate in finding an old college friend; and the circumstances of our meeting added greatly to the pleasure of my visit.

The life of Johnstown, and indeed almost the *raison d'être* of its existence, is the Cambria Iron Company. The city itself is rather complex in its organization. It includes several neighboring boroughs, and in all boasts of something like eight thousand inhabitants. Its location is rather peculiar. In the very heart of the mountains, the town-site is nearly level. On all sides, the town is surrounded by steep hill-sides; and in this lies its peculiarity that, when one reaches the top of the hills, instead of finding corresponding valleys on the other side, he finds simply an elevated table-land, on which many productive farms are located. The city seems to be situated in a marked depression of an otherwise level plateau. The streets of the place have no gradual changing to steep grades, but are beautifully level until they seem to terminate against the steep hills. The town has shared the success of its great company. With the growth and prosperity of their furnaces and mills, the Cambria people have done much to improve the locality. The company's stores, run under the name of Wood, Morrell & Co., the original projectors of the iron-works, are themselves a substantial monument to the business importance of the place. I was told that in one month the sales amounted to $93,000—a goodly sum for a place of this size; but, as a rule, the miners and iron-workers are an improvident set, and enjoy their money while they have it. This accounts, in a measure, for the enormous sales of a store which must compete with many other well-stocked houses. It is, perhaps, an unequal competition; for, while the laws of the State forbid manufacturing and mining companies from paying their employés in merchandise, yet, in most cases, some pressure is brought to bear to influence the workmen's choice of stores. Adjoining the stores, one finds a large, substantial brick building, and on inquiry is told that it is the general offices and drawing-rooms of the company. On the opposite side of the street, another large brick building attracts the attention; it is the library erected by the company for the use of its employés and the townspeople generally. Its architecture and general appearance proclaim it to be a new structure; and if it fulfills the promise of its exterior, the Johnstownians can have no lack of good reading matter. It is a noticeable and very pleasing fact in all these industrial towns to see the pains the large companies are taking to furnish every incentive to their workmen to educate and cultivate themselves; and both by libraries and night-schools, the good work is helped along. At Johnstown, certain evenings in the week are devoted to lectures on various subjects of educational interest. Thus, the assistant mining engineer lectures on geology, another gentleman on astronomy, perhaps, and so on. The time seems finally to have come when capitalists recognize the importance of intelligent workmen, and, joining philanthropy and self-interest, they are making earnest efforts for the improvement of their employés. A few squares from the library, another building of no small pretensions is found in the Cambria Club-House, which addresses itself to the more material wants of Cambria's richer workmen. A few years since, and the visiting president and directors of the company had, in the absence of any decent hotels, to be accommodated at the house of the general manager; but since the gentlemen came once a month and staid several days on each visit, it became necessary to provide some more extensive quarters than could be demanded of individual hospitality, and so the Club-House was built to meet this requirement. Its advantages are, however, open to the company's employés, and to any strangers procuring cards of admission from officials high in authority. Unfortunately, the prices, ranging from thirty to sixty dollars a month for room and board, are beyond the means of most young men whom it would benefit—those coming from comfortable homes, who are ill prepared to be content at a country hotel or provincial boarding-house. The building is quite modern, having gas and electric bells, and is furnished in a modestly artistic style. The rooms are gems of their kind, having large windows, open grates, and Queen Anne furniture. On the whole, the entire building, inside and out, gives one the impression of being a well-kept, comfortable sort of place.

Nor is the town devoid of amusements. Though the largest building, Union Hall, affords but meager accommodation, in either auditorium or stage appointments, it is made the most of, and many a strolling dramatic company lures the half-dollar necessary for admittance to the "show" from the open pockets of the too careless workmen. At the time of our visit, Miss Pixley was in town, and with her company gave *M'liss* at the Hall. The performance was highly appreciated, the applause being quite uproarious at all sensational situations. The heavy villainy and wholesale display of revolvers particularly pleased the fancy of the iron-workers.

Not less conspicuous among Johnstown's buildings are her churches. A stranger is surprised to see such roomy and substantial structures. All denominations seem represented, and, from the size of their buildings, are apparently well patronized. Sunday morning finds quite a change in the town. The noise and bustle of the week are hushed, and the works, except the blast-furnaces, are at rest and silent. The Episcopal church, one of the prettiest in the place, gathered a very fair congregation to hear the discourse of her bishop. In the evening, we went a second time; but on account of the administration of confirmation, the church was greatly crowded, and we turned away to attend a neighboring service. We were somewhat amused to find the sermon about half over, but understood the cause when we afterward learned that the hour was a half earlier than in our own church.

With Monday morning, the stir and bustle of the place again manifested itself. Mills and shops were again in operation, and the town reverted to its condition of the previous week—that of a huge factory. Steel rails form the chief product of the company's works. The rail-mill is a long, low building, that presents many interesting features to a stranger. After watching the production of the pig-iron from the ores in the great blast-furnaces, and having seen the change of the pig metal into steel in the huge Bessemer converters, the last chapter in the transformation, the shaping of the steel into rails, is no less interesting. As carried out at present, the large ingots of metal, as they come from the converter, are heated to whiteness in furnaces, and having been rolled out into long bars, are cut into lengths such that each will form one rail. These smaller ingots are again reheated, and are now ready for the rolling-mill proper. Eleven times does the steel ingot pass through the rolls before it attains the proper shape for a rail. The mass of red-hot metal is first rolled into a short stout bar, then into a thinner but longer one, then into an approximation to the rail shape, and so on through the gradual changes, until it emerges into the perfect rail. But the process is not yet ended; for the rail ends are still ragged and uneven, and must be cut down to a smooth section and uniform length. To accomplish this, the rail, still red-hot, is brought before two parallel circular saws, revolving at great speed but without teeth. The distance between the saws being of the length desired for the rails, both ends are cut at once and the rail passes out to the cooling platform. Here small iron arms receive the rails, and placing them side by side, give to each a slight curve to allow for contraction. Were they left straight, they would be found to have a decided curve when cold, since there being a greater mass of metal in the head than in the flange, the contraction would be greater in the greater mass, and the rail would be found in a curve, with the flange on the outside. Hence the red-hot metal is curved with the head on the outside of the circle, so that when cold the rail shall be perfectly straight. When quite cold, the rails are further passed through another machine, so that any irregularities may be corrected, and the product be of perfect form.

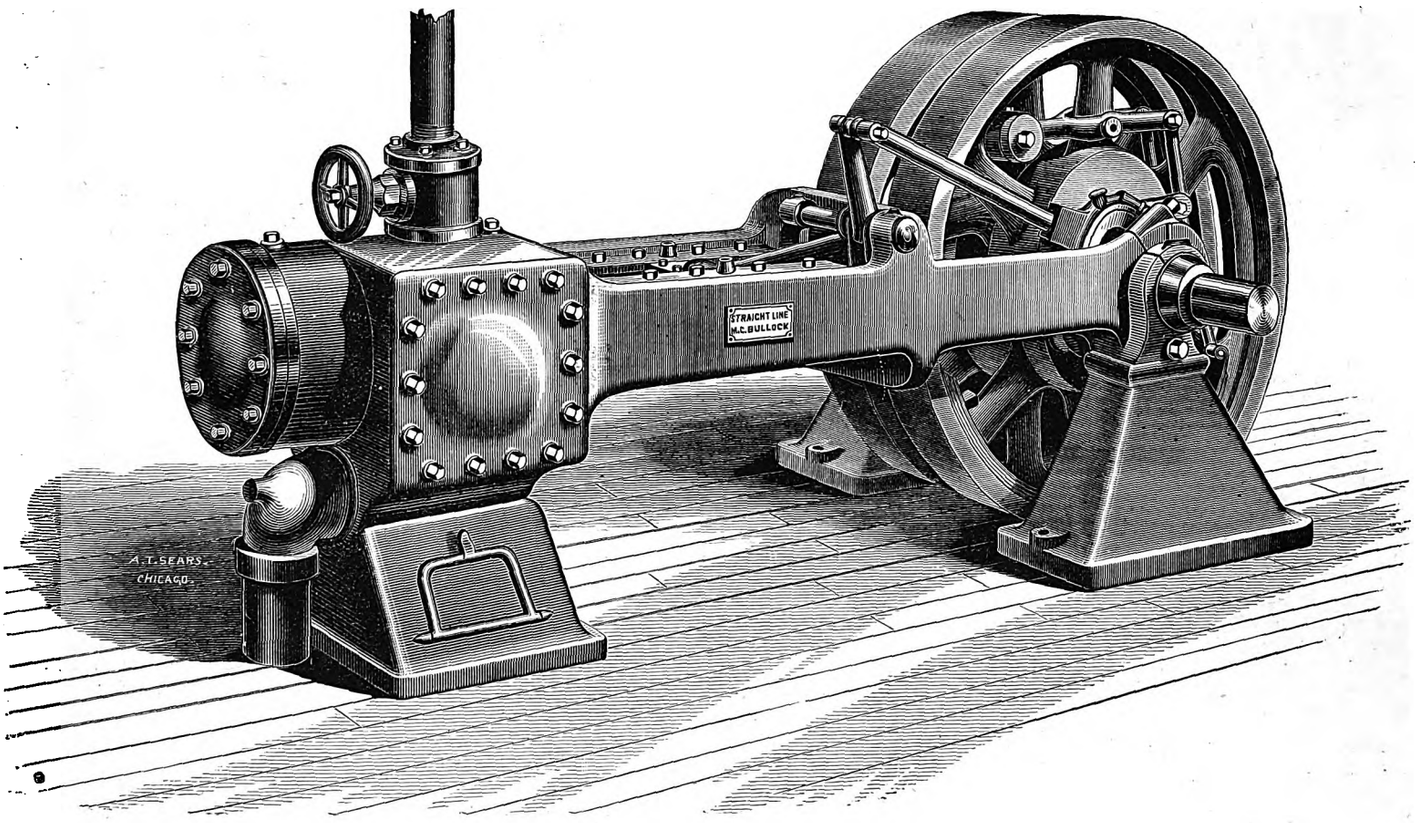
Johnstown had many other objects of interest in the way of mines, wire-mills, and coking-ovens, at which we could take but a glance, and proceed on our pilgrimage; the Mecca of our trip being, in this case, Pittsburg. CARL.

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THE STRAIGHT-LINE ENGINE.

We place before our readers illustrations of the straight-line engine, including special cuts of the latest improvements in the minor details which have never before appeared in print. The engine, as will be seen by an examination of the various engravings, differs in nearly every essential feature from all other engines heretofore brought out; and from the character of the design or the motto that we find on one of the circulars of the builders, "A straight line is the shortest distance between two points," we infer the name "straight line" was evolved.

The two sides of the frame run in straight lines following the lines of strain from the cylinder to the main bearings, and the frame, jacketed cylinder, steam-chest, guides, main bearings, etc., are cast in one piece and rest on three self-adjusting supports. All the lines in the design are straight, with curved ends, and all the sections rectangular, with rounded corners. While in its articulating and rotating elements there is very little that is essentially different from the modern horizontal engines, constructively each point has been a study in itself. The piston is very long and light, as shown by the section Fig. 1, and is secured to the rod by the double taper central thread and a shrink fit. The packing consists of four eccentric cast-iron rings sprung into grooves, and prevented from working around in the manner shown in Fig. 2; *A* being the piston, *B* the rings, and *C* filling pieces tightly driven in



THE STRAIGHT-LINE ENGINE.

the grooves. The joints between the ring and filling pieces are cut in such form that the expansion and contraction of the rings does not open a passage for steam between the two. The packing pieces are placed on the bottom of the piston, and dressed smooth, restoring the wearing surface to its full extent. The pistons are deeply recessed, to admit of the long Babbitt bushings which serve as the piston-rod packings *D*, Fig. 1. These bushings are self-adjusting, by the ball-and-socket and sliding joint, so as to conform to the position of the piston-rod, and are steam-tight when the engine is running, while they are four one thousandths of an inch loose on the rod. This is due to the length of the bush, the steam not having time to insinuate its way through the narrow opening during the time the engine is making a half-revolution. The piston-rod is secured in the cross-head by being threaded in between two half-nuts and the half-nuts clamped on the thread by binding screws. The cross-head pin is made fast in the connecting-rod by a clamp-bolt, and turns in the cross-head, giving two bearings in the place of one, as usually employed, with the advantage that the journals can be oiled with perfect convenience. The pin is of hardened steel, ground and polished, and turns in Babbitt bearings with effective compensating wedges and screws. The connecting-rods, Fig. 7, are of cast-steel, 6½ cranks long, and grasp the crank-pins more than one half the diameter of the cylinder in size and of a length equal to about one third the stroke of the engine. These crank-pins take direct hold of and join two fly-wheels. These wheels may be used for driving belts, or pulleys may be placed on the ends of the shafts, which project through the side frames for that purpose. (See Fig. 3.) The crank-pins and shafts are of steel, ground and polished in their bearings, and turn in compressed and scraped Babbitt-metal boxes.

One of the fly-wheels carries the governor, Fig. 4, which consists of a single governing weight, a single spring connected by links to a single shifting eccentric. The eccentric has cast with it two projecting arms, one being pivoted to the fly-wheel and the other attached to the governor. The weight of the governing ball is such as to just counterbalance the weight of the eccentric and its attachments against gravity; but the center of gravity of the weight being farther from the center of rotation than the eccentric, the weight being heavy, rotating in a large circle and at a high velocity, gives it high governing power. All the pivots subject to heavy strain are anti-friction journals, flat pieces of hardened steel rolling on round pins, giving rolling in the place of sliding contact, and requiring no oil.

The eccentric plate is pivoted in such a position that the engine when taking steam at three-quarter stroke has a positive lead; and when cutting off shorter, the lead changes to zero and negative lead, as the cut-off grows shorter and shorter.

One of the most novel features of the engine is the valve motion, which, though consisting of the ordinary rock-shaft arrangement, is so proportioned that the lead varies alike at each end of the cylinder, and the cut-off is practically alike at each end at all points of cut-off. This is accomplished by the position of the upper rocker-arm, which is at an acute angle with the eccentric-rod, as shown by the diagram Fig. 9. By this arrangement, the eccentric can be shifted when the crank is on either dead-center from its greatest to its least throw, without giving motion to the valve, if it is desirable to provide for a constant lead; or so as to give equal motion to the valve at each end when a variable lead is required. The rocker-arm is of ordinary construction, except that the lower arm is forked so as to take hold of each side of a sliding block which works in jaws on the end of the valve-rod, Fig. 5. The valve-rod works through a long Babbitt bush, which is secured in the frame of the engine by a taper fit and nut. The adjustable coupling on the valve-rod hooks into lugs cast on the valve in such a way that the valve may be removed without disturbing the adjustment. The valve is a flat slide working between a cover-plate and the valve-face, and distance-pieces between the valve-face and cover-plate above and below the valve, three or four one thousandths of an inch wider than the thickness of the valve, receive the full pressure of the steam on the cover-plate, allowing the valve to play free and yet practically steam-tight. Valves of this character were used in England years ago, and proved defective from two causes: First, the pressure-plates were too light, springing down and grasping the valve under high-pressure steam, and away from the valve and leaking under low pressure; and secondly, the exhaust steam issuing from the ports cut away the opposite faces on the cover-plate. In these engines, shields are cast in the valves, to protect the cover-plates from such action, and the cover-plates are made so strong that steam pressure does not spring them beyond the limit of clearance.

The throttle-valve is a disk rotating on a circular face, both the disk and face having a D-shaped opening on one side and a D-shaped recess in their faces opposite. When the two holes coin-

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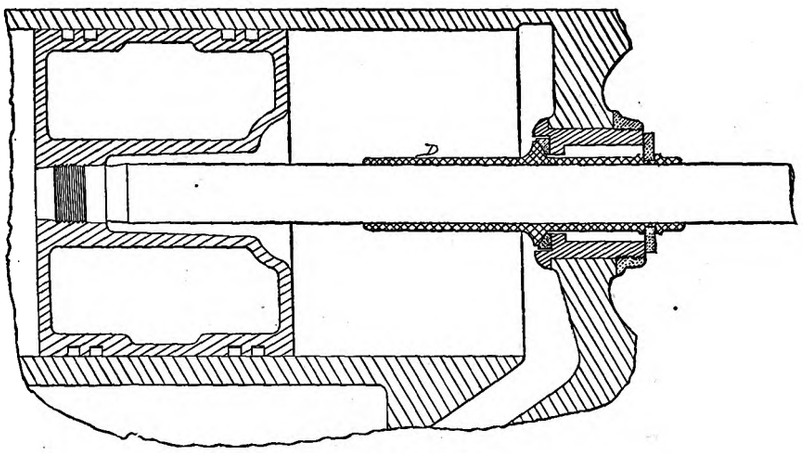


Fig. 1.—Piston.

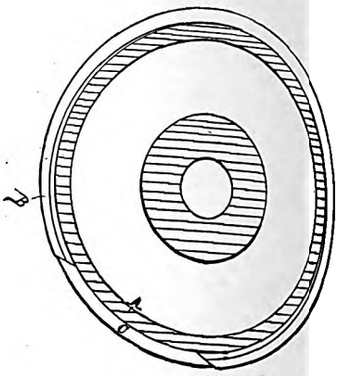


Fig. 2.—Piston-Rings.

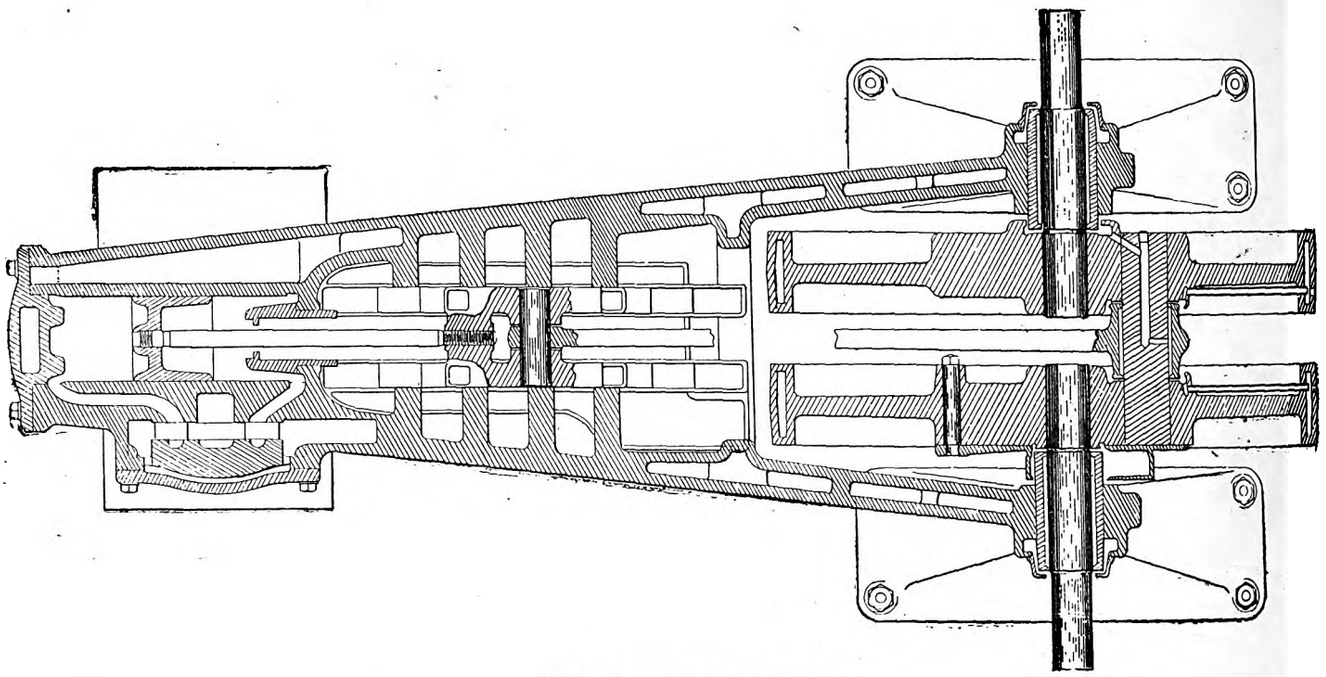


Fig. 3.—Horizontal Section.

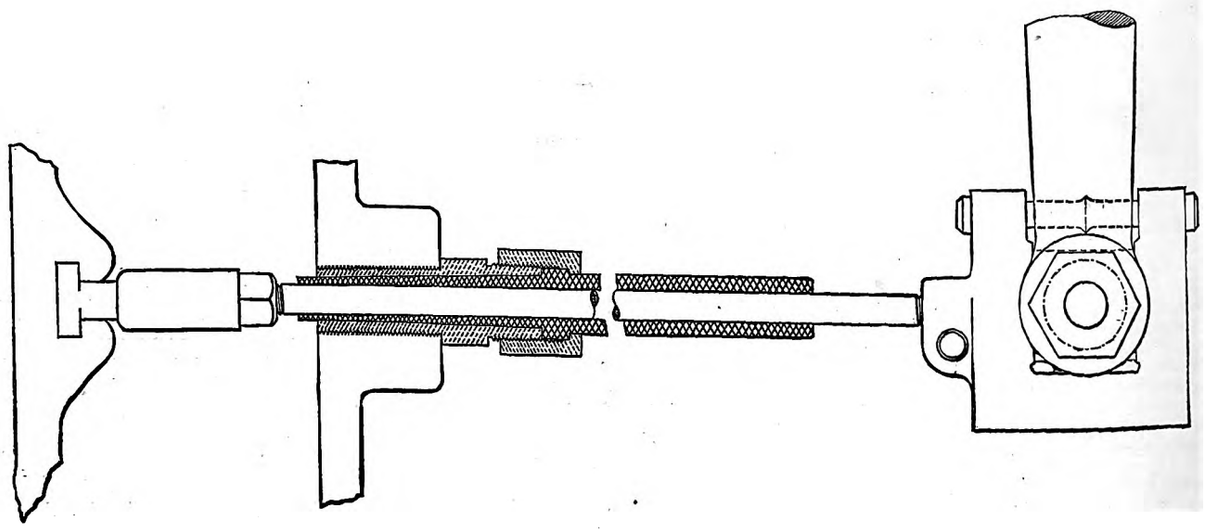


Fig. 5.—Valve-Rod.

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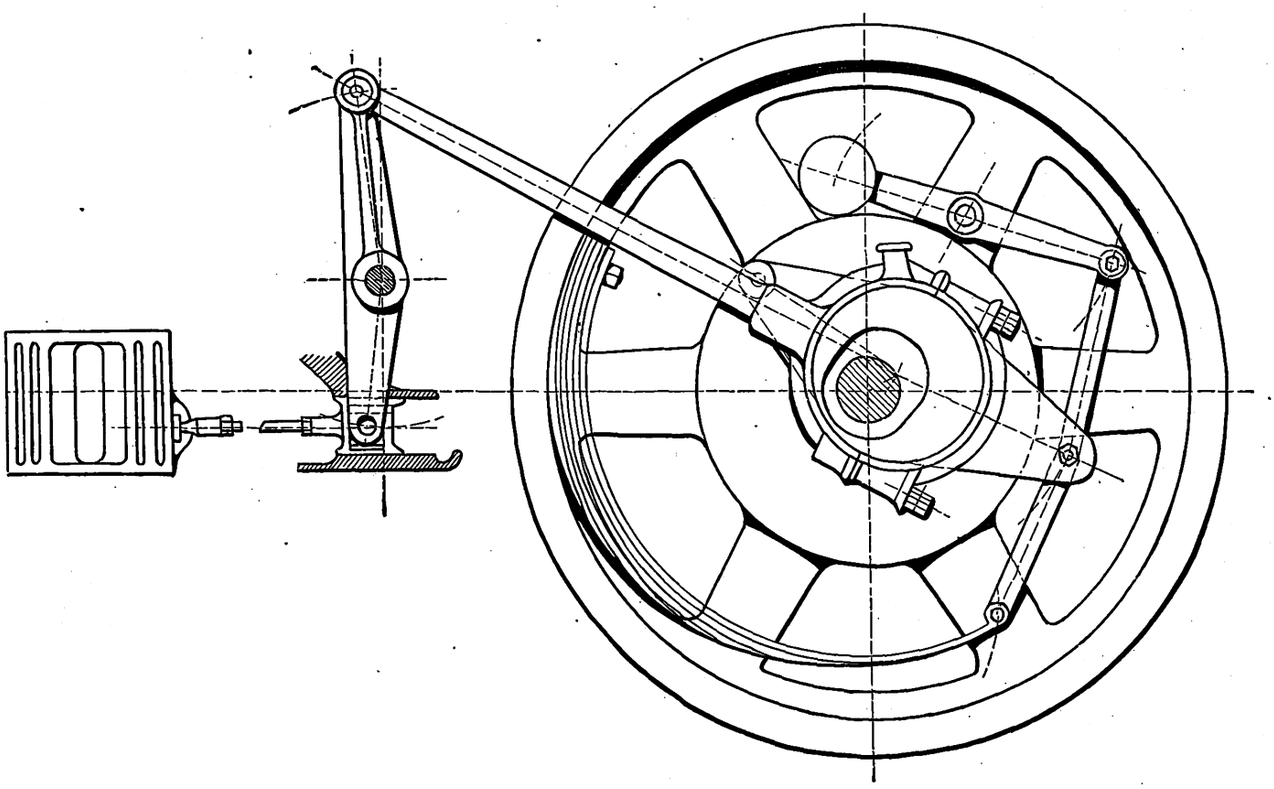


Fig. 4.—Governor.

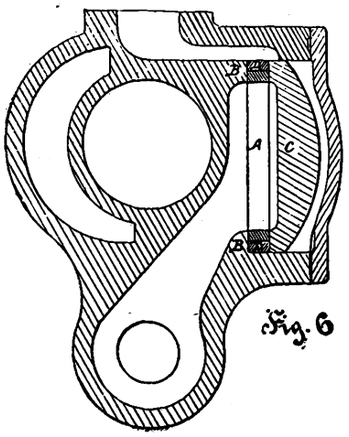


Fig. 6

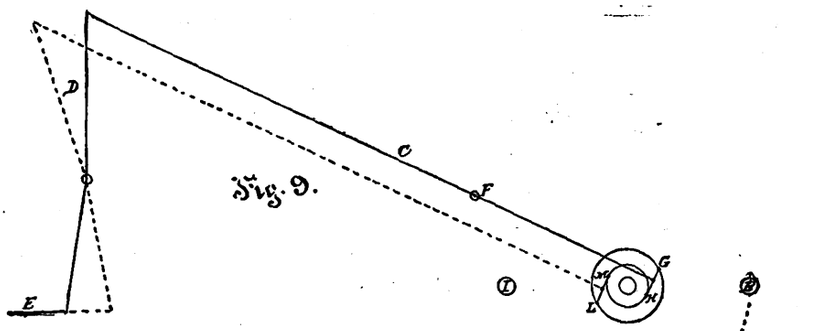


Fig. 9.



Fig. 8.

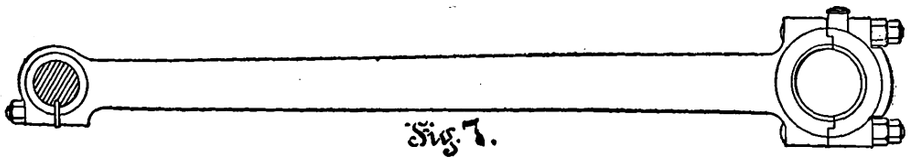


Fig. 7.

cide, there is a straight-way passage for the steam; and when the disk is turned half-way around, the valve is closed, and the recesses coming opposite, and being the same form as the openings, there is no face left exposed to rust. The engines are always to be run with an open throttle.

The material used in these engines is of the best quality obtainable, and the workmanship in all respects first class. They are run at medium or high speed, are so perfectly balanced as to run perfectly still on a solid foundation without holding-down bolts, and govern within the lowest fraction of variation, from full load to no load, and at all variations of steam pressure. All parts can be oiled from a common oil-can while in motion. The engine is built and sold in the West and Northwest by the M. C. Bullock Manufacturing Company, of Chicago; and for the Eastern, Middle, and Southern States by the Straight-Line Engine Company, of Syracuse,

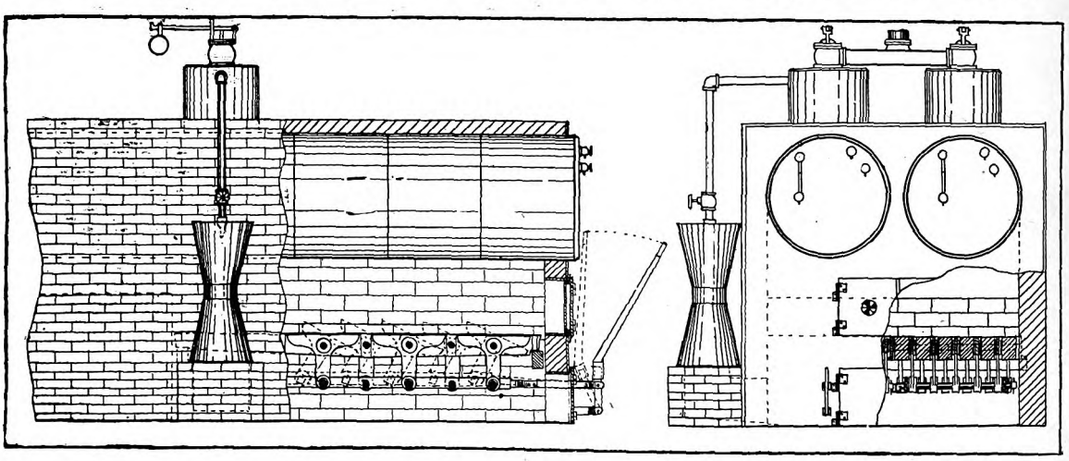
ON THE MAGNETIZATION OF IRON AND STEEL.—Sir William Thomson, at a meeting of the British Association, read a communication from Mr. J. E. Ewing on the Susceptibility and Retentiveness of Iron and Steel. The author said that he had been experimenting in Japan on the effect of stress in relation to magnetization, and he had demonstrated the hitherto unsuspected fact that soft iron is capable of an immensely greater degree of magnetization than steel. The method employed was to subject wires to the magnetizing force, tapping them during its application, and withdrawing it gradually. When this plan was followed, 93 per cent of the charge remained. He had obtained magnetic intensity of 1590 units, while Thalen only obtained 40 from soft Swedish iron, and Roland 200. This result, Sir William Thomson said, was a satire on our knowledge of magnetism. The author also stated that he had computed the heating effect of the reversal of the induction in iron in absolute measure.

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THE HOWE CULM GRATE.

The Howe culm grate, which is illustrated this week, consists of the ordinary grate-bars, cast with holes through them, through which rods are passed carrying knife-edged rockers, which are connected together and are rocked by means of a lever in front of the furnace. The grate-bars, spaces, and rockers are made equal width, and the bars are preferably made full length of furnace, and divided up so that the rockers are arranged to break joints, which prevents the fire being left in ridges. The holes in the bars and rockers are cored, and for burning culm or anthracite coal-dust, the bars, spaces, and rockers are each three eighths of an inch wide; for burning larger sizes of coal, the parts are made proportionally. Among the advantages claimed for this new grate are these: That culm, small-sized anthracite, and bituminous coal can be successfully burned and thoroughly cleaned on this grate, and make as much steam as large-sized coal; that it can be cleaned in two minutes without the use of the poker, and without loss of steam, as the furnace-doors are opened when feeding the fire; that it breaks up clinker and cinder by means of the knife-edge rockers, and forces them through the grate; that it has nearly sixty per cent air space, which insures good combustion; and that, as the bars are of simple construction, they are not likely to get out of order.

The engineers of the different departments of the Lackawanna Iron and Coal Company, by whom the grate has been used, speak of it in high terms. A series of experiments conducted by Mr. C. M. Morse, mechanical engineer, of this city, representative of the patentees, on the premises of Mrs. C. L. Weston, No. 332 Seventh avenue, gave the following results: In the boiler-room are two boilers, which, until recently, had been running with a Jarvis furnace setting, burning egg coal, the grate surface per furnace being 40 square feet, and the expenditure for fuel for the month of June being with the Jarvis setting $19.60 per day. One furnace was then equipped with the Howe grate and a steam-blower, the supplementary air-ducts of the Jarvis setting being bricked up. One furnace, with hard firing, could furnish steam enough for a 150 horse-power engine, and the two were therefore alternately used to do that duty. On one day, the furnace equipped with the Howe grate and blower consumed 4315 pounds of Lackawanna culm at $2.35 per ton, and 1230 pounds of bituminous coal at $4.55 per ton, the total cost of fuel for the day being $7.02. On the next day, the other boiler, left unchanged, used 5234 pounds of egg coal at $4.95 per ton, a daily cost of $11.56, thus showing a saving in the cost in favor of the Howe grate of $4.54 per day. Both boilers together, on the following day connected, supplied steam for the engine and all other purposes, using 4072 pounds of egg at $4.95, 3672 pounds of culm at $2.35 per ton, and 133 pounds of bituminous coal at $4.55, making the total cost per day $13.12, against the average of $19.60 in June.



GASES OCCLUDED BY COKE.—A recent number of the *American Chemical Journal* gives some interesting details of an exhaustive series of experiments on the gases occluded by coke, carried out by Messrs. F. H. Storer and D. H. Lewis. Reichardt's method of exhausting with mercury and heating was used, but only to compare the results given by it with those afforded by the Sprengel pump; the flask containing the coke being exhausted and subsequently heated in a paraffine bath. The first experiments were made upon some air-dried coke from the cellar of a dwelling-house. The maximum temperature to which it was subjected was, as in all other cases, 200 degrees Fahr. By Reichardt's method, each gram of coke gave rather more than 1 c. c. of gas containing about 43 per cent of carbonic acid and 2·6 per cent of oxygen. With the Sprengel pump, each gram yielded about 0·7 c. c. of gas containing from 50 to 60 per cent of carbonic acid and from 2 to 6 per cent of oxygen, as well as carbonic oxide and nitrogen. In some cases where the pump was used, a current of nitrogen was driven through the flask for some time, to clear out the air more effectually. Some air-dried coke, which had been standing for two years in a dry storehouse, gave (by Reichardt's method) about the same quantity of gas as the above; the percentage of carbon dioxide being lower, and that of nitrogen and oxygen much higher. The same coke, however, with the pump gave less gas; but the percentage of carbonic acid was higher, and that of oxygen lower than in the first samples. Other experiments with old coke from out of doors, recently partially dried coke, and coke taken straight from a gas-retort gave results very similar, save that, in the last case, the percentage of carbonic acid, which was at first only between 7 and 11 per cent, increased (on keeping for two months) to 21 per cent. It would thus almost seem as if a slow oxidation of the carbon had gone on. It is noteworthy that the gases given off up to 100 degrees Fahr. invariably contained a higher percentage of oxygen, and a lower one of carbonic acid, than those by heating to 200° Fahr.

A PLEA FOR PURE SCIENCE.*†

American science is a thing of the future, and not of the present or past; and the proper course of one in my position is to consider what must be done to create a science of physics in this country, rather than to call telegraphs, electric lights, and such conveniences, by the name of science. I do not wish to underrate the value of all these things; the progress of the world depends on them, and he is to be honored who cultivates them successfully. So also the cook who invents a new and palatable dish for the table benefits the world to a certain degree; yet we do not dignify him by the name of a chemist. And yet it is not an uncommon thing, especially in American newspapers, to have the *applications* of science confounded with pure science; and some obscure American who steals the ideas of some great mind of the past, and enriches himself by the application of the same to domestic uses, is often lauded above the great originator of the idea, who might have worked out hundreds of such applications, had his mind possessed the necessary element of vulgarity. I have often been asked, which was the most important to the world, pure or applied science? To have the applications of a science, the science itself must exist. Should we stop its progress, and attend only to its applications, we should soon degenerate into a people like the Chinese, who have made no progress for generations, because they have been satisfied with the applications of science, and have never sought for reasons in what they have done. The reasons constitute pure science. They have known the application of gunpowder for centuries; and yet the reasons for its peculiar action, if sought in the proper manner, would have developed the science of chemistry, and even of physics, with all their numerous applications. By contenting themselves with the fact that gunpowder will explode, and seeking no farther, they have fallen behind in the progress of the world; and we now regard this oldest and most numerous of nations as only barbarian. And yet our country is in this same state. But we have done better; for we have taken the science of the old world, and applied it to all our uses, accepting it like the rain of heaven, without asking whence it came, or even acknowledging the debt of gratitude we owe to the great and unselfish workers who have given it to us. And, like the rain of heaven, this pure science has fallen upon our country, and made it great and rich and strong.

To a civilized nation of the present day, the applications of science are a necessity; and our country has hitherto succeeded in this line, only for the reason that there are certain countries in the world where pure science has been and is cultivated, and where the study of nature is considered a noble pursuit. But such countries are rare, and those who wish to pursue pure science in our own country must be prepared to face public opinion in a manner which requires much moral courage. They must be prepared to be looked down upon by every successful inventor whose shallow mind imagines that the only pursuit of mankind is wealth, and that he who obtains most has best succeeded in the world. Everybody can comprehend a million of money; but how few can comprehend any advance in scientific theory, especially in its more abstruse portions! And this, I believe, is one of the causes of the small number of persons who have ever devoted themselves to work of the higher order in any human pursuit. Man is a gregarious animal, and depends very much for his happiness on the sympathy of those around him; and it is rare to find one with courage to pursue his own ideas in spite of his surroundings. In times past, men were more isolated than at present, and each came in contact with a fewer number of people. Hence that time constitutes the period when the great sculptures, paintings, and poems were produced. Each man's mind was comparatively free to follow its own ideals, and the results were the great and unique works of the ancient masters. To-day, the railroad and the telegraph, the books and newspapers, have united each individual man with the rest of the world; instead of his mind being an individual, a thing apart by itself and unique, it has become so influenced by the outer world, and so dependent upon it, that it has lost its originality to a great extent. The man who in times past would naturally have been in the lowest depths of poverty, mentally and physically, to-day measures tape behind a counter, and with lordly air advises the naturally born genius how he may best bring his outward appearance down to a level with his own. A new idea he never had, but he can at least cover his mental nakedness with ideas imbibed from others. So the genius of the past soon perceives that his higher ideas are too high to be appreciated by the world; his mind is clipped down to the standard form; every natural offshoot upward is repressed, until the man is no higher than his fellows. Hence the

* Abstracts from an address of H. A. Rowland, of Baltimore, Md., Vice-President of Section B, American Association for the Advancement of Science.

† In using the word "science," I refer to physical science, as I know nothing of natural science. Probably my remarks will, however, apply to both, but I do not know.

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world, through the abundance of its intercourse, is reduced to a level. What was formerly a grand and magnificent landscape, with mountains ascending above the clouds, and depths whose gloom we can not now appreciate, has become serene and peaceful. The depths have been filled, and the heights leveled, and the wavy harvests and smoky factories cover the landscape.

As far as the average man is concerned, the change is for the better. The average life of man is far pleasanter, and his mental condition better, than before. But we miss the vigor imparted by the mountains. We are tired of mediocrity, the curse of our country. We are tired of seeing our artists reduced to hirelings, and imploring Congress to protect them against foreign competition. We are tired of seeing our countrymen take their science from abroad, and boast that they here convert it into wealth. We are tired of seeing our professors degrading their chairs by the pursuit of applied science instead of pure science; or sitting inactive while the whole world is open to investigation; lingering by the wayside while the problem of the universe remains unsolved. We wish for something higher and nobler in this country of mediocrity, for a mountain to relieve the landscape of its monotony. We are surrounded with mysteries, and have been created with minds to enjoy and reason to aid in the unfolding of such mysteries. Nature calls to us to study her, and our better feelings urge us in the same direction. . . .

There is room for all in the work, and the race has but commenced. The problems are not to be solved in a moment, but need the best work of the best minds, for an indefinite time.

Shall our country be contented to stand by, while other countries lead in the race? Shall we always grovel in the dust, and pick up the crumbs which fall from the rich man's table, considering ourselves richer than he because we have more crumbs, while we forget that he has the cake, which is the source of all crumbs? Shall we be swine, to whom the corn and husks are of more value than the pearls? If I read aright the signs of the times, I think we shall not always be contented with our inferior position. From looking down, we have almost become blind, but may recover. In a new country, the necessities of life must be attended to first. The curse of Adam is upon us all, and we must earn our bread.

The scientific study of nature in all its branches, of mathematics, of mankind in its past and present, the pursuit of art, and the cultivation of all that is great and noble in the world—these are the highest occupations of mankind. Commerce, the applications of science, the accumulation of wealth, are necessities which are a curse to those with high ideals, but a blessing to that portion of the world which has neither the ability nor the taste for higher pursuits.

As the applications of science multiply, living becomes easier, the wealth necessary for the purchase of apparatus can better be obtained, and the pursuit of other things besides the necessities of life becomes possible.

But the moral qualities must also be cultivated in proportion to the wealth of the country, before much can be done in pure science. The successful sculptor or painter naturally attains to wealth through the legitimate work of his profession. The novelist, the poet, the musician, all have wealth before them as the end of a successful career. But the scientist and the mathematician have no such incentive to work; they must earn their living by other pursuits, usually teaching, and only devote their surplus time to the true pursuit of their science. And frequently, by the small salary which they receive, by the lack of instrumental and literary facilities, by the mental atmosphere in which they exist, and, most of all, by their low ideals of life, they are led to devote their surplus time to applied science or to other means of increasing their fortune. How shall we, then, honor the few, the very few, who, in spite of all difficulties, have kept their eyes fixed on the goal, and have steadily worked for pure science, giving to the world a most precious donation, which has borne fruit in our greater knowledge of the universe and in the applications to our physical life which have enriched thousands and benefited each one of us? There are also those who have every facility for the pursuit of science, who have an ample salary and every appliance for work, yet who devote themselves to commercial work, to testifying in courts of law, and to any other work to increase their present large income. Such men would be respectable if they gave up the name of professor, and took that of consulting chemists or physicists. And such men are needed in the community. But for a man to occupy the professor's chair in a prominent college, and, by his energy and ability in the commercial applications of his science, stand before the local community in a prominent manner, and become the newspaper exponent of his science, is a disgrace both to him and his college. It is the death-blow to science in that region. Call him by his proper name, and he becomes at once a useful member of the community. Put in his place a man who shall by precept and example cultivate his science, and how different is the result! Young men, looking forward into the world for something to do see before them this high and noble life, and they see that there is something more honorable than the accumulation of wealth. They are thus led to devote their lives to similar pursuits, and they honor the professor who has drawn them to something higher than they might otherwise have aspired to reach.

I do not wish to be misunderstood in this matter. It is no disgrace to make money by an invention, or otherwise, or to do commercial scientific work under some circumstances. But let pure science be the aim of those in the chairs of professors, and so prominently the aim that there can be no mistake. If our aim in life is wealth, let us honestly engage in commercial pursuits, and compete with others for its possession. But if we choose a life which we consider higher, let us live up to it, taking wealth or poverty as it may chance to come to us, but letting neither turn us aside from our pursuit.

The work of teaching may absorb the energies of many; and indeed, this is the excuse given by most for not doing any scientific work. But there is an old saying, that where there is a will there is a way. Few professors do as much teaching or lecturing as the German professors, who are also noted for their elaborate papers in the scientific journals. I myself have been burdened down with work, and know what it is; and yet I here assert that all *can* find time for scientific research if they desire it. But here, again, that curse of our country, mediocrity, is upon us. Our colleges and universities seldom call for first-class men of reputation, and I have even heard the trustee of a well-known college assert that no professor should engage in research because of the time wasted! I was glad to see, soon after, by the call of a prominent scientist to that college, that the majority of the trustees did not agree with him.

That teaching is important, goes without saying. A successful teacher is to be respected; but if he does not lead his scholars to that which is highest, is he not blameworthy? We are, then, to look to the colleges and universities of the land for most of the work in pure science which is done. Let us, therefore, examine these latter, and see what the prospect is. . . .

I have before me the report of the Commissioner of Education for 1880. According to that report, there were 389,* or say, in round numbers, 400 institutions, calling themselves colleges or universities, in our country! We may well exclaim that ours is a great country, having more than the whole world besides. The fact is sufficient. The whole earth would hardly support such a number of first-class institutions. The curse of mediocrity must be upon them, to swarm in such numbers. They must be a cloud of mosquitoes, instead of eagles as they profess. And this becomes evident on further analysis. About one third aspire to the name of university; and I note one called by that name which has two professors and 18 students, and another having three teachers and 12 students! And these instances are not unique, for the number of small institutions and schools which call themselves universities is very great. It is difficult to decide from the statistics alone the exact standing of these institutions. The extremes are easy to manage. Who can doubt that an institution with over 800 students, and a faculty of 70, is of a higher grade than those above cited having 10 or 20 students and two or three in the faculty? Yet this is not always true; for I note one institution with over 500 students which is known to me personally as of the grade of a high-school.

If the statistics were forthcoming—and possibly they may exist—we might also get an idea of the standing of these institutions and their approach to the true university idea, by the average age of the scholars. Possibly also the ratio of number of scholars to teachers might be of some help. All these methods give an approximation to the present standing of the institutions. But there is another method of attacking the problem, which is very exact, but it only gives us the *possibilities* of which the institution is capable. I refer to the wealth of the institution. In estimating the wealth, I have not included the value of grounds and buildings; for this is of little importance either to the present or future standing of the institution. As good work can be done in a hovel as in a palace. I have taken the productive funds of the institution as the basis of estimate. I find:

284	have below	$500,000.
8	" between	$500,000 and $1,000,000.
8	" over	$1,000,000.

There is no fact more firmly established, all over the world, than that the higher education can never be made to pay for itself. Usually, the cost to a college of educating a young man very much exceeds what he pays for it, and is often three or four times as much. The higher the education, the greater this proportion will be; and a university of the highest class should anticipate only a small accession to its income from the fees of students. Hence the test I have applied must give a true representation of the possibilities in every case. According to the figures, only sixteen colleges and universities have $500,000 or over of invested funds, and only one half of these have $1,000,000 and over. Now, even the latter sum is a very small endowment for a college; and to call any institution a university which has less than $1,000,000 is to render it absurd in the face of the world. And yet more than one hundred of our institutions, many of them very respectable colleges, have abused the word "university" in this manner. It is to be hoped that the endowment of the more respectable of these institutions may be increased, as many of them deserve it; and their unfortunate appellation has probably been repented of long since.

It may be urged, that all these institutions are doing good work in education; and that many young men are thus taught who could not afford to go to a true college or university. But I do not object to the education—though I have no doubt an investigation would disclose equal absurdities here—for it is aside from my object. But I do object to lowering the ideals of the youth of the country. Let them know that they are attending a school, and not a university; and let them know that above them comes the college, and above that the university. Let them be taught that they are only half-educated, and that there are persons in the world by whose side they are but atoms. In other words, let them be taught the truth.

It may be that some small institutions are of high grade, especially those which are new; but who can doubt that more than two thirds of our institutions calling themselves colleges and universities are unworthy of the name? Each one of these institutions has so-called professors, but it is evident that they can be only of the grade of teachers. Why should they not be so called? The position of teacher is an honored one, but it is not made more honorable by the assumption of a false title. Furthermore, the multiplication of the title, and the ease with which it can be obtained, render it scarcely worth striving for. When the man of energy, ability, and perhaps genius, is rewarded by the same title and emoluments as the commonplace man with the modicum of knowledge, who takes to teaching not because of any aptitude for his work, but possibly because he has not the energy to compete with his fellow-men in business, then I say one of the inducements for first-class men to become professors is gone.

When work and ability are required for the position, and when the professor is expected to keep up with the progress of his subject, and to do all in his power to advance it, and when he is selected for these reasons, then the position will be worth working for, and the successful competitor will be honored accordingly. The chivalric spirit which prompted Faraday to devote his life to the study of nature may actuate a few noble men to give their life to scientific work; but if we wish to cultivate this highest class of men in science, we must open a career to them worthy of their efforts.

Jenny Lind, with her beautiful voice, would have cultivated it to

* 364 reported on, and 25 not reported.

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some extent in her native village; yet who would expect her to travel over the world, and give concerts for nothing? and how would she have been able to do so if she had wished? And so the scientific man, whatever his natural talents, must have instruments and a library, and a suitable and respectable salary to live upon, before he is able to exert himself to his full capacity. This is true of advance in all the higher departments of human learning, and yet something more is necessary. It is not those in this country who receive the largest salary, and have positions in the richest colleges, who have advanced their subject the most; men receiving the highest salaries, and occupying the professor's chair, are to-day doing absolutely nothing in pure science, but are striving by the commercial applications of their science to increase their already large salary. Such pursuits, as I have said before, are honorable in their proper place; but the duty of a professor is to advance his science, and to set an example of pure and true devotion to it which shall demonstrate to his students and the world that there is something high and noble worth living for. Money-changers are often respectable men, and yet they were once severely rebuked for carrying on their trade in the court of the temple.

Wealth does not constitute a university, buildings do not; it is the men who constitute its faculty, and the students who learn from them. It is the last and highest step which the mere student takes. He goes forth into the world, and the hight to which he rises has been influenced by the ideals which he has consciously or unconsciously imbibed in his university. If the professors under whom he has studied have been high in their profession, and have themselves had high ideals; if they have considered the advance of their particular subject their highest work in life, and are themselves honored for their intellect throughout the world, the student is drawn toward that which is highest, and ever after in life has high ideals. But if the student is taught by what are sometimes called good teachers, and teachers only, who know little more than the student, and who are often surpassed and even despised by him, no one can doubt the lowered tone of his mind. He finds that by his feeble efforts he can surpass one to whom a university has given its highest honor; and he begins to think that he himself is a born genius, and the incentive to work is gone. He is great by the side of the molehill, and does not know any mountain to compare himself with.

A university should not only have great men in its faculty, but have numerous minor professors and assistants of all kinds, and should encourage the highest work, if for no other reason than to encourage the student to his highest efforts.

But, assuming that the professor has high ideals, wealth such as only a large and high university can command is necessary to allow him the fullest development.

(TO BE CONTINUED.)

FURNACE, MILL AND FACTORY.

The New York, Pennsylvania & Ohio Railroad Company, after having tested the Brown hoisting and conveying machine by using, during two seasons, a plant consisting of three machines suspended on cable tramways, ordered an additional plant for its ore-dock in Cleveland. This plant, consisting of three machines with truss-bridge tramways, hoist-house, and hoisting appliances, is now receiving the finishing touches, and will perhaps be in operation by the time this reaches the readers of the ENGINEERING AND MINING JOURNAL. The bridges are each 180-foot span, the ends being supported on piers which rest on a track to which they are firmly held by a simple device, and on which the tramways are movable along the line of the dock. A ball-and-socket joint enables the workmen to adjust the front pier to the hatch of a vessel without moving the rear pier. In and between the back piers of two of the three bridges are the hoist-house and machinery, consisting of a locomotive boiler 16 feet long, 48 inches shell, and three double-acting four-inch cylinder hoisting-drums (Webster, Camp & Lane Machine Company's make), one of which is arranged at a right angle with the other two and with the line of movement of the piers, so as to allow the one bridge to be moved independently of the other two, which are connected and contain the hoist plants. All of it moves together, and can be driven along the track by one man at each pier turning the crank of the gearing arranged for that purpose. The bridges and piers present a very neat appearance. The trusses are of the inverted parabolic bow-string type, and the size and position of each part are designed and calculated with mathematical precision with reference to the duty each has to perform, a large allowance being made for safety. As the machine and bucket works within the space occupied by the truss, and the hight of clearance is the maximum hight of ore that the dock can safely sustain, the full width of the dock can be filled by the machine operated by one man in the hoist-house. The size of bucket used is one gross ton capacity, and the speed in handling is only limited by the rapidity with which the men on the vessel can fill the buckets. Great care has been taken to provide against any special strain or wear, and all emergencies of operating, even to providing to a great extent against the carelessness and cupidity usual to thoughtless or unprincipled workmen. The Brown Hoisting and Conveying Machine Company is about to bring to public notice a new and automatic system for charging blast-furnaces, ovens, kilns, etc., the first cost of which is cheaper. It does away with all top fillers, present style of hoist-house, etc., making it possible for one man easily to accomplish the whole work by operating an engine and accompanying mechanical arrangements. The system is the invention of Mr. Fayette Brown, and the details of construction and operation are by Alexander E. Brown. It has been tested by continuous service for a year or more at one of the most successful furnaces of the country, and already several large concerns have placed their orders for similar outfits.

Best & Gibson, furnace builders, St. Louis, have recently erected three annealing furnaces and two ovens for the Ashley Wire Company, Joliet, Ill., and have another contract for the same company for the building of seven more annealing furnaces and a muffle-furnace.

The articles of association of the Kalamein Alloy Company, Limited, were filed for record in Pittsburg on the 25th ult. The total amount of capital stock is $500,000, of which $460,000 have been paid in, that sum being paid to the owners for certain patent rights under which the company proposes to operate. The business of the company is to be the manufacture, use, and sale of the inventions mentioned, and the stockholders are the following gentlemen, each of whom owns the amount stated: Henry W. Shepard, $230,000; H. W. Oliver, Jr., $40,000; D. B. Oliver, $40,000; J. B. Oliver, $40,000; George T. Oliver, $40,000; Henry Roberts, $40,000; and Cadwallader Evans, $30,000. The kalamein alloy is a substance invented by Mr. Henry Roberts, who has devised a process to be substituted for galvanizing.

The Steelton *Reporter*, 27th ult., says: No. 2 furnace was not damaged to so great an extent as we thought it was from the explosion on Friday of last week. The repairs were completed and the blast and a cast made in five hours afterward. The furnace has been doing good work all the week. No. 5 furnace produced 27 tons of pig-iron one day this week, being the largest product ever obtained from "Little Dock." Masons are at work on the stone foundations for the new hot ovens at No. 1 furnace. The basic mill has been running successfully and increasing in production. The large rolls at the new merchant mill will be put into operation on Wednesday or Thursday. All the machinery has been tested and found to be in good working order, and the successful starting of the new mill is anxiously looked for. Mr. E. C. Felton was in Tyrone this week, witnessing the rolling of steel skelp from the basic mill. The steel is used for making boiler tubes, and is found especially fine for that purpose, being easily rolled and welding nicely.

The Link-Belt Machinery Company, of Chicago, has recently filled orders as follows: The Lead Mine Company, of Bingham, Utah, an ore-conveyer; the Columbus & Hocking Coal and Iron Company, Columbus, O., a 40-foot coal-elevator; the Boston Gas-Light Company, of Boston, a 75-foot double-strand coal-elevator; the Abbey Coal Mining Company, St. Louis, Mo., a coal-elevator; Wells, Fargo & Co., at Salt Lake City, an ore-elevator, to be used in a mine.

John H. Davey, of Galena, Dakota, is putting in a Gates pulverizer from the works of Charles Kaestner & Co., Chicago, and S. L. Bailey and Robert Seaman have ordered one to go to their Wyoming mines. The manufacturers state that they are ready to guarantee 40 tons a day through a 40-mesh screen, with 15 horse-power. The machine takes up a floor-space of 11 by 6 feet, and weighs 18,000 pounds.

The famous Société John Cockerill, of Belgium, has, according to an annual report just published, established an agency in this city.

The property of the Norwood Lumber Company was sold at auction in Norwood, N. Y., November 7th, to A. O. Brainerd, of St. Alban's, Vt., for $166,500.

The Ohio Iron and Steel Company, operating the Mary furnace at Lowellville, has just completed the erection of a large iron casting-house. This, with the improvements made the past season, makes it one of the finest iron plants in the Mahoning Valley.

The sheriff's sale of the Huntington Car-Works property was held recently, and lasted several days. Forty-five creditors were present, whose aggregate claims amounted to $350,000. Considerable litigation is expected before a final adjustment of the claims is made.

Under an order of the Supreme Court in Equity, at St. John, N. B., on November 5th, there was offered at auction the Coldbrook iron-works and rolling-mill and the Coldbrook nail and spike factory. The properties, which were sold together, were knocked down for $32,000 to the Maritime Bank of the Dominion of Canada.

H. G. Lapham & Co. have placed their order with the Lechner Manufacturing Company, Columbus, O., for chain elevators and conveyers, to be used in their tannery at Tunkhannock, Pa., for conveying dry and spent tan. The Lechner Company has also received orders for chain belting from Samuel Williamson, of Cincinnati, Phœnix Iron-Works, Meadville, Pa., and others, to be used for driving purposes.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ALABAMA.

HUNTSVILLE DISTRICT.

Franklin Pottery Company, Montague lode.

ARIZONA.

TUCSON DISTRICT.

Silver King Gold and Silver Mining Company, Burro Burro lode. Philip Corbin, Mammoth lode. John B. Richards *et al.*, Independence lode.

CALIFORNIA.

LOS ANGELES DISTRICT.

Robert Gardner, Gardner lode.

SAN FRANCISCO DISTRICT.

W. E. Gillespie, Occidental Quicksilver mine. Edward R. Jones, Red Hill placer.

COLORADO.

CENTRAL CITY DISTRICT.

Peter G. Gustafson, Little Emma lode. Henry C. Parker *et al.*, Florida lode. William A. Brown, Nevada lode. E. W. Dickinson *et al.*, Garfield lode. John L. Hopper, Belle of Empire lode. Aurora Mining Company, Frankfort lode.

DEL NORTE DISTRICT.

Golconda Gold Mining Company, Gamecock lode.

DURANGO DISTRICT.

E. J. Warner, Junction placer. San Juan & New York Mining and Smelting Company, Ruby No. 1 and Ruby No. 2 placers. John F. Williams *et al.*, Victoria lode and mill-site. Rico Silver Mining Company of Colorado, Georgia lode.

LAKE CITY DISTRICT.

Green Mountain Milling and Mining Company, Blue Bird lode. Nathaniel Slaight, New Dollar and Fairview lodes. Michigan & Colorado Mining Company, Silver Arrow and Silver Nugget lodes. George A. Bute *et al.*, Alama lode. John Fallen, Ansborough lode.

LEADVILLE DISTRICT.

George G. Washburn *et al.*, Snow Drift lode. Joel W. Smith *et al.*, Borealis lode. Mount Ætna Gold and Silver Mining Company, Ocean Wave lode. J. O. Hudnute *et al.*, Mammoth Extension lode. William P. Farris *et al.*, Eureka lode. Silver Bell Mining Company, Silver Bell lode. H. C. Francis *et al.*, Elk lode. Thomas Starr *et al.*, Thistle lode. Star Mining Company, placer embracing lodes.

PUEBLO DISTRICT.

George Weetman, Hennan lode.

IDAHO.

BOISE CITY DISTRICT.

Philadelphia Mining and Smelting Company, West Fork No. 1, West Fork No. 2, Black Hawk, Yellow Jacket, and Satellite lodes. George Francy, Vienna Extension lode. Henry E. Miller, Minnie Moore lode. Samuel Marsh *et al.*, Scotia lode.

MONTANA.

HELENA DISTRICT.

Fielding L. Graves *et al.*, Erie lode. Saly Runnheim, Jesse lode.

NEVADA.

CARSON CITY DISTRICT.

Golden Fleece Gold and Silver Mining Company, Fleece lode.

NEW MEXICO.

LAS CRUCES DISTRICT.

John S. Hutchinson, Pueblo Spring lode.

UTAH.

SALT LAKE CITY DISTRICT.

Jacob S. Boreman *et al.*, Exchequer lode. Samuel Kahn *et al.*, Oneida No. 2 lode. Jacob S. Boreman *et al.*, Chester lode.

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GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

BOSTON & ARIZONA SMELTING AND REFINING COMPANY.—The starting up of these reduction-works and the resumption of work at the Stonewall mine are announced.

CONTENTION.—It is reported that a new body of ore has been struck while prospecting in a northeasterly direction.

EMPIRE.—The new shaft is down 45 feet. This shaft is to tap the ore-body which extends from the Good Enough and Way Up mines. The rock has changed from lime into porphyry heavily stained with iron. In the old workings, the timbering has been completed, and brisk prospecting from the 200 and 400-foot levels is going on. A cross-cut east from the 400 foot level is running, and is at present in a very hard limestone.

GILDED AGE.—This mine has been sold to the owners of the Way Up mine. Underground surveys are making with the intention of starting work on the mine.

MAMIE.—Considerable work in the upper levels of this mine is doing. The lessees have just completed a shipment to the Watervale mill of nine tons of ore that samples $67 to the ton.

PROMPTER.—An assessment of ten cents per share has been levied, the money to be used for the erection of hoisting-works.

SAN PEDRO.—This mine has been leased.

PIMA COUNTY.

It is stated that a smelter will be erected at Tucson very shortly. Mr. Aaron Mason, who is interested in the enterprise, is in Tucson, attending to the preliminary arrangements. A thirty-ton smelter will first be put up. Power will also be put in at same time for a copper smelter. Copper will be bought from the start. With the smelter, there will also be sampling-works and concentrating-tables.

PINAL COUNTY.

RAY COPPER.—The superintendent reports, October 29th: Developments continue very favorable. North drift, 50-foot level, now in 45 feet, still in heavy native copper—sheet-copper, but increasing in thickness of the sheet. Cross-cut, 100-foot level, in 26 feet, also in native copper and carrying considerable glance with the native. Winze No. 3 from station 100-foot level, now down 31 feet; carrying considerable glance for the past three days, and some oxide. The native lies to the northwest. At 50 feet, we shall put in another station, then cross-cut and drift for the native. Our ore in this winze (copper glance) has assayed as high as 62 per cent. No. 1 shaft will be put in position at once. I have put a steam-pump on the well, to enable the men to continue sinking the same to the bed-rock.

SILVER BOW COUNTY.

The Anaconda Company has made arrangements with the Union Pacific for the extension of a branch line connecting Stuart Station, on the Utah & Northern, with the town of Anaconda. It is understood that the work of construction will begin at once, and that by the first of December the branch will be completed and in operation. In addition to this branch, the Union Pacific Company has agreed at once to begin the construction of a second branch from the present terminus of the road at the Montana smelter, to the St. Lawrence and Anaconda mines. The road-bed and ties will be broad-gauge, and the track for the present will be narrow-gauge. The conditions of the contract are, that the Anaconda Company is to procure the right of way, and that the Union Pacific Company will consent at any time to the laying of a third rail on the branch by the Northern Pacific Company.

SUMMIT VALLEY DISTRICT.

COLUSA.—According to the *Inter-Mountain*, a private letter received from London states that the negotiations for the sale of this mine and plant to English capitalists have been almost concluded. The price, if the sale goes, is understood to be $1,500,000.

JOSEPHINE.—It is claimed that this is an extension of the Lexington. The ore-body varies in width from three to ten feet, and pulps in the mill about $45. Since operations on the mine were resumed a short time ago, 300 tons of ore have been hoisted, and worked in the Silver Bow mill.

LEXINGTON.—The company is opening up the Allie Brown, a vein which runs parallel with the main property. The shaft is now down 50 feet, all in ore, which mills 50 ounces.

POLLOCK.—This prospect is located east of the Poser. The claim contains two separate and distinct veins. Shafts have been sunk and a tunnel is running on one of the veins. A 100-ton lot has just been sent to the Moulton mill to be treated.

POSER.—The daily product averages 20 tons, which pulps in the Silver Bow mill about $35. The productive capacity of this mine is considered sufficient to supply a 40-stamp mill, and it is among the probabilities that the company next year will have reduction-works of its own.

WASHOE.—An important strike has been made at a depth of 212 feet.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—During the week ended October 27th, 216 car-loads of ore were hoisted from the mine, 13 car-loads of which were from the 770 (shaft) level and 187 car-loads were from the stopes between the 640 and 780-foot levels. The remaining 66 car-loads were extracted from the old workings at the 206 and 306-foot levels. During the week, 163·535 tons of ore were hauled to the mill and 136·765 tons of ore were crushed. The average assay value of the pulp was $37.83 per ton; that of the tailings was $6.20 per ton.

STANDARD CONSOLIDATED.—There were extracted and shipped to the mills 1436 tons of ore during the week ended October 27th; received 1585 ounces of crude bullion. There is no change to notice in the appearance of the stopes.

PATERSON DISTRICT.

SUMMERS.—A new strike has been made in the lower tunnel. The ledge is six feet wide. The little five-stamp mill is running steadily, and cleaning up from $20,000 to $25,000 per month.

SWEETWATER.—The Great Western, Lookout, and other mines belonging to this group are looking well. Operations have been suspended pending negotiations for their purchase by a New York company. The mines are bonded to William Irwin, representing the Standard Company, of Bodie.

NEVADA COUNTY.

MAGENTA CONSOLIDATED.—The company has been reorganized. About nine years ago, a shaft was sunk to the depth of 365 feet, and about 1000 feet of drifts were run, but no stoping was done. The mine has been idle most of the time since; the company then owning the property not having sufficient capital to develop it. Work has now begun, and developments will be pushed vigorously.

YUBA COUNTY.

EXCELSIOR WATER AND MINING COMPANY.—This company has begun an action in the Superior Court to recover $266,692 from J. P. Pierce, of Santa Clara. The complaint alleges that defendant was a stockholder and director of said corporation, and that on nineteen different occasions between July, 1877, and September 22d, 1879, resolutions were adopted declaring dividends upon the shares of stock of said corporation, and that dividends were paid thereon at times when there were no surplus earnings or profit, and that, in fact, said dividends were drawn from the capital stock of said corporation; it also alleges that James P. Pierce was a director, and was present and voted for each of the resolutions declaring such dividends.

CANADA.

PROVINCE OF QUEBEC.

DOMINION PHOSPHATE AND MINING COMPANY.—A special meeting of the stockholders will be held at the company's office in Montreal, November 14th, for the purpose of considering the matter of increasing the stock of the company, and to decide whether the company shall accept or decline to purchase the property known as Lot No. 18, 7th Range, Township of Portland East, County and District of Ottawa, Province of Quebec.

COLORADO.

CHAFFEE COUNTY.

CLAREMONT.—The Red Mountain Mining Company began operations last year, but, falling into litigation, did not accomplish much. Its troubles have, however, been adjusted, the company dissolved, and the Claremont Mining and Milling Company is its successor. The company owns mining property in the Red Mountain District, including the Gibraltar and Bonanza lodes. A thirty-stamp mill will be erected soon.

TABOR VS. COLUMBUS.—The suit of the Tabor mining lode claimants against the Columbus Mining and Milling Company, on trial in the United States Court at Denver, has been decided in favor of the Tabor. The judgment awarded the plaintiffs the disputed ground and $4500 damages.

CLEAR CREEK COUNTY.

DIAMOND.—This tunnel is now 2188 feet in length. Much interest is taken in the developments lately made on the first intersection of the Corry City veins which this tunnel cuts at 2100 feet from its mouth. Thus far, four distinct and well-defined veins have been encountered, within a distance of 50 feet of cross-cutting. The other veins cut by this tunnel show small streaks of ore. The East Dives Company is working its property through this tunnel. Arrangements are making for extended workings in and through the tuunel and property. It has cost $1,000,000 to drive the tunnel, not taking into consideration other developments. The production up to the present time of the lodes cut by the tunnel is as follows: No. 5 and E. K. Baxter lode, $350,000; D. T. No. 6, $160,000; Pelican & Dives, over $2,000,000, besides considerable production from smaller veins.

DOLORES COUNTY.

NELLIE AND ELLA.—These mines have been sold for $50,000.

RICO REDUCTION COMPANY.—The company has purchased a half-interest in the Little Susie group of mines on the West Dolores, nine miles above the Fish Fork. The mines are the Little Susie, Little Wonder, Russian Bear, Democrat, and Governor Grant lodes, all near together.

GILPIN COUNTY.

COTTON.—This mine, situated on Bobtail Hill, has been sold for $25,000.

GUNNISON COUNTY.

DOMINGO.—This mine has been sold to Missouri capitalists for $20,000.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY.—No work will be done at the Ulé for an indefinite period except to keep down the water. The steam-power at the mine will be used to drive the concentrator. At the Ute, all the present forces will be continued and the mine driven to its full capacity. It it expected that enough ore will be taken from the Ute to keep both sides of the concentrator in operation.

HENSON CREEK REDUCTION COMPANY.—The concentrator has made several successful runs. The machinery worked well, but the water in the creek is growing visibly less, and it is feared that soon there will not be enough to run the mill. The smelter can be completed as soon as there is demand for it, and can be put in operation on sixty days' notice, all that is required being three thousand fire-brick and the erection of the blast-furnace, the columns and piping being on the ground.

SAN JUAN & WISCONSIN.—Work on the Lone Tree and Seventy-six lodes has begun. The company is securing patents on all its properties.

LAKE COUNTY.

A. Y.—The ore production is confined principally to the extraction of sulphide ores that formerly would not pay mining expenses, and at present smelting rates return only small profits.

CATALPA.—During October, the mine produced only a limited quantity of ore; and as a consequence, the profits are small. The manager stated that, notwithstanding this fact, he would be able to transmit to the company $1000 out of the ore receipts after paying the month's working expenses.

DENVER CITY & LEE BASIN.—These mines, on Yankee Hill, after a suspension of about nine months, are to be started up again. The properties consist of three full claims, and were first acquired by the present company in 1879. The strikes in the Dexter and Elkins shafts, just west of the Denver City and Lee Basin claims, have led to the resumption.

DUNKIN.—During October, 278 tons of ore were extracted and sold to the smelters, returning $6290.98; expenses, $3133.66; net profit, $1457.32.

HARRISON.—These works, after a suspension of about two months, have resumed operations.

HENRIETT.—Developments are now in progress which promise to result in valuable discoveries of ore. At a stockholders' meeting held in London, England, resolutions to wind up the company voluntarily, and appointing Mr. William A. Rose liquidator, were carried unanimously.

IRON HILL CONSOLIDATED.—This company has its machinery on the Imes shaft in good working condition. The developments contiguous to the Imes are preparing for active work, and in a short time, this portion of the property will be producing regularly. The workings of the Imes are still 120 feet distant from the farthest north drift of the White Cap, the nearest working-shaft of the same company. The two shafts will be connected as soon as possible. The production of the mines for October was in excess of the yield during the previous month, and the properties are looking well.

ST. BERNARD MINING COMPANY VS. LESSEES OF MOYAMENSING CLAIM.—Suits were filed in the District Court, at Leadville, November 3d, for over $500,000 damages. The suits were instituted by the St. Bernard Mining Company and the lessees of the Moyamensing claim, each of which sues for the recovery of $300,000, making a total of $600,000, which Messrs. Dennis Sullivan, James Dexter, and others, are expected to refund. The claim is based on the extraction of ore from the Moyamensing claim, which ore, it is alleged, was extracted from the Moyamensing claim and hoisted through the South May Queen and Dexter shaft. The suit is one of the largest yet instituted in the local courts, and one involving many intricate questions of mining law.

LARIMER COUNTY.

At Fort Collins, a meeting of citizens was recently held to take the necessary steps to organize a stock company to bore for oil, coal, and gas. It was decided to file articles of incorporation, and to solicit the citizens to subscribe to the stock

OURAY COUNTY.

Owing to the announcement made on the 15th of October by the mine-owners, that miners' wages would be cut fifty cents per day on November 1st, the miners at Telluride have quit work, and every shipping mine in Marshall Basin is closed. Both the mine-owners and men are determined to stand firm.

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SAN JUAN COUNTY.

BISMUTH.—The concentrator of this company was started up, and all the ore at the mill run through with success. The 3500-foot tramway will be completed soon, and will be ready for business during the winter. About 60 men are employed about the mines and mills, and at present matters are rapidly arranging at the Sampson mine to allow them an opportunity to make a production equal to the capacity of the mill, which will be run night and day with the capacity of 30 tons every twelve hours.

ECLIPSE.—The capacity of the mill is to be enlarged. Arrangements are to be made for working the Red Cross and Mountain Queen mines, owned by the company. The smelter will be put in operation to work these ores.

LITTLE ABBIE.—The president of the company has arrived in Silverton for the purpose of straightening up the affairs of the company and resuming work on the Abbie tunnel, and opening up the Belcher vein on Picayune Mountain. This property was worked last winter by a large force of men, who quit work on account of the company's failing to pay them monthly. The company owns a large group of mines, extending up over Picayune Mountain to Eureka Mountain.

SUMMIT COUNTY.

HORN-SILVER.—This group of claims at Red Cliff, numbering eight, has been sold for $35,000. The property was purchased by a syndicate. Work will begin at once.

KINGFISHER.—The new strike made in No. 2 drift consists of two and a half feet of fine ore.

DAKOTA.

FATHER DE SMET.—The report of the superintendent for the week ended November 1st shows: Ore extracted from the first, second, and third levels, 2895 tons. Ore milled, 3000 tons. Golden Gate east cross-cut, third level, advanced 9 feet; total length, 105 feet. Golden Gate south header, second level, advanced 6 feet. Header in 77 feet.

HARNEY PEAK TIN MINING COMPANY.—This company has recently been organized at Rapid City. The property consists of twenty tin-bearing quartz locations near the summit of Harney's Peak, and a large scope of stream-tin ground lying along the branches of Palmer's Gulch, together with various water-rights, mill-sites, etc. Mr. G. F. Randall, an English engineer and representative of English capitalists, has reported favorably on the property, and before his departure made the following proposition to the company: He to organize an English company with a capital of $500,000; such company to furnish $250,000 for developing the mines and purchasing machinery within a certain specified time; the local company to turn over the property upon receipt of $250,000 or one half the capital stock (non-assessable). An agreement which binds the company to give a bond upon the property on payment of $10,000 has been executed, and as soon as part of the money has been paid, work will be commenced. Unless the Black Hills *Journal* has horribly garbled the "Professor's" report, it furnishes ample testimony for the conclusion that he does not know what he is writing about, not to speak of how he writes. For the edification of our readers, we quote:

The first tin ore is found about half a mile from the base of the mountain, at which point a ridge of greisen quartz rock some 300 feet in width and from 100 to 500 feet in hight, above the surface, is found. This ridge extends for over one mile, and capes the two branches of Palmer Creek, producing suitable sites for mills, and adequate water-power for concentrating-works. The rock is composed of mica, silica, and porphyry, carrying a large percentage of black tin crystals, which yield under assay from 50 to 75 per cent of pure metallic tin and from 8 to 10 per cent of nickel. Large veins are found in this ridge which will yield 75 per cent of black tin crystals, and vary in width from three to eight inches. No rock could be easier or better situated for mining purposes. I was able with an ordinary hammer to break it at any point; and in some hundreds of samples which I examined, was unable to discover any except what contained a high percentage of tin crystals. At a distance of a quarter of a mile, running parallel with this, the erect ridge is continued. This is of still larger dimensions, and extends from the head of the east branch of Palmer's Gulch to nearly the summit of the mountain, and in some cases 600 to 800 feet in hight ABOVE THE SURFACE. The tin crystals in this mass are almost incredible, in many cases where they occur being 50 per cent of the quartz-rock—the black crystals in contrast to the white spar and shining mica, presenting a most beautiful appearance, exceeding in size two and a half inches in diameter, yielding under analysis from 70 to 75 per cent pure tin, and from 8 to 15 per cent of nickel. From this to the top of the mountain, a distance of about 1000 feet perpendicularly, the same formation extends, containing ore in perfectly inexhaustible quantities. This rock needs no mining whatever. It is simply throwing down the greisen rock into chutes and ore-bins and carrying the same to the mill for crushing and concentrating. To form any estimate of the extent of this formation is impossible, the magnitude is so great, and it is no exaggeration to state that it requires a fortnight even to survey this mass of rock. These mines will certainly rule the tin markets of the world. The ore can without doubt be mined and concentrated for from five to ten per cent per ton, with suitable appliances, and the quantity is so enormous that for years to come none but the richest portions need be touched.

The mining community of the Black Hills should raise a subscription to pay the expenses of the "Professor's" trip back to England on condition that he will never come back. He is hurting the prospects of their country as a future tin-producing district. Turn him out!

GEORGIA.

LOUD.—The sale of this placer mine will take place January 8th, at Cleveland, O.

IDAHO.

The scarcity of cars at Hailey to move the Wood River ores and bullion is getting alarming and is seriously interfering with the yield of the mines.

ALLEN.—This group of mines has been purchased by the Buzzo Silver Mining Company for $50,000.

MAINE.

A stock company has been formed to work the iron mine at Webb's Mills, Casco, discovered many years ago. The necessary buildings are in course of construction. The ore will be shipped to Portland.

DOUGLAS.—The annual meeting was held at Bangor recently. Frank H. Williams was chosen secretary, and the following board of directors was elected for the ensuing year: Eugene H. Clapp, Horace P. Tobey, and Frank H. Williams, of Boston; Frederick M. Laughton and John S. Jennes, of Bangor; Hanson Gregory, Jr., of Rockland; and William D. Swazey, of Rucksport. No business of public importance was transacted. The result of the subsequent directors' meeting, held in Boston, has not yet been learned.

MICHIGAN.

The following mines mentioned below produced during October as follows:

	Tons.	Lbs.
Franklin	195	1355
Huron (about)	70	....
Pewabic	48	450

It will be seen that the Franklin comes to the fore with the largest product ever taken from the mine in one month. The Huron also makes a good return, considering that the stamping capacity of the mine is confined to one head.

English capitalists have lately visited Rockland for the purpose of examining and buying the National, Minnesota, Rockland, and Superior copper mines. The different properties adjoin and have a length of 3½ miles, and aggregate about 7000 acres. If they buy this, they propose to consolidate all the properties and make one or possibly two mines, and drive in an adit east from Ontonagon River at a depth of about 500 feet, and this will unwater all of the old mines and save future pumping.

ARGYLE.—This iron mine has been closed down, owing to the depressed condition of the market.

ERIE.—The sale of this iron mine, negotiations for which have been pending for some weeks, is announced. The purchasers of the property, of whom Judge Hoadley is said to be one, have not yet organized as a company. The purchasers intend to buy other properties on the same range.

INDIANA IRON COMPANY.—At a special meeting recently held, the capital stock was increased. The amount is not reported.

METROPOLITAN.—A new and hitherto unknown vein of blue ore, 16 feet wide, is reported as the latest development.

STERLING.—Work has been entirely suspended.

WHITE PINE.—This copper mine, on Section 5, two miles east of Nonesuch, and on the same vein, and down 135 feet, with good show of copper from the surface down to the bottom, has just stopped work for the winter, on account of the low price of copper, but will start up next spring with stamping machinery.

NEVADA.

ELKO COUNTY.

NAVAJO.—The new pumps have been tested, and work satisfactorily. Hoisting ore has begun. It is though tthat there is sufficient water to start the mill soon after the first of November.

EUREKA COUNTY.

SILVER CONNOR.—The body of ore found on the 250-foot level is developing. The ore runs in value at the rate of $60 per ton.

SILVER STATE.—The mines comprising the company's property are the original Baltic, Hilma, Confidence, and Silver State, all of which are United States patented claims. The company has run a tunnel under the apex of the property, where it expects to strike the vein at a depth of from 200 to 300 feet. The main tunnel is 370 feet in length. At the distance of 320 feet from the mouth of the tunnel, a favorable iron formation was struck and followed by a cross-cut run in a northerly direction, which is now in eighty-one feet. Forty feet from this cross-cut, cross-cut No. 2 begins. It has a present length of a little over 100 feet. The face is in quartz and iron, with low-grade ore, which is followed in the working of the present contract.

STOREY COUNTY—COMSTOCK LODE.

The station for the new hydraulic pump for the combination shaft is completed, and they are now leveling down the rock for the timbers on which the machinery will be set up. November 3d, the time expired in which the machinery had to be completed by the contractors at San Francisco.

ALTA.—The water is below the top of the 2150 drift, and is steadily lowering. This is the last level remaining to be drained; but as the source of the water is on this level, progress for the last 20 feet has been necessarily slow. It will take some time to put cages in and perform other necessary repairs before resuming prospecting.

NORTH GOULD & CURRY.—The lawsuit which has been pending for so long a time against this company has been settled and the case dismissed.

WHITE PINE COUNTY.

MARTIN WHITE.—At the present time, work is carried on in the mine, taking out ore and prospecting for more. There is no ore reduced, but it is accumulating.

NEW MEXICO.

BERNALILLO COUNTY.

The five placer mining companies recently formed in Albuquerque for working the placer grounds at Golden have been consolidated.

GRANT COUNTY.

There are eight claims in the vicinity of Kingston, in which ore has been struck. These claims are the Bullion, Superior, Lady Franklin, Iron King, Brush Heap, Andy Johnson, Illinois, and Monasca. The latter is on the South Percha, but three miles distant from the town. In addition to these, the claims which promise well in both low and high-grade ores are numerous.

OLD MAN.—Every thing looks promising. As stated, there are fully 2000 tons of ore out. This is mainly low-grade or milling ore, the body having been stripped of high-grade, which has been shipped and sold. In the mine, enough ore is in sight to keep the mill running all winter.

PENNSYLVANIA.

The Silver mine in Garland, which caused considerable agitation two years ago, is again worked. A company of capitalists sank a shaft at that time, but abandoned it when thirty feet deep. The owner of the land and another man are now working it. The latter is to sink a shaft 100 feet for half of the profits. No person is allowed to enter the shaft, and the operators refuse to speak on the subject.

UTAH.

BEAVER COUNTY.

CACTUS.—The company has just put a new Knowles pump into the mine. The new concentrating jiggers have arrived in Frisco, and will soon be erected and in operation. A series of tanks and reservoirs has been built, of sufficient capacity to hold all the water that passes through the machinery, so that it may be pumped back, and used over and over again.

BOX ELDER COUNTY.

LEAD.—The mine is producing about fifty tons of jigging ore daily, and is reported to be looking well in all its workings.

MARTIN TELEGRAPH.—This location, situated near the Yosemite, is working about one hundred men, and is sending to the surface large quantities of good ore.

JUAB COUNTY.

MAMMOTH.—Reports in Salt Lake papers state that this company has offered to compromise with its creditors, paying twenty-five cents on the dollar.

SUMMIT COUNTY.

BON HOMME.—An incline is sinking which is now about seventy-five feet deep, all the way in a vein from four to seven feet thick. The vein carries a large amount of black manganese.

UINTAH.—Preparations are making by this company to resume work on its claims at the base of Rebellion Hill.

WYOMING.

CARBON COUNTY.

Considerable work has been done at Ferris during the past months on the Pride of the West, Columbia, Leonidas, and some others, all of which show mineral in paying quantities, the character of ore being argentiferous galena, carbonates, and chlorides. Many locations have recently been made.

COLUMBIA.—The mine has a vein four and a half feet in width, carrying galena, carbonates, and gray copper.

LEONIDAS.—This is a contact vein ten feet in width, the ore being galena, oxides, and carbonates.

PRIDE OF THE WEST.—Two shafts were sunk, one tunnel driven, and an open cut made during the summer. All the developments made show favorable prospects.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 9.

Business in the mining market continues very dull, and a holiday coming in this week has tended to further demoralize the market. The principal feature of the market was Horn-Silver, which suffered a further decline from last week's prices. Chrysolite was an exception to the general depression which seemed to prevail, and was quite strong to-day. A full summary will be found below. The total number of shares sold aggregates 97,665, as against 117,935 last week.

The Comstock shares were very quiet at about steady prices. California sold from 26@25c. under a small business. Consolidated Virginia was moderately dealt in at about steady prices, selling from 48@45c. Sierra Nevada was weak, with a very small business, selling from $3.80@$3.60. Hale and Norcross sold at $2.10. Sutro Tunnel was quiet and steady, selling from 16@15c.

The Leadville stocks were moderately dealt in and were steady. Amie was quiet and steady at 12@11c. Chrysolite was strong, under a small business, selling from $1.15@$1.30. Iron Silver was moderately dealt in at irregular prices; it sold from $3@$2.90. Leadville was quiet and steady at 45@48c. Little Chief was strong last Saturday at 60c., but sold through the week at 57@55c.; the stock was fairly dealt in. Little Pittsburg was strong, under a small business, selling from 50@60c. Climax sold at 6c.

The Bodie stocks were very quiet. Standard was steady, selling from $6.25@$6. Bulwer was steady, selling at 50c. Bodie sold to-day from 45@40c.

The Tuscarora stocks were quiet and steady. Grand Prize sold at 45@40c., with a small business. Belle Isle was quiet and steady at 43@40c. Navajo was strong, under a small business, selling from $4@$4 10. North Belle Isle sold at 65c. Elko Consolidated was quiet and steady, selling from 18@19c., assessment paid. Argenta sold at 22c.

In the miscellaneous list, Alice was moderately dealt in and was weak, selling from $2.80@$2.50. Bassick was quiet and steady, selling from $8.50@$9. Father de Smet sold at $3.50. Horn-Silver was fairly dealt in at weak prices; it sold from $6@$5@$5.25 dividend unpaid, and from $4.60@$4.90 dividend paid. Robinson Consolidated was quiet and irregular, selling from 48@43@46c. Sierra Grande sold from $1@96c. under a very small business. Castle Creek was strong, with moderate transactions, selling from $1.05@$1.20.

Barcelona was weak, under a small business, selling from 27@24c. Bradshaw was quiet at 22@21c. Caledonia was quiet and steady at 25@27c. Decatur was quite active at 4c. Eastern Oregon was active and steady, selling from 43@47c. Harlem was fairly dealt in at irregular prices; it sold from 94@98@96c. Hortense was quiet and steady at 10@11c. Lacrosse sold at 9c. and Rappahannock at 8c. Red Elephant sold from 6@5c. with small transactions. Sonora Consolidated was quiet and a little weak, selling from 28@25c.

At a meeting of the stockholders of the Chrysolite Silver Mining Company, held on Wednesday last at the office, No. 18 Wall street, this city, the following trustees were elected for the ensuing year: R. W. Raymond, H. A. V. Post, W. S. Gurnee, D. S. Appleton, Abram S. Hewitt, E. F. Bedell, J. F. Tams, C. S. Knowles, William Borden, Nicholas Rath, and R. H. Thurston.

A large array of counsel appeared last Monday before Judge Wallace, of the United States Circuit Court, and Judge Brown, of the United States District Court, who held court jointly, to argue motions for the removal of five suits against mining companies from the Federal to the State courts. The first case was that of Henry T. Cutter *against* Daniel S. Appleton, Charles A. Whittier, and others, and the Chryso lite Silver Mining Company; the second was that of Sylvester H. Langdon, Francis A. Fogg, Clinton B. Fisk, John S. Williams, James Clyne, Morris Seligman, and the Silver Era Mining Company; the third was that of Philip D. Jenkins *against* Charles Dennis, Hiram Dewing, Walter T. Hatch, and the Dunderberg Mining Company; the fourth was that of Eliphalet Nott and other stockholders *against* Henry Clews, John B. Alley, and others, and the Los Nueve Minas de Santa Maria Gold and Silver Mining Company; and the fifth was the case of George W. Boyd and other stockholders *against* Andrew W. Gill, Stephen B. Elkins, Augustus Ebert, Preston B. Plumb, William W. Macfarland, and the Amie Consolidated Mining Company. Decision was reserved in all cases.

MEETINGS.

The Animas Silver Mining Company, No. 35 Broadway, New York City. Annual meeting of stockholders and election of trustees, November 27th, at twelve o'clock M.

The Camuchin Consolidated Silver Mining Company, No. 35 Broadway, New York City. Annual meeting of stockholders and election of trustees, November 27th, at twelve o'clock M.

The Descubridora Consolidated Silver Mining Company, No. 35 Broadway, New York City. Annual meeting of stockholders and election of trustees, November 27th, at twelve o'clock M.

The South Yuba Water and Mining Company, No. 23 Nassau street, New York City. Annual meeting of stockholders and election of trustees, November 28th, at twelve o'clock M.

The Valenzuela Consolidated Silver Mining Company, 35 Broadway, New York City. Annual meeting of stockholders and election of trustees, November 27th, at twelve o'clock M.

DIVIDENDS.

The Plymouth Consolidated, of California, has declared its sixth dividend, amounting to $50,000; total dividends, $300,000.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF OCTOBER, AND FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of October.	Since January 1, 1883.
Amie Consolidated, s	Colo.	$25,000	$25,000
Atlantic, c	Mich.		80,000
Bassick, s	Colo.		200,000
Black Bear, G	Cal.		6,000
Boston & Montana, G	Mont		10,000
Bulwer Consolidated, G	Cal		35,000
California, G	Colo.		65,000
Calumet & Hecla, C	Mich	500,000	2,000,000
Carbonate Hill, s	Colo.		60,000
Castle Creek, G	Idaho	3,000	30,000
Catalpa, s	Colo.		30,000
Central, C	Mich.		60,000
Christy, s, L	Utah		6,000
Colorado United, s	Colo.		16,750
Contention, s	Ariz.		375,000
Con. Gold M. Co. of Ga	Ga.		32,000
Copper Queen, C	Ariz.	125,000	500,000
Cosmopolitan	Utah		50,000
Crescent, s, L	"	30.000	150,000
Deadwood-Terra, G	Dak		20,000
Dunkin, s	Colo.	10,000	10,000
Evening Star, s, L	"		50,000
Father de Smet, G	Dak	20,000	100.000
Gem, s	Colo.		7,500
Glen, s	"		3,000
Granite, s	"		3,750
Hecla, s	Mont	15.000	150,000
Henriett, s	Colo		27,000
Holyoke, G	Idaho	4,000	40,000
Homestake, G	Dak	25,000	475,000
Hope, s	Mont	11,304	45,216
Horn-Silver, s, L	Utah		900,000
Howell S. & M. Co., G. s, L	Ariz.		3,750
Idaho, G	Cal.	3,100	72,850
Indian Queen	Nev.		3,750
Indian Spring Drift	Cal.		1,000
Iron Silver, s, L	Colo.	100,000	300,000
Jocuistita, s	Mexico		150,000
Kentuck, s	Nev.		21,000
Leadville Consolidated, s	Colo	20,000	60,000
Lexington, s	Mont.		200,000
Little Chief, s	Colo.	20,000	20,000
Morning Star, s, L	"	25,000	50,000
Mount Pleasant, G	Cal.		60,000
Mount Diablo, s	Nev.	12,500	37,000
Navajo, G, s	Nev.		125,000
Northern Belle, s	"		100,000
Ontario, s, L	Utah	75,000	150,000
Osceola Consolidated, c	Mich.	25,000	100,000
Oxford, G	N. S.		30,000
Plymouth Cons, G	Cal.	50,000	250,000
Prussian, s, L	Colo		15,000
Quincy, C	Mich		380,000
Richmond, s, L	Nev.		270,000
San Francisco, C	Cal		2,500
Shoshone, G	Idaho.		6,000
Sierra Buttes, G	Cal.	5,625	11,250
Sierra Grande, s	New Mex.	100,000	500,000
Silver Cord, G, s, L	Colo		180,000
Silver King, s	Ariz		150,000
Smuggler, s	Colo		36,000
Standard Cons., G	Cal	35,000	250,000
Total Wreck	Ariz.		50,000
True Fissure, G, s, L	Utah.		75,000
United Gregory, G	Colo.		12,000
		$1,229,429	$9,234,316

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

PIPE LINE CERTIFICATES.

The petroleum market up to to-day was absolutely featureless, the fluctuations being within a narrow range and the dealings of a limited character. To-day, however, a reaction set in, and the market was quite active at strong prices, closing at the highest figure for the day. There was no news from the oil-fields to affect the market either way, and the dealings were simply confined to the local traders.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Nov. 3	$1.09¼	$1.10⅜	$1.09⅛	$1.10⅜	2,990,000
5	1.10⅜	1.10⅞	1.09⅞	1.09⅞	2,839,000
6					
7	1.09¾	1.10¼	1.09¾	1.09⅞	1,779,000
8	1.10¼	1.10⅜	1.10	1.10	1,310,000
9	1.10⅛	1.12⅛	1.09⅞	1.12⅛	3,727,000
Total sales					12,645,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Nov. 2.	Nov. 3.	Nov. 5.	Nov. 6.	Nov. 7.	Nov. 8.
Albion						
Alpha	1¾	1⅞		1⅞	1⅝	1⅝
Alta	1⅜	1⅜	1½	1⅜	1⅜	1⅜
Argenta					.20	
Bechtel						
Belcher	1				1	.90
Belle Isle		.40	.45		.45	
Best & Belcher	3¾	3⅞	3¾	3⅝	3½	3½
Bodie	.40	.35			.25	.30
Bullion						
Bulwer						
California	.25	.25	.25	.25		.25
Challar	2⅛	2¼	2¼	2	2⅛	2
Con. Virginia	.50	.50	.50	.45	.45	45
Crown Point		1⅛	1⅛		1	1
Elko Cons					.20	20
Eureka Cons	4⅜	4⅜	4½	4		4
Exchequer						
Gould & Curry	1⅞	1¾	1⅞	1¾	1⅝	1¼
Grand Prize	.55	.50	.45	.40	.30	25
Hale & Norcross	2	2⅛	2	1⅞	1¾	1¾
Independence	.45	.40		.35		
Martin White						
Mexican	3⅛	3¼	3¼	3	3	2¾
Mono						
Mount Diablo	4		4			
Navajo	3¾	3¾	3¾	4		3⅞
Northern Belle	4¼	4¼	4		4	
North Belle Isle						
Ophir	5⅝	5¾	5⅝	4¾	4	3½
Overman						
Potosi	.85	.80	.85	.75	.75	.70
Savage	85	.85	.80	.60	.65	.70
Scorpion	.50		.50	.50	.55	.50
Sierra Nevada	3¾	4	4	3⅞	3⅞	3⅞
Silver King						
Tip Top						
Union Cons	3⅝	3½	3¾	3½	3⅝	3½
Utah	1¾	1⅝	1¾	1⅝	1½	1⅝
Wales Cons						
Yellow Jacket	3⅜	3⅛	3⅜	3	3⅛	3⅛

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, November 8.

There is no feature to report in regard to mining stocks for the past week. The market is dull and uninteresting, with very little doing and no incentive to speculation. Ingot copper holds quite steady at 15@15¼c., and the market for producing mines, while quite limited, is nevertheless firm, and small lots for investment purposes are taken at current rates. Calumet & Hecla sold at $240, and is in firm demand at that price. Franklin declined from $11⅝@$11 for a small lot, with later sales at $11½@$11¼ for regular stock, and $11¾ buyer 60. Quincy is unusually quiet; sales of 20 shares only reported for the week at $50; but $51 was bid for it to-day, without bringing out the stock. Pewabic advanced from $2½ (October 27th) to $3¼, at which price a small lot was sold to-day, and more is wanted at the same price. Osceola is very firm at $18½, with but little stock offered. A sale of 100 shares Allouez is reported at $1½, the last sale being September 26th, at the same price. The rest of the list is without any reported transactions.

The silver stocks continue dull, and, with the exception of Sullivan, almost without feature. Bonanza sold at $1½, same as before. Catalpa, dull at 27½c. Harshaw sold at 50c. Sullivan has been the most active stock on the list, and declined from 96@81¼c., with a subsequent rally later to 95c. The delinquent stock was sold at $1, 1900 shares being sold to pay the assessment of 25c. per share on 7600 shares defaulted. Bowman Silver declined to 10c.; this, for a stock on which assessments of 15c. per share have been paid within a year, offers but poor encouragement to stockholders. Empire declined to 25c. Massachusetts & New Mexico offered at 3c Dunkin, 23@26c.

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3 P.M.—At the afternoon Boards, Catalpa sold at 27½@29c. Franklin, $11½. Closing prices: Atlantic, $10 bid, $11 asked. Bonanza, $1 7/16@$1¾. Calumet & Hecla, $240 asked. Huron, $1¼@$1¾. Osceola, $18@$18½. Pewabic, $3. Quincy, $51@$51¾. Silver Islet, $3½@$4. Sullivan, 92½@95c.

BULLION MARKET.

NEW YORK, Friday Evening, Nov. 9.

Under a fall in the price of exchange on India, the silver market in London has receded somewhat, and affected the price here, as shown by the figures of the accompanying table:

DATE.	London. Pence.	N. Y Cents.	DATE.	London. Pence.	N. Y Cents.
Nov. 3	50 15-16	110½	Nov. 7	50 13-16	110¼
5	50 15-16	110½	8	50 13-16	110¼
6	50⅞	Holiday.	9	50 13-16	110⅜

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of September.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	$97,512	$779,099
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"	——	12,604
Bodie, G. S.	Cal.	15,659	189,660
Bodie Tunnel, G.	"		52,742
*Bonanza King, G.	"		426,967
*Boston & Montana, G.	Mont.	6,277	135,107
*Central Arizona. S.	Ariz.		35,845
*Christy, S.	Utah.	20,981	201,715
*Chrysolite, S. L.	Colo.	27,183	311,491
*Consolidated Bobtail, G.	Colo.		47,986
*Contention, S.	Ariz.	79,224	714,637
Crescent, G.	Cal.		13,000
*Custer, G. S.	Idaho.		43,572
*Deadwood-Terra, G.	Dak.	51,960	335,840
*Derbec Blue Gravel, G. S.	Cal.	14,097	102,579
Dunkin, S. L.	Colo.	6,113	42,959
Evening Star, S. L.	Colo.		47,061
*Father de Smet, G.	Dak.	32,286	270,876
*Frisco M. and S Co., G. S. L.	Utah.		§77,084
*Granite Mountain, S.	Mont.	63,834	165,950
Gunnell, S.	Colo.		58,828
*Haile, G., S., C.	S. C.		27,900
*Head Center Consolidated	Ariz.	10,629	43,247
*Head Center and Tranquillity	Ariz.	——	89,108
*Hecla Consolidated, G. S. L.	Mont.	**77,630	633,979
*Homestake, G.	Dak.	81,624	767,596
*Hope, S.	Mont.	19,613	82,060
Horn-Silver, S. L.	Utah.	303,000	2,474,200
*Howell S. and Mg. Co., G. S. L.	Ariz.	23,769	114,289
Idaho, G.	Cal.		150,642
*Independence, G. S.	Nev.	——	32,991
Iron Silver, S. L.	Colo.		751,062
*Jocuistita, S.	Mex.		‡258,950
*Kentuck, G. S.	Nev.	1,730	18,596
*Lexington, S.	Mont.	111,005	967,708
*Little Pittsburg, S. L.	Colo.	10,473	64,978
*Marguerite, G.	Cal.	3,200	68,794
*Martin White, G. S.	Nev.		136,317
Morning Star, S. D.	Colo.		84,428
*Moulton, G. S.	Mont.		123,288
Mount Diablo	Nev.	51,709	381,142
*Navajo, G. S.	"	——	411,642
*North Belle Isle	"	——	2,153
Northern Belle, S.	"	30,340	505,827
*Ontario, S. L.	Utah.	185,814	1,595,378
*Oxford, G.	N. S.	4,910	50,175
*Phœnix, G	N. C.	3,500	21,009
*Pinal Consolidated, S. L.	Ariz.		181,485
*Plymouth Consolidated, G.	Cal.	68,864	296,082
*Sateino, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		203,947
*Silver Cord, G. S. L.	Colo.		703,333
Silver King, S.	Ariz.		367,802
*South Yuba, G.	Cal.	2,567	37,272
Standard, G.	Cal.	95,878	875,222
Star, S.	Nev.		27,095
*Stormont, S.	Utah.	17,686	193,791
Syndicate, G.	Cal.	9,623	56,008
Tintic M. and M. Co.	Utah.	5,554	34,670
*Tip Top, S.	Ariz.		37,868
*Tombstone, G. S. L.	"		548,764
Wyoming Consolidated.	Cal.		51,541
Yellow Jacket, S.	Nev.		265,885
Total amount of shipments to date			$17,794,751

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended November 9th, as compiled from various sources, amounted to $335,896, as against $247,000 reported for the previous week. The receipts from January 1st, 1883, to date are $9,898,443.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended November 3d	$356,860
Corresponding week last year	117,844
Since January 1st, 1883	12,685,819
Corresponding period last year	44,561,721

Imports.

Week ended November 3d	$1,526,520
Corresponding week last year	447,712
Since January 1st, 1883	15,668,367
Corresponding period last year	4,728,631

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £15,000 bullion, but the proportion of its reserve to liabilities was raised from 43⅛ to 43⅝ per cent, against 37¼ per cent a year ago. The weekly statement of the Bank of France shows losses of 260,000 francs gold, and 2,144,000 francs silver.

Coinage at the Philadelphia Mint.—The coinage executed at the Mint in October aggregated 9,497,800 pieces, valued at $1,359,914.50. This amount was made up of 1,050,050 silver dollars, 50 half-dollars, 50 quarters, 1,410,050 dimes, 2,461,000 five-cent pieces, 300 three-cent pieces, and 4,576,300 one-cent pieces.

United States Assay-Office at New York.—Statement of business for the month ended October 31st, 1883:

Deposits of gold:		
Foreign coin	$1,361,000	
Foreign bullion	858,000	
United States bullion	470,000	
United States bullion (re-deposits)	305,000	
Jewelers' bars	98,000	
Refined gold	347,000	$3,439,000
Deposits of silver:		
Jewelers' bars	17,000	
Foreign coin	7,700	
Foreign bullion	33,000	
United States bullion (contained in gold)	11,500	
United States bullion (re-deposits)	4,200	
Bullion, Arizona	2,200	
Colorado	29,500	
Dakota	27,100	
Idaho	14,400	
Lake Superior	1,400	
Montana	130,700	
Nevada	1,700	
New Mexico	19,600	
Utah	86,600	
Refined silver	82,400	469,000
Total deposits		$3,908,000
Gold bars stamped	$1,977,091	
Silver "	518,378	2,495,469

METALS.

NEW YORK, Friday Evening, Nov. 9.

Copper.—It is reported now that the extension of the Lake contracts alluded to some time ago as carrying the deliveries up to the close of the year, are really brought down to the beginning of April, the amount involved being reported to be twenty millions of pounds. There is an elasticity about such engagements which does not inspire much confidence. There is one feature in connection with the deliveries which to some extent checks a movement which has had much significance during past two years. Much of the copper is delivered at Waterbury and other centers of the manufacturing trade. This, to some extent, hampers the exchange of other brands of copper for Lake.

During the week, Lake copper has sold at 14⅞c., though probably the quantity available at that price is very small. Larger blocks of Baltimore, aggregating 500,000 pounds, have been placed. We quote 14⅛@14⅝c., according to brand.

The advices from abroad are not encouraging, and, in spite of all that is said to the contrary, it is difficult to see how, as we have already contended, our own market can resist the influence. London cables to-day £60 15s. cash and £61 f. o. b. for Chili Bars, and £66@£67 for Best Selected.

Tin.—The market is dull and weak, under the pressure of late and prospective arrivals. There are now 400 tons on the dock, and 275 tons are due on Sunday. We quote 20c. for Straits, large lines, cash. England cables £90 to-day.

Lead.—Since our last, the market has been dull, sales not aggregating more than a few hundred tons at 4c. for Common and Refined. Lead could be bought at 3·95c. for Common, if any body could be got to make an offer at that figure. Buyers, however, are frightened rather than encouraged at every further concession. While on the whole, the situation, as we have repeatedly stated, warrants the low figure of 4c., it can not be denied that at the present moment there appears to be some special effort to depress prices below it. It looks as though somebody were at work trying to bring smelters to the conviction that they must accept lower figures. The manufacturing trade will be busy for the next four or six weeks, and for that time some support from that quarter may be looked to. How matters will shape after that period remains to be seen. Until then, we do not believe that the situation warrants any sustained downward movement.

Messrs. John Wahl & Co., of St. Louis, wire to us as follows to-day:

Our market has declined slowly since our last report, on sales of 250 tons of Refined at 3·75c. There is very little doing, the demand being only moderate, with quotations nominally 3.70c.

Messrs. Everett & Post, of Chicago, telegraph us to-day:

The market is flat and weak, sales not aggregating more than 700 tons at 3·75c. down to 3·70c., closing nominally at the latter figure.

Soft Spanish is cabled from London £11 12s. 6d.

Spelter.—This metal has not shown any symptoms of the improvement so confidently expected months ago. It is quiet at 4⅝@4½c. for Ordinary Domestic. London cables £15 17s. 6d.

Antimony.—This metal is slightly stronger.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 9.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has the following returns:

One hundred and thirteen furnaces, all kinds—sixty-four in blast, forty-nine out of blast.

All grades.	Stocks. Oct. 1.	Stocks. Nov. 1.	Production. In Sept.	Production. In Oct.
Anthracite	23,979	22,550	11,880	13,557
Bituminous	30,235	28,888	19,967	23,020
Charcoal	20,635	20,606	7,396	8,124
Grand total	74,849	72,044	39,243	44,701

American Pig.—Inquiries are getting more numerous, and the conviction is gaining ground generally that, if we have not come down to "bed-rock" in all departments, we are very near the lowest prices. Consumers, on the other hand, do not show the slightest anxiety, and have no cause for it. During the week, sales have been fair at prices practically unchanged. Foundry iron remains $20@$22 for No. 1 and $19@$20 for No. 2, with Gray Forge at $17.50 @$18.50 at tide-water. Bessemer pig is dull, and with the lower prices for rails, will not find buyers except at very close figures. We quote $20@$20.25. Spiegeleisen is quiet at $30 for 20 per cent.

At the Exchange, the following sales were recorded: To-day, 1,000 tons No. 1, March, at $20.50.

Scotch Pig.—There is very little to report, the situation remaining unchanged, with a light business and moderate supplies.

We quote ex ship and to arrive: Coltness, $23; Langloan, $23@$23.25; Summerlee, $22.50@$23; Eglinton, $20.50@$21; Glengarnock, $21.75@$22; Dalmellington, $20.75@$21.

At the Exchange, the following lower cable quotations were received to-day: Coltness, 55s. 6d.; Langloan, 54s. 6d.; Summerlee, 54s.; Gartsherrie, 53s.; Glengarnock, at Ardrossan, 48s.; and Eglinton, at Ardrossan, 46s. 9d. Warrants at the Exchange to-day were 44s. 1d.

Rails.—The wide publicity given to the open drop in the price of rails had brought out many inquiries and negotiations are now pending for the closing of several large contracts, and it is likely that in the next fortnight considerable orders will be placed, all of course for next year's delivery. Buyers generally appear to recognize the fact that the low prices are causing competition to narrow down, and it is believed that they will soon abandon all efforts to obtain further concessions.

Old Rails.—The market has shown little animation. We quote $21@$22 for Tees.

Scrap.—We quote $23 ex ship.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Nov. 3.		Nov. 5.		Nov. 6.		Nov. 7.		Nov. 8.		Nov. 9.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	....	....	2.80	2 65	....	....	2.75	....	2.75	2.50	....	....	700
Amie Con., Co.	.12	.11	.12	....	....	....	.12	.11	.11	....	....	....	5,000
Argenta, Ne.	....	....	....	....	....	....	....	....	....	....	.22	....	100
Bar. & Walker, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bassick, Co.	....	....	....	....	....	....	9.00	....	....	....	9.00	8.50	55
Belle Isle, Ne.	....	....	....	....	....	....	.43	.40	....	....	....	....	900
Bodie Cons., Ca.	....	....	....	....	....	....	....	....	....	....	.45	.40	100
Breece, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer, Ca.	.50	....	....	....	....	....	....	.40	....	....	....	....	110
California, Ne.	....	....	....	....	....	....	.26	.25	....	....	....	....	200
Cal. & Hecla, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Carbonate Hill	....	....	....	....	....	....	....	....	....	....	....	....	....
Caribou Con., Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Castle Creek	....	....	1.10	1.05	....	....	1.20	1.10	1.20	1.15	1.20	....	3,700
Chrysolite, Co.	1.20	1.15	1.20	1.15	....	....	1.20	1.15	....	....	1.30	1.25	6,650
Cons. Va., Ne.	....	....	....	....	....	....	.48	.46	.47	....	.46	.45	3,900
Crown Point	....	....	....	....	....	....	....	....	....	....	....	....	....
Deadwood-Terra, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Eureka Cons., Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Excelsior, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Father de Smet, Dk.	....	....	....	....	....	....	3 50	....	....	....	....	....	200
Findley, Ga.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Stripe, Ca.	.04	....	....	....	....	....	....	....	....	....	....	....	300
Gould & Curry, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Ne.	....	....	....	....	....	....	....	....	.45	.40	....	....	700
Great Eastern, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Green Mountain, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hale & Norcross, Ne.	....	....	....	....	....	....	2.10	....	....	....	....	....	100
Hall-Anderson, N. S	....	....	....	....	....	....	....	....	....	....	....	....	....
Hibernia, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Homestake, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn-Silver, Ut.	6.00	5.75	5.50	5.00	....	....	5.25	....	4.60	....	5.25	4.90	3,770
Hukill, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Independence, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Iron Silver, Co.	3.00	2.95	2.95	....	....	....	2.95	2.90	....	....	2.95	2.90	2,950
La Plata, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C., Co.	.45	.43	....	....	....	....	....	....	....	....	....	....	1,300
Little Chief, Co.	.6	.56	....	....	....	....	.57	.56	.56	.55	....	....	4,800
Little Pittsburg, Co.	.56	.55	.50	....	....	....	.60	....	....	....	....	....	1,510
Martin White, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Moose, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Ne.	4.00	....	4.05	....	....	....	4.10	....	....	....	....	....	300
Northern Belle, Ne.	....	....	....	....	....	....	4.25	....	....	....	....	....	25
North Belle Isle, Ne.	....	....	....	....	....	....	....	....	.65	....	....	....	100
Ontario, Ut.	....	....	....	....	....	....	31.00	30.00	....	....	....	....	135
Opir, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Plumas, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Prussian, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Quicksilver Pref., Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Rising Sun, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson Cons., Co.	.48	.44	.45	.45	....	....	.47	.43	.45	....	.47	.46	3,700
Saint Joseph's Lead.	....	....	....	....	....	....	....	....	....	....	....	....	....
Savage, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Grande, N. M.	1.00	....	1.00	.98	....	....	....	....	....	....	....	....	600
Sierra Nevada, Ne.	3.80	....	....	....	....	....	3.75	....	3.60	....	....	....	160
Silver King, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Spring Valley, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Ca.	6 25	....	....	....	....	....	6.00	....	6 00	....	....	....	300
Stormont, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tip Top, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Yellow Jacket	....	....	....	....	....	....	....	....	....	....	....	....	....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Nov. 3.		Nov. 5.		Nov. 6.		Nov. 7.		Nov. 8.		Nov. 9		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	....	....	....	....	....	....	....	....	....	....	....	....	....
Alta-Montana	....	....	....	....	....	....	....	....	....	....	....	....	....
Barcelona, G.	.27	....	.27	....	....	....	.25	....	.25	....	.24	....	2,400
Bear Creek	....	....	....	....	....	....	....	....	....	....	....	....	....
Bechtel Con., G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Belvidere	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & Belcher, G. S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Big Pittsburg, S. L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradshaw, S.	....	....	....	....	....	....	....	....	.22	.21	....	....	200
Buckeye	....	....	....	....	....	....	....	....	....	....	....	....	....
" pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bull-Domingo, S.L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bye and Bye	....	....	....	....	....	....	....	....	....	....	....	....	....
Calaveras, G	....	....	....	....	....	....	....	....	....	....	....	....	....
Clav'r's W.&M.Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal., B. H. G.	.25	....	.27	....	....	....	....	....	....	....	....	....	3,000
Central Ariz'na, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherokee, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chollar	....	....	....	....	....	....	....	....	....	....	....	....	....
Climax, Co.	.06	....	....	....	....	....	....	....	....	....	....	....	100
Cons. Imp'ri'l, G.S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cons. Pacific	....	....	....	....	....	....	....	....	....	....	....	....	....
Crowell, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dahlonega, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur	.04	....	.04	....	....	....	.04	....	.04	....	.04	....	11,700
Dunderberg	....	....	....	....	....	....	....	....	....	....	....	....	....
Durango, G.	....	....	....	....	....	....	....	....	.04	....	....	....	500
Eastern Oregon	.44	.43	.44	.43	....	....	.47	.46	.47	.46	....	....	9,500
Elko Cons.	.18	....	....	....	....	....	.18	....	.19	....	.01	....	4,900
Enterprise	....	....	....	....	....	....	....	....	....	....	....	....	....
Fannie Barret	....	....	....	....	....	....	....	....	....	....	....	....	....
Globe Copper	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Placer, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Goodshaw, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Granville, G	....	....	....	....	....	....	....	....	....	....	....	....	....
Harlem M.& M.Co.	.97	.94	.98	.95	....	....	.98	.97	.98	.97	.96	....	8,300
Hercules, S	....	....	.10	....	....	....	.11	....	....	....	....	....	500
Imperial	....	....	....	....	....	....	....	....	....	....	....	....	....
Lacrosse, G.	....	....	....	....	....	....	.09	....	.09	....	....	....	900
Lucerne	....	....	....	....	....	....	....	....	....	....	....	....	....
Mariposa Pref., G	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., G	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, G. S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Miner Boy	....	....	....	....	....	....	....	....	....	....	....	....	....
Mono	....	....	....	....	....	....	....	....	....	....	....	....	....
North Standard, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
N. Horn-Silv'r, S L.	....	....	....	....	....	....	....	....	....	....	....	....	....
Orit'l & Miller, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Parnell	....	....	....	....	....	....	....	....	....	....	....	....	....
Quartz Creek	....	....	....	....	....	....	....	....	....	....	....	....	....
Rappahannock, G.	....	....	.08	....	....	....	.08	....	....	....	....	....	1,500
Red Elephant, S.	....	....	....	....	....	....	.06	....	.05	....	....	....	200
Ruby, of Arizona	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cliff, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con.	.26	....	.28	.26	....	....	.26	....	.26	.25	.26	.26	6,000
South Bodie, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Bulwer, G.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Elko	....	....	....	....	....	....	....	....	....	....	....	....	....
South Pacific	....	....	....	....	....	....	....	....	....	....	....	....	....
State Line, 1 & 4, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Nos. 2 & 3, S.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tunnel	....	....	....	....	....	....	....	....	.16	.15	.16	....	5,000
Taylor-Plumas	....	....	....	....	....	....	....	....	....	....	....	....	....
Unadilla, S	....	....	....	....	....	....	....	....	....	....	.01	....	1,000
Union Cons., G. S.	....	....	....	....	....	....	....	....	....	....	....	....	....

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 41,350. Non-dividend shares sold, 56,300.

BOSTON MINING STOCKS.

	Nov. 2.		Nov. 3.		Nov. 5.		Nov. 6.		Nov. 7.		Nov. 8.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	....	....	....	....	1.50	....	....	....	....	....	....	....	100
Amie	....	....	....	....	.12	....	....	....	.12	....	....	....	300
Atlantic	....	....	....	....	....	....	....	....	....	....	....	....	....
Aztec	....	....	....	....	....	....	....	....	....	....	....	....	....
Bodie Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bonanza D.	1.63	....	1.50	....	1.50	....	....	....	1.63	....	....	....	400
Bowman Sil	.12	.10	.11	....	.10	....	....	....	.10	....	.11	.10	8,200
Bruns. Ant.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....	....	....	....	....	....	....	....
California	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal. & Hec.	....	....	240	....	240	....	....	....	....	....	240	....	22
Catalpa	....	....	.27	....	.27½	....	....	....	....	....	.30	.27½	1,750
Co. Virginia	....	....	.50	....	....	....	....	....	....	....	....	....	300
Copper F'lls	....	....	....	....	....	....	....	....	....	....	....	....	....
Crescent	....	....	....	....	....	....	....	....	....	....	....	....	....
"Cusi"	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur	....	....	....	....	....	....	....	....	....	....	....	....	....
Deer Isle	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	....	....	....	....	....	....	....	....	....	....	....	....	....
Douglas	....	....	....	....	....	....	....	....	....	....	....	....	....
Duncan	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin	.26	....	.26	....	.26	....	....	....	....	....	....	....	500
Empire	.29	.28	.28	.26	.27	.26	....	....	....	....	.24	....	4,400
Franklin	....	....	.11	....	....	....	....	....	11.50	11.25	11.50	....	630
Hancock G.	....	....	....	....	....	....	....	....	....	....	....	....	....
Harshaw	....	....	....	....	....	....	....	....	....	....	.50	....	900
Horn-Silver	....	....	....	....	....	....	....	....	5.25	....	....	....	50
Huron	....	....	....	....	....	....	....	....	....	....	....	....	....
Independ'ce	....	....	....	....	....	....	....	....	....	....	....	....	....
Indian Queen	....	....	....	....	....	....	....	....	....	....	....	....	....
Mammoth	....	....	....	....	....	....	....	....	.01	....	....	....	5,000
Mass. & N.M.	....	....	....	....	....	....	....	....	....	....	....	....	....
Milton	....	....	....	....	....	....	....	....	....	....	....	....	....
Napa	....	....	....	....	....	....	....	....	....	....	....	....	....
National	....	....	....	....	....	....	....	....	....	....	....	....	....
Ontario	....	....	....	....	....	....	....	....	....	....	....	....	....
Osceola	....	....	....	....	18.50	....	....	....	18.50	....	....	....	22
Penn-Breck	....	....	....	....	....	....	....	....	....	....	....	....	....
Pewabic	....	....	....	....	....	....	....	....	....	....	3.25	....	110
Pine Tree	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth	....	....	....	....	....	....	....	....	....	....	....	....	....
Quincy	....	....	50.00	....	50.00	....	....	....	....	....	....	....	38
Ridge	....	....	....	....	....	....	....	....	....	....	.47	....	300
Robinson	.45	....	....	....	....	....	....	....	....	....	.16	....	500
San Pedro	....	....	17	....	....	....	....	....	.16	....	....	....	....
S'ra Grande	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Islet	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver King	....	....	....	....	....	....	....	....	....	....	....	....	....
Simpson Gd	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con	.28	....	....	....	....	....	....	....	....	....	....	....	200
South Paci.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard	....	....	....	....	....	....	....	....	....	....	....	....	....
Stewart	....	....	....	....	....	....	....	....	....	....	....	....	300
Sullivan	.97½	.82½	.85	....	.14	....	....	....	1.02½	.95	.95	....	8,160
Sutro Tun.	....	....	....	....	.90	.81¼	....	....	....	....	....	....	300
Sycamore	....	....	....	....	.16	....	....	....	....	....	....	....	....
Twin Lead.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

PHILADELPHIA MINING STOCKS.

	Nov. 2.		Nov. 3.		Nov. 5.		Nov. 6.		Nov. 7.		Nov. 8.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.	....	....	....	....	....	....	....	....	....	....	....	....	....
Argent.	.23	.22	.23	.22	.21	....	....	....	....	....	.22	....	4,900
Arizona So.	....	....	....	....	....	....	....	....	....	....	....	....	....
Battle Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
Buena	....	....	....	....	....	....	....	....	....	....	....	....	....
California	....	....	....	....	....	....	....	....	....	....	....	....	....
Calista	....	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite	....	....	....	....	....	....	....	....	....	....	....	....	....
Cincinnati	.09	....	.09	....	.09	....	....	....	....	....	....	....	7,500
Comprom'e	.15	.10	.15	....	....	....	....	....	....	....	....	....	3,980
Contention	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Virg.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dauntless	....	....	....	....	....	....	....	....	....	....	....	....	....
Del Monte	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	....	....	.19	.18	.18	.17	....	....	.18	....	....	....	5,300
Eureka	....	....	....	....	....	....	....	....	....	....	....	....	....
Girard	....	....	....	....	....	....	....	....	....	....	....	....	....
Governor	....	....	....	....	....	....	....	....	.03	....	....	....	1,000
Grand Uni'n	....	....	....	....	.08	....	....	....	....	....	....	....	2,600
Green Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gunnison	....	....	....	....	.19	.18	....	....	....	....	.19	....	1,200
Homestake	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver	....	....	....	....	....	....	....	....	....	....	....	....	....
Iowa Gulch	....	....	.04	....	.04	.03	....	....	.04	....	.04	.03	18,500
Iron Silver	....	....	....	....	....	....	....	....	....	....	....	....	....
King Bul'on	....	....	....	....	....	....	....	....	....	....	....	....	....
Ledger Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Dia'd.	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Maud	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Pitts.	....	....	....	....	....	....	....	....	....	....	....	....	....
L'g & D'y H.	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....
Mt. Sheridan	....	....	....	....	.02	....	....	....	....	....	....	....	500
Navajo	....	....	....	....	....	....	....	....	....	....	....	....	....
North'n B'l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion Pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Palmetto E.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pembina	.10	....	....	....	....	....	....	....	....	....	....	....	1,000
Penn-Breck.	....	....	....	....	....	....	....	....	....	....	....	....	....
Permanent	....	....	....	....	....	....	....	....	....	....	....	....	....
Pizarro	....	....	....	....	....	....	....	....	....	....	....	....	....
Pizarro Ex.	....	....	....	....	....	....	....	....	....	....	....	....	....
Potosi	....	....	....	....	....	....	....	....	....	....	....	....	....
Rara Avis	.09	....	....	....	....	....	....	....	....	....	.08	....	4,200
Rara Avis E.	.07	....	....	....	....	....	....	....	....	....	....	....	1,100
Record	....	....	....	....	....	....	....	....	....	....	....	....	....
Rico Pion'r.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Apac.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Be.la.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra G'nde	1.00	....	1.00	....	.95	.90	....	....	....	....	.97½	.95	8,950
Sierra Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cord	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver King	....	....	....	....	....	....	....	....	....	....	....	....	....
Silv'r Plume	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard	....	....	....	....	....	....	....	....	....	....	....	....	....
Sultana	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tun'l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone	....	....	....	....	....	....	....	....	....	....	.80	....	100
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....
Yale Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

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Philadelphia. November 9.

The views of leading iron men as to the future of the market are but little more hopeful than two or three weeks ago. Rumors are afloat as to further concessions and shading of prices from figures which have heretofore been considered bottom prices. This has had an unsettling effect upon those who were about ready to order stocks for the rest of the year; and it has also arrested the tendency to speculate in standard irons which was developed a few days ago by offers for large lots. At present writing, the outlook is unfavorable to any improvement, either in demand or prices. Foundry irons are selling very slowly. Prices for ordinary are as low as $20, while $20.50@$21 is quoted and paid for some of the better brands, with some small sales at $21.50. No. 2 has sold as low as $18.50, and the highest heard of this week was $19.50. About $19 represents the average, at which only small lots have sold. The leading makers consider the situation encouraging, but have no business or inquiries to justify their opinion. Millmen are looking up large lots of Forge, and White and Mottled have sold at $16.50@$17 delivered. Straight Forge, $17.50@$18.50. Most of the business is in from 50 to 100-ton lots, with a few contracts for larger lots for delivery this and next month. The improvement expected will be delayed still longer. Too many offerings are on the market for firm prices, and more stock is at furnace-banks than can be readily moved, and sellers are more urgent than buyers. Some of the stronger companies are putting a good face upon the market, and report active business probable for the future; but it must be admitted that the trade is without evidences of activity, beyond that necessitated by current requirements.

Foreign Irons.—Several offers for Bessemer and spiegeleisen have been withdrawn. For Bessemer, $20.50 is asked, and $30.50 for Spiegeleisen.

Muck Bars.—A further weakness of 50 cents is to be reported; sales have been made at $33, though some makes are held at $33.50.

Blooms.—Sales of Blooms have been made as low as $55 and $45, but some makes are higher.

Manufactured Iron.—Prices are weak, and sales have been made at 1·80c. for what passes as Refined. Very low prices are taken, in competition with Western mills. Eastern dealers prefer to pay ⅛c. more for home iron, especially small buyers. Very little iron sells above 2c. Manufacturers are loath to admit that prices are declining and demand likely to continue as it is, but the indications all point that way. Two or three have received fair orders this week, but reports, especially from the country mills, are unfavorable, and show a positively declining tendency.

Plate and Tank Iron.—Mills on Plate and Tank iron are doing fairly, and taking orders for the first quarter of next year in some cases at 2·40@2·50c. for Common Plate and 3¾c. for Shell in small lots. Inquiries for flange and fire-box have come to hand this week. Locomotive requirements are active and steady. The ship-yards are consuming sufficient to impart a fair activity to the trade.

Structural Iron.—Two or three large specifications have arrived, and reports from the bridge-works continue as favorable as heretofore. Definite information can not be given at present as to the probable transactions for this and next month, but there is a good deal of work yet to be done. Angles, 2·40@2·50c., Tees, 2·75@3c. Beams and Channels, 3·40@3·50c. These figures have been shaded in reply to this week's inquiries.

Wrought Pipes and Tubes.—Mills on pipes and tubes are busy, and negotiations are about closing for large lots of pipe iron.

Steel.—An improving demand for low-grade steels is reported, in consequence of heavy shadings offered.

Steel Rails.—The action of the Scranton people has prevented the closing of some negotiations which were in hand a week ago. Small lots have been ordered at $37, but no large transactions are likely to take place at present, although it is dangerous to accept statements as to future intentions. Manufacturers will probably find it necessary to meet the drop half way. Several large lots are in negotiation.

Old Rails.—$23.50 is asked for Foreign and American Tees. Bridge rails nominal. Double-Heads, $25.50

Scrap.—$24.50@$25 is quoted for No. 1 and $18.50 @$22 for No. 2. Cargo, $23, nominal.

Pittsburg. November 7.

Pig-iron is in moderate demand at prices lower than have been reported for a long time. Buyers are still refusing to anticipate requirements, hoping and believing that lower prices will be reached; but furnace men say that they will be compelled to blow out if any further decline takes place, prices now being almost, and in a few cases quite, down to cost of production. C. B. Charcoal has sold at $30, and Warm Blast at $28. Red Short, $20 cash; standard brands of Neutral Forge, $17.50@$18. Muck Bars are dull and have declined to $32.50. For manufactured iron, 1·80@1·90c. is quoted. The market is weak and the demand dull except for small lots for immediate use. It is still uncertain whether the Nail Association will order a suspension, or agree to continue production. Stocks of nails are not large, but the demand is dull and prices weak, and it is thought that a suspension of the 2500 nail-machines will soon give the market a better tone. Mills on wrought iron pipe are fully employed, and the demand is active, although there is a great deal of complaint as to prices. Discounts on gas and steam-pipe, from 73 to 75 per cent off; boiler tubes, 60 per cent off. Old Rails are selling at $24.50. Steel Rails, $37.50@$38 for fall and $36 for next year's delivery, with moderate sales reported. Merchant steel is without improvement, and prices continue low. Quotations for railroad track supplies are unchanged, and the demand is moderate. Scrap, $21@$23 for No. 1.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 9.

Anthracite.

If any thing, the situation in our local market has grown worse, and there is almost a complete stagnation. Buyers, who had been assured months ago when they were stocking up heavily that their interests would be taken care of, are disgusted with the turn of affairs, and enter the market only when absolute necessity compels them to. The great majority of them by far prefer to deliver from accumulated stocks, letting them run down slightly, than keep their supplies up as is usual at this season. In spite of the fact that the West is taking more coal, that the Southern markets have absorbed more anthracite than usual, there is an excess of coal here, and the attitude of buyers makes the situation all the worse. Concessions are the rule, and yet it is difficult to place coal. Besides, the falling off in prices demoralizes that part of the trade, a heavy part of it, which consists in deliveries on contracts.

There is absolutely no hope that there will be a restriction of output this month; not because the state of the trade does not demand it, but for another reason. The beginning of December, however, will have to witness a stoppage, not alone of half time, but for at least a week. Prices are lower, $4.15@$4.20 for stove coal.

Bituminous.

The Philadelphia correspondent of *Coal* says: The total production sent to Eastern markets for the year is 4,088,196 tons—an increase of 510,272 tons over the production for last year. The figures for last week are 107,782 tons. The Clearfield output was 57,455 tons; Broad Top, 13,048 tons. The smaller operators still complain of the lack of cars, but some of them have recently received more than during September. There is a disposition shown to meet trade requirements as far as possible, but the necessities of some shippers would lead them to precipitate more coal on the market than is needed, could they be as liberally supplied with cars as they desire. The company is endeavoring to serve the interests of both producers and consumers to a certain extent, and at the same time to profit by the heavy traffic. The shipments from the Cumberland region for the week are 57,043 tons, and for the year, 2,086,936 tons, or double those of last year.

Buffalo.

The bituminous coal trade of Port Arthur, L. S., has already reached a considerable magnitude. Last year, 5000 tons were received at that port (the only port of entry in Manitoba), and this year the aggregate may exceed 90,000 tons, including 12,000 tons of anthracite, which is quoted at $13@$14 per ton at retail. From the want of proper shipping facilities in the way of handling soft coal at this point, the bulk of the movement has been from upper Lake Ports. Railroad freights also ruled too high from the mines to Buffalo. The cost of handling soft coal in Buffalo from cars to vessels by wheelbarrows is about thirty cents per ton; at Cleveland and Sandusky, where they have derricks, only from ten to twelve cents. The firm here which has contracts with the Canada Pacific Railroad expects to send 200,000 tons to Port Arthur next year and to use its own coal instead of purchasing from the producers. The firm will erect derricks and all conveniences at this port if possible before the opening of next season's business.

Chicago.

Reports of new discoveries of soft coal in the territory tributary to Chicago are constantly coming in, and it would seem as if the whole Western country were underlain by some kind of coal, better or worse in quality. Portage County, Wisconsin, is happy over the discovery of a vein of coal of fair quality, while a rich vein of excellent quality has been found the past week at Manning, Carroll County, Iowa. A company with $200,000 capital has been formed to work the newly discovered mines at Victoria, five miles north of Bismarck, on the Northern Pacific road. A Canadian geologist who has just returned from a tour over the Canadian Pacific Railroad, reports that he has found indications of abundant coal—on the plains lignite, on the foot-hills bituminous, and in the mountains anthracite of fair quality. There are reports of other discoveries, too numerous for mention, constantly coming in, many of which of course amount to nothing.

Cleveland.

The latest from the "new find" seems to establish my statement of two weeks ago. From samples of the drillings sent to Professor Orton, he declares it to be bituminous shale or albertite, containing about 50 per cent of fixed carbon. From the reputation of the men and the witnesses present at the drilling, I am satisfied it is an honest find, so far as they are concerned, and therefore not "salted," as some have charged; but as to the quantity or value of the "find," the presumption is against its being of any considerable dimensions, and its positive value can only be learned by sinking additional holes by a more systematic method, which will probably be done, as the quantity is evidently greater than any heretofore struck in this region.

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RICHARD P. ROTHWELL, C.E., M.E., ROSSITER W. RAYMOND, Ph.D., CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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FROM England, comes the news that the office of Keeper of Mining Records, so long and ably filled by Mr. ROBERT HUNT, has been abolished, and that the work of collecting the mineral statistics of Great Britain will now be performed by the mine inspectors under the surveillance of the Home Office.

DISPATCHES from Washington to the New York daily papers unfriendly to the administration represent naval circles in that capital to be considerably excited over a criticism, published in the *Engineer*, of the design of engine and boilers of the new steel cruiser Chicago. It may be well to warn Americans, before they attach too much importance to what the *Engineer* says, to state that the pages of that journal have for years maintained an attitude of hostility to every thing that is American.

ROPE tramways for transporting coal, ore, stone, etc., particularly over very difficult ground that would involve complex road construction, are much older than is generally believed. Recently, a description, with drawings, was found in the archives of the city of Dantzic, Germany, showing the arrangement designed in 1644 by a Dutch engineer, ADAM WYBE, to carry earth excavated on one side of the city fortification ditch across it to the other side. It was only when wire rope became known and generally appreciated that such tramways again came into use and assumed the importance they now command.

THE low prices of copper during the current year have played sad havoc with a large number of Western enterprises, and there are few of the smaller producers figuring in last year's reports of production that have been able to stand the strain. In Arizona, six have succumbed; in Wyoming, Montana, and Nevada, one; and in New Mexico, there is not now, so far as we know, a single concern running. The East has dwindled down to insignificant proportions, and even some of the largest mines of Arizona have shown symptoms of a decline, or are erratic to an extent that does not speak well for their future. Among those which have temporarily suspended operations, is the Arizona Copper Company, of the Clifton District, though its idleness is due to extensive preparations for a future large output. At a recent meeting of the company at Edinburgh, some facts were brought forward which are of interest. The company has nearly completed its road, 70 miles in length, and is trying to provide for the expenditure incurred, £290,000, in calling for a loan of £300,000, the purchase price of the mines having been £600,000. A new plant has been contracted for, as already noticed, because, as the chairman stated, the old smelters were costing them as much as $150 per day for running expenses. They hope to reduce the figure to $200 for four furnaces. It is estimated that the cost of mining and smelting 15 per cent ore will be $19 per ton, or, roughly, 6½ cents per pound at smelting-works. Taking the cost of shipment to New York, and the cost of refining, the copper might be laid down in New York at about 12½ cents, a figure which presumably would be considerably reduced by improved appliances, cheaper fuel, etc. The recent developments in some of the mines give reasonable assurance that the output will be sufficient to keep the plant busy. Though apparently loaded down with a very heavy capital, fully five millions of dollars, including purchase price and cost of railroad, the magnitude of the operations of the company will enable it to become a factor in our copper markets, particularly if they company will do its own refining, as it seems inclined to do.

Unless some of the large producers fail to keep up their record—as one of them is now rumored to be doing—their combined product will fully compensate for the falling off of the smaller companies. Their copper, however, to judge from the developments of the past year, will be very largely diverted into other channels, leaving our market tolerably free to the Lake producers. to whom, however, they will be a standing menace.

THE Russian Department of Mines has published statistics of the production of the mining industry of Russia and Finland for the fiscal year ended May 1st, 1882, which furnishes an idea of its development during the past decade. Compared with the year 1872, the figures are:

PRODUCTION OF THE MINERAL INDUSTRY OF RUSSIA AND FINLAND.

	1881.	1872.
Gold, pounds, aver	81,028	84,172
Platinum, " "	6,572	3,322
Silver, " "	20,799	27,154
Lead, net tons	1,087	1,348
Copper, "	3,818	4,105
Spelter, "	5,013	3,397
Tin, "	22	8
Pig-iron, "	517,487	440,091
Wrought-iron, net tons	322,090	295,534
Steel, "	323,323	9,239
Direct castings from blast-furnace, net tons	66,181	36,765
Coal, net tons	3,850,397	1,210,090
Naphtha, "	730,771	27,148
Petroleum, "	231,125	9,361
Manganese ore, net tons	12,387	.....

On the whole, these figures show a satisfactory growth. The gold product of the year 1881 was below the average of 2500 poods in Silesia and the Ural during the past few years, because the season was an unfavorable one. Silver has fallen off because the Altai mines are poorly managed; while the decline in copper is only temporary, the output having again reached normal figures in 1882. Still, Russia is dependent upon outside sources for more than one half of its supply of that metal. The spelter manufacture is almost entirely confined to Poland, and is making satisfactory progress. The oil industry has made very satisfactory advances, though it is predicted that where the needed transportation facilities are provided it will assume much greater proportions.

With all its show, the steel industry is in a precarious condition, because its growth has not been accompanied by a corresponding increase in the make of the raw material, for which the works are almost entirely dependent upon foreign sources. A slight increase in the duty on pig-iron or any hampering of the import of coal would promptly cause this hot-house plant to languish. The Russian coal trade is represented to be embarrassed chiefly by lack of railroad facilities and a short-sighted policy on the part of railroad managers, who can not be made to understand that it would pay them to transport fuel at low rates. In spite of the efforts made in Russia to foster a native mining and metallurgical industry, it does not seem that it is likely to become at an early ate even a very serious competitor of its rivals in its own markets.

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A CASE which is of the greatest importance to those holding coal property under title obtained under patent from the United States has just been decided in Colorado by Judge MCCRARY, of the United States Circuit Court, at Denver, Colorado. In that, as well as in almost all of the States and territories of the far West, coal lands are acquired from the government by proof of discovery of their mineral character, and the expenditure of a specified amount of labor in improvement, a patent being issued to the claimant, provided no adverse claims are filed. It is a notorious fact that large tracts of territory have been fraudulently obtained, and yet the innocent third parties who now hold such property by right of purchase from the original claimants have generally been believed to be secure. This hope is now widely dispelled by the decision of Judge MCCRARY in the case of the United States *versus* the Colorado Coal and Town Company, in which the title to 2500 acres of coal lands mostly in Las Animas County, Colo., was in dispute, the present owners being the Colorado Coal and Iron Company, the largest enterprise of its kind in the State. In 1873, sixty-one persons, whom the Judge declares were fictitious, with the possible exception of one JUAN B. MARTINE, a laborer, obtained patents each covering a quarter-section, or in the aggregate 10,000 acres. The evidence shows that none of the lands was occupied by the pre-emptors, nor were they improved in any way, prior to the issuing of the patents, thus showing clearly that the register, IRVING W. STANTON, and the receiver, CHARLES A. COOK, both officers of the Pueblo United States Land-Office, conspired with A. C. HUNT, the person to whom were issued all of the patents in the name of the 61 persons. From HUNT, W. S. JACKSON, a trustee of the Colorado Coal and Town Company, bought them, from which concern they, in time, passed to the Colorado Coal and Iron Company.

One very curious circumstance in connection with the matter is, that E. J. HUBBARD, writing from Trinidad, Colo., under date of November 28th, 1873, called the attention of the General Land-Office to the fact that "coal lands were being entered as agricultural lands by *straw men*, and conveyances made to the procurers of these forgeries (who pretend to be innocent in the matter)." The same party in the same letter wrote: "The register and receiver are charged with complicity in these things." In spite of this warning, the government did not file its bill until January, 1880, when the value of the lands had become more generally appreciated, largely through the exertions of the defendant company; therefore the charge that the negligence of the government officers is due to complicity of persons in office in Washington can not be determined, as it was outside of the question in this case.

The respondents, while partly denying the charge of conspiracy or fraud, rested their case chiefly on the claim that they were innocent third parties. The judge, however, held that, as the patentees were fictitious persons, a grant to them was void, as there could be no conveyance of the title where there was no grantee to take the title. He held, too, that neither the defense of the statute of limitations nor that of laches can be pleaded against the United States.

This decision, if sustained by the Supreme Court of the United States, to which it will be carried, would lead to very serious consequences in the West, endangering the title to a good deal of property. It will be conceded that it is well calculated to stop the scandalous frauds that have led to wholesale stealing of the public lands. But on the other hand, it will cause a good deal of hardship to *bona-fide* purchasers. We trust that, so far as the latter are concerned, some means will be found to lighten their burden.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Consumers of Graphite.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: We notice that in giving the consumers of graphite in your recent article on graphite, you omitted to make mention of our firm among crucible makers. We have made crucibles for the last twenty years, using Ceylon plumbago. HUSSEY & CO.

PITTSBURG, PA., Nov. 8.

The Population of Johnstown.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My attention has been called to an article in your paper of the 10th, headed "Among the Iron Workers—Johnstown," in which the writer makes the great mistake of taking the census report of Johnstown proper as containing all the population of the place. Johnstown, containing all the population south of the Conemaugh River, has a little over 8000 people; but the boroughs of Millville, of Cambria, of Prospect, of Conemaugh, which lie around Johnstown borough, and are as much a part of its population as that lying within its legal limits, swell its numbers to over 25,000 people. It is probable that a consolidation will some day be asked for, and the magnitude of our place will be realized.

The Cambria Iron and Steel-Works proper are located in Millville borough, while the works of the Gautier department are located in the borough of Conemaugh, both boroughs being immediately adjacent to Johnstown. In Woodvale borough, which lies just east of Conemaugh borough, are located the flouring mills and woolen mills controlled by the Cambria Iron Company. When the Cambria Works were first established at Johnstown, the population amounted to about 2000. At this day, the total population of Johnstown and surroundings approximates closely to 25,000. Yours truly, D. J. MORRELL.

JOHNSTOWN, PA., Nov. 12.

Amalgamating Flour Gold.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In answer to your correspondent M. H., in the JOURNAL for October 27th, I will say that pan amalgamation treats flour gold very cheaply and successfully. Notable instances are the ores of Bodie, California; also, the Minas Prietas, of Sonora, Mexico. For cheapness and close work, the latter is a conspicuous success. The company has an office at No. 211 Sansome street, San Francisco, and would doubtless respond to inquiries from your correspondent. MILLMAN.

Nov. 4.

Is Alumina an Acid or a Base in Singulo-Silicates?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: We know that, in compounds very rich in silica, alumina plays the part of a base; for we have simple silicates of alumina, in which alumina is not only a base but the only base present. We also know that, in compounds low in silica, alumina acts as an acid; for we have not only blast-furnace slags containing as much as 30 per cent of alumina, but also compounds consisting wholly of lime and alumina, in which alumina is the sole acid present, and these are completely fusible. We also have compounds of alumina and magnesia (spinel), of alumina and ferrous oxide (hercynite), and of alumina and zinc oxide (gahnite), which occur well crystallized. We have fusible aluminates of lime, from a tri-aluminate with 64·5 per cent of alumina (which may even be considered as an aluminate of alumina and lime) to a sub-aluminate with only 10 per cent of alumina, corresponding approximately to the formula $Al_2O_3,15CaO$. But we should expect that, in compounds with one and the same ratio between the oxygen of the silica and that of the other oxides present, alumina would play a tolerably uniform part, either acting always as an acid or always as a base.

On this important question, opposite views seem to be held by two of the latest writers on the subject, Mr. A. F. Schneider (in a paper read before the American Institute of Mining Engineers at the Colorado meeting) stating that in his slags, which are singulo-silicates, an *increase* in the percentage of alumina calls for a *decrease* in that of silica and an *increase* in that of the bases; while Mr. O. H. Hahn (in *The Mineral Resources of the United States*, 1883, page 328) states that it demands an *increase* in the percentage of silica, which of course implies a *decrease* in the percentage of the bases. The singulo-silicate of alumina has a higher percentage of silica than have those of iron and of lime, and Mr. Hahn states that, if the increase in the percentage of alumina is not accompanied with a corresponding increase in that of silica, so as to preserve the singulo-silicate relation between the oxygen of the silica and that of the bases, the slag will be undesirably basic.

Mr. Schneider's statements imply that a lower oxygen ratio of silica to base is desirable in aluminous than in non-aluminous slags, or that alumina in these singulo-silicates acts as an acid, which he hints may be the case.

Now, who is right? If we are running successfully with a singulo-silicate slag, and have to increase the percentage of alumina, shall we follow Mr. Schneider, and cut down our silica, or shall we follow Mr. Hahn, and raise it? Which course will give us the best metallurgical results, supposing the other advantages of the two courses to be equal?

May it be that both are right, and that, in calcareous singulo-silicates low in iron, alumina acts as an acid, while in ferruginous ones low in lime it acts as a base? This seems a very important point for all smelters to clearly understand, and more light on it is to be hoped for. Can not some of our plumbic friends elucidate it? With all the experience accumulated in our smelting, it should not be necessary for each metallurgist to test this point for himself by costly experimenting and sleepless nights.

BOSTON, Nov. 9. HENRY M. HOWE.

The Illumination of Mines in Japan.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Regarding the note entitled, "The Ways that are Queer of Japanese Miners," which appeared in your issue of the 8th of September last, I beg your permission to reply to it. It may be construed to mean that all the Japanese miners are occupying most of their time in knocking off the ashes from the bamboo torches, without appreciating the fact that "time is money." I myself was struck by the inconvenience of this kind of lighting a mine, as it causes not only the trouble of knocking off the ashes, and a great waste of time, but also gives off much smoke and more or less vitiates the air of the mines. Fortunately, the use of the torches for the illumination is restricted to some of the northeastern mines, on account of the scarcity of burning-oils, and of the abundance of bamboo in the neighborhood of the mines. In all the other mines, on the contrary, lamps of different types are in general use, and therefore most of the Japanese miners do not really devote their time to the trouble of the bamboo ashes. I am sorry to say that "the engineer who has just returned from Japan" seems to have seen only one or two of the northern mines, which are now using the old way of illumination, and he seems to have concluded that every mine in Japan was in the same condition as those which he inspected.

It is indeed a difficult task to sweep away at once all those disadvantageous methods which we have been accustomed to in all the industrial branches from the time of our ancestors, especially in such a country as Japan, which had so little or almost no communication with the civilized countries. The improvement can only be expected to be a gradual one. In fact, for the last sixteen years, mining and metallurgy have undergone a great many improvements, and the old methods of mining, dressing, and beneficiating the ores are now disappearing day after day.

The above method of illuminating the mines might have already been

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abolished, if it had happened in the western mines; but the conservatism of the eastern miners, and the abundance of bamboo in that section, have prevented its abandonment until now. Moreover, they cling to the belief that the use of torches improves the ventilation. It happened one time in the fall of the year, at one of the eastern copper mines, that the light did not burn at all from the stopping of the natural ventilation. All the appliances made at that time failed to restore the current. One miner, however, bravely tried to force his way into the mine with a large bundle of burning torches, by which the ventilation was immediately restored. As the miners did not understand the theory of natural ventilation, this cause was imputed by them to the torch itself, without considering its heating action and the consequent change of the temperature of the air between the inside and the outside of the mine.

The engineer of whom you speak reports again that Japanese miners are also great smokers. This is really ridiculous. By what standard of comparison has he determined that they are great smokers? I have never seen Japanese pipes having a bowl the capacity of which is equal to that of an ordinary thimble. The bowl is generally from four tenths to five tenths of an inch in diameter at the mouth, which tapers toward the bottom, like a hollow inverted cone, having the depth of three tenths of an inch. Now, we may just imagine how long it takes to fill such a small bowl with tobacco, and to smoke two whiffs! According to my long experience, it takes no longer than half a minute. If the miners smoke twice successively, it will only be the loss of one minute, which may not disturb them much in their work, although there ought to be no smoking in the working places, especially in coal mines; but I am afraid that they spend much more time in conversation *after* the smoking. If the comparison be made between the Japanese pipes and those which are hanging down from the mouths of German workmen, how many times more do the latter require to fill and clean them?

Permit me to explain briefly in the following the different methods of illuminating the mines which were and are employed in Japan:

The illumination of Japanese mines is done in three ways:

First. By torches. (*a*) Wooden torches. (*b*) Bamboo torches.

Secondly. By lamps of Japanese origin. (*a*) Dish-lamps. (*b*) Shell-lamps.

Thirdly. By lamps of foreign invention. (*a*) The ordinary miner's lamps. (*b*) Safety-lamps.

First. Torches.

(*a*) Wooden torches. There are two kinds of wooden torches. The one called "Tatakigi" (hammered wood) is a common wooden torch, about two feet long, and half an inch thick, the one end of which is hammered so as to be easily lighted. Another kind, called "Shishoku" (paper candle), is a rope made from the long shavings of wood, and moistened with oil. For making this kind of torch, pine or some other wood about one and a half inches wide and three feet long is planed so as to get long shavings as thin as a sheet of paper (hence the name). Many sheets are now rubbed together, so as to soften them, and then made into a loose rope, and lastly moistened with oil. As the rope thus prepared is not stiff enough to be held by hand, a wooden holder provided with an iron hook near the top is used, to which the rope is wound up, the burning end of which is suspended to the hook. It is gradually rolled up toward the top, according to the rate of burning. Both of these wooden torches were formerly used for lighting the underground passages, but not in working places, on account of their smoke.

(*b*) Bamboo torch. It is a small bamboo of a special kind, called "Suzutake" (tin-bamboo), having the diameter of only half an inch. The length varies according to its growth, but, as a rule, it is taken about two feet. Before burning it, the following preparation is necessary: The freshly-cut bamboo is bound up to a bundle of about 2 feet 6 inches in diameter, and placed on the shelves of a smoking-house, where the fire is made on the floor. By this heating operation, the bamboo gives off a tarry sap on the surface, and then it is ready for use. As already mentioned, it is still used in some of the northeastern mines.

Secondly. Lamps of Japanese origin.

(*a*) Dish-lamps. The dishes are either earthenware, porcelain, or iron. The one used in the Sado gold and silver mine was an earthenware dish placed on a clay receptacle in the working places; but it was soon replaced by an iron dish-lamp, provided with a movable hanging rod, whose upper end is bent to a hook. This is called "Kantera," and is now used both for lighting the galleries as well as the working places. When ascending or descending a shaft, the oil is previously poured out into a reservoir, leaving just so much oil behind as is necessary to burn the wick, in order to save the oil which might be lost by the vibration of the lamp. This should, of course, be replaced by the closed foreign lamps. The oil-reservoir carried by each miner is simply a bamboo tube closed at the bottom by the notch, and at the top provided with a stopper.

(*b*) Shell-lamp. The most common lamp which is seen in Japanese mines is what we call "Sazai." It is a shell of about the size of the fist, having a screw-shaped bottom, which gradually widens out toward the mouth. A sketch of this lamp made by me is shown in the memoir *On Mines and Mining of Japan*, written by Prof. C. Netto, and published by the Tokio University. The lamp is either held directly in the hand or, better, by a hanging hook. It has an advantage that the oil does not flow off in case of dropping it down, owing to the spiral shape of its bottom. The origin of the shell-lamp seems to be very old. In a Japanese book, written about 900 A.C., it is mentioned that the "Sazai" lamp is used in the silver mine of the island Tsushima, where silver was first found in Japan in 674 A.C. In some of the western mines, porcelain dishes are used, which are placed on iron rings provided with hanging hooks. The oil used is either rape oil, or an oil extracted from the root of a certain tree; and sometimes fish oil is also used, but it is not desirable, as it burns with a sooty flame and emits a bad smell. The wick is generally the small pith of a sort of rush, four or five pieces of which are burnt together.

Thirdly. The lamps of foreign invention. Although they were lately introduced, they are now rapidly spreading in use. The officers and foremen carry with them always such lamps, as a distinction from the ordinary miners. The safety-lamps are also employed where there is any fire-damp. These kinds of lamps hardly need any further explanation.

Yours respectfully, W. WATANABE.

FREIBERG, SAXONY, Oct. 23.

METALLURGY AND ENGINEERING AT THE BOSTON EXHIBITION.

Special Correspondence of the Engineering and Mining Journal.

Steel Castings.—The Chester Steel Casting Company displays many open-hearth steel castings, some of them bent hot, and showing great ductility. They impress one with the very considerable progress which has been made in steel casting, and with the variety of uses to which these important products are now put. The fractures exhibited are solid and free from blow-holes. Some large and very beautiful taps displayed testify highly to the solidity and excellence of these castings, as does also the fact that many of the most important locomotive-works, including the Baldwin Works and others of the very highest standing, are largely supplied with steel castings from Chester for such difficult and important pieces as cross-heads, etc.

Drop-Forgings.—The Billings & Spencer Company has a very impressive display of drop-forgings, many of them of exceedingly complicated form, which it would be next to impossible to forge in the ordinary way. The work of the company is so highly esteemed that it has recently sent to Prussia sets of dies and forging apparatus and skilled drop-forgers to manufacture the bands and other complicated and most difficult pieces for the needle-guns of the Prussian government. This is indeed carrying the war into the enemy's country, when Europe has to send to New England not only for raw materials but actually for skilled labor. Among other exceedingly difficult drop-forgings displayed may be mentioned the sewing-machine shuttles, stocks for taps and dies, set and screw wrenches, very complicated frames for the handles of pistols, lathe-dogs and cutting tools, and the bodies and shells of the Morse twist drills. So extensive has become the use of these drop-forgings that the company now turns out about 20 tons of forgings a month, made mostly from open-hearth steel, employing no less than 34 drops. A single order is shown from the W. A. Wood Mowing and Reaping-Machine Company for 50,000 pitman eyes, which the company is turning out at the rate of 2000 a week; while of sewing-machine shuttles, 35,000 per month is the regular output.

Wooden Rimmed Pulleys.—The large wooden rimmed pulleys of W. W. Carey, of Lowell, Mass., attract considerable attention. The rim is made in segments about one inch broad, firmly spiked and glued together, and is wholly of wood. The hub and arms are of iron, cast in a single piece. The arms proper do not extend quite to the rim, but into the thickened outer end of each arm a set-screw is tapped radially, its axis coinciding with that of the arm proper; in fact, the set-screw is a continuation of the arm, and, by being screwed into or out of it, shortens or increases its effective length. The connection between the rim and the arms is made by screwing these set-screws out radially, away from the hub and toward the rim, against which they firmly jam, so firmly as to make a rigid connection between the rim and the arms. The pulleys are in general faced with leather, to increase their traction.

The evident advantages of these pulleys over ordinary cast-iron ones are: 1. The arrangement of set-screws permits them to be very exactly centered. 2. The leather face has from 30 to 50 per cent higher traction than smooth iron. 3. The danger of serious accidents from the breaking of the pulleys is considerably lessened, if not removed. 4. As they are lighter than cast pulleys, somewhat lighter shafts can be used, at least in the case of pulleys of large diameter, and in those whose diameter bears a large ratio to the width of belt employed. Where the width of the belt is large compared with the diameter of the pulley, the shaft has to be designed to resist the tension of the belt, which not only is often much more severe than the weight of the pulley, but in very many cases in another direction. In places where there are great changes in the amount of moisture in the air, the shrinking and swelling of the wooden rims would probably be a serious inconvenience. These pulleys, faced with leather, are sold at the price of cast-iron pulleys, and it is said that the sales last year amounted to $20,000.

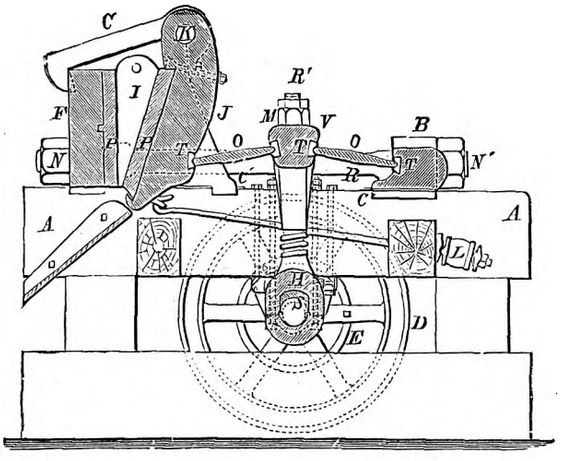
Wrought-Iron Rimmed Pulleys.—Some large wrought-iron rimmed pulleys made under Medart's patent by McMurray & Stoughton, of Hartford, deserve attention. The rim is made in one circular or two semi-circular pieces, according to the size of the pulley, is properly crowned, and is riveted to the cast-iron arms very securely. The company has made these pulleys as large as ten feet in diameter, and is now preparing to make one fifteen feet in diameter. Some 250,000 of these pulleys have been made. When their manufacture was first begun, they were made too light, and a considerable number of breakages occurred; but since the manufacture passed into the present hands, about two years ago, it is claimed that not a single pulley has failed. Among the numerous advantages claimed for these pulleys over cast-iron ones, two should probably be conceded: 1. They are much less liable to break, since the cast-iron portions are not subjected to any thing like such severe cooling strains as are cast-iron pulleys; and if they do break, they are less likely to cause a serious or fatal accident. 2. They are considerably lighter than cast pulleys, thus permitting the use of lighter shafting, hangers, etc., in many cases, and reducing the cost of transportation.

Automatic Speed-Recorder.—The Ashcroft Manufacturing Company exhibits Moscrop's well-designed speed-recorder for engines, shafting, etc. The maker's name is a guarantee of the workmanship of the instrument, which records automatically and continuously the slightest variations of speed. Considerable light might be thrown on the mysterious things which happen in many of our smelting-works at night by the testimony of this instrument and of a continuous blast-pressure recorder, and it has long been a matter of surprise to me that the latter instrument is not largely introduced.

Blake's Challenge Rock-Breaker.—This improved form of our old friend, the Blake crusher, has such marked advantages over the older form that it is likely to supersede it. The old Blake crusher, now called the "Eccentric" crusher, consisted of a fixed jaw *F*, and a moving jaw *J*, actuated by a toggle-joint, all of which were contained and rigidly supported by a very strong cast-iron frame or box. The upper end of the movable jaw was fixed and the lower end was moved by a toggle-joint driven by a pitman *R' H*, somewhat as shown in the accompanying cut. Of course, when the pitman descended, forcing the movable jaw toward the fixed one and crushing the ore between them, there was a tremendous longitudinal strain in the cast-iron frame which contained the two jaws, and against the ends of which the fixed jaw and the outer toggle pressed

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violently. To resist this pressure, the frame needed great strength, and consequently a large cross-section and great weight per unit of length. To avoid excessive weight, the frame was made short, which necessitated making the toggles *O O* short also. Now, the proportion of the downward pressure of the pitman which is resolved into horizontal pressure against the jaw *J* depends on the angle which the toggles make with each other. If they are nearly parallel with each other, most of the downward pressure of the pitman will be resolved into downward pressure on the bearings T_2 *T*, and but a small portion into horizontal pressure; of course, economical working demands that as much as possible of the power be resolved into useful horizontal pressure and as little as possible into vertical pressure, which is simply rigidly resisted by fixed parts of the machine. Now, if we suppose, for simplicity, that in every case the toggles are approximately in a straight line with each other at the end of the pitman's downward stroke, it should be evident that, for a given length of



stroke of the pitman, the longer the toggles are, the less will be their inclination to each other at the beginning of the stroke. Thus, efficiency demands length of toggles, which in turn requires excessive length and weight of the containing cast-iron frame.

In the "Challenge" crusher, which is represented in the cut, the tensile strains are taken up, not by weak cast-iron, with its puny strength of say 20,000 pounds, perhaps seriously weakened by cooling strains, but by light steel bolts, many times as strong per unit of weight. The upper ends of the jaws are held together by the powerful steel strap *C*, and the bottom of the fixed jaw is held firmly by the strong steel bolts *R*, to the block *B*, against which the outer toggle presses. These bolts are in the plane of the toggles, thus concentrating the material near the line of strain. This arrangement permits us to increase the length of the toggles and thus to get high efficiency, and at the same time to get a very much lighter machine. The upward pressure of the eccentric shaft *S* is taken up by the wooden beams *A A*. It is evident that, as the toggles wear, not only will the opening between the jaws but also the obliquity of the toggles to each other be increased; and as that obliquity increases, so will the horizontal travel of the jaw increase. Now, although in the old or "Eccentric" crusher the opening of the jaw could be adjusted, the obliquity of the toggles could not, except by putting in different-sized toggles; so that in effect the stroke did increase with the wear of the toggles, and if they were allowed to wear too short, the stroke became so long as sometimes to cause strains so great as to break the machine.

In the "Challenge" machine, however, while the opening between the jaws can be regulated by the tension-rods *R*, the obliquity of the toggles, and through it the travel of the jaw, can be adjusted by raising and lowering the pitman-rod *R*, so that any size of opening and any stroke are attainable. While standing up bravely to its work, the Challenge crusher is less absolutely rigid than its predecessor, owing to the resilience of the main tension-bolts and of the beam *A A*, and also to the presence of thin rubber plates inserted between the beam *A* and the fixed jaw and the toggle-block *B*, so that if, as has often happened, a sledge or a lump of wrought iron or of copper gets into the machine, there is enough spring in it to greatly mitigate the sudden irresistible shock which occurs in the "Eccentric" crusher in such an event.

An important feature of the new form of crusher is the lightness of its parts, the heaviest part of a 10 by 7 crusher being 1175 pounds, while the heaviest piece of the 10 by 7 crusher of the older or "Eccentric" pattern weighed 4339 pounds, rather a heavy load for a single mule or llama or canoe to carry. The Dodge crusher and the Wheeler crusher have a slight incidental advantage over the Blake, in the fact that the discharge-opening from their jaws is of constant size, the moving jaw being fixed at the bottom and moving at the top, while the movable jaw of the Blake is pivoted at the top, so that the width of the discharge-opening varies during the stroke by the whole travel of the jaw, this variation in the size of the discharge-opening tending to diminish the uniformity of the size of the product. This is much more than compensated for by the other advantages of the Blake crusher, which is likely to remain long the best crusher in the market for most purposes.

Safety Railroad Crossing and Block System.—The Union Switch and Signal Company, of Pittsburg, exhibits a very interesting full-size working model of its excellent safety crossing, which makes collisions at crossings practically impossible. Even if the engineers of two trains conspired with the operator of the crossing system to produce a *coup de théâtre* by means of a grand and startling collision, they could not accomplish it without first breaking up the machinery with sledge and chisel; so that blowing up the embankment beneath a passing train with dynamite would be a more ready means of accomplishing their object. Not to occupy too much of your space, I will here merely outline the method of protecting a double-track crossing. The manner of applying this apparently very complete system to complicated crossings and junctions, to draw-bridges, etc., is clearly and admirably set forth in the company's pamphlets.

At some distance from the crossing, each track is provided with a switch-rail, to divert trains from the crossing and throw them into a siding. (The siding may be omitted, so that the switch-rail in diverting a train from the crossing will simply derail it, that is, throw it off the track). The switches for all these sidings are operated by levers, which are all collected in a central operating room or cabin, where is also the lever for operating the signals. In addition, each track has two signals, a "distant" and a "home" signal, both of which, as well as the switch, are on that side of the crossing from which the train comes. The "distant" signals are from 1000 to 2000 feet from the central operating cabin; the switches are from 300 to 600 feet from it, according to the grade; and the "home" signals are between the switches and the crossing, about fifty feet from the former. When the crossing is not used, all the switches connect with the sidings, and all the signals, both "distant" and "home," indicate danger. There is but a single lever for all the signals, and this lever can not be moved to indicate safety for any track until its switch has been placed so as to connect that track with the crossing. Nor is it at the option of the operator which signal he shall put at safety; he has no choice in the matter, and the mechanism is so arranged that only the signals of the tracks which are opened into the crossing can indicate safety, or indeed can be moved at all. This arrangement is automatic; there is only one lever for the four signals, and only one mode of moving it to display safety, so that the operator has not to trouble his mind to get the right signal-lever. However, when a train has the "distant" signal, and for any reason stops before or after passing the crossing, the operator can turn that "distant" signal to danger, to prevent other trains from following in on the same track. There is a separate lever for each switch, and these four levers are so interlocked that only the switches of two parallel tracks can lead into the crossing at any one time, the switches of the two opposing tracks necessarily, and in spite of any thing the operator can do, remaining connected into the sidings. As already stated, no safety-signal can be displayed until its track has been connected into the crossing, and then the signal of the opposing tracks must remain at danger, their normal position. But, having displayed a safety-signal for a given track, that track can not be connected into the siding and away from the crossing until its signals, both "distant" and "home," have been turned back to danger. Further, there is an electrical connection (through a short-circuiting caused by the wheels and axles of the train forming an electric connection between the two rails), such that, when a train has been allowed to approach the crossing, the switch of its track having been connected so as to permit it, the train automatically locks all the switches in the position they are in, its own switch connecting into the crossing, and those of the opposing tracks into their sidings; nor can this automatic locking be broken or any switch moved until the last car of that train has actually passed say sixty feet beyond and past the crossings; so that if an operator tried to admit a train from a cross-track so as to cause a collision with one already admitted and past his switch, he could not do it. With this arrangement, we can see how malice, stupidity, or carelessness could block the business of a road and cause annoying delays; but it is hard to see how it could cause an accident. In the model here exhibited, the switches and signals are moved by means of compressed air, which moves the pistons of cylinders placed close to them, its admission being governed by valves actuated by the levers in the cabin. In some instances, hydraulic cylinders are used in place of these pneumatic ones; and in other cases, the movements are effected by means of a series of levers, cranks, and rods.

The same company's *rail circuit block system* is already widely adopted and seems very effective. In it, the signals are so hung that a heavy counterpoise draws them always to "danger," and they can only be brought and held at "safety" by the action of electro-magnets, one of which is connected with each signal, and is magnetized by a gravity cell. If by any means the current from this gravity cell is diverted from the electro-magnet, the latter becomes at once demagnetized, and the counterpoise above referred to, no longer opposed by the magnet, draws the signal to "danger."

The track is divided up into sections, each of a length of say 1000 feet. Each section is insulated from the adjoining ones. In a double-track road, the signal of a given section is placed at the end of that section at which the train enters, and the cell which magnetizes its magnet is at the farther end of the same section. When the section is vacant, the current from the cell passes down one rail to the magnet (thus displaying "safety") and back to the cell along the other rail, the cell and the magnet being each connected by wires with each rail. Now, if a train or a single pair of wheels enters this section, it will short-circuit the current; that is to say, the current will pass from the battery along one rail until it meets a wheel; now it will take the path of least resistance, and pass through the wheels and the axle over to the other rail, and so back to the battery, instead of taking the longer and narrower path through the long fine wire through which it would have to pass to continue its work of magnetizing the electro-magnet. Diverting the current from the magnet destroys its magnetic power. It no longer holds the signal, which the counterpoise, now unresisted, draws to "danger." This state of affairs will continue as long as a single pair of wheel remains on the section. When the last pair leaves the section, the current will now have no short cut offered to it, but will be forced to pass through the electro-magnet, which will draw the signal to "safety," overcoming the weaker attraction of the counterpoise. Thus, as long as a single pair of wheels remains on the section, the signal "danger" will be displayed to all following trains on approaching that section. It is evident that, if a rail breaks so as to destroy the continuity of the track, the current will be broken, the magnet, as before, demagnetized, and the signal drawn by the counterpoise to "danger." In brief, if any thing goes wrong, "danger" is displayed.

Several modifications of this method are shown. In some, the signal and magnet are placed, not at the beginning of the section, but so that they will be seen by the engineer, say 1000 feet before he arrives at that section. In others, two signals and two electro-magnets are placed, one at the beginning of the section, and one say 1000 feet back of it. The latter would then be merely a signal for caution, the former for danger.

In single-track roads, the current of each section operates four signals, one at each end of the section, one a whole section-length back of it, and

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one a whole section-length beyond it. Thus, when a train is entering a section, danger-signals are displayed two whole section-lengths ahead of it; and just before its engine leaves that section, there will still be danger-signals one section-length before it, and two section-lengths (minus the train-length) behind it. Two trains approaching from opposite directions will be notified of each other's approach while they are still two section-lengths apart, and perhaps much farther; while the hindermost of two trains moving in the same direction will be notified of the presence of the train which precedes it, while they are still at least one section-length apart. (TO BE CONTINUED.)

ON MILL STATISTICS, WITH SPECIAL REFERENCE TO THE EXTRACTION OF THE PRECIOUS METALS.

By C. A. Stetefeldt.

Complete statistics are as essential in metallurgical works as double book-keeping is in a mercantile business. In most European establishments, these statistics are carried out with an amount of labor and care which are unknown here. Still, so far as the percentage of metal extracted is concerned, some very loose customs formerly prevailed. The good old "Hüttenmeister" of the Hartz smelting-works, who used to go on a tour of inspection with a long pipe and in a dressing-gown, really believed that they did not lose any silver in smelting, but even got out more than the amount found by assay. I am told there are smelting-works in Colorado in which the same thing is done: they lose no silver at all, but are content with a yield of 100 per cent. The losses in lead and copper also were invariably given too low. These discrepancies were caused by the so-called "Hüttenremedien" or allowances, and by defective methods of assaying, especially so far as lead and copper were concerned. Such statistics were only in so far of value as they served as comparative standards of the operations performed, as the same blunders were committed over and over again. In recent times, many of these nuisances have been abated, and more accurate methods of assaying have been generally introduced.

In our American silver and gold mills, treating ores by amalgamation or lixiviation, statistics are kept which are sufficiently approximate so far as the cost of reduction and the quantities of materials consumed are concerned; but, in most cases, they are entirely worthless when it comes to the question what percentage of the precious metals has actually been extracted. There are a few exceptions to this rule; for instance, the Manhattan mill. Austin, Nev., where a large portion of the ore reduced is "tribute" or "custom" ore. But even in this case, I am inclined to believe that the results are somewhat overestimated on account of the "allowances." Of course, in taking weight, and in determining the percentage of moisture, the mill can not afford to be on the losing side. The proper way would be to take the weight of the dry ore as it comes from the dry-kiln. But here we are not in any better position, if the taking of weights is left to the laborer who discharges the dry-kiln. In fact, it would be necessary to have in each shift a reliable person attending to nothing else but taking weights. But for such extra labor, nobody is willing to pay.

With what remarkable inaccuracy statistics are kept, and how strangely they have been interpreted, even by prominent mining engineers, the following example will illustrate. I have before me a report by Prof. W. P. Blake, on the Alice mine, Montana, dated November, 1881. In it, he gives a "table showing the assay value of the raw and roasted ore, in silver and gold, of the Alice mine, worked at the company's mill in 1879." The table contains: 1. The ounces of silver and gold in "raw ore battery." 2. The ounces of silver and gold in "roasted ore pulp." 3. The ounces of silver and gold in "tailings." 4. A column with "silver saved." The column "silver saved" is calculated from the silver value of the "roasted ore pulp" and the silver value of the "tailings." Let us see how Professor Blake comments on these statistics. He says: "I regard such a table as this as unique in the history of the metallurgy of silver and gold in the United States. It is a very satisfactory record and exhibition of the work of the Alice Company for the past year. . . ."

His comment should have been: These tables are incomplete and incorrect in more than one respect. 1. They do not contain any chlorination tests, which are essential to show how the roasting process has been conducted. 2. The percentage of silver saved is calculated by comparing the value of the roasted ore directly with the tailings. These values bear no direct relation to each other, as the soluble salts of the roasted ore are leached out from the tailings in the settlers, and the tailings represent concentrated matter compared with the roasted ore. 3. In place of "silver saved," the last column should read "silver remaining in tailings." The silver remaining in tailings does not represent the total loss of silver in milling. Besides, Professor Blake is mistaken in considering these statistics as "unique in the history of metallurgy in the United States." Long before, better and more complete statistics were kept at the Auburn mill, Manhattan mill, Northern Belle mills, and others, in Nevada.

Farther on, Professor Blake indulges in the following remarkable statement: "It is interesting and of some practical importance to note that the working result in the large way in the mill exceeds in the totals the amount which the assay results indicate; . . . . . hence the bullion was in excess $10,329.66, or about $2.50 per ton for the amount worked during that time, namely, 4120 tons. This discrepancy may be due to the difference in the working. The fire-assays, of course, entail a loss in silver, due to the presence of zinc, and perhaps a greater loss than is experienced in roasting and milling. It is not yet clearly experienced, but is a well-ascertained fact, that the product overruns the assays."

These facts are indeed "interesting and of some practical importance." The idea that "the zinc entails a greater loss in assaying than is experienced in roasting and milling" will be a great comfort to the owners of all mills and smelting-works who buy silver ores, and who should pay a premium on ores containing zinc.

Professor Blake's criticism should have been: These facts again prove in what a desultory manner some Western mills keep their statistics. Indeed, to get a yield of bullion $2.50 above the assay value is a most astonishing feat. Granting that the samples have been taken with proper care, and that the assayer's work is reliable, the results show gross negligence in ascertaining the weight and moisture of the ore.

Under the circumstances, it is desirable to have some statistics which show us every day what is actually done in the mill, and to give us at least an approximate idea of the losses in precious metals which take place in roasting. Such statistics I first introduced at the Ontario mill, and they have also been adopted by the Lexington mill and others.

The following determinations are made every day, namely:

1. Pulp-sample contains..... ..... Ounces silver.
   " " " .... Ounces gold.
   " " " .... Per cent salt.
2. Value of raw ore..... ..... Ounces silver.
   " " .... Ounces gold.
3. Car-sample, roasted ore, contains..... Ounces silver.
   " " " ..... Ounces gold.
   " " " ..... Per cent soluble salts.
   " " " ..... Per cent of the silver chloridized.
4. Value of roasted ore after leaching... ..... Ounces silver.
   " " " " " ..... Ounces gold.
5. Tailings..... Ounces silver.
   " .... Ounces gold.
6. Remaining in tailings..... ..... Per cent silver.
   " " " .... Per cent gold.
7. Of the silver remaining in tailings..... .. Per cent present as chloride of silver.

1. Where roasting-furnaces are used, working on the continuous principle, the pulp-sample is best taken where the ore enters the feeding apparatus of the furnace, because here the moisture is most complete. The percentage of salt is determined by leaching 10 gr. with water on a filter, until the filtrate shows no chlorine reaction with silver nitrate. The filter is then dried, and the residue carefully brushed off, and its weight taken.

2. The value of raw ore is calculated from the assays and salt percentage of the pulp-sample.

3. The sample of roasted ore is taken from the cars transporting the ore, after cooling, to the pans or leaching-vats. This sample being moist, must first be made dry. It is best to pass it through a screen and destroy any lumps by rubbing in a mortar. Ten grams are washed with hot water as above. As in amalgamation, chloride of silver is reduced and also cuprous chloride, which latter goes only partially in solution by leaching with water, the result is not absolutely correct, but this error is compensated, to a certain extent, by some soluble salts remaining in the tailings after decanting the settler water. When the silver is extracted by lixiviation, a hyposulphite solution of the same strength as that used in working should be employed for the leaching test in determining the percentage of soluble salts. The chlorination assay is made in the customary manner with sodium hyposulphite.

4. The value of the roasted ore after leaching is calculated from the assays and percentage of soluble salts of the car sample of roasted ore.

5. If tailings are taken from the settlers, the water should be decanted from the sample before the same is put up for drying.

6. The percentage of precious metals remaining in tailings is calculated from the values of the roasted ore after leaching.

7. The tailings very frequently contain chloride of silver. It is advisable to make chlorination tests, if not every day, at least occasionally, especially if the tailings are of higher value than usual.

In case the ore contains gold, besides silver, gold assays need not be made every day. It is sufficient and more accurate to collect say ten assay-buttons, and dissolve them together.

It will be seen that these statistics, which do not cause so much extra labor as appears at first sight, give a most complete insight into the metallurgical working of the mill. We learn, in the first place, that the ore has been mixed with such a percentage of salt as is most advantageous for good chlorination. The chlorination tests show us how the roasting has been conducted. When ore is of such a character that the silver is well chloridized without having to go through the "banking up" process on the cooling-floor, it is of advantage to take also samples, every shift, from the furnace, directly after discharging the ore. This is done at the Manhattan mill. Four chlorination tests are made every day. Samples are taken from the shaft, and from the ore roasted by the auxiliary fire of the Stetefeldt furnace, day-shift and night-shift.

In judging the work of the pans or the leaching-vats, the tailings can not be compared with any other values but those of the roasted ore after leaching with water or sodium hyposulphite solution. To these alone, and to none other, the value of the tailings stands in a direct relation.

Finally, the chlorination test of the tailings informs us about the mechanical condition of the roasted ore, namely, whether the same contained hard and insoluble lumps. Or it shows negligence in conducting the process of amalgamation, or lixiviation, when the roasting was normal.

But besides this, if we only understand reading between the lines, these statistics give us valuable information about the loss of silver which took place in roasting, and herein consists one of their chief merits. To show this, we must enter into a discussion of some length, and will select a special case in which the reasoning can be supported by actual results. We will take ore from the Ontario mine. The Ontario ore contains zinc-blende, galena, fahl-ore (with silver, copper, lead, zinc, antimony, arsenic, and sulphur), iron pyrites, metallic oxides, quartz, and clay. It enters the furnace mixed with salt. After roasting, the following changes have taken place:

The silver is changed mostly to chloride. The salt is mostly changed to sodium sulphate, a variable percentage being left undecomposed. The quartz remains unchanged. From the clay, some valuable aluminium chloride and sulphate are formed. The zinc-blende is principally converted into zinc oxide. A small percentage appears as soluble zinc chloride and sulphate. Galena changes partly to lead oxide, partly to insoluble lead sulphate. The larger portion of the copper in the fahl-ore becomes oxide. Another portion is found as cuprous chloride and as copper sulphate. Iron pyrites becomes peroxide of iron. Antimony and arsenic pass off mostly in fumes, partly they remain as antimoniates and arseniates. The sulphur escapes partly as sulphurous acid; another portion becomes sulphuric acid, which largely remains in the roasted ore in the form of sulphates.

The principal changes in weight of the ore are as follows:

100 salt change to 121¼ sodium sulphate.
100 sulphate in galena and zinc-blende are replaced by 50 oxygen.
100 sulphur in iron pyrites are replaced by 87½ oxygen.

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100 sulphur in combination with copper in fahl-ore are replaced by 100 oxygen.

100 sulphur in combination with copper in fahl-ore are replaced by 222 chlorine.

100 sulphur in galena, are replaced by 300 sulphuric acid, and oxygen for that portion of galena which changes to lead sulphate. The same increase takes place in the formation of the sulphates of copper and zinc. If an ore contains hydrates and carbonates, the loss in water and carbonic acid will also cause a considerable reduction in weight.

It will be seen that some of these changes have a tendency to increase the weight of the ore after roasting, while others decrease it. If we compare the weight of raw ore, mixed with salt, with its weight after roasting, it may show an increase, especially if a large percentage of salt has been used, and the ore is rich in sulphur. But we obtain an entirely different result by comparing the weight of the raw ore, without salt, with the weight of the roasted ore after leaching out the sodium sulphate, undecomposed salt, and the other soluble salts. This change can be easily ascertained by roasting a known quantity of ore pulp (with salt) in a muffle, and then taking its weight after the soluble salts have been leached out, either with water or with sodium hyposulphite solution, as the case may demand. If, then, a decrease in weight has taken place, the roasted ore, minus soluble salts, should contain, per ton, a proportionately higher amount in ounces of the precious metals, provided no silver has been lost in roasting. If, however, the roasted ore should contain a less per cent of silver per ton than that demanded by its reduction in weight, we can arrive at no other conclusion save this—that silver has been lost in roasting by volatilization. If the weight of the ore has been increased, a similar reasoning holds good.

Even if it should be impossible to roast the ore in the muffle exactly in the same manner as it is done on a large scale, the result will at least be a very close approximation. Another, but more t-dious, method would be to subject the raw ore and the roasted ore to a chemical analysis, and from it calculate the change in weight which has taken place.

The following experiments were carried out for me by Mr. E. H. Russell at the Ontario mill. An average sample of battery-pulp was collected for a period of 35 days. After chloridizing roasting in the muffle, and leaching out the soluble salts with water, 96·3 parts of roasted ore resulted from 100 parts of raw ore. During the same period, the average value of the battery samples was 70 ounces silver per ton. The average percentage in salt was 18·5 per cent. Hence the value of the raw ore was 85·9 ounces per ton. The average value of the car-samples of roasted ore was 67 ounces; the soluble salts, 23·5 per cent. Hence the value of the roasted ore, after leaching out soluble salts, was 87·6 ounces of silver per ton. According to the above roasting test in the muffle, it should have been 89·2 ounces. From this it appears that 1·6 ounces of silver per ton were lost in roasting, or 1·8 per cent of the silver contained in the raw ore. No absolute correctness is claimed for these figures, but they are, no doubt, sufficiently near the truth to be of interest and of practical value.

THE IBRUEGGER CUPOLA.

A new cupola, the invention of G. Ibruegger, of Norden, has been brought out recently in Germany by Dirks & Co., of Lees, and is now being introduced into this country by Mr. E. J. Schmitz, of this city. The reports which come to us from Germany regarding its working are encouraging, to say the least; and though upon first examination it may appear to show the serious drawbacks of being too complicated and too easily liable to excessive repairs, it has features which commend it to the attention of founders and metallurgists. The cupola consists of the usual shaft *A*, below which is a receiving chamber *B*, with arched roof, accessible by the charging-flue *C*, which also fills the office of a preheating chamber for scrap. *N* is an opening for cleaning out the slag, while *F* is a tap-hole for running out the melted pig. *E* is an opening for raking out unconsumed coke. The cupola is charged with pig in the usual way, the upper part of the shaft being, by the way, protected against wear by the wrought-iron frames *H*. Any wrought scrap to be used is run into the preheating chamber *C* through the door *G*. Blast is supplied through the main *L* to the lower series of tuyeres *b*, which, it will be noticed, do not lie in the same plane. The greater portion of the carbonic oxide formed in front of the tuyeres, finding greater resistance to their passage upward through the charge than downward through the holes *a a* connecting the shaft *A* with the receiver *B*, pass down into the atter, where they are supplied with fresh air through the branch of the tuyere-pipe *D* and its flue into the roof of the receiver. In this manner, the receiver *B* is heated, the gases of combustion escaping through the flue *K*, preheating in their way the scrap piled up in the chamber *C*. That portion of the gases of combustion before the lower series of tuyeres which escapes upward is consumed by air blown in through the upper series of tuyeres, the throttle being alternately opened and closed. The molten iron drops through the openings *a a* into the receiver *B*, in which it to some extent undergoes a fining process. Whenever necessary, the scrap is pushed into the bath and stirred. It is claimed that, under the action of the gas in the preheating chamber, it is to some extent carburized.

The principal advantages claimed for the new cupola are that a low grade of pig can be used, Middlesborough No. 3, containing much silicon, but little magauese, being recommended; that a very considerable quantity of wrought scrap may be added, when needed, without impairing the fluidity of the metal; that the removal of the melted iron at once from the shaft permits of the tuyeres being placed at a lower level; and that the thorough utilization of the waste gases saves fuel. In reference to the first point, Messrs. Dirks & Co. state that, when using a mixture of one half of Middlesborough No. 3 and one half of cast scrap, with a small quantity of old rails and wrought scrap, they have made castings bringing a piece from 10 to 15 per cent higher than metal made from a mixture of which No. 1 Scotch was a leading part.

For small castings, an admixture of from 2 to 3 per cent of wrought scrap is recommended, the proportion rising to 10 per cent for castings of medium size, and to 30 per cent and more for large machinery castings. The consumption of fuel is stated to be from 10 to 12 per cent with coke.

THE MINES AT RIO TINTO, SPAIN.—I.

Among the most remarkable mineral deposits known, those of Rio Tinto, Spain, possess more than ordinary interest for Americans, because the company working them is one of the leading competitors in our own markets of the miners of pyrites for sulphuric acid manufacture, and at the same time the one that has during the past few years rivaled our copper producers in placing growing quantities of metal on the markets of the world. An elaborate report by a leading French engineer, M. E. Cumenge, and printed during the current year, throws a flood of light on the present condition and the future of the great mine, and contains many points which deserve the attention of engineers and metallurgists.

The deposits of the Province of Huelva, of which Rio Tinto is one, were known to the ancients, Phœnicians and Romans, who, as evidence of their activity, have left more than 180 miles of workings in the Rio Tinto deposit alone, and accumulated no less than twenty million tons of slags and cinders on the neighboring dumps. A metalliferous zone extends in approximately an east and west direction for a distance of twenty leagues from El Castillo de las Guardias, north of Seville, beyond the Portuguese frontier. It is four leagues wide. Rio Tinto is situated towards the eastern end of the zone, while the mines of the Tharsis Company are located toward the west, there being a series of minor deposits between the two, among them El Castillo, Peña de Hierro, La Cueva de la Mora, Sotill, St. Elmo, La Joja, La Zarga and some others, some of them, like the Buitron mine, being partially exhausted. According to M. Cumenge, the province of Huelva is composed of Carboniferous or culm schists and graywackes plicated by powerful eruptions of granitic rocks forming the distant Sierra Morena. A later period was marked by the appearance of quartz porphyry, while the deposits themselves are attributed to the Permian period by M. Cumenge, who, for some reason not specified, believes them to be the equivalent of the Carboniferous schists of Mansfeld, the sandstones impregnated with copper ores of the Corrège, of the Saar, of the Rhine, and the Ural Mountains. Since the formation of the pyrites deposits, movements have taken place which have caused fissures in the deposits, and the upper portions of the deposits have, under atmospheric action, been converted into iron oxide, forming an "iron hat." To the south of the Rio Tinto deposit, the schists have been covered by a horizontal layer of from 10 to 13 feet of rock, mined as an iron ore under the name of *Mesa de los Pinos*. There are also eruptive rocks, traps, of a more recent date.

The pyrites deposits of this zone are closely related to the porphyries, and are found at the contact of the latter and the rudimentary rocks, or in the latter. M. Cumenge pronounces the Rio Tinto deposit a fissure-vein, and refers to the Comstock to dispel the prejudice against considering deposits of such dimensions true fissure-veins. Neglecting the Vallée vein, on which no work has been done, there are two principal seams of ore, called the North vein and the South vein, the former being 3500 feet and the latter 2500 feet long. Those parts of the South vein which are worked are over 400 feet wide, while at other parts soon to be opened the vein is upward of 300 feet wide. The North vein at some points reaches a thickness of 1600 feet.

The Rio Tinto deposit consists of a compact mass of cupriferous iron pyrites occasionally showing patches of gray copper, blende, and galena. The ore as mined is divided into two classes, by sorting according to its contents of copper, about one quarter of the quantity being exported, while the rest is treated on the spot. Samples are taken from every car of ore loaded, and, the entire sample being crushed, a daily average assay is made. M. Cumenge estimates the general average for the year 1882 at 2·88 per cent of copper. The export ore, 250,000 tons annually, is sold by the Cornish assay, which understates the true percentage by 0·75 to 1·0 unit, so that the actual percentage of copper in this class of ore lies between 3·25 and 3·50 per cent and from 48 to 50 per cent of sulphur. The ore treated on the spot carries on an average 2·50 per cent of copper. The following is a recent analysis of the export ore:

ANALYSIS OF RIO TINTO EXPORT ORE.

	Per cent.		Per cent.
Sulphur	47·76	Lead	0·10
Iron	43·99	Cobalt	0·05
Copper	3·69	Lime	0·23
Arsenic	0·83	Manganese	0·07
Bismuth	0·37	Silica	1·99
Zinc	0·24	Moisture	0·48

The ore contains traces of selenium and thallium, 40 grams of silver, and 0·892 gram of gold to the metric ton.

Until now, all the estimates of the engineers have referred solely to the mass of ore worked by an open cut, which until a recent date furnished almost all the ore. The ancient workings, which, to a certain depth, were numerous, had evidently the object of mining the seams of richer ore in the mass of average grade, and this fact alone explains the increase in the percentage of copper when virgin ground was opened. Experience has proved that, in taking five millions of tons out of the open cut, almost the entire mass is uniform and essentially composed of compact iron pyrites, with spots of copper pyrites and black sulphide. In the future, however, the fact must be taken into account that the western part of the South vein, known as the San Dionisio lode, is more complex. The copper becomes a more important factor. Pure copper pyrites is not found in spots, but true seams, and other copper minerals become more abundant, so that the average thus far is 4 per cent of copper, and selected lots assay from 7 to 8 per cent. The Rio Tinto Company bases great hopes upon this part of the ground, and has begun great underground workings; and it is a fortunate circumstance that that portion of the San Dionisio ores which are too rich to be worked by the present process carry considerably larger quantities of silica, fitting it better for smelting.

Of the North vein, which is much larger than the South vein, comparatively little can be positively stated, because, though extensive, the workings have hardly more than scratched the deposit. If it be fair to reason from the existence of innumerable Roman pits and the proximity of dumps of slags, the ancients directed their main efforts to this deposit, probably with good reasons. To judge from the quality of the ore taken out of workings now going on, the poor ores of this vein are more porous

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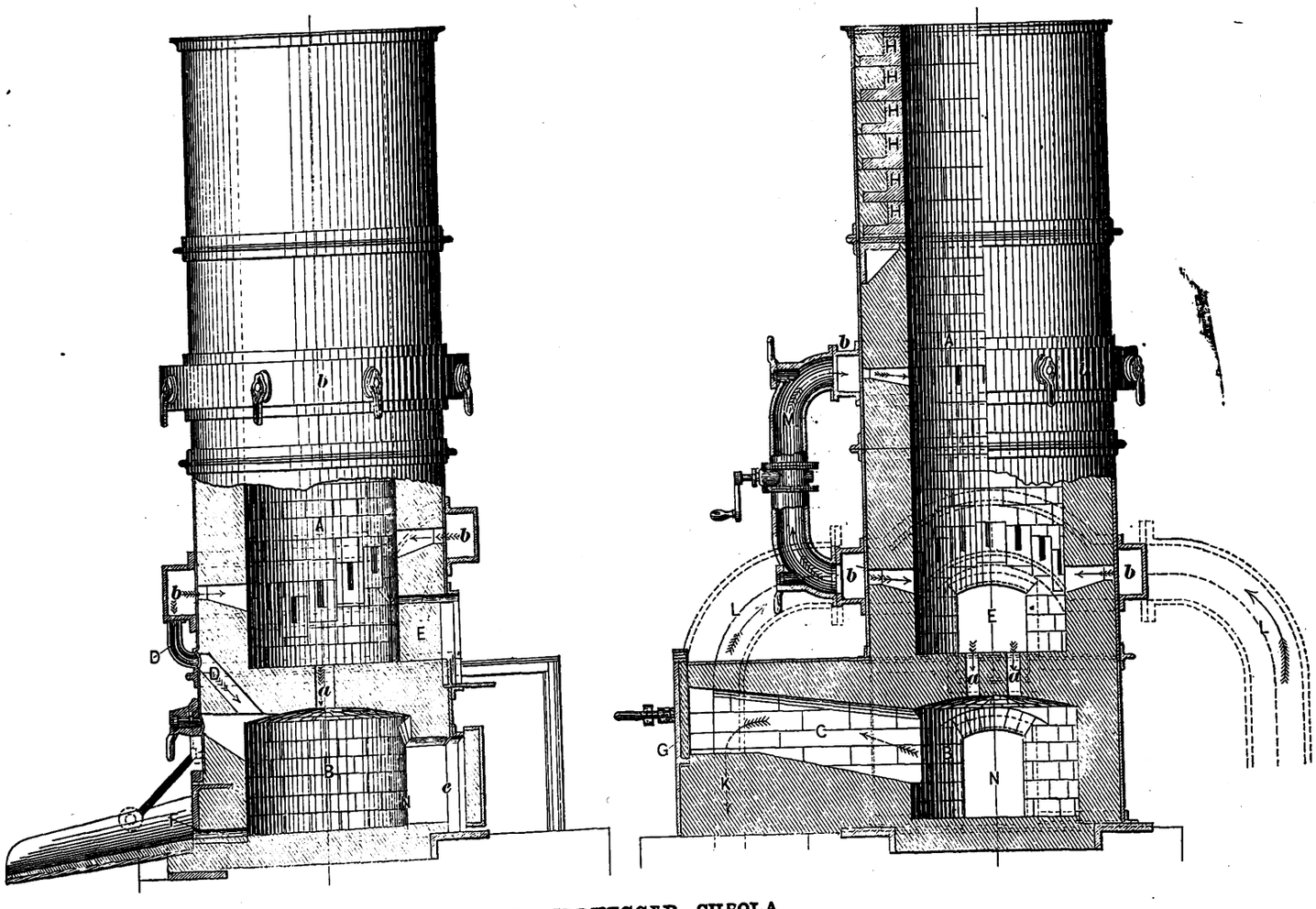
and better fitted for the treatment by the lixiviation process. Rich ores have also been extracted, and there is reason to believe that the average grade is very nearly the same as that of the ore from the open cut on the South vein. As the company has fourteen millions of tons of ore in sight above the tunnel level in the open cut and in the San Dionisio lode, M. Cumenge does not believe that for the present the subject is one that it is necessary to discuss. .

On the question of the maintenance of the grade in depth, below the 300-foot level, it is only necessary to cite the fact that a bore-hole drilled 250 feet below the lowest workings in the open cut yielded ore running 3·25 per cent of copper on an average. Possibly, the quantity of galena may increase ; but on the other hand, as the silver seems to be associated with it, this will tend to better returns in this respect. In a general way, it may be stated, concerning the percentage of copper in different parts of the deposits, that it increases toward their western extension.

The workings have been begun by starting an open cut on the widest portion of the South vein, which had been opened out on a small scale by shafts and drifts during the time when the deposit was the property of the Spanish government. In order to reach the ore, it was necessary to strip the vein of from 30 to 100 feet in depth of oxide, forming the "iron hat" of the vein, an undertaking rendered necessary by the character of the side-walls and by the importance of carrying up the production to a high figure at short notice. There is no doubt that there is nothing in metalliferous mining in the world to compare with this open cut, which is in its central portion nearly 400 feet wide, all in ore, is about 1600 feet long, and represents a body of ore nearly 300 feet in hight, and which has yielded at the rate of one million tons of ore per annum. It has become evident that mining on such a scale could not be continued without further stripping. The mass of Mount Solomon, near the open cut, is a source of danger to it, and the heroic measure has been adopted to remove the entire hill, made up of decomposed porphyry. Six terraces, each 50 feet high, have been started, and work is pushed day and night. If that plan had not been adopted, it would have been impossible to extract, by the open cut, a quantity of ore above the main tunnel amounting, according to M. Cumenge's estimate, to four millions of tons, or eight years' work, if the rate of extraction be maintained equal to that of 1882, when the quantity of ore taken from the open cut was 500,000 tons. M. Cumenge, by close measurements, computes the average surface of the section of the ore-body in the open cut at 3318 square meters, the average section of the stripping already done being 6875 square meters, and of the stripping to be done 3375. On the 1st of January, 1882, 2,578,125 cubic meters of dead-rock were to be removed to make 4,900,000 tons of ore accessible. In all, when exhausted, the open cut will have furnished 9,600,000 tons of ore, for which about 3,000,000 tons of dead-rock will be removed. The actual cost of stripping in 1882 was 0·43 franc per ton of ore. M. Cumenge, however, for safety's sake, places it at 1 franc per ton.

A study of the conditions affecting the San Dionisio lode proved that it was impossible to mine in the same manner. Though the large number of Roman pits and a long drainage tunnel driven by them indicated favorable ground, there was nothing upon which to base an estimate of the width of the deposit or the grade of the ore. Systematically conducted borings were begun in 1879 with an American diamond rock-drill, which threw light upon the thickness of the barren cap of oxide of iron and the grade of the ore at different points. After three years' work, the following has been accomplished on the San Dionisio lode: There are in a line four hoisting-shafts and three ventilating-pits, No. 5, the main shaft, being equipped with a plant capable of handling a daily output of from 1000 to 1200 tons. It has passed through about 150 feet of the "iron hat" to reach the ore, in which it has been sunk about 175 feet. The lowest workings on the San Dionisio vein have been connected with the level of the tunnel under the open cut, and there are now 8500 feet of gallery 13 feet square, in which the same locomotives pass to and fro which run on the railroad connecting the mines with the port of Huelva. While driving this level in the ore at the rate of about 7 feet per day with rock-drills, it yielded 120 tons per day, and it will be readily understood that these underground operations will furnish as much ore annually as the open cut, when it is stated that a cross-cut run 285 feet did not reach the north wall. Independently of the underground railroad mentioned, the shafts are connected above ground by a railroad running both to the coast road and to the ore-treating grounds. M. Cumenge estimates the stock of ore opened out by these underground workings on the San Dionisio vein at ten millions of tons.

The North vein has been attacked from the east end by a tunnel 2000 feet long, and nine pits, two of them supplied with powerful machinery, have been sunk on it. No. 1 struck ore at a depth of about 120 feet, so that there are 250 feet of it above the level of the Rio Tinto village depot. The vein is at points more than 1300 feet thick and more than 6000 feet long, so that M. Cumenge's estimate of 120,000,000 of tons above that level seems moderate. A double-track tunnel is now driving from Rio Tinto through the porphyry of Mount Solomon toward the North vein, to be completed probably in five years.



THE IBRUEGGER CUPOLA.

THE WORD "TON" IN THE TARIFF ACTS.—The Treasury Department has decided that the word "ton," wherever used in the Tariff acts, should be construed to be the ton avoirdupois—that is, 2240 pounds.

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A PLEA FOR PURE SCIENCE.*†

(*Concluded from page* 298.)

Is it possible that any of our four hundred colleges and universities have love enough of learning to unite with each other and form larger institutions? Is it possible that any have such a love of truth that they are willing to be called by their right name? I fear not; for the spirit of expectation, which is analogous to the spirit of gambling, is strong in the American breast, and each institution which now, except in name, slumbers in obscurity, expects in time to bloom out into full prosperity. Although many of them are under religious influence, where truth is inculcated, and where men are taught to take a low seat at the table in order that they may be honored by being called up higher, and not dishonored by being thrust down lower, yet these institutions have thrust themselves into the highest seats, and can not probably be dislodged.

But would it not be possible to so change public opinion that no college could be founded with a less endowment than say $1,000,000, or no university with less than three or four times that amount? From the report of the commissioner of education, I learn that such a change is taking place; that the tendency toward large institutions is increasing, and that it is principally in the West and Southwest that the multiplication of small institutions with big names is to be feared most, and that the East is almost ready for the great coming university.

The total wealth of the four hundred colleges and universities in 1880 was about $40,000,000 in buildings, and $43,000,000 in productive funds. This would be sufficient for one great university of $10,000,000, four of $5,000,000, and twenty-six colleges of $2,000,000 each. But such an idea can of course never be carried out. Government appropriations are out of the question, because no political trickery must be allowed around the ideal institution.

In the year 1880, the private bequests to all schools and colleges amounted to about $5,500,000; and although there was one bequest of $1,250,000, yet the amount does not appear to be phenomenal. It would thus seem that the total amount was about five million dollars in one year, of which more than half is given to so-called colleges and universities. It would be very difficult to regulate these bequests so that they might be concentrated sufficiently to produce an immediate result. But the figures show that generosity is a prominent feature of the American people, and that the needs of the country only have to be appreciated to have the funds forthcoming. We must make the need of research and of pure science felt in the country. We must live such lives of pure devotion to our science that all shall see that we ask for money, not that we may live in indolent ease at the expense of charity, but that we may work for that which has advanced and will advance the world more than any other subject, both intellectually and physically. We must live such lives as to neutralize the influence of those who in high places have degraded their profession, or have given themselves over to ease, and do nothing for the science which they represent. Let us do what we can with the present means at our disposal. There is not one of us who is situated in the position best adapted to bring out all his powers, and allow him to do most for his science. All have their difficulties, and I do not think that circumstances will ever radically change a man. If a man has the instinct of research in him, it will always show itself in some form. But circumstances may direct it into new paths, or may foster it so that what would otherwise have died as a bud now blossoms and ripens into the perfect fruit.

Americans have shown no lack of invention in small things; and the same spirit, when united to knowledge and love of science, becomes the spirit of research. It is useless to attempt to advance science until one has mastered the science; he must step to the front before his blows can tell in the strife. Furthermore, I do not believe any body can be thorough in any department of science without wishing to advance it. In the study of what is known, in the reading of the scientific journals, and the discussions therein contained of the current scientific questions, one would obtain an impulse to work, even though it did not before exist. And the same spirit which prompted him to seek what was already known would make him wish to know the unknown.

As I remarked before, the investigator in pure science is usually a professor. He must teach as well as investigate. It is a question which has been discussed in late years, whether these two functions would better be combined in the same individual, or separated. It seems to be the opinion of most, that a certain amount of teaching is conducive, rather than otherwise, to the spirit of research. I myself think that this is true, and I should myself not like to give up my daily lecture. But one must not be overburdened. I suppose that the true solution, in many cases, would be found in the multiplication of assistants, not only for the work of teaching but of research. Some men are gifted with more ideas than they can work out with their own hands, and the world is losing much by not supplying them with extra hands. Life is short: old age comes quickly, and the amount one pair of hands can do is very limited. What sort of shop would that be, or what sort of factory, where one man had to do all the work with his own hands? It is a fact in nature, which no democracy can change, that men are *not* equal—that some have brains, and some hands. And no idle talk about equality can ever subvert the order of the universe. I know of no institution in this country where assistants are supplied to aid directly in research. Yet why should it not be so? And even the absence of assistant professors and assistants of all kinds, to aid in teaching, is very noticeable, and must be remedied before we can expect much.

As stated before, men are influenced by the sympathy of those with whom they come in contact. It is impossible to immediately change public opinion in our favor; and indeed, we must always seek to lead it, and not be guided by it. For pure science is the pioneer who must not hover about cities and civilized countries, but must strike into unknown forests, and climb the hitherto inaccessible mountains which lead to and command a view of the promised land—the land which science promises us in the future; which shall not only flow with milk and honey, but shall give us a better and more glorious idea of this wonderful universe. We must create a public opinion in our favor, but it need not at first be the general public. We must be contented to stand aside, and see the honors of the world for a time given to our inferiors; and must be better contented with the approval of our own consciences, and of the very few who are capable of judging our work, than of the whole world beside. Let us look to the other physicists, not in our own town, not in our own country, but in the whole world, for the words of praise which are to encourage us, or the words of blame which are to stimulate us to renewed effort. For what to us is the praise of the ignorant? Let us join together in the bonds of our scientific societies, and encourage each other, as we are now doing, in the pursuit of our favorite study; knowing that the world will some time recognize our services, and knowing, also, that we constitute the most important element in human progress.

But danger is also near, even in our societies. When the average tone of the society is low, when the highest honors are given to the mediocre, when third-class men are held up as examples, and when trifling inventions are magnified into scientific discoveries, then the influence of such societies is prejudicial. A young scientist attending the meetings of such a society soon gets perverted ideas. To his mind, a molehill is a mountain, and the mountain a molehill. The small inventor or the local celebrity rises to a greater hight, in his mind, than the great leader of science in some foreign land. He gauges himself by the molehill, and is satisfied with his stature; not knowing that he is but an atom in comparison with the mountain, until, perhaps, in old age, when it is too late. But if the size of the mountain had been seen at first, the young scientist would at least have been stimulated in his endeavor to grow.

We can not all be men of genius; but we can, at least, point them out to those around us. We may not be able to benefit science much ourselves; but we can have high ideals on the subject, and instill them into those with whom we come in contact. For the good of ourselves, for the good of our country, for the good of the world, it is incumbent on us to form a true estimate of the worth and standing of persons and things, and to set before our own minds all that is great and good and noble, all that is most important for scientific advance, above the mean and low and unimportant.

It is very often said, that a man has a right to his own opinion. This might be true for a man on a desert island, whose error would influence only himself. But when he opens his lips to instruct others, or even when he signifies his opinions by his daily life, then he is directly responsible for all his errors of judgment or fact. He has no right to think a molehill as big as a mountain, nor to teach it, any more than he has to think the world flat, and teach that it is so. The facts and laws of our science have *not* equal importance, neither have the men who cultivate the science achieved equal results. One thing is greater than another, and we have no right to neglect the order. Thus shall our minds be guided aright, and our efforts be toward that which is the highest.

Then shall we see that no physicist of the first class has ever existed in this country, that we must look to other countries for our leaders in that subject, and that the few excellent workers in our country must receive many accessions from without before they can constitute an American science, or do their share in the world's work.

But let me return to the subject of scientific societies. Here, American science has its hardest problem to contend with. There are very many local societies dignified by high-sounding names, each having its local celebrity, to whom the privilege of describing some crab with an extra claw, which he found in his morning ramble, is inestimable. And there are some academies of science, situated at our seats of learning, which are doing good work in their locality. But distances are so great that it is difficult to collect men together at any one point. The American Association, which we are now attending, is not a scientific academy, and does not profess to be more than a gathering of all who are interested in science, to read papers and enjoy social intercourse. The National Academy of Sciences contains eminent men from the whole country, but then it is only for the purpose of advising the government freely on scientific matters. It has no building, it has no library; and it publishes nothing except the information which it freely gives to the government, which does nothing for it in return. It has not had much effect directly on American science; but the liberality of the government in the way of scientific expeditions, publications, etc., is at least partly due to its influence, and in this way it has done much good. But it in no way takes the place of the great Royal Society or the great academies of science at Paris, Berlin, Vienna, St. Petersburg, Munich, and, indeed, all the European capitals and large cities. These, by their publications, give to the young student, as well as the more advanced physicist, models of all that is considered excellent; and to become a member is one of the highest honors to which he can aspire, while to write a memoir which the academy considers worthy to be published in its transactions excites each one to his highest effort.

The American Academy of Sciences in Boston is perhaps our nearest representation of this class of academies; but its limitation of membership to the State deprives it of national character.

But there is another matter which influences the growth of our science.

As it is necessary for us still to look abroad for our highest inspiration in pure science, and as science is not an affair of one town or one country, but of the whole world, it becomes us all to read the current journals of science and the great transactions of foreign societies, as well as those of our own countries. These great transactions and journals should be in the library of every institution of learning in the country, where science is taught. How can teachers and professors be expected to know what has been discovered in the past, or is being discovered now, if these are not provided? Has any institution a right to mentally starve the teachers whom it employs, or the students who come to it? There can be but one answer to this; and an institution calling itself a university, and not having the current scientific journals upon its table or the transactions of societies upon its library-shelves, is certainly not doing its best to cultivate all that is best in this world.

We call this a free country, and yet it is the only one where there is a direct tax upon the pursuit of science. The low state of pure science in our country may possibly be attributed to the youth of the country; but a direct tax, to prevent the growth of our country in that subject, can not be looked upon as other than a deep disgrace. I refer to the duty

* Abstracts from an address of H. A. Rowland, of Baltimore, Md., Vice-President of Section B, American Association for the Advancement of Science.

† In using the word "science," I refer to physical science, as I know nothing of natural science. Probably my remarks will, however, apply to both, but I do not know.

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upon foreign books and periodicals. In our science, no books above elementary ones have ever been published, or are likely to be published, in this country; and yet every teacher in physics must have them, not only in the college library, but on his own shelves, and must pay the government of this country to allow him to use a portion of his small salary to buy that which is to do good to the whole country. All freedom of intercourse which is necessary to foster our growing science is thus broken off; and that which might, in time, relieve our country of its mediocrity, is nipped in the bud by our government, which is most liberal when appealed to directly on scientific subjects.

In conclusion, let me say once more, that I do not believe that our country is to remain long in its present position. The science of physics, in whose applications our country glories, is to arise among us, and make us respected by the nations of the world. Such a prophecy may seem rash with regard to a nation which does not yet do enough physical work to support a physical journal. But we know the speed with which we advance in this country: we see cities springing up in a night, and other wonders performed at an unprecedented rate. And now we see physical laboratories being built, we see a great demand for thoroughly trained physicists, who have not shirked their mathematics, both as professors and in so-called practical life; and perhaps we have the feeling, common to all true Americans, that our country is going forward to a glorious future, when we shall lead the world in the strife for intellectual prizes as we now do in the strife for wealth.

But if this is to be so, we must not aim low. The problems of the universe can not be solved without labor; they can not be attacked without the proper intellectual as well as physical tools; and no physicist need expect to go far without his mathematics. No one expects a horse to win in a great and long race who has not been properly trained; and it would be folly to attempt to win with one, however pure his blood and high his pedigree, without it. The problems we solve are more difficult than any race; the highest intellect can not hope to succeed without proper preparation. The great prizes are reserved for the greatest efforts of the greatest intellects, who have kept their mental eye bright and flesh hard by constant exercise. Apparatus can be bought with money, talents may come to us at birth; but our mental tools, our mathematics, our experimental ability, our knowledge of what others have done before us, all have to be obtained by work. The time is almost past, even in our own country, when third-rate men can find a place as teachers, because they are unfit for every thing else. We wish to see brains and learning, combined with energy and immense working-power, in the professor's chair; but, above all, we wish to see that high and chivalrous spirit which causes one to pursue his idea in spite of all difficulties, to work at the problems of nature with the approval of his own conscience, and not of men before him. Let him fit himself for the struggle with all the weapons which mathematics and the experience of those gone before him can furnish, and let him enter the arena with the fixed and stern purpose to conquer. Let him not be contented to stand back with the crowd of mediocrity, but let him press forward for a front place in the strife.

The whole universe is before us to study. The greatest labor of the greatest minds has only given us a few pearls; and yet the limitless ocean, with its hidden depths filled with diamonds and precious stones, is before us. The problem of the universe is yet unsolved, and the mystery involved in one single atom yet eludes us. The field of research only opens wider and wider as we advance, and our minds are lost in wonder and astonishment at the grandeur and beauty unfolded before us. Shall we help in this grand work or not? Shall our country do its share, or shall it still live in the almshouse of the world?

THE WORK OF THE ORDNANCE BUREAU.

General S. V. Benét, Chief of Ordnance, has submitted to the Secretary of War a report from which we cull the following data:

Under the specific provisions of the act making appropriations for fortifications, etc., approved March 3d, 1883, contracts have been made as follows: For converting fifty ten-inch Rodman smooth-bore guns into eight-inch rifles, by lining with a coiled wrought-iron tube; for making two twelve-inch cast-iron breech-loading rifles, one of which is to be lined, as far as the trunnions, with a steel tube wrapped with wire; for making one twelve-inch cast-iron mortar, banded with steel hoops; for making one ten-inch cast-iron breech-loading rifle, wrapped with steel wire, and one twelve-inch cast-iron breech-loading rifle, tubed, and banded with steel hoops; for the tubes, hoops, etc.; for one eight and one ten-inch steel rifle; for testing the "devices for breech-loading guns," submitted by H. F. Mann and Col. Theodore Yates; and twenty-five carriages for fifteen-inch smooth-bore guns have been ordered to be altered to permit the use of increased powder charges. In the purely experimental guns in the above list, with one exception, steel is used wholly or in part in the construction. Whether or not gun steel, in suitable masses and of the requisite quality, could be procured in this country, had first to be considered. In order to put the wants fairly and squarely before the steel manufacturers of the United States, a circular letter inclosing drawings and giving the weights and dimensions of the steel forgings for an eight-inch "breech-loading rifle and a twelve-inch" muzzle-loading rifle mortar, desired for the armament of fortifications, was freely distributed to more than twenty of the principal steel-works in this country. The replies to this letter were, with one or two exceptions, adverse to undertaking such work, arising, the Chief of Ordnance presumes, from want of skill and knowledge in the treatment of steel for gun construction and from the want of the requisite plant to perfect the forgings. General Benét says the conclusion reached was, that the plant or the experience in this country can not as yet produce the steel forgings for tube and jacket for so large a gun as an eight-inch caliber. The tubes and jackets required for the eight and ten-inch steel guns have therefore been ordered from Sir Joseph Whitworth & Co., England.

The steel hoops required for the banded guns, being of comparatively small mass and readily produced from an ordinary tire-mill, their manufacture has been undertaken by the Midvale Steel Company, of Philadelphia. Three experimental hoops were ordered from this company for test, in order to ascertain how nearly it could come up to the requirements of the department's circular letter. Two of these hoops were of the largest scale that will be required for the experimental guns, and one was annealed after rolling, while the other was oil-tempered and annealed. The third hoop was hammered and oil-tempered, being of the size required for the smaller hoops of the eight-inch gun, which are not sufficiently large to admit of being rolled in the mill at the Midvale Works. The results obtained from the mechanical tests of these hoops, both by traction and by hooping tests, show that they are fully equal in quality to the best hoops of European manufacture. The success attained in the fabrication of these hoops reflects credit on the manufacturers, and testifies to their knowledge, both of the qualities requisite in gun hoops and the best methods of manufacture and treatment for producing them. Under the provisions of the appropriation act to make and test a cast-iron gun, banded with steel, it was at first thought best, on account of its greater simplicity, to make a twelve-inch gun in the Italian system; but unfavorable reports having been received of the behavior of the Italian twelve-inch guns when chambered for charges of 230 pounds, that system was abandoned for the French.

As regards the twelve-inch mortars, cast-iron hooped, experiments are already in progress determining the most suitable rifling and projectiles. The results thus far obtained are fair, and encourage the hope that, with our service projectiles, a good degree of accuracy may be realized from a muzzle-loading rifled mortar. It is recommended that the conversion of ten-inch smooth-bores into muzzle-loading eight-inch rifles be continued. The results of trial show that the eight-inch rifle has sufficient power to penetrate wrought-iron armor eight inches thick at 1000 yards, and this will include that of more than one half of the armored vessels of the world. For places where the depth of water will only admit vessels of light draught and of comparatively thin armor, and for secondary positions in more important places, this gun will fulfill all the conditions of a good defense. It is also recommended to utilize our 300 fifteen-inch smooth-bore guns by supplying the carriages with hydraulic buffers to absorb the recoil, and thus enable us to use the heaviest charges. The projectile energy of this gun has been largely increased, and renders it not only efficient for secondary purposes, but a very formidable weapon even in our most important harbors.

The Gun Foundry Board has visited the principal steel and iron-works in this country and great steel-works and gun factories of Europe. It is hoped that it will be able to submit to Congress such a strong and full report and make such definite recommendations that Congress will be able to take prompt action toward providing for the country's great want in suitable facilities and plant for the manufacture of heavy ordnance.

The report concludes with a recommendation that the expense of testing iron, steel, and other materials for industrial purposes by the United States testing-machine at the Watertown Arsenal be borne by the United States. The Chief of Ordnance is of the opinion that all that should be required of the Society of Civil Engineers is the preparation of a programme for a series of tests; the purchase and preparation of material and the making of the tests to be paid out of moneys appropriated by Congress.

FURNACE, MILL, AND FACTORY.

The Catasauqua Manufacturing Company has made a reduction of ten per cent upon the wages of all employés.

The E. & G. Brooke Iron Company, of Birdsboro', is erecting at its No. 2 furnace a Taylor Langdon ore-roaster, being the second one erected in the State.

The ground is staked off for the erection of the mill of the new Chartiers Iron and Steel Company, Limited, at Mansfield, O., and building will soon be commenced.

P. H. Laufman & Co.'s iron-works at Apollo, Armstrong County, Pa., have been consolidated with the Volta Galvanizing Works of Pittsburg. The concern is now a joint-stock company with a capital of $300,000. The plant at Apollo will be enlarged. Additional anneal-boxes and puddling-furnaces are building, and the firm expects to put in batteries for the galvanizing of sheet iron. The mill is partially operated with natural gas, and more wells are drilling.

The new light rail-mill and the two new Siemens gas-furnaces of the St. Louis Bolt and Iron Company, at East St. Louis, will be started up next week.

The judges of the United States Court in Illinois have sustained the validity of the Washburn & Moen barb-wire patents, while the United States Court for the Eastern District of Missouri gave an opposite decision; and as a result of this conflict of high judicial opinion, it is said there will be an exodus from Illinois of its barb-wire manufacturers, who are expected to locate in Missouri. Several very large factories are now in operation at Joliet, Ill., and it is stated that they will shortly be removed to Missouri, and that their example will certainly be followed by the other Illinois manufacturers of barb-wire. The names of the firms employed in this business in Joliet are, the Lambert Bishop Wire-Fence Company, W. J. Adams, the Ashley Wire Company, Schaeffer & Vanfleet, Klemfelder & Dilman, Kraff, Gross & Co., J. W. Watkins, Barb-Fence Company, and the Lockstitch Fence Company. These factories employ about 1000 men and represent a large amount of capital. Chicago, De Kalb, and Joliet are the three largest markets for barb-wire fences in the West. The factory of J. L. Elwood, at De Kalb, is the largest of these concerns. There are about twenty manufactories in all in the State of Illinois, and the removal of most of them into Missouri would be a matter of no small importance. The dealers in St. Louis claim, however, that the market is already overstocked with the wire fencing, and that it would not pay any new factories to start here. Whatever may be the final outcome of the affair, it seems certain that Washburn will not be able in future to obtain any thing like so large a royalty on his patents as he has in the past.

On the 9th inst., the Scranton Steel Company made sixty heats in eleven hours and forty-three minutes, a little better that twelve heats per hour. This work is worthy of record, because, so far as known, this number of heats has never been equaled in that length of time, anywhere in the world, with two converters. It is also worthy of note that one of the converter bottoms used made forty-two heats, which also, so far as known, beats the record to date.

The sheriff, November 15th, levied on Reis Brothers' sheet-iron mill at Newcastle, Pa., to satisfy a judgment for $10,000 held by Cleveland persons. The exact liabilities can not be ascertained, but they will not exceed $50,000.

The Norton Iron-Works, rolling-mill, and nail-mill, in Ashland, Ky., were burned November 14th. The loss is $200,000.

The nail factory of Brown, Bonnell & Co., is running to its full capacity.

The Black Band Iron and Coal Company, which owns some 4000 acres of land on Davis Creek, in the Kanawha Valley, has just started a new blast-furnace in that locality. The iron ore it reduces is taken from the property. One is a four-foot vein of black band, yielding 46 per cent of metallic ore. Another is brown hematite, or rather a carbonate, of an average thickness of three feet, and yielding, in its raw state, about 45 per cent of metallic iron. The iron is said to be very fine for foundry use. The company makes coke from its own coal. The furnace is 48 feet high, with a 10-foot bosh. Its capacity is 25 tons in twenty-four hours, and the cost is not over $13 a ton.

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A dispatch from Milwaukee, Wis., dated November 15th, says that the Bay View Fish-Plate Mill and the North Chicago Rolling-Mill Company closed yesterday, throwing several hundred men out of employment. The shut-down was owing to a lack of orders.

The Cleveland Rolling-Mill Company's steel-works will shut down for repairs about December 1st, which will render necessary the closing of the rail-mills and the banking of the blast-furnaces. The wire-mills will remain in operation. The poor state of trade explains the stoppage. President Chisholm, in an interview, stated: "We have concluded not to continue to make rails at a loss." Other iron-works here will follow this example, and either shut down or largely reduce their force of employés.

Henry R. Worthington, the well-known firm manufacturing pumping machinery, has established a branch office in San Francisco, at No. 30 First street.

The Westinghouse Machine Company, of Pittsburg, reports a remarkable activity in the demand for its automatic engine. During the month of October, it manufactured and shipped a total of seventy-three engines, representing a product of nearly $50,000. The new orders during the same month aggregated over 2000 horse-power. Among the prominent orders were: The Philadelphia & Reading Coal and Iron Company, one 80 horse-power, one 65 horse-power, two 50 horse-power, and one 40 horse-power; the New York & Brooklyn Electric Light Company, four engines of 50 horse-power each; the Atnoux Electric Light Company, of Cleveland, two of 65 horse-power; the Brush Electric Light and Power Company, of Savannah, two of 50 horse-power; the Butte Electric Light Company, Butte, Montana, two of 50 horse-power; the Brush-Swan Electric Light Company, of Cheyenne, 65 horse-power; the Brush Electric Light Company, of Buffalo, 50 horse-power; the Electric Light Company, of Decatur, Ill., 50 horse-power. In general manufacture, the Arthurs Coal and Lumber Company, Hemlock, Pa., 125 horse-power; Miller, Dubrul & Peters Manufacturing Company, Cincinnati, 80 horse-power; the Pacific Rolling-Mill Company, San Francisco, Cal., 65 horse-power; E. Stinson & Co., Baltimore, Md., wheel factory, 50 horse-power; McKinney Manufacturing Company, Alleghany City, 50 horse-power; William Broadhead & Sons, Jamestown, N. Y., worsted mills, 30 horse-power; the Senghi Woolen Mills, Yokohama, Japan, 20 horse-power; and about thirty others of various sizes from 10 to 50 horse-power.

The New Jersey & Sonora Reduction Company, of Newark, N. J., composed of Senator McPherson, Col. C. Meyer Zulick, Surrogate; Mr. Packer, of the Lehigh Valley Railroad; Willard Richards, and J. F. Howland, banker, has closed a contract with the Pacific Iron-Works, Rankin, Brayton & Co., San Francisco, for the erection at Nacasari, Sonora, Mexico, of a complete copper smelting plant of 60 tons daily capacity, with the Pacific water-jacket copper smelting-furnaces. This plant will be in running order in ninety days, and will work the Cobriza ores, which are reported very rich by Mr. William A. Farrish, the well-known mining engineer, now at the Carlisle mine, Grant County, New Mexico.

The Tennessee Coal, Iron and Railroad Company, which owns two furnaces at South Pittsburg and a third at Cowan, has lately completed a railroad from its furnaces to its extensive ore and coal mines, giving it ready command of unlimited supplies of ore and fuel. The company owns altogether over 120,000 acres of land, rich with ores of best varieties, and employs nearly 2000 men. Its output of coal is about 600 tons a day, and its production of coke 500 tons a day, which is consumed in its furnaces. Its furnaces at South Pittsburg have a capacity of 200 tons of pig-iron a day, and its Sewanee furnace, at Cowan, a capacity of 85 tons daily.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

HENDRICKS.—This mine, which is leased to the Tombstone Mining and Milling Company, is producing ten tons of lead ore per day, which is shipped to Charleston, where it materially aids in smelting the mill concentrations.

TOMBSTONE DISTRICT.

GIRARD.—An important strike has been made. A ledge fully fifteen feet in width and assaying one hundred ounces per ton in silver has been found. A large force of men will no doubt be put to work. This is the most important strike made in the camp for some months. According to the Tombstone *Epitaph*, the Girard mill and mine were recently sold under judgment by the sheriff, to Mr. W. J. Cheyney, Secretary of the Tombstone Mining and Milling Company, for $60,000. This includes the judgment against the property held by Judge G. G. Berry, under which the former sale for $49,968.40 was made. The recent strike will probably induce its redemption by them.

GRAHAM COUNTY.

DETROIT.—The Detroit mine, of the Longfellow group, is showing up well. In the forty-two foot shaft, a fine body of carbonate ore has been encountered. A drift of thirty-six feet was run, all in ore which at least will average twenty-five per cent in copper. It is the intention of the company to prospect this property thoroughly.

GREENLEE DISTRICT.

The gold mines in this new district, the discovery of which we mentioned some time ago, are reported to be opening up with very satisfactory results. A test made from the ores of these mines at Denver, Colo., gave an average return of $27 gold.

PIMA COUNTY.

ESPERANZA.—The mill is ready to start up on ore from the mine. At present a lack of water prevents its running.

ORION.—The mill has been running on ore from the Montana mine for some time, with satisfactory results.

PEERLESS.—The company continues to extract ore which is freighted to Tucson, and stored, with a view of having it reduced there, though some shipments of second and third-class ore from the mines of this company have been made to Benson and the Argo works at Denver. The shipping ore from these mines will continue to Tucson for reduction, as soon as the smelters are ready to begin operation. The company has resolved to sink a deep shaft on the Peer mine. In the mean time, the extraction of ore will continue from the surface as heretofore, which will pay largely over and above the cost of taking out and freighting to Tucson.

CALIFORNIA.

NEVADA COUNTY.

SOUTH YUBA WATER AND MINING COMPANY.—During the month of October, the Nevada mine, belonging to this company, was not worked because of short water. Work has been resumed, and the usual amount of bullion will be produced in November.

PLUMAS COUNTY—GREENVILLE DISTRICT.

SOUTHERN EUREKA.—A strike is reported. When the mill was last run, the best ore ever found in the mine was taken from the bottom of the tunnel. Another tunnel has recently been run to reach the same chimney at a greater depth. This tunnel has now reached the ledge, and a drift has been pushed into the chimney about forty feet, and at a depth of about 168 feet below the other tunnel. The mill will be put in order and started up again without delay. This last tunnel has added very much to the supply of water.

CANADA.

PROVINCE OF NOVA SCOTIA.

OXFORD.—The property adjoining this mine, recently purchased by Adams & De Camp, of New York, for $20,000, has been sold by them to the Oxford Company at the same price. The new lead on it is developing into a very rich vein, in some places being two feet wide and rich in gold. A large force of men is now at work on the property, and a considerable increase in the output of bullion will soon begin.

COLORADO.

ARAPAHOE COUNTY.

At a depth of 350 feet, the Union Addition Artesian Well Company, of North Denver, has struck oil.

CLEAR CREEK COUNTY.

The shipments for the month of October are reported as follows:

Boston & Colorado Works	230	tons.	$25,355
Silver Plume Sampling Works	160	"	11,000
Miners' Sampling Company	130	"	14,105
Morris & Noone	244	"	30,040
G. W. Hall & Co.	25	"	5,625
Total	789	"	$86,125

Charles H. Morris, of the Rocky Mountain mill, and W. S. Duncan, of the Pelican mill, Georgetown, have opened a public ore-market in the latter mill, where ore of all grades, in quantities over one thousand pounds, will be crushed and sampled, a sample furnished to the owners of the ore, and one sent to each of the smelters, or to their resident agents at Georgetown, who will put in their bids, addressed to number of the mill lot, on Tuesdays and Fridays of every week, the smelters or agents bidding the highest prices taking the ore, after paying the owner the full amount bid, without any reduction. All small lots will be sent to the Rocky Mountain mill, Georgetown.

FREELAND.—A rich strike is reported to have been made in the main shaft of this mine, at a depth of over 900 feet.

NEW YORK & COLORADO MINING AND MILLING COMPANY.—The Big and Little Chief lodes are operated by this company. On the first-mentioned, there is a main tunnel run 300 feet, opening up a mineral vein from four to five feet wide, carrying quartz with iron pyrites and purple copper ore. The Little Chief has a 150-foot drift, showing from two to three feet of milling ore. There is also a shaft sunk on the vein some 35 feet deep. In the mill and mines, there are about 50 men at work. The mill is about 50 rods from the mines, and is connected by a tramway which runs to the upper floor. The capacity of the mill is 150 tons of ore per day.

RED ELEPHANT.—A new plant of machinery for the White mine and Schwarz shaft on Red Elephant Mountain has been put into position. The plant has a sixty horse-power boiler and a forty horse-power engine.

SUNNY SOUTH.—The mine has been shut down on account of the immense amount of water encountered. A new plant of machinery will be put on with pumps, when operations will be resumed.

VULCAN.—Eleven lessees, in addition to the owners, are working on this property. The Egan level has been driven 350 east of the Egan tunnel. Work at present is concentrated on the stope. A rise is gradually making to the upper shaft, which will be tapped in about 120 feet. The ore grade and output continue high and steady.

CUSTER COUNTY.

BULL-DOMINGO.—While cleaning out the 350-foot level, a vein of mineral at least eight feet thick was discovered. It is of a different character and far richer mineral than any ever before found in the mine.

GILPIN COUNTY.

KING.—The company has begun pumping operations. The water has been lowered below the 200-foot station, and the superintendent expects to have the water out soon, and the shaft in readiness for sinking shortly after.

LAKE COUNTY.

ARGENTINE.—The company, after an unsuccessful campaign of several months, finally decided to lease its properties, and half a dozen parties are now engaged in working different portions of the old Gallagher mine.

BELLE LODE.—Shipments are now made to the Arkansas Valley Smelting-Works of ore from this mine, which it is stated averages one hundred dollars per ton. The property is situated in Sowbelly Gulch, about three miles north of Sugar Loaf Mountain. The mineral was struck, so the report says, at twenty feet from the surface, and a twenty-foot body of ore has since been opened. The ore is similar to the product of the Little Frying Pan mines.

BUCKEYE.—This mine, situated on Fryer Hill, adjoining the Chrysolite and Little Chief mines, has struck a pocket of fine-looking ore. The mineral consists of black iron and galena. The property contains nearly 2000 feet of development-work, and this is the first ore ever encountered.

CARBONATE HILL.—The annual report presented at the recent meeting showed a total production for the year ended November 1st of $110,000. Out of this amount, the expenses at the mine consumed $40,000, and $70,000 were transmitted to the New York office. Six dividends of $10,000 each have been paid within a year past.

CUMMINGS & FINN.—Finn, Grant & Co. have begun to receive ore at the Cummings & Finn smelter. There are about 1200 tons of ore on the premises, purchased by the retiring firm, which the new company also receives.

EVENING STAR.—The Leadville *Herald* says that the ore resources of this mine are rapidly decreasing, and the future of the property, unless new ore-bodies are soon discovered, is not over-flattering. The present ore production of the mine is secured mainly in gleaning through the large stopes, from which hundreds of thousands of dollars' worth of ore have been extracted in the past. Naturally, such a source of supply is very unreliable, and can not be expected to hold out very long. The mine is also shipping some iron ore. At the upper shaft, which is to be sunk to a greater depth, stations are now making for relief tanks for the pumps, and other provisions for an early resumption of work in this direction. The large pumping-engine and pump rig on the surface are all complete, and work satisfactorily. Four or six weeks will witness the sinking of the shaft again in operation.

LEADVILLE CONSOLIDATED.—The most extensive and productive ore-bodies of the Carbonate mine are as follows: At the foot of the Crane shaft, which is situated about 100 feet north of the engine-house. For some months past, this pocket has yielded twenty to thirty tons a month of one hundred dollar ore. Another profitable ore-body is situated in the extreme northern end of the Carbonate claim. The largest ore-body in the mine is located near the junction of the south incline and No. 10 level. A large area has here been stoped out and fine ore is left standing on all sides. A number of smaller ore-bodies are to be seen in various other portions of the mine, and a great deal of available ground is still left for prospecting.

LITTLE CHIEF.—No. 9 shaft, located on the southern end of the Little Chief claim, has been reopened and sinking has commenced. The shaft has a depth of

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136 feet, and is still in porphyry. The shaft is on a piece of unexplored territory.

MORNING STAR.—The excellent results that followed the sinking of the McHarg shaft, and the great success attending exploration-work from this shaft, have greatly enhanced the prospects as well as the present value of this property. The shaft has quite recently been connected, by a working level, with the head of the Waterloo incline, and all the ore formerly hoisted through the Waterloo incline and shaft is now brought up through the McHarg shaft; from 35 to 40 tons are hoisted a day from this shaft. The change is a very desirable one, as it expedites the extraction of ore, and has allowed the company to get along with about fifteen less men than heretofore, and yet do the same amount of work.

PROSPECT LODE.—The latest discovery of mineral on Carbonate Hill is reported in the Prospect incline, the property adjoining the Leadville Consolidated mines on the south. Several years ago, an incline was sunk on this claim to a depth of five hundred feet or over, and yearly since then the required assessment-work has been done. During all this time, however, not a pound of ore was obtained. The property has recently been leased. In examining the incline for a suitable point to begin work, the first stroke of a pick disclosed a streak of lead carbonates. Several assays have so far been made, returning respectively 32 and 40 per cent of lead, and 17 and 30 ounces to the ton. The mineral is a gray sand and galena, and was found in the contact.

TERRIBLE VS. ARGENTINE.—In the United States Court at Denver, the Terrible Mining Company against the Argentine Mining Company, in a conflict between the Adlaide and Camp Bird mines, was tried before a jury, and a verdict secured in favor of the Adlaide. The defendants have given notice of their intention to move for a new trial.

OURAY COUNTY.

It is reported that Mr. William Weston has just made a sale, to English capitalists, of the Agnes and Declaration mines in Imogene Basin, price $50,000.

CIMARRON.—The men who were members of the Miners' Union and not getting three dollars per day and their board recently struck; in consequence, the mine has been closed down.

PARK COUNTY.

CHICAGO SAMPLING AND CONCENTRATING COMPANY.—This company has purchased the Park County Sampling and Concentrating Works, located at London Junction, and having repaired the same, is now prepared to purchase good concentrating ores for cash.

PITKIN COUNTY.

It is estimated that there are nearly 1000 tons of ore at the smelter at Aspen. The average daily receipt is about 20 tons. The ore-house is full to the top, and new bins are building constantly to accommodate the ore coming in. It is now thought that, as soon as coke can be made and brought up from the Wheeler collieries on Four Mile, the smelter will blow in.

DAKOTA.

It is stated that New York capitalists who are interested in certain Rapid Creek properties will soon begin the work of development on them, and erect reduction-works.

CALEDONIA.—Work has stopped at the mine and mill for some unknown reason. An assessment of ten cents a share has just been levied.

FATHER DE SMET.—The superintendent reports, October 27th: At the mine, work is going on well, and every thing is in good shape for working economically. Golden Gate south header continues to hold its own in good ore, and is gradually developing an extensive body of it. We have breasted out into it about eighteen feet, and there are no indications of a wall yet. East cross-cut, third level, has disappointed us in not finding a better quality of ore, but it may change for the better any day. It is looking more encouraging to-day. The mill is running very well, and giving no trouble. For week ended November 7th, he reports: Ore extracted from first level, 950 tons; second level, 600 tons; third level, 400 tons. Ore milled, 1950 tons. Golden Gate east cross-cut, third level, advanced eight feet.

MINNESOTA.—Negotiations for the sale of this mine are pending.

ORO FINO.—The shaft is down 75 feet, following the wall and disclosing a fine body of ore, assaying well in gold and a large percentage in silver.

ROCKERVILLE HYDRAULIC COMPANY.—Operations at these works have been discontinued for the winter.

STAND-BY.—Preparations for milling on an extensive scale are making, and it is expected that work will continue all winter.

IDAHO.

The Wood River *Times* states that the smelter at Bellevue will probably not be finished this year, and that it is doubtful if it is ever operated by the present management.

BALTIMORE.—This group has been sold for $30,000. The developments made show that the group is on the Elkhorn mineral belt. The work done on the Baltimore includes an incline which is down over 100 feet, and a drift about 75 feet long from the bottom of the incline. On the Victoria, which adjoins the Baltimore, there is a tunnel which is over 100 feet long, and shows an ore-vein from one foot to seven or eight feet wide. In the progress of work, about $10,000 worth of ore has been extracted, which is now on the dumps.

COLUMBIA & BEAVER.—The mill will probably close down for the winter at the end of this month. During its run of forty-five days, it has turned out $60,000 worth of bullion. Operations at the mines and mill, next summer, will be pushed vigorously, and the capacity of the leading plant of the mill will then be greatly increased.

PHILADELPHIA SMELTING COMPANY.—It is estimated that the production this season will amount to over seven million pounds of base bullion, worth about $1,300,000.

MAINE.

The silver vein on the land of E. L. French, South Exeter, is in a fair way to be developed. The property has been bonded by M. B. Spinney, W. H. Sweet, J. W. Kelly, and others of Bath, who are making arrangements to open it up and ascertain its extent and value.

DOUGLAS.—At the directors' meeting, reference to which was made in the last issue of the JOURNAL, Hon. F. M. Laughton, of Bangor, was chosen president. It has been decided to employ a practical mining engineer to examine and report as to the condition of the mine, before laying out plans for the coming winter.

STEWART.—Work on this mine, Blue Hill, is progressing satisfactorily. The northerly cross-cut is in 110 feet from the shaft, and the character of the ground is improving—the rock growing softer. It is calculated that at 140 feet the vein exposed by the open cut will be reached. The work of sinking the main shaft is going on continuously, and in the southerly cross-cut, which is in some thirty feet, an eight-foot vein of good copper ore has just been penetrated.

MARYLAND.

A bed of marl has recently been discovered near Cambridge. There are three strata. The first is of a rich brown color, thoroughly decomposed. The second is lead-colored. This stratum seems to have but lately decomposed, as there are still visible impressions of various sea-shells and bones. The jaw-bones of some very large animal have been discovered. The third stratum is of solid bone or rock, and, when powdered, closely resembles pure bone.

MICHIGAN.

The L'Anse & Houghton Railroad will be ready for business very soon. Both districts are to be congratulated on this important acquisition, especially those of the copper section, who have long since been inconvenienced by the lack of it.

The product during the month of October and total for the year of the mines mentioned has been as follows:

	October.	Total.
Calumet & Hecla	1,807	17,102
Quincy	351	2,677
Atlantic	166	1,607
Franklin	196	1,708
Allouez	100	1,004
Pewabic	48	631
Peninsula	61	483
Grand Portage	43	378
Hancock	37	386
Wolverine	40	289
Centennial		
Copper Falls	43	
Huron	70	181
Conglomerate		99

The amount for the Conglomerate is for the first four months, no stamping having been done since April 30th, on account of building the new mill.

CONGLOMERATE.—The stamp-mill is to be lighted by electricity. The last rail has been laid on the railroad from the mine to the mill, the piers at the canal entrance are completed, and there is now a sufficient depth of water to admit vessels fully loaded. It is expected that the mill, when in complete running order, will be capable of stamping 600 tons of rock daily.

DEER LAKE.—This company has joined with the Ropes Gold and Silver Company in exploring the property adjoining the Ropes land on the west. Good encouragement has been met with thus far. A fine quartz-vein has been discovered a few feet from surface where the first test-pitting was done. The Deer Lake Company owns other lands besides this that hold gold and silver-bearing veins.

EAST VULCAN.—Ore was struck in the new shaft twelve feet from the surface.

EMMET.—This company is just finishing the largest shaft-house in the mining region, and will have machinery to hoist 800 feet per minute, and electric signals and electric lights.

OLD CLIFF.—The recent operations on the north side of the range, in the Old Cliff property, seem from all reports to have a fair prospect of resulting in the development of a very valuable copper mine. The work was prompted by discoveries made about a year ago by Mr. Martin Kirshwing, who subsequently called the attention of Mr. D. D. Brockway to them. Openings have been made along the course of the vein, and during the past season the mine has been opened at nine different points. The result has been so encouraging as to induce the owner to sink three shafts and develop the vein in a thorough and systematic manner.

PAINT RIVER IRON COMPANY.—The company is considering the erection of a furnace at Crystal Falls for the treatment of a portion of the product of the Paint River and Mastodon mines, the property of the company.

MONTANA.

LEWIS & CLARKE COUNTY.

DRUM LUMMON.—Three bars of gold and silver bullion, valued at $10,000, were recently produced. The output of this mine will be large as soon as the new mill is up and ready for work. A force of men has begun to prepare for its erection, and it is hoped that it will be completed by next summer. Meanwhile, the little five-stamp mill will continue to run.

HELENA MINING AND REDUCTION COMPANY.—About complet.d at these works, are a 150-ton concentrator, and another 80-ton concentrator, and two 20-ton furnaces, and a 20-ton mill. This company will mine at least 250 tons per day, of the value of $40 per ton. The bulk of this will be concentrated and shipped.

SILVER BOW COUNTY.

ALICE.—The amalgamations for the past month averaged 89·55 per cent, and the chlorinations 84·02 per cent.

COLUSA.—The ore taken from the drift of the old discovery-shaft showed that the first-class ore ran 63·9 per cent copper and the second class 36·8 per cent.

MOULTON.—The main object at present is to get the mine in good working shape and to open new stoping ground. In order to accomplish this result, the mill is kept partly supplied for a few weeks with custom ore, for the treatment of which, however, the company realizes a good profit.

WASHOE.—An important strike has been made.

NEVADA.

ESMERALDA COUNTY.

WESTERN BELLE.—This company has been incorporated, with a capital stock of $5,000,000, divided into 100,000 shares. It is said that the entire amount of the capital stock has been subscribed by five gentlemen, John Neat, of San Francisco, subscribing $4,980,000 and the four other gentlemen $5000 each. The principal place of business will be in San Francisco, and the company is formed for the purposes of mining and milling in all its branches in Columbia Mining District, and elsewhere in this State.

EUREKA COUNTY.

A special meeting of the Eureka Miners' Union was recently held in Eureka, for the purpose, it is supposed, of taking steps to close down certain mines in which non-union men are working for less than $4 per day; or to require the men to join the Union and work for Union prices.

EUREKA TUNNEL.—The troubles of this company, reference to which has been made at various times in the JOURNAL, continue. The Eureka *Sentinel* states that all the mining claims belonging to the company were sold at sheriff's sale October 27th, in order to satisfy the judgment of the White Pine County Bank. The entire property was bought in by R. Sadler for the sum of $12,000, this amount being necessary to pay off the preferred claims which had been filed with the sheriff, and the bank judgment. Prior to the sale, arrangements had been made with the miners by a syndicate to take up all the preferred claims at 93 cents on the dollar, cash, and all the preferred claims have been paid off at this rate. The personal property of the company has not yet been sold, it being under attachment sued out of the Justice's Court by P. N. Hansen. As the matter now stands, the property belongs to Messrs. Sadler, Capron, Muller, and Pardy. F. W. Clute has a judgment against the company for $36,000, and it is quite probable that he will redeem the property from the syndicate in order to save himself. From the present outlook, it will be some time before work can be resumed in the mine.

RICHMOND.—Th mine is partially closed down. The reason for this act on the part of the management, says the Eureka *Leader*, is a scarcity of ore on the upper levels and too much water on the lower levels. The machinery is closed down for the present, but will be started up as often as the tributers have ore to hoist.

NYE COUNTY.

BELMONT.—Stopes in the south tunnel are showing well. The ore extracted will mill from $150 to $200 per ton. The stopes in Laity ground are producing first-class ore in liberal quantity. The level going south shows the ledge to be 10

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feet in width. The mill is doing good work. Chlorinations are high, averaging so far 92 per cent

WHITE PINE COUNTY.

STAR MINING COMPANY.—The case of Wells, Fargo & Co. *vs.* this company, of Cherry Creek, will come up in the Supreme Court of Carson shortly. This is said to be an important case, and the decision of the court will be of interest to laborers throughout the State, as it involves the constitutionality of the lien law in Nevada. It appears that Wells, Fargo & Co. advanced money to the Star Mill Mining Company, for which the latter gave a mortgage on the property. At the Star mill, several men were employed who had not received their wages for some time. These men, growing impatient, filed liens against the mill. Wells, Fargo & Co., however, say that their mortgage is prior to the liens, and bring suit against the mill to recover the amount of the mortgage.

SUNDOWN.—This mine, which adjoins the Black Jack mine, at Diamond, has been bonded to J. C. Clark for the sum of $20,000. It is the intention to commence work in the mine at once.

NEW JERSEY.

DICKERSON.—The sinking of the shaft at this iron mine is well under way. It is now a little over 100 feet deep, but will be sunk to a depth of 700 feet. This shaft is sinking to strike the vein at the foot of the slope, and when completed will be the outlet for hoisting the ore, which now has to be conveyed a long distance underground and up a long slope. The shaft is 8 by 16 feet, and will occupy some two years in sinking. There is a hoisting-engine and an air-compressor in position, at present; but they will be replaced by larger and more powerful ones when the ore is to be hoisted. Five large boilers have been set, which are to supply the steam for the present and also for permanent use when the shaft is completed.

UTAH.

BEAVER COUNTY.

HORN-SILVER.—Major Goodspeed has recently visited this mine, and has made some interesting measurements. In an interview with a reporter of the Salt Lake *Tribune*, he states that he found the mine worked out down to the third level, or to a depth of 150 feet, and some of the ore between the third and fourth levels stoped out. Hence he confined his measurements to the great body of ore, as yet untouched, lying between the fourth and seventh levels, and took no account or approximation of the ore below the seventh level, which is opened by a shaft 54 feet deep. By actual measurement, he found the average width of the ore-body between the fourth and sixth levels to be 70 feet, and the average length 150 feet, by 200 feet in depth, containing 2,100,000 cubic feet of ore. The seventh level exposes in length 240 feet of ore. From this level, the cross-cuts, none of which has struck either wall, show an average width of 70 feet by 100 feet in depth, aggregating 1,680,000 cubic feet of ore; or, allowing 10 cubic feet per ton, 168,000 tons. Between the sixth and seventh levels, the ore is said to be richer in grade. Up to the present time, the Horn-Silver has put out 150,000 tons of ore, besides buying into the Utah Southern Railroad and putting up the smelter.

JUAB COUNTY.

MAMMOTH.—A report from Salt Lake City states that the Earl of Onslow, who arrived there recently, has left for Tintic on a special train to inspect the Mammoth mine, being interested with the English company which two years ago began negotiations for it, but the negotiations for which have lagged till the whole affair is in an inextricable muddle. The debts are heavy. People are in hopes that the visit may result in something decisive.

SUMMIT COUNTY.

ONTARIO.—The drain tunnel in this mine is progressing.

WYOMING.

Articles of incorporation have been filed at Cheyenne for the Black Hills & Montana Railroad Company, with a capital of $10,000,000, divided into 100,000 shares. The incorporators are F. E. Warren, A. H. Swan, M. E. Post, W. C. Irvine, and C. E. Anthony. According to the articles of incorporation, the company has the privilege of operating a railroad in Wyoming, Montana, Dakota, and other territories.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED OCTOBER 2D, 1883.

285,786. Purifying Iron with Carbonic-Acid Gas. John F. Bennett. Pittsburg, Pa.
285,828. Fuel-Magazine for Steam-Generators. George Mehring, Chicago, Ill.
285,860. Metallurgic Furnace. Edwin D. Wassell, Pittsburg, Pa.
285,861. Cutter for Revolving Puddling-Furnaces. Samuel T. Wellman, Cleveland, O.
285,883. Friction-Compressor for Dredging-Machines, etc. Asahel H. Fisher, Philadelphia, Pa., Assignor of one half to William C. Turner, same place.
285,895. Alloying Iridium. John Holland, Cincinnati, O., Assignor to the American Iridium Company, same place.
285,940. Friction-Clutch. Richard Wels, Dessau, Germany.
285,945. Method of and Apparatus for the Treatment of Spoil-Heaps of Collieries. Lawrence H. Armour, Gateshead-on-Tyne, County of Durham, England.
285,952. Apparatus for Loading Coal. William G. Barnard, Bellaire, O.
285,970. Ore-Concentrating Table. R Neilson Clark and Norris H. Cone, Leadville, Colo.
286,025. Process of Obtaining Precious Metals from Refractory Ores. George T. Lewis, Philadelphia, Pa.
286,028. Sheet-Metal Pulley and Drum. Norman Macbeth, Bolton-le-Moors, County of Lancaster, England.
286,050. Concentrator. George A. Metcalf, Malden, Mass.
286,052. Dumping-Wagon. Charles Miller, Auburn, N. Y.
286,067. Process of Producing Ingot Iron and Steel. Jacob Reese, Alleghany, Pa.
286,074. Utilizing the Exhaust of Steam-Pumps. Henry W. Robie, Portsmouth, and William H. Lyons, Berkley, Va.
286,083. Grate-Bar. Charles Smith and Joseph Hutchinson, Chicago, Ill.
286,102. Rotary Steam-Engine. Augustus B. Wood, Fountain Hill, Ark.
286,104. Process of Treating Iron. Brock Woodruff, Albert Lea, Minn.
286,105. Steam-Engine for Mining Purposes. Bernhard Yoch, St. Louis, Mo.
286,110. Metallurgical Furnace. Simeon Bissell, Pittsburg, Pa., Assignor to Thomas Bakewell, Trustee.
286,117. Composition Paint for Metallic Surfaces. Henry R. Clothier, John Grogan, and John McMullen, Philadelphia, Pa.
286,119. Hod-Elevator. Samuel Dale, Boonesborough, Iowa.

RE-ISSUE.

10,389. Dumping-Platform. John T. Savage and John Love, Rockford, Ill.

GRANTED OCTOBER 9TH.

286,200. Antimony-Furnace. Arthur Hudson, Newton, Mass.
286,208. Process of and Apparatus for Reducing Zinc Ores. Leon Letrange, Paris, France.
286,223. Rock-Breaker. Lazarus Radovich, San Francisco, Cal.
286,286. Gas-Consuming Furnace. George Farr, Cincinnati, O., Assignor of one half to James Russell Whittemore and Myron Spiekerman, both of same place.
286,290. Pulverizing-Machine. Ryerson D. Gates, Chicago, Ill.
286,294. Ratchet-Drill. John A. Haase, Philadelphia, Pa.
286,320. Process of Converting Cast-Iron into Fibrous Wrought-Iron. Jacob Reese, Pittsburg, Pa.
286,342. Ore-Concentrator. William E. Stirk, Leadville, Colo., Assignor to A. P. Brayton, San Francisco, Cal.
286,364. Mining-Machine. Benhard Yoch, St. Louis, Mo.
286,466. Machine for Dressing Rollers for Grinding-Mills. Fred Messer, Beloit, Wis.
286,520. Clay-Pulverizer. William Andrus, Keokuk, Iowa.
286,549. Ventilating-Door for Mines. Casper P. Moyer, Woodville, Pa.

GRANTED OCTOBER 16TH.

286,720. Apparatus for Grinding White Lead and other Materials. John C. Martin, Richmond, County of Surrey, England.
286,721. Apparatus for Drying White Lead. John C. Martin, Richmond, County of Surrey, England.
286,723. Ore-Crusher. Frederick H. McDowell, New York City.
286,728. Brick-Kiln. Clark D. Page, Rochester, N. Y.
286,729. Brick-Kiln. Clark D. Page, Rochester, N. Y., Assignor of one half to Andrew Albright.
286,751. Hydraulic Air-Compressor. Hiram Webster, East Aurora, N. Y.
286,754. Art of Making Metallic Wheels. Charles O. Wilder, Chicago, Ill., Assignor to the Northwestern Steele Wheel Company, same place.
286,777. Smelting-Furnace. Edward Cartwright, Wilber, Neb., Assignor of two thirds to William H. Mann and John S. Edwards, same place.
286,791. Amalgamator. George Dean, St. Louis, Mo.
286,815. Miner's Pick. Samuel Herron, Coalton, Ky.
286,822. Combined Roasting and Smelting Furnace. Ezekiel Holman, Sandy, Utah.
286,825. Soft-Metal Casting Apparatus. Robert J. Howdon, Cincinnati, O., Assignor of one half to the Cincinnati Coffin Company, same place.
286,837. Rock and Earth Boring Apparatus. Theodore Lindell, Clarksville, Mo., Assignor of one half to Per Swainson, same place.
286,854. Device for Promoting Combustion in Boiler-Furnaces. Isaac W. Seaverns, Jr., Chicago, Ill.
286,887. Furnace. Jacob S. Williams, St Louis, Mo.
286,892. Brick-Machine. William Andrus, Keokuk, Iowa.
286,904. Manufacture of Metal. George H. Chinnock, Brooklyn, N. Y., Assignor to himself, Albert Sichel, and James Lemon.
286,986. Pick. William A. Wright, Centerton, N. J., Assignor of two thirds to A. J. Lamborn, Philadelphia, Pa.

GRANTED OCTOBER 23D.

287,004. Inlet-Valve for Air-Compressors. George R. Cullingworth, New York City.
287,005. Outlet-Valve for Air-Compressors. George R Cullingworth, New York City.
287,006. Journal-Box. George R. Cullingworth, New York City.
287,007. Inlet-Valve for Air-Compressors. George R. Cullingworth and Charles W. Potter, New York City, Assignors to the Sergeant & Cullingworth Company, same place.
287,032. Coal-Mining Machine. Samuel C. Lechner, Columbus, O.
287,038. Cleaner for Steam-Boilers. Arthur Lowcock, Shrewsbury, Shropshire, and John Taylor, Salford, County of Lancaster, England; said Taylor Assignor to said Lowcock
287,053. Pump. Jay W. Powers, Winnetka, Ill., Assignor of one half to Morris J. Moth, same place.
287,054. Process of and Plant for Producing Cast-Iron High in Carbon and with a Predetermined Percentage of Silicon. Jacob Reese, Pittsburg, Pa.
287,069. Steam-Pump Regulator. Jacob Wagner, Pickering, Mo.
287,074. Apparatus for Tempering and Preparing Clay for Making Brick. Walter W. Winn, Troy, N. Y.
287,101. Safety-Governor for Air-Compressors. George R. Cullingworth, New York City.
287,102. Rock-Drill Support. George R. Cullingworth, New York City.
287,103. Tripod for Rock-Drills. George R. Cullingworth, New York City.
287,104. Air-Compressor. George R. Cullingworth, New York City.
287,105. Pressure-Regulator for Air-Compressors. George R. Cullingworth and Charles W. Potter, New York City, Assignors to the Sergeant & Cullingworth Company, same place.
287,117. Process of Preparing Powdered or Granulated Ores for Furnaces. James J. Fronheiser, Johnstown, Pa.
287,131. Safety-Valve. Albert H. Jarecki, Erie, Pa.
287,139. Elevator-Bucket. Robert B. Little, Providence, R. I.
287,140. Coal Elevator and Conveyer. Robert B. Little, Providence, R. I.
287,161. Coal Sieve. John G. W. Putnam, Saratoga Springs, N. Y.
287,167. Safety-Valve. George W. Richardson, Boston, Mass., Assignor to the Consolidated Safety-Valve Company, Hartford, Conn.
287,173. Ore-Concentrator. Charles C. Rueger, San Francisco, Cal.
287,188. Connecting-Rod for Rock-Drills. Charles A. Sterling, New York City.
287,195. Ore-Separator and Amalgamator. Horace P. Tobey, Wareham, and George B. Thayer, Boston, Mass., Assignors to the Golden Gate Concentrator Company, Augusta, Me.
287,204. Blast-Furnace. Peter L. Weimer, Lebanon, Pa.
287,209. Drilling-Machine. Edward J. Worcester, Worcester, Mass.
287,235. Manufacture of Steel. William W. Chipman, Brooklyn, Assignor of two thirds to William Courtenay and Joseph C. Tiffany, both of New York City.
287,252. Double-Acting Steam-Pump. Evan Davies, Cleveland, O.
287,256. Combined Ore-Grinder and Amalgamator. Peter Eddy, Nevada City, Cal., Assignor of one half to James G. Hartwell, same place.
287,262. Friction-Brake for Elevating Devices. John A. Evarts, Meriden, Conn., Assignor to the Bradley & Hubbard Manufacturing Company, same place.
287,273. Apparatus for Treating Molten Iron. Robert H. Gordon, Reading, Pa.
287,325. Water-Pump Attachment for Air-Compressors. Charles W. Potter, New York City, Assignor to the Sergeant & Cullingworth Company, same place.
287,332. Coke-Oven. Louis Semet, Brussels, Belgium.
287,358. Hydraulic Air-Compressor. William A. Babcock, South Coventry, Conn., Assignor to Bishop & Babcock, Cleveland, O.
287,396. Dry Ore Concentrator. John George Vollmer, Austin, Tex.

REISSUE.

10,395. Process of Analyzing Pig-Iron from Blast-Furnaces. Samuel A. Ford, Pittsburg, Pa.

GRANTED OCTOBER 30TH.

287,403. Turbine Water-Wheel. Henry R. Austin, Norwood, N. Y.
287,431. Amalgamating Apparatus. Ellick H. Gollings, Lewiston, Idaho, Assignor to himself and Charles H. Smith, Chicago, Ill.
287,432. Brick-Kiln. Francis L. Hall, Oneida, N. Y.
287,433. Gas and Coke-Kiln. Hayden H. Hall, New Hamburg, N. Y.
287,436. Coal-Mining Machine. William Hilton, Barton, O.
287,508. Centrifugal Pump. Nicholas Didiot, Bakersfield, Cal.
287,546. Ore Concentrator and Amalgamator. Frederick M. Johnson, Gardiner, Oregon.
287,579. Combined Boiler and Steam Vacuum-Pump. Carrall I. Riker, Brooklyn, N. Y.
287,633. Brick-Kiln. George F. Cotton, Bushnell, Ill.
287,646. Apparatus for Casting Copper. William F. Durfee, Bridgeport, Conn., and Thomas Egleston, New York City.
287,650. Dumping-Car. William Fallon, Newburg, N. Y.
287,653. Machine for Pulverizing Ores, etc. Arthur L. Fish, San Francisco, Cal.
287,658. Pulverizing-Machine. Ryerson D. Gates, Chicago, Ill.
287,663. Dumping-Car. James T. Godwin, Norfolk, Va., Assignor of one half to Albert L. Woodworth, same place.
287,679. Apparatus for Preparing and Treating Peat for Fuel or other Purposes. J. Burrows Hyde, New York City.
287,687. Manufacture of Bessemer Metal. William R. Jones, Braddock, Pa.
287,699. Manufacture of Brick. Frederick W. Meeker, New York City, Assignor to the Fire-Proof Building Company of New Jersey.
287,728. Tunneling-Machine. Maier Rothschild, Shamokin, Pa.
287,737. Process of Treating Sulphides. Carl A. Stetefeldt, New York City.
287,754. Air-Injector for Furnaces. James W. Bonta, Philadelphia, Pa., Assignor to the Giant Air-Injector Manufacturing Company (Limited), same place.
287,784. Metal-Crimping Tool. Richard Whitaker, New Brunswick, N. J., Assignor to Alvin L. Fisher, same place.
287,785. Can for Holding Blasting-Cartridges. Chauncey C. White, Peckville, Pa.

REISSUE.

10,399. Furnace and the Art of Working the same. James Henderson, Bellefonte, Pa.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 16.

There was a slightly improved feeling in the mining market this week, and the dealings were more generally confined to the better class of stocks. The chief stock of interest dealt in was Horn-Silver, which at one time was quite strong. It reacted, however, and closed weak to-day. Iron Silver was another feature of interest, and was remarkable for its weakness. It is the impression that it is manipulated to create a "short" interest and then to "bull" the stock. Chrysolite shows some strength under moderate dealings. Some of the fancies were largely dealt in, but show no material change in price. Below will be found a complete summary of the market. The total number of shares sold aggregates 121,565, as against 97,665 last week.

The Comstock shares were almost neglected, and were generally weak. California was quiet at 25c. Consolidated Virginia was weak, under a small business, selling from 47@38@43c. Sierra Nevada was also weak at $3.50@$3.15 with small transactions. Mexican sold at $2.50, and Hale & Norcross at $1.60. Sutro Tunnel was very quiet at steady prices, selling at 15c.

The Leadville stocks were moderately dealt in at steady prices. Amie was quiet and steady, selling from 12@14c. Chrysolite was strong, with a fair business, selling from $1.25@$1.35@$1.30. Dunkin sold from 26@25c. Breece was quiet and steady at 17c. Iron Silver was weak, with a moderate business, selling from $2.90@$2.25@$2.35. Leadville was quiet and steady at 46@49c. Little Chief sold from 56@55c., with a small business. Little Pittsburg was steady under a small business, selling from 50@57c. Climax sold at 6c.

The Bodie stocks were very quiet and were steady. Bodie Consolidated sold from 45@40c., with a small business. Standard was quiet and steady at $6.25@$6.38. Bulwer was steady at 50@45c., with small ransactions.

The Tuscarora stocks were very quiet. Grand Prize was weak, under a small business, selling from 50@42c. Argenta sold at 20c. Elko Consolidated was quiet and steady, selling from 18@19c.

In the miscellaneous list, Bassick was irregular, under a small business, selling from $8.38@$9@$8.50. Eureka Consolidated was weak at $3.90. Green Mountain was strong, selling from 85c.@$1, buyer's option; the business was small. Homestake was quite weak, selling from $10@$8@$8.25. Horn-Silver was quite strong at one time, but suffered a decline toward the close; it sold from $5.50@$6.75@$6. Robinson Consolidated was weak, with a small business, selling from 45@39@40c. Sierra Grande declined from 98@94c., under small transactions. Silver King was quiet and steady at $7. Castle Creek sold from $1.20@$1.10: the transactions were small.

Barcelona was quite active at weak prices; it sold from 21@23@22c. Caledonia was a little weak at 30@25c. Decatur was very active at steady prices, selling from 4@5c. Eastern Oregon was quiet and steady, selling from 42@43c. Harlem was moderately dealt in at steady prices; it sold from 96 98c. La Crosse sold from 8@12@9c., with a small business. Sonora Consolidated was weak during the early part of the week, but was stronger at the close; it sold from 25@22@27@26c., with a very active business.

MEETINGS.

The Consolidated Batopilas Silver Mining Company, No. 82 Broadway, New York City. Annual meeting of stockholders and election of trustees November 26th, at twelve o'clock M.

The Hibernia Silver Mining Company, office of Messrs. Lexow & Haldane, attorneys, No. 46 Exchange Place, Room 48, New York City. A special meeting of stockholders for the purpose of voting on the question of returning the contributions, December 1st, at three o'clock P.M.

The St. Joseph Lead Company, No. 152 Broadway, New York City. A special meeting of stockholders for the purpose of considering the question of increasing the capital stock from $1,000,000 to $1,100,000, December 4th, at one o'clock P.M.

DIVIDENDS.

The Bassick Mining Company, of Colorado, has declared a dividend of one dollar per share, payable on and after November 27th.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 14) of two per cent on the capital stock, payable November 19th.

The Homestake Gold Mining Company, of Dakota, has declared its 63d dividend of $25,000, for the month of October, payable at the office of the transfer-agents, Lounsbery & Haggin, No. 15 Broad street, on the 24th inst. Transfers close on the 20th. Total of dividends to date, $2,262,500.

The Jocuistita Mining Company, of Mexico, has declared a quarterly dividend (No. 10) of $50,000, being fifty cents per share, payable November 30th.

The Mount Diablo Mining Company, of Nevada, has declared a dividend of twenty-five cents per share, paya ble November 26th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report on the petroleum market for the week as follows:

A week ago Friday, oil opened at 110 and began a journey upward that has reached 119¼ this Friday noon, with scarcely a reaction.

For a month, extreme dullness prevailed in the oil market, and the public was but little interested in it. It now appears that a short interest had been created and that oil had gone into strong hands, who started this boom to make a market to sell on.

The price of refined oil has been daily advanced a fraction from 8½ cents to 9, and this in presence of the fact that there is almost no foreign demand and only the usual domestic trade. The charters for export this month so far show a daily average of less than 18,000 barrels, against about 46,000 in September and October.

It would appear that the Standard Oil Company is either the author of this advance in crude oil or is at least friendly to it. There is not much short interest in any of the markets except Pittsburg, but the market is undeniably strong. The public are not in yet. The professional leaders are nearly all bulls. The bull argument is, that the field is showing a decline in production. Cooper tract and Balltown are only about 3000 barrels per day below their maximum production, and there is nothing to show that consumption is in excess of production. The market suffered a strong decline this afternoon, and closed in a feverish and unsettled condition.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Nov. 10	$1.12⅝	$1.14	$1.12½	$1.13⅝	4,857,000
12	1.14¼	1.16	1.14¼	1.14¾	6,285,000
13	1.15⅛	1.15⅝	1.14⅝	1.15¼	3,927,000
14	1.15⅝	1.17⅞	1.15⅛	1.17⅛	5,505,000
15	1.18⅜	1.19	1.17¼	1.18⅛	6,809,000
16	1.18⅞	1.19¼	1.17⅛	1.17¼	9,307,000
Total sales					36,690,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, November 15.

The dealings in mining stocks the past week have been few and far between; and with a single exception, prices are unchanged. In copper stocks, Calumet & Hecla is steady at $240, with sale of a single share to-day at $239, closing $238 bid, $240 asked. Franklin sold at $11⅛, same as last week—only one transaction for the week. Quincy is duller than ever; only 9 shares changed hands the past week at $52. Pewabic is exceptionally strong under orders to buy, and advanced from $31¼@$33¾; but the advance brings out but little stock. The owners of most of this stock paid high prices for it, and still have faith in the enterprise, and expect some day to get good returns for their patient waiting. The four stocks above named comprise all the dealings in coppers for the week, and show how little interest there is in this class of property. The outs do not want to get *in*, and the ins can not get *out*, and the result is dull business and few commissions for the brokers.

The silver stocks are gradually fading from the market. The transactions at the regular Brokers' Board are comparatively nothing, and at the Mining Exchange the same want of activity is noticed. Bonanza Development sold at $1.50—200 shares only. Catalpa, at 30c., at which the market is well supplied. Bowman Silver is floating about at 10@11c. Massachusetts & New Mexico is not wanted at any thing over 2c. per share. Sullivan seems to be the only stock in which there is any degree of activity. This stock is largely held by a few parties who are manipulating the market in hopes to be able to unload upon the public. The price has ruled quite steady at 90c.@$1 as the extreme limits. There have been some sales of Dunkin at 26@28c., but dealings are extremely limited.

3 P.M.—At the afternoon Board, Calumet & Hecla declined on sale of 41 shares to $238. Sullivan sold at $1⅛, and Catalpa at 30c. Allouez, $1½ asked. Atlantic, $12 asked. Bonanza, $1½ bid, $1⅝ asked. Calumet & Hecla, $238 asked. Catalpa, 30c. bid. Franklin, $11¼ bid. Huron, $1⅜ bid, $1¾ asked. Pewabic, $3½ bid, $4 asked. Quincy, $51 bid. Silver Islet, $3 bid, $4 asked. Sullivan, $⅛ bid, 95c. asked.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Nov. 9.	Nov. 10.	Nov. 12.	Nov. 13.	Nov. 14.	Nov. 15.
Albion	....	....	....	....	....	....
Alpha	1⅝	....	1½	1¼	1⅛	1⅛
Alta	1⅜	1¼	1⅛	1	1	1
Argenta	....	....	....	....	....	....
Bechtel	....	....	....	....	....	....
Belcher	.90	....	....	.90	.70	.90
Belle Isle	....	.45	....	.45	.40	40
Best & Belcher	3⅜	3⅜	3¼	3⅛	3	3⅛
Bodie	.35	.30	.25	.30	.35	.35
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.25	.25	.25	....	.25	....
Challar	2⅛	2	2	1¾	1⅝	1¾
Con. Virginia	.45	.40	.45	.40	.40	40
Crown Point	1	....	1	.80	.90	.90
Elko Cons	....	.20	.20	.25	....	....
Eureka Cons	....	.4	....	4	3⅞	....
Exchequer	....	....	....	....	....	....
Gould & Curry	1½	1½	1⅝	1¼	1¼	1⅝
Grand Prize	.40	.35	.40	.40	.30	.35
Hale & Norcross	1¾	1⅞	1¾	1½	1⅝	1⅝
Independence	....	....	....	.25	....	.30
Martin White	....	....	....	....	.25	....
Mexican	2¾	2¾	2⅛	2¼	2¼	2⅜
Mono	....	....	....	....	....	....
Mount Diablo	....	....	....	....	3¼	3¼
Navajo	3⅞	3⅞	3¾	3¾	3¾	3¾
Northern Belle	....	....	3¾	4	4	4
North Belle Isle	....	....	....	....	....	....
Ophir	4¼	3	4	3⅞	3¾	3⅞
Overman	....	....	....	....	....	....
Potosi	.70	.65	.70	.60	.55	.55
Savage	.80	.70	.65	.50	.50	.50
Scorpion	.50	....	.45	.45	....	....
Sierra Nevada	3⅞	3¾	3½	3⅛	3⅜	3¼
Silver King	....	....	....	....	....	....
Tip Top	....	....	....	....	....	....
Union Cons	3⅛	3¼	3	2¾	2⅞	3¼
Utah	1⅜	1¼	2¼	2⅛	2¼	2¼
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3¼	3¼	2⅞	2¾	2⅛	2¾

The following are the financial balances of the various mining companies on November 1st:

CASH ON HAND.

Alta	$20,803.48	§Hale & Norcross	$4,443.70
Bodie Con	24,764.31	Mexican	36,512.07
Bulwer	3,119.94	Mono	2,338.10
Best & Belcher	30,785.17	McClinton	1.15
Benton Con	4,266.05	Northern Belle	22,404.81
Booker Con	203.38	Ophir	58,623.98
*Belcher	21,907.05	Occidental	58,623.98
Crown Point	24,167.47	Sierra Nevada	50,910.15
†Con. Virginia	71,443.76	Summit	945.15
‡California	489.80	Standard	178,936.69
Double Standard	.20	Tioga Con	821.82
Gould & Curry	6,212.37		

INDEBTEDNESS.

Lady Washington Con	$3,941.76
Savage	1,622.77

Albion indebtedness exact amount not yet known; approximate, $260,000.

Utah, overdrawn November 1st, $3187.52.

Northern Belle, bullion unsold, $33,278.84.

* Due Sutro Tunnel Company, $10,920.

† Expenses of mine, amount not known.

‡ Overdraft at Nevada Bank, $13,057.17.

§ Amount due on assessment No. 78, $9881.50.

BULLION MARKET.

NEW YORK, Friday Evening, Nov. 16.

The market abroad and here is weaker, and the indications point to somewhat lower prices.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Nov. 10	50 13-16	110½	Nov. 14	50 13-16	110½
12	50 13-16	110½	15	50¾	110⅝
13	50 13-16	110⅛	16	50¾	110⅝

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended November 16th, as compiled from various sources, amounted to $257,000, as against $885,396 reported for the previous week. The receipts from January 1st, 1883, to date are $10,155,448.

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Exports and Imports of Gold and Silver at New York.

Exports.

Week ended November 10th	$260,940
Corresponding week last year	52,500
Since January 1st, 1883	12,946,759
Corresponding period last year	44,614,221

Imports.

Week ended November 10th	$1,819,295
Corresponding week last year	299,538
Since January 1st, 1883	17,487,662
Corresponding period last year	5,028,169

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £2900 bullion, and the proportion of its reserve to its liabilities was decreased from 43⅜ to 42 11/16 per cent, against 38 13/16 per cent a year ago. The weekly statement of the Bank of France shows losses of 2,375,000 francs gold, and 2,525,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of October.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	.....	$779,099
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal....	.....	139,660
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	.....	426,967
*Boston & Montana, G.	Mont...	2,908	138,015
*Central Arizona, S.	Ariz..	.....	35,845
*Christy, S.	Utah..	.....	201,715
*Chrysolite, S. L.	Colo....	16,288	327,779
*Consolidated Bobtail, G.	Colo...	6,996	54,982
*Contention, S.	Ariz..	.....	714,637
*Crescent, G. S. L.	Utah...	40,820	266,498
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak...	52,922	388,582
*Derbec Blue Gravel, G. S.	Cal...	12,464	115,043
Dunkin, S. L.	Colo...	6,291	49,250
Evening Star, S. L.	Colo...	.....	47,061
*Father de Smet, G.	Dak....	29.805	300,681
*Frisco M. and S. Co., G. S. L.	Utah..	.....	$77,084
*Granite Mountain, S.	Mont...	.....	165,950
Gunnell, S.	Colo...	.....	58,828
*Halle, G., S., C.	S. C....	.....	27,900
*Head Center Consolidated	Ariz..	.....	43,247
*Head Center and Tranquillity	Ariz..	.....	89,108
*Hecla Consolidated, G. S. L.	Mont...	**	633,979
*Homestake, G.	Dak..	99,113	866,709
*Hope, S.	Mont...	.....	82,060
Horn-Silver, S. L.	Utah...	.....	2,474,200
*Howell S. and Mg. Co., G. S. L.	Ariz....	30,588	144,877
Idaho, G.	Cal....	.....	150,642
*Independence, G. S.	Nev....	.....	32,991
*Iron Silver, S. L.	Colo...	.....	1,031,952
*Jocnistita, S.	Mex...	.....	‡258,959
*Kentuck, G. S.	Nev	.....	18,596
*Lexington, S.	Mont...	86,843	1,054,551
*Little Pittsburg, S. L.	Colo....	.....	64,078
*Marguerite, G.	Cal	.....	68,794
*Martin White, G. S.	Nev....	.....	136,317
Morning Star, S. D.	Colo...	.....	84,428
*Moulton, G. S.	Mont...	.....	123,288
Mount Diablo	Nev ...	.....	381,142
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	.....	505,827
*Ontario, S. L.	Utah...	211.800	1,807,178
*Oxford, G.	N. S....	3,880	54,055
*Phœnix, G.	N. C....	.....	21,009
*Pinal Consolidated, S. L.	Ariz ...	.....	181.485
*Plymouth Consolidated, G.	Cal	77,008	373.090
*Satemo, G.	N. S....	.....	2,500
*Silver Bow, G. S.	Mont...	.....	203,947
*Silver Cord, G. S. L.	Colo....	.....	703,333
Silver King, S.	Ariz..	.....	367,802
*South Yuba, G.	Cal	.....	37,272
Standard, G.	Cal	.....	$75,222
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah...	21,761	215,552
Syndicate, G.	Cal ..	.....	56,008
Tintic M. and M. Co.	Utah...	.....	34,670
*Tip Top, S.	Ariz....	.....	37,868
*Tombstone, G. S. L.	"	59,057	664,618
Wyoming Consolidated.	Cal	.....	31,541
Yellow Jacket, S	Nev....	.....	265,885
Total amount of shipments to date			$19,103,660

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Nov. 16.

Copper.—The condition of the market is, on the whole, healthy. From the West, come evidences of a forced restoration of the production, one of the leading concerns, it is stated, being unable to promptly meet its engagements for the delivery of raw material to refiners and exporters. It is certain that our refiners are getting less of blister mattes and ore than for some time past, so that the quantity of outside brands in our market is less. Lake is dull at nominally 15c., transactions being on a limited scale.

The English market has again shown symptoms of weakness, the last cable being £59 15s.@£60 for Chili Bars and £66@£66 10s. for Best Selected.

Tin.—There has been considerable excitement in this metal, the transactions at the Exchange amounting to 580 tons of tin, spot and futures, in the three last days, spot selling as low as 19½c. for Straits. London went down to £87, but has since recovered to £88 10s.

Messrs. James & Shakspeare, of London, have issued the following statistics of copper for England and France, including metal afloat:

	Oct. 1 to 31. Imports. Tons.	Deliveries. Tons.
Fine foreign, chiefly Australian	866	1,086
Chili { Bars	1,216	1,787
Chili { Ingots	385	308
Chili { In ores and regulus	22	274
American	946	824
Spanish precipitate and sundries	1,800	3,914
Totals, England	5,235	8,203
American	270	320
Chili bars, ingots, and Barilla, France	1,460	953
Sundries, France	25	25
Total, England and France	6,990	9,501

	Stocks. Oct. 31. Tons.	Sept. 30. Tons.
Fine foreign, chiefly Australian	3,680	3,900
Chili { Bars	24,574	25,155
Chili { Ingots	613	536
Chili { In ores and regulus	1,863	2,115
American	219	97
Spanish precipitates and sundries	2,224	4,338
Totals, England	33,173	36,141
American	290	340
Chili bars, ingots, and Barilla, France	2,429	1,922
Sundries, France	30	30
Total, England and France	35,922	38,433
Advised by mail and telegram: Chili	9,981	10,200
Australian	430	900
Stock and afloat, gross totals	46,333	49,533

	Jan. 1 to Oct. 31. 1883. Tons.	1882. Tons.	1881. Tons.
Imports	78,399	65,552	63,258
Deliveries	77,604	70,356	68,480

Messrs. James Lewis & Son, of Liverpool, estimate the total arrivals of copper from the United States in that port for the first nine months at about 7125 tons of fine copper.

The following are the Board of Trade returns, the most striking feature of which is the heavy increase in the quantity of Spanish precipitate:

Imports:	1883.	1882.
Ores, Chili	182	36
Cape	4,221	3,823
Other countries	6,730	6,502
	11,143	10,361
Regulus, Chili	2,463	2,977
Precipitate, etc	25,033	18,064
Bars, ingots, etc., Chili	16,508	14.904
Australia	7,928	7,242
Other countries	1,995	3,805
	11,983	12,125
Pyrites	77,053	69,478
Exports:		
Wrought and unwrought (English)	23,747	21,251
Yellow metal (English)	8,840	8,385
Brass (English)	2,551	2,484
Unwrought and part wrought (Foreign)	5,907	9,121
	44,045	41,241
Difference	33,008	28,237
Stocks of all kinds, in England, January 1st	32,623	35,306
Stocks of all kinds, in England, September 30th	36.141	31,030
Increase	3.518	
Decrease		3,676
Apparent home consumption of foreign copper	29,490	31,913
Produce of Cornish mines	1,793	1,826
British ores sold at Swansea	53	42
Apparent home consumption	31,336	33,781
Stocks of copper of all kinds in France were, January 1st	2,504	3,437
Stocks of copper of all kinds in France were, September 30th	2,292	2,965
Decrease	212	472
Import of copper of all kinds into France directly	15,815	11,588
Apparent French consumption (exclusive of import from England)	16,027	12,060
Apparent French consumption (including import of English copper)	20,837	17,078
Total English and French consumption of English copper and English export	91,408	87.082

Lead.—This metal has taken another plunge downward, sales having been made yesterday and to-day of from 400 to 500 tons of Common at 3·75c., while Refined is nominally 3·80c. The decline, which was not looked forward to until a later period, appears to have been precipitated by the eagerness of refiners. The situation is becoming grave, and unless relief is obtained in some manner, will hurt the mining interests. It is argued that to the mines it is a matter of indifference what lead fetches; "their profit comes from the silver." This may be true in a few isolated cases, but the great bulk of the lead ores are carriers of the silver in drier ores, whose value is dependent upon the supply of the former. Let it be cut off, and the smelting charges for the latter run up to a figure putting their profitable mining out of the question. The lead and silver mining interests can look for relief only in one quarter. The exorbitant rates of the railroads carrying bullion to the refiners from the smelters must come down. There is a good deal of mystery about these rates, and it is freely charged that some of the Western desilverizing works are unduly favored. Be this as it may, from $20 to $30 per ton is too high in bullion from Colorado smelting-works to desilverizing establishments in Missouri, Kansas, and Illinois, from which the refined lead can be sent East in some cases as low as $6 per ton.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market has declined slowly since our last report, there being no demand. Buyers were few, and make their own terms. Sales will not aggregate 400 tons at 3·65@3·70c. Hard Missouri is quoted at 3·60c.

Messrs. Everett & Post send us the following dispatch from Chicago to-day:

There being more sellers than buyers in the market, prices have weakened, and buyers who expect a further decline hold off, purchasing only for immediate requirements now. Sales for the week figure up to 800 tons, prices ranging from 3·60 down to 3·50c., closing nominally 3·50@3·55c.

Spelter.—Under the pressure of occasional forced sales, promptly picked up, spelter remains low, being quoted for Common Domestic 4⅝@4½c. Some Glendale, which is a favorite brand of brass-makers, has been placed at 4·95c., and a small lot of Silesian at a higher figure. The outlook for some of the smaller smelters in the Joplin District is not encouraging, the price of ore having been forced as high as $5 per ton.

Antimony remains unchanged.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Nov. 10.		Nov. 12.		Nov. 13.		Nov. 14.		Nov. 15.		Nov. 16.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.													
Amie Con., Co.	.12				.12				.14	.13	.14	.13	4,800
Argenta, Ne.			.20										100
Bar. & Walker, Ut.													
Bassick, Co.			8.50	8 33	9.00	8.75	8.75	8.50					785
Belle Isle, Ne.													
Bodie Cons., Ca.	.45						.40						180
Breece, Co.	.17										.17		2,300
Bulwer, Ca.	.50		.45								.50	.45	545
California, Ne.			.25										100
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Castle Creek	1.20	1.15	1.15	1.10	1.15		1.15		1.10		1.10		1,550
Chrysolite, Co.	1.30	1.25			1.35	1.30	1.35	1.30	1.35		1.35	1.30	3,900
Cons. Va. Ne.	.47		.44	.43	.42		.42	.41	.40	.38	.43	.40	2,450
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.					.26	.25	.26	.25					1,000
Eureka Cons., Ne.											3.90		25
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.			.05										500
Gould & Curry, Ne.													
Grand Prize, Ne.	.50	.47	.43		.42								1,400
Great Eastern, Dk.													
Green Mountain, Ca.	.85				.85		.86		.92		1.00		1,800
Hale & Norcross, Ne.							1 60						100
Hall-Anderson, N. S													
Hibernia, Co.													
Homestake, Dk.	10.00						8.75	8.00	8.25				825
Horn-Silver, Ut.	6.50	5 50	6.00	5.88	6.75	6.25	6.75	6.50	6.63	6.50	6.38	6.00	5,365
Hukill, Co.													
Independence, Ne.													
Iron Silver, Co.	2.90		2.90		2.90		2.75		2.60	2.25	2.60	2.35	6,200
La Plata, Co.													
Leadville C., Co.			.46						.49				200
Little Chief, Co.	.55		.56	.55	.55						.55		1,810
Little Pittsburg, Co.			.55		.50				.57	.55			620
Martin White, Ne.	.40												100
Moose, Co.													
Navajo, Ne.													
Northern Belle, Ne.					4.00								200
North Belle Isle, Ne.													
Ontario, Ut.													
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.					32.00								100
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.45		.45	.44	.44	.43	.42	.39	.40				5,200
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.							.98	.97	.98	.94			600
Sierra Nevada, Ne.							3.50	3.15					220
Silver King, Ar.					7.00				7.00				330
Spring Valley, Ca.													
Standard, Ca.			6.25		6.38								60
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Nov. 10.		Nov. 12.		Nov. 13.		Nov. 14.		Nov. 15.		Nov. 16.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion													
Alta-Montana													
Barcelona, G.	.23		.23	.21	.23		.22		.22		.23	.22	11,500
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'cher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.													
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., B. H., G.					.30		.25						600
Central Ariz'na, S.													
Cherokee, G.													
Chollar													
Climax, Co.											.06		100
Cons. Impr'v'l, G. S.													
Cons. Pacific													
Crowell, G.													
Dahlonega, G.													
Decatur	.04		.04		.04		.05		.05		.05		21,400
Dunderberg													
Durango, G.													
Eastern Oregon			.42		.42						.43	.42	6,200
Elko Cons.			.18		.18		.19	.18	.19		.19		5,000
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	.97	.90	.97	.96	.98	.96	.98		.98		.98		5,600
Hortense, S.													
Imperial													
Lacrosse, G.	.09	.08			.10		.10				.12	.09	4,600
Lucerne													
Mariposa Pref., G.													
" Com., G													
Mexican, G. S.									2.50				100
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, S. L.													
Orl'nt'l & Miller, S.													
Parnell													
Quartz Creek													
Rappahannock, G.	.08												100
Red Elephant, S.											.06		200
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con	.26	.25			.24	.22	.26	23	.26	.25	.27	.26	21,800
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel									.15		.15		1,400
Taylor-Plumas													
Unadilla, S.													
Union Cons., G. S.											3.85		100

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 42,865. Non-dividend shares sold, 78,700.

BOSTON MINING STOCKS.

	Nov. 9.		Nov. 10.		Nov. 12.		Nov. 13.		Nov. 14.		Nov. 15.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Amie													
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.					1.50		1.58¼	1.50					350
Bowman Sil	.11	.10	.11		.11	.10	.11		.11		.12	.11	21,200
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	240				240		240		239		238		22
Catalpa	.30				.30		.30		.30		.31	.30	1,459
Co. Virginia	.48						.45						300
Copper F'lls													
Crescent			.10				.08						300
"Cusi"											1.38		100
Decatur													
Deer Isle									.06				200
Denver City													
Douglas									.25				200
Duncan													
Dunkin													1,200
Elko Con							.26		.28	.26	.19		200
Empire	.24		.25						.23				350
Franklin	11.50				11.50						11.63		200
Gila County							.10		.09		.08		3,000
Hancock G.													
Harshaw									.50		.50		400
Horn-Silver					6.00		6.00						200
Huron													
Independ'ce													
Indian Qeen													
Mammoth					.02		.02				.02		4,000
Mass. & N.M.			.03										2,500
Milton													
Napa													
National													
Ontario													
Osceola							18.50						5
Penn-Breck													
Pewabic	3.25	3.00			3.50	3.25	3.50	3.25			3.75		495
Pine Tree													
Plymouth					.12								300
Quincy	52.00		52.00						52.00				89
Ridge													
Robinson											.40		200
San Pedro							.45		.15	.12½	.15		300
S'ra Grande													
Silver Islet													
Silver King													
Simpson Gd													
Sonora Con	.26										.26		400
South Pacl.													
Standard													
Sullivan	.95	.92½	.95		.95	.93	.92		1.00	.95	.93¾		2,238
Sutro Tun.	.16		.16		.16								600
Sycamore													
Twin Lead													
Vizina													

PHILADELPHIA MINING STOCKS.

	Nov. 9.		Nov. 10.		Nov. 12.		Nov. 13.		Nov. 14.		Nov. 15.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.22		.23	.22	.21		.22	.20					3,900
Arizona So.													
Battle Mt.					.02		.02						4,000
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.10		.10										7,000
Comprom'e.													
Contention													
Con. Virg.													
Dauntless													
Del Monte													
Denver City	.17		.18				.16	.15			.16	.14	10,400
Eureka													
Girard													
Governor	.03												1,000
Grand Uni'n													
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Gulch	.04	.03	.03		.03								11,000
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud													
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan													
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck													
Pennanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis													
Rara Avis E.													
Record													
Rico Pion'r													
Sierra Apac.	.23		.24										1,200
Sierra Be.la.	.65						.63¾	.60			.62½	.60	3,300
Sierra G'nde	.95		.97½	.95	.97½		.95	.92½			.92½		2,900
Sierra Nev.													
Silver Cord											1.20		200
Silver Klug													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.													
Tombstone	.82½										.80		1,000
Victor													
Yale Mt.													

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IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 16.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has the following returns:

130 furnaces, all kinds; 75 in blast, 55 out of blast.

All grades.	Stocks. Oct. 1.	Stocks. Nov. 1.	Production. In Sept.	Production. In Oct.
Anthracite—25 in; 19 out	28,979	28,550	17,862	18,877
Bituminous—21 in; 21 out	31,461	31,927	19,967	26,538
Charcoal—28 in; 16 out	27,477	27,739	11,595	12,349
Grand total	87,917	88,216	49,424	57,764

American Pig.—The slight indications of an improvement noted in our last have been confirmed during the present week, although they have not gathered to any extent in strength. The fact remains that, on the whole, the season has been far behind the expectations of furnace-men. As indicating to what the long-continued policy on the part of consumers, of purchasing only from hand to mouth, has led, it may be stated that very prompt delivery is, in the majority of cases, insisted upon. This proves that the stock is almost entirely held by producers, and therefore will appear to be larger than the facts in the case really warrant. Transactions have been on a fair scale at unchanged prices, which we quote: Foundry No. 1, $20@$22.50; No. 2, $19@$20; and Gray Forge, $17.50@$18.50, all at tide-water. Bessemer pig is dull at $20@$20.50, and Spiegel is quiet at $30.50@31 for 20 per cent.

At the Exchange, the following transactions were reported during the week:

Saturday, 200 tons, January, $20; 200 tons, February, $20.12½. Thursday, 100 tons, January, $20.25; and to-day 100 tons, December, $20.25, and 200 tons, January, $20.50.

Scotch Pig.—The market is dull and depressed, and, in spite of the fact that arrivals are moderate, some of the iron goes into store.

We quote ex ship and to arrive: Coltness, $23; Langloan, $23@$23.25; Summerlee, $22.50@$23; Eglinton, $20@$21; Glengarnock, $21.75@$22; Dalmellington, $20@$21.

At the Exchange, the following cable quotations were received to-day: Coltness, 55s. 3d.; Langloan, 55s.; Summerlee, 54s. 6d.; Gartsherrie, 52s. 9d.; Glengarnock, at Ardrossan, 53s.; and Eglinton, at Ardrossan, 46s. 6d. Warrants at the Exchange to-day were 44s. 7d.

Rails.—It is reported that the aggregate of the sales East and West during the past week has been 140,000 tons, at $35 at Eastern mill and $37 laid down at Chicago. We have reason to believe that all but a small part of this total, 15,000 to 20,000 tons at the utmost, must be Western, because Eastern mills have taken few orders. The report has been circulated, but is positively denied, that one Eastern mill has sold rails at $34 at mill. We are in a position to state emphatically that such is not the case. An amusing item has been started in its rounds, and will probably during the next few weeks turn up with that obstinacy which absurd statements have, in which some misguided reporter has been led to compare the difference in the cost of fuel to the Edgar Thomson, the Lackawanna, and one Western mill. In a neat little table he shows what coke costs at the oven, and what the freight of that fuel is to the different works mentioned. It is unfortunate for him that the Lackawanna Company does not use coke in its blast-furnaces, except very rarely, under special circumstances.

Old Rails.—There has been a little more activity. We quote Tees $20.75@$21 for large lots.

Philadelphia. November 16.

Pig-Iron.—The past six days have developed an improving tendency in some kinds and qualities of forge iron, and at present writing there are a number of inquiries for large lots on hand, which makers and brokers think will result in heavy orders for delivery during the next sixty or ninety days. But these sales will depend upon the acceptance of lower prices than are at present named. In some cases, a difference of 25 or 50 cents per ton holds back large orders. Consumers seem to have realized the fact that the market has at last reached the lowest limits, and are prepared to buy, if their offers are accepted. Generally speaking, the better grades of iron are under inquiry, the poorer makes having been neglected for a few days, notwithstanding the fact that large lots have been offered at very low prices. Parties who were offering large lots of mill irons ten days ago at concessions are now asking 25 cents more, and expect to get it. Selling prices range from $17@$19; very little desirable iron has sold this week under $18, and several good-sized lots have sold a little above this figure. Between 20,000 and 30,000 tons will sell this week for delivery in from sixty to ninety days, if offers are accepted. Foundry irons do not enjoy any activity deserving of attention, and several large lots have been offered this week as low as $20 and $20.50. The strong companies are still holding at $21, but are ready to make terms when buyers talk business. There seems to be no urgent demand for foundry, although yards are very slack of material.

Muck Bars.—Sales aggregating from 700 to 800 tons of Muck Bars have been made at $33.25@$34. Some stocks are held at $34.50, and command that in small lots where good quality is essential.

Blooms.—To-day's quotations show a little improvement in some makes, prices for these being from 25 to 50 cents higher than last week, but there is no general improvement. A number of lots of anthracite irons were sold at $47@$48, and there are offers in hand at $46.50.

Manufactured Iron.—The situation in merchant bar is still unsatisfactory, as it has been reported for a number of weeks past. Agents of Western makers have been traveling through the East, hunting out large buyers, and endeavoring to overcome some of the obstacles which have prevented the placing of large orders in the West, namely, the trouble as to assortments and guarantee as to quality. The mills have a number of inquiries in hand, which will probably result in business at about 2c. In some cases, iron has sold from Western mills at 1·90c. delivered. Prices are generally downward, and only in cases where extreme concessions are offered, can large lots be bought. City mills sell at 2@2·10c., and stores report a retail business at 2·10@2·20c. Common iron in country mills has been ordered more freely for car-work. One establishment at Berwick, Pa., has received a contract for 1000 freight-cars. Contracts for 1000 coal-cars have also been placed. Other railroad orders, aggregating from 1000 to 1500 cars, have been placed in this State inside of thirty days. These order will bring common iron into request, but there is no difficulty in obtaining it at 1·75@1·80c.

Nails.—Consumers of nails have taken the hint, and are buying only for current requirements. The action of the Western makers on Wednesday was anticipated here, and demand is irregular, and need not be expected to improve much during the winter, for the double reason that building activity is falling off and buyers expect that the heavy capacity will lead to a depression of prices, in spite of the five weeks' suspension ordered in the West. The East will continue production. Selling prices are $2.80 @ $2.90, and further concessions are looked for.

Plate Iron.—To-day's quotations are 2·35c. for Boat Plate; 2·40@2·50c. for Plate; 3@3·25 for Shell; 4@4·25c. for Flange; and 5@5·25c. for Fire-Box. Brokers have received several inquiries for large lots of Plate, and it is probable that business will be steady up to the end of the year.

Structural Iron.—Several orders have been received during the past week, one of 450 tons, and several smaller ones. One order for 1100 tons for delivery in Northern Ohio is in abeyance for the present. Engineering work calling for from 12,000 to 15,000 tons is in sight, and orders will probably be placed before the close of the year. Quotations are 2·40c. for Angles; 2·75@3c. for Tees; and 3·50c. for Beams and Channels, with concessions on large lots.

Steel Rails.—The sudden drop in steel rails to $35, instead of increasing business, has had a contrary effect. The reason seems to be that a general reduction in wages is anticipated on the first of January, to what extent is not yet known, and railroad builders are not willing to order for winter or spring delivery until this is decided. No heavy business will be placed this year. A number of small orders are coming along, and are taken at $36@$37, and a good many are offered at $35, but are not taken.

Old Rails.—Brokers here have more than usual inquiry for old rails, foreign and domestic, but have had but little success in meeting buyers' requirements. There are no stocks, and buyers' offers are below asking prices. Nominal quotations are $23@$23.50 for Foreign; $24 for American; and $25 for Double Heads.

Scrap.—Scrap-iron is in dull demand at $24@$25 for Selected. Cargo, nominal at $22.50. Steel Rail Crop-Ends, $23.50 offered.

Pittsburg. November 16.

The fact that pig-iron stocks have been gradually declining led this week to a number of inquiries for large lots of forge iron and the closing of some large contracts for delivery during December. Business will probably continue of a hand-to-mouth character with most buyers. A few, however, will risk large purchases, especially as the concessions offered are from 25 to 50 cents per ton more than those offered two weeks ago. Gray Forge is $17@$17.50. Charcoal irons, $24 for Warm Blast and $27@$28 for Cold Blast. Bituminous irons, $17 for Gray Forge to $17.50 and $20@$21 for Bessemer. The heavy orders referred to were placed at $17. Muck Bars are weak at $32.50. Merchant Bar ranges from 1·75@1·90c. Prices are very unsatisfactory, but nothing better can be done, and makers are running along in the hope of a better state of things before long. The season for the pipe mills is nearly over, and inquiry is declining. Discounts, 70 to 75 per cent. Nails are in moderate demand at $2.60@$2.70. Sales of steel rails have been made this week at $36.50 in small lots. Old rails are quoted at $23.50@$24 for American. Holders are refusing to sell at less.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 16.

The recent cold weather has caused a little more inquiry, and to that extent the market is in better shape. It does good rather in a negative than in a positive way, by preventing further additions to the considerable quality of coal afloat and causing some reduction in it. On the whole, the market continues dull, and the managers of the coal companies are probably looking with a sigh of relief to the approach of the first of December, which will terminate the period of forbearance wisely exercised in behalf of one of their number which is making so gallant a fight for a return to prosperity. Prices remain practically where they were, with occasional concessions of sizes that may for a short time be particularly pressing upon one or the other producer. Even from Philadelphia, usually too confident, come tales of "shading."

Bituminous.

The temporary scarcity of cars has forced some of the Clearfield operators to enter the market. They have purchased Cumberland coal at current rates, but are now fully supplied. The steamer trade is slightly better, but otherwise the demand from other quarters is disappointing for this season of the year.

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In Nervous Diseases.
Dr. HENRY, New York, says: "In nervous diseases, I know of no preparation to equal it."

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ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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WE print elsewhere the conclusion of our abstract of M. E. CUMENGE'S report on the Rio Tinto mine, which we believe leaves no doubt as to the future of that great enterprise. It is destined to play an increasingly important part in the copper trade of the world. The preparations for an increase in the output are on a magnificent scale, and the improvements introduced in the metallurgical treatment of the ores dispel all hope that in the long run any falling off in the world's supplies of copper, from the residues of burning pyrites in acid works, will not be fully compensated by an increased make on the spot, without reference to the revenue derived from the sulphur.

SCIENCE and the arts have lost in Sir CHARLES WILLIAM SIEMENS, who died suddenly of rupture of the heart, one of their leading workers. Dr. SIEMENS was one of the very few who have been able to make original contributions to science while engaged as leaders of progress in conducting large business enterprises in more than one branch of technology. As an inventor, a metallurgist, an engineer, and an electrician, his achievements are numerous and varied. One of eight sons of a family in moderate circumstances, he was born at Leuthe, Hanover, and after a course of studies at a polytechnic school and a university, he began work at the Stolberg engine-shops in 1842, at the age of nineteen. A year later, he for the first time visited England, which was to become his future home. He brought forward a series of inventions, in some of which he had the co-operation of his brother WERNER, and it was not until 1847 that he turned his attention to the study of the dynamical theory of heat, which ten years later led to the development of the regenerative system of firing with which his name and that of his brother FREDERICK are so closely associated. A little later, he took up the manufacture of iron directly from the ore, a process which has not, however, fulfilled the expectations of himself and his friends. In 1848, he turned his attention to electric and telegraph engineering, in which he was highly successful. England, his adopted country, delighted in showering honors upon him, while his brief sojourn in this country years ago won for him many friends.

IN a recent issue, we printed an interesting letter from Mr. W. W. SCRANTON, President of the Scranton Steel-Works, on the working of the Gjers soaking-pit at that establishment. Mr. JOHN GJERS, of Middlesborough, quotes it in a letter printed in a number of English technical journals, in which he gives some data on the rapid spread of the process in Europe. In Great Britain, the Darlington Steel Company, which was, we believe, among the first to take up the process, has rolled 60,000 tons of ingots into blooms from the pits. The West Cumberland Steel Company, also, has been blooming from the pits, while the Mossbay Iron and Steel Company is getting ready to roll rails directly. The first open-hearth works to adopt the process is the Steel Company of Scotland, which will use it in its plate-mill. On the continent, the Société Cockerill is blooming 96 per cent of its make from the pits; while in France, the DE WENDELS are preparing for its introduction. In Austria, at the works of which M. KUPELWIESER, the well-known metallurgist, has charge, soft steel ingots for plates have been put through the pits to be rolled into slabs without heating, and a new rail-mill now building is also equipped with a pit plant. An interesting statement is made by M. GREINER, who, as the result of experiments made, has found that the waste in rolling from ingot to bloom is reduced to one half of one per cent, while in rolling directly to the rail it is only one per cent, a gain in the latter case of at least two per cent. That the advantages of the soaking-pit are becoming appreciated in this country may be gathered from the fact that the Cambria and the Edgar Thomson works are about to introduce it. It may be stated that Mr. GJERS, with the object of preventing the cooling of the top of the ingots, has designed a cover, and that he has undertaken improvements the object of which is to facilitate repairs.

LEAD has dropped down to 3·70 cents per pound, under fairly large sales. An encouraging feature is the appearance of the first evidences of a speculative support of the metal, but otherwise the general feeling in this the leading market of the country is one of discouragement. The most enthusiastic, a small number in any case, do not look forward to an early improvement, but limit their hopes to maintenance of current rates. The mines have now to choose between two alternatives, either to close down or to make some effort to reduce the cost of delivery of lead to the markets of the country. The former course is one which few will care to adopt, unless special circumstances, like the fight between the Silver Cord at Leadville and the smelters, prove an inducement. An idle mine costs money, and very few of them are in a position to make immediate outlays with the hope of future compensation from higher prices. Most of the mines will therefore probably go on producing as long as they can make both ends meet, or can raise money. Their principal relief, in the mean time, must therefore come from some other quarter. They have a right to demand, and will probably urge, that others who have in the past largely profited from the industry in which they represent first hands shall also bear their share of the burden. The smelters, we know, have been sailing as close to the wind as is possible. Where the prospect of cheapening lies is in the railroad rates, which, as we have already stated, appear to show much that is mysterious. We can see no sound reason why a mining company, when it ships ore from Leadville to Denver, should pay $5 per ton, while if a smelter ships it, it should be little more than one half of that amount. The nominal rates from Leadville to Pueblo or Denver are $12 per ton for bullion, and $10 from Denver to Kansas City; but how much cutting there is under these figures it is difficult to get at, and yet the profit must be great when compared with the rate from Kansas City to St. Louis, which is only $2.80 per ton. Nobody will demand that the railroads haul base bullion for bare cost or even less, but the impression is general that they might accept much lower rates than those rumored to be paid by "insiders." If the refiners gave the benefit of the reduction to the smelters, and they in turn were to ease up on smelting charges, the miners could meet current prices of lead.

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IT is satisfactory to note that a ray of hope has been cast upon at least one important industry, the pig-iron manufacture, by the elaborate statistics just published by Mr. JAMES M. SWANK, Secretary of the American Iron and Steel Association. The following table will show at a glance to what an extent production has accommodated itself to the great shrinkage in current demand, and it is only necessary to add that of all branches of the iron trade the blast-furnaces are the slowest to so adapt themselves. It costs a good deal of money to blow out a furnace and blow it in again, and the temptation to keep on working is increased by the fact that pig-iron, more than any other product, is a staple article, there being no consideration as to assortment, etc. A rolling-mill can be shut down in a day and be started at short notice, and can not so easily pile up stock.

CONDITION OF THE BLAST-FURNACES.

Kind of fuel.	In blast Jan. 1.	In blast July 1.	In blast Nov. 1.	Going in Nov.	Going out Nov.	Out of blast Nov. 1.
Anthracite	161	125	117	3	3	104
Charcoal	129	98	98	7	6	144
Bituminous	127	111	116	9	6	107
Total	417	334	331	19	15	355

The great decrease is in the anthracite furnaces, of which 44 have blown out since the beginning of the year. The furnaces using bituminous coal or coke as a fuel have decreased in the number working very slightly, only eight, taking into account those noted as preparing to blow in this month. The decrease with them will, we presume, become more marked when some of the rail-mills still running on orders stop.

The same state of affairs is reported, fortunately, by the quantity of stock, and the showing is more satisfactory now than it was a few months ago, when it was found that the stocks had increased from 383,655 tons on January 1st to 528,590 tons on July 1st. Since then, the figures have changed as follows:

STOCKS OF PIG-IRON IN MAKERS' AND AGENTS' HANDS—GROSS TONS.

	July 1.	Nov. 1.
Bituminous	196,099	128,830
Anthracite	186,735	159,521
Charcoal	145,756	145,003
	528,590	432,354

When it is considered that consumers have run down their supplies notoriously low during the long period of hand-to-mouth buying, it will be conceded that the trade is getting down to "bed-rock." It would be idle to deny that there is not much prospect of a sustained improvement during the winter months, which are generally dull; but there is every assurance that the business is now in a very sound position statistically, and that the first signs of returning activity may witness a reaction which, under the conditions, is likely to be rapid and well sustained.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Mill Statistics.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: It is encouraging to find in the last number of the JOURNAL (p. 309) a plea by Mr. Stetefeldt for more complete and accurate statistics of metallurgical work, especially in our mills for extracting the precious metals. That there is room for great improvement there can be no question, but we can scarcely expect perfect work in a perfect system within the bounds of the cost which mining and milling companies are willing to assume. The excellence of such work must long continue to be relative and not absolute in most of our mills; for very few companies are willing to pay expert chemists and assayers, and to sustain a proper laboratory in which accurate work can be executed. The results obtained by the assays and tests are generally approximations, and must be so received.

Mr. Stetefeldt's criticism of my commendation of the statistical tables of the Alice mill in 1881 is just to a certain extent. To me, the statistics were worthy of commendation because so much more full and complete than we usually find. Mr. Stetefeldt looks for the defects, which unquestionably exist; but the *effort* of the management was in the right direction.

In regard to the fact that the product was greater than the assays indicated, and my suggestion in explanation of it, it should be said here that the last paragraph of the sentence quoted from my report contains a typographical error; the word "experienced" should be "explained," and the sentence should read, "*It is not yet clearly explained, but is a well-ascertained fact, that the product overruns the assays.*" Experienced is the wrong word. The fault most likely lay in taking the samples; the full quantity not being represented in the assays. W. P. BLAKE.

NEW HAVEN, CONN., Nov. 22.

A Request for Specimens of Construction Material for Compression Tests

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: For some years past, I have been making investigations on metals and alloys of all kinds, and have arrived at a point where I am very anxious to secure specimens for the purpose of studying the effects of compression. Will you be good enough to announce the fact through your JOURNAL, and ask the manufacturers of metals and alloys of any kind to send me specimens for that purpose? The specimens I wish should be of the following dimensions: For each investigation of compression, two inches in diameter and three inches long, three pieces being required for each examination; two pieces each one inch in diameter and four inches long; and from one to five pounds of the same metal or alloy for each examination. I should like to make at least three examinations, which will make fifteen pieces in all of each metal—nine of the larger size, six of the smaller, and not less than five pounds of the filings. I desire as much material as possible, as the expense of these investigations will be very great, and as I am making them for scientific purposes only, without remuneration of any kind, in the hope of discovering some facts which will be useful to manufacturers. I shall also be very glad to make comparative tests other than compression, and also analyses of the metals and alloys for their actual cost to me, making no charge for my own time and services.

The results I have already obtained are such as lead me to believe that the results of the investigations I am about to make will be of great interest to all persons using metals of any kind for construction.

A few very liberal gentlemen and firms have supplied me with the amount necessary for the investigations on compression; but I have no funds with which to make the comparative tests on tension, and on torsional and transverse strain, and I am therefore willing to make them for their actual cost to me, and request your kind interest in making my purpose known to your readers and asking their assistance. Yours truly,

NEW YORK, Nov. 16. THOMAS EGLESTON

Is Alumina an Acid or a Base in Singulo-Silicates?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I was much interested in a few suggestions made by Mr. Henry M. Howe in the JOURNAL of November 17th, and from having been professionally associated with him in metallurgical work, realize that any statements made by him are entitled to respect. But I desire merely to say a few words in confirmation of a suggestion that he throws out, and that my own experience substantiates to a considerable extent, although the question of exactly what *rôle* alumina plays in the formation of slags is far too deep and complicated to be definitely settled by any single series of observations.

During the years 1872 and 1873, I was engaged in smelting the ores of Mount Lincoln (Colorado) and vicinity in a blast-furnace. They were largely composed of massive heavy-spar, with some lime and silica, though with too much lead and copper to answer for amalgamation, while, on the other hand, the overwhelming percentage of baryta and lime, and the almost total lack of iron, made their smelting, with the poor charcoal at our command, a matter of the greatest difficulty. They were smelted into a copper matte, running some 700 ounces in silver and 25 per cent copper, and as, owing to the high percentage of heavy-spar, the matte often fell below this grade, it was frequently found necessary to calcine and resmelt it with pure siliceous ores, to bring it up to the proper grade for shipment, or for home treatment, by a modification of Patera's method, which I carried out toward the last, and while the Moose mine was in its glory. These brief explanations being necessary to show the quality of ore we had to deal with, I will come to the point suggested by Mr. Howe. He asks, "May it not be that, in calcareous singulo-silicates low in iron, alumina acts as an acid, while in ferruginous ones low in lime, it acts as a base?" My experience confirms this entire suggestion, as will be seen. I have assumed that baryta may be regarded as replacing lime to a great extent, and without going into accurate figures, my old smelting records not being at hand, I can distinctly affirm that, when producing a slag high in lime (and baryta) and low in iron, with only about 24 per cent of silica, an addition of a highly aluminous ore, carrying very little silica, produced almost the same effect as the addition of an equivalent amount of nearly pure quartz. This was first discovered by one of those fortunate accidents that often do more toward rendering a doubtful enterprise successful than the most carefully laid plans. For some weeks, we had been running with the very basic slag mentioned above, which gave us a great deal of trouble, being so pasty that it only flowed with difficulty, and constantly carried out grains of matte, requiring to be resmelted in considerable proportions. I could easily remedy it by the addition of silica, but having no siliceous ores at my disposal, excepting some that carried a large amount of heavy-spar, I found it unprofitable to add a sufficient amount of barren quartz to obtain such a slag as I desired. In this dilemma, I purchased a few tons of ore of a very peculiar nature from Buckskin Gulch. Analysis showed it to consist largely of alumina, with some silica, of course, and it carried about 90 ounces of silver to the ton as sulphide of silver, scattered through it in little specks and nodules. I regarded it as an ore only fit for amalgamation, and yet apprehended considerable difficulty even by that method, owing to its clayey nature. Yielding to the solicitations of my head smelter, as ignorant a man as ever lived, though a good smelter, and who fancied the ore would make a good flux because he had once used some clay iron ore that looked like it, we began its use cautiously, and with the most excellent results. Not to make too long a story of it, I will merely add that we contracted for a large quantity of the ore, and soon came to regard it as our stand-by for all ores carrying too high a percentage of lime and baryta. So much for alumina as an acid in slags high in lime and low in iron.

As time went on, several gold mines were opened in Montgomery, Mosquito, and the neighboring districts; and instead of being short of siliceous material, we were crowded with it, as these gold ores were mostly surface quartz, from which all the pyrites had long since disappeared, and though well stained with iron oxide, carried over 90 per cent of silica. They would have been best treated in a stamp-mill, but there being none running in the district at that time, there was no market for them except at the smelting-works, and as we could purchase them pretty much at our own price, and many of them contained from two to four ounces of gold per ton, we soon were overstocked with them. It so happened that, at the end of our autumn campaign, I had smelted up all our stock of Moose and other heavy-spar ores, and had on hand merely a quantity of the siliceous gold ores, and a lot of calcined matte, with which I proposed to smelt through as much of these gold ores as possible. On calculating out my slag, I despaired of nearly finishing up my gold ores; but my smelting foreman, having a natural desire to see every

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thing cleaned up neatly, and recognizing the impossibility of fluxing the large pile of quartz with our little remnant of calcined matte, reasoned that our clay ore, of which we could always obtain a sufficiency at short notice (though much lower grade than I at first described), being such an admirable flux at one time, ought to be equally good under all circumstances; and taking advantage of my absence and the temporary delegation of my authority to him, proceeded to carry out this exceedingly simple and ingenious theory, and curiously enough, with such satisfactory results that a large heap of almost pure quartz was smelted with the addition of a very little iron, and a considerable proportion of alumina, the slag being perfectly clean, but more like glass than any blast-furnace slag that I ever saw before or since. I think this gives us a right to speak of alumina as a decided base. I fully recognize the impropriety of attaching any weight to such a very rambling statement, unsupported by analyses or exact figures. But both analyses and exact figures were made at the time, and are now among my possessions, and I merely have stated the very strong impression made on my mind by my investigations at that time.

I need hardly say that my smelting foreman regarded the laboratory work with the utmost contempt, and considered (and very justly, as it happened this time) that he could judge by eye what flux was needed better than the "boss" could with all his laboratory work, although I fear that, if I had taken up his offer to smelt any thing, even fire-brick, as he insisted he could do in his excitement, if he "only had enough of that Buckskin clay for a flux," he might not have been so uniformly successful.

I trust Mr. Howe may feel gratified at having arrived at the same results by a course of reasoning. EDWARD D. PETERS, JR., M.E.

ANSONIA, CONN., Nov. 1.

Is Alumina an Acid or a Base?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the last number of the JOURNAL, Mr. H. M. Howe asks, "Is alumina an acid or a base in singulo-silicates?" and requests more information on this point.

Perhaps the behavior of the slags obtained in smelting the franklinite residuum for spiegel may be of help. The slag is normally of about the following composition: SiO_2, 34·5 per cent; Al_2O_3, 9·5 per cent; MnO, 12·5 per cent; FeO, 2·5 per cent; CaO, 32 per cent; MgO, 9 per cent; being nearly a singulo-silicate, if the alumina is present as a base. Any increase of either silica or alumina causes the slag to appear and act as if it were more acid and to take up more manganese. In fact, I am more afraid of the effect of an excess of alumina on the grade of the iron than of an excess of silica.

I know of one spiegel furnace using similar residuum where, when a very poor coal was used (I was told it contained 27 per cent ash) the slag contained about 30 per cent of silica and 15 per cent of alumina, and the furnace made gray iron containing about 8 per cent of manganese. On drawing the charge so as to get a slag of about the composition I have given above, it made 15 per cent spiegel. The same effect (lowering the grade) would have been produced if the slag had contained a normal quantity of alumina and an excess of silica.

These slags being made in larger and hotter furnaces than is usual with slags so basic and so high in oxides of the iron group, may aid in forming a more general conclusion than if lead slags only were considered. My own opinion is that, where silica is high and alumina is low, the alumina acts as a base; but where silica is low and alumina is high, it acts as an acid; in other words, the alumina has a tendency to form a slag of about the same acidity, and plays whichever part is necessary to effect this result. Yours truly, GEORGE C. STONE.

NEWARK, N. J., Nov. 19.

O Wise and Just Reporter!

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The following incident will be interesting and a warning to the profession. A few weeks ago, a gentleman called at my office, introducing himself as a reporter for a paper which we will call the *Weekly Scientific Terror*. He stated that he had noticed the issue of a patent granted to me for a new metallurgical process, and wished to publish an account of it in his paper. Would I give him the necessary information? I assured him I would take great pleasure in doing so, and gave him a concise description of my "improved process for treating sulphides, obtained in the lixiviation process with sodium hyposulphite," which he took down by "short-hand." About a week later, a reporter No. 2, from the *Weekly Scientific Terror*, handed to me a voluminous manuscript for "correction." It was headed: "*The Treatment of Ores—A New Patent just taken out by a well-known Mining Engineer.*" The article commenced with a most favorable notice of my professional achievements; noticed "an able paper read before the American Institute of Mining Engineers;" and finally came to the "last patent," to be especially considered. I felt so highly flattered by this kind and unsought-for attention that I actually blushed, and cried out: "O wise and just Reporter!" After giving the "claims" of the specification, the article ended as follows, namely: "Mr. Stetefeldt said yesterday to a reporter for this paper, in an interview at his office, that the lixiviation process was coming into general favor in place of amalgamation, and is now in use in important mills in Nevada and elsewhere. The old method was to roast the ores in a reverberatory furnace, and then to melt the orders and material" [this stands for "roasted material," I suppose] "in a crucible with scrap-iron, to obtain bullion together with a certain amount of matte containing copper and silver. There is a considerable loss in drying sulphides—sometimes as much as four per cent—whereas, by the lixiviation process, the sulphides do not need to be dried and roasted, and there is no chemical loss, but refined bullion is produced, and without any copper matte."

After reading this, I felt stunned. Did I say all this to you, O wise and just Reporter? I felt as if I was a sulphide after losing 4 per cent of silver by drying; indeed, I felt as if I had gone through the whole lixiviation process, and been turned out as copper matte. Reporter No. 2 then said: "Of course, you wish to have a few hundred copies (at 12 cents per copy) of the *Weekly Scientific Terror* with this article for distribution!" A quick calculation how many "Havanas" and how much "Liebotschaner" this would represent brought me back to my senses. I made some very unkind remarks about the scientific ability of the editorial staff of the *Weekly Scientific Terror*, and vehemently protested against taking several hundred copies of their valuable paper. Reporter No. 2 finally proposed that I should write an article myself, but not "too good;" otherwise, the readers of the paper would suspect that it had been written by the inventor himself. "Can you do it in a week?" "In half an hour," I said. "Well, then, I shall call for it on Friday morning." Friday morning came, but Reporter No. 2 did not! I am afraid I have hurt the feelings of the *Weekly Scientific Terror*.

NEW YORK, Nov. 19. C. A. STETEFELDT.

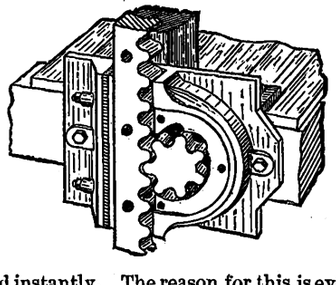
[Referring to the above, we may state that, during the past few months, four similar cases, all the doing of the *Scientific T.*, have come under our notice in this city and in Philadelphia. In one instance, the only one in which the operations of the schemers were successful—the victim being a manufacturer of straw goods, if we remember correctly—a gentleman came to ask our advice. In the rush of business, he had listened to the reporter of the *Scientific T.*, and had signed an order for a few hundred copies, without, as it occurred to him later, making any inquiry as to the cost per copy. He feared that an exorbitant charge might be made, and went off relieved after having received assurances of the doubtful legality of such a course. We need hardly add that, as a new venture in journalism, the *Scientific T.* does not deserve encouragement.—EDITOR ENGINEERING AND MINING JOURNAL.]

METALLURGY AND ENGINEERING AT THE BOSTON EXHIBITION.

Special Correspondence of the Engineering and Mining Journal.

(*Continued from page* 309.)

Canfield's Safety-Stop.—This simple and apparently very effective little stop shown in the cut, though designed for ordinary elevators, seems quite applicable, with certain modifications, to mine shafts. It consists of three parts: A stout rack strongly bolted to the guide-timbers, and having short but thick and wide teeth; a small but strong cast-iron guide-box, with a recess which is toothed on its upper side; and a pinion, wholly unpivoted and playing freely in the recess in the guide-box, and gearing into the teeth of the rack. These parts are shown in the accompanying cut, in which, however, the teeth on the upper side of the recess of the guide-box do not stand out very clearly. As the elevator rises and falls, the little pinion plays loosely in the recess, its teeth gearing into those of the rack, and barely avoiding contact with those of the guide-box, its own weight keeping it always against the bottom of the recess. But if the downward speed of the cage is rapidly increased, the little pinion becomes jammed between the teeth of the rack and those of the upper side of the recess, and the



cage is thus stopped instantly. The reason for this is evident. The pinion does not fall freely, its descent being retarded or hampered by its playing in the teeth of the rack; this retards its descent so much that any considerable increase in the downward speed of the elevator causes the guide-box to overtake the pinion, so that the latter now comes in contact with the upper and toothed sides of the recess. An advantage of this is, that it is apparently instantaneous. I carefully watched its action when the elevator rope was suddenly detached, and the car appeared to stop before it had fallen an inch and a half. Of course, much less strain is caused by stopping a car before it has fallen an inch than by stopping it after it has acquired momentum in falling a considerable distance. To prevent the stoppage being so sudden as to seriously strain the cage, rubber plates are introduced in the guide-box itself, and between the cage timbers and the flange of the guide-box which supports them.

One objection to the stop occurs to me. Its sudden action depends on there being but a small amount of play between the pinion and the inclosing recess. Now, in the years which might elapse before the breaking of a rope, and in which all care and concern for the safety-catch might have vanished, the teeth of the pinion might have become considerably shortened by their constant sliding friction against the bottom of the guide-box, which would itself be worn away by the same cause. This wearing away of these parts would destroy their adjustment, on the accuracy of which the rapidity of action of the catch seems largely to depend. Mr. Canfield states that he has tested this point, and it appears that the teeth wear into such a shape that they jam and stop the cage while they are still long enough to act promptly in case of breakage of the rope. Of course, these heavy iron racks would be too costly for deep shafts, and I have only described this stop because it occurs to me that it might be easily modified to suit wooden guides. If the pinion had sharp saw-teeth, and if the upper side of the recess which contains it were lined with wood or rubber, it should jam between this lining and the wooden guide on a sudden increase of the rate of descent of the cage, just as the present pinion does between the racks and the recess. It would cost but little to put two or even four such stops on each side of a cage in addition to any other safety-stop desired, which they would thus reinforce. They would be an anchor to leeward.

Emery-Wheel Flanges.—On account of the many and fatal accidents to metal workers from the bursting of emery wheels, Ware's anti-bursting flanges deserve attention. We are told that the number of persons thus injured averages as high as from eight to ten per annum, of whom nearly

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fifty per cent are killed. To diminish the dangers from this source, Ware's emery-wheel flanges are made very broad, nearly as broad as the wheel they hold, and are studded over on their insides, that is, on the sides which come in contact with the emery-wheel itself, with rubber buttons, set very tightly into little recesses in the flanges, and projecting perhaps an eighth of an inch from their surface. These buttons grasp the emery-wheel very firmly when the flanges are screwed together tightly, so that when a wheel bursts the fragments can not fly out, being held in place by the rubber buttons. In some cases where wheels with these flanges have broken, the fracture has not been discovered until the wheel was stopped at the end of the shift. The Union Stone Company, which exhibits these safety-flanges, has also a swing-frame grinding and polishing machine, which consists in a swiftly-revolving emery-wheel suspended and freely swinging, its hight and position being readily and easily adjustable. It is especially designed for grinding large castings, etc., which it would be difficult or inconvenient to grind with the ordinary stationary wheels. It is hung from above with a jointed frame, and is swiftly revolved by an endless rope, whose stretch is compensated for by simple mechanism.

This company's surface-grinding machine also deserves attention. It is practically a small planer or milling-machine, in which the cutting is done by an emery-wheel instead of in the ordinary way. The piece to be operated on is fastened to a table, by jaws, etc., and the table travels back and forth beneath the emery-wheel, just as the bed of an ordinary planer does. This device might advantageously replace the planer and milling-machine in working exceedingly hard substances, such as the surfaces of dies and punches.

Messrs. Hill, Clarke & Co., of Boston, have an interesting display of *Iron-Working Machines*. Among those with features at once novel and interesting may be mentioned their large Brainerd milling-machines and their fine hollow spindle lathes, made by Flather & Co., of Nashua. These milling machines run from 9 to 84 inches, the latter size weighing only 7000 pounds. The large sizes are advantageously replacing planing-machines for some important classes of work. The Flather lathes, in addition to the hollow spindle, whose advantages are too well known to need description here, are fitted with most excellent turrets, which enormously increase the output of work. On some classes of work, for example, on bolts, etc., of different diameters in different parts of their length, five times as much work can be done in a given time with these turrets as with a lathe unprovided with them; and once set by a competent machinist, they can be run by a boy on work which would require the constant attention of a man if done in the ordinary way on a lathe.

The same firm displays the *Cummer Engine*, which I will pass over briefly, as it has already been fully described in your pages. It is an automatic cut-off engine, with a positive cut-off motion similar to that of the well-known Buckeye engine, as opposed to the releasing cut-off class like the Corliss. In the Buckeye, the governor consists of two weights revolving around the main shaft in a vertical plane. As the centrifugal force throws these weights outward, they draw with them the cut-off eccentric, altering its lead, so that the steam is cut off earlier in the stroke. In the Buckeye engine, the centrifugal tendency of these weights is resisted by a pair of springs. In the Cummer engine, it is resisted by a single spring assisted by a heavy stationary counterpoise, which is connected with the governing revolving weights by an arrangement of bell-cranks. By lessening the tension of the springs in the Buckeye governor, and by lightening the counterpoise in the Cummer engine, we diminish the centripetal force; that is, the resistance which is offered to the centrifugal tendency of the revolving weights for a given radius of gyration; so that at a given speed of revolution they will fly out farther from their shaft, and thus increase the lead of the cut-off eccentric, causing the steam to be cut off earlier and reducing the speed of the engine. That is to say, the speed at which the engine will run depends, in the Buckeye, on the adjustable tension of the governing springs—in the Cummer, on the adjustable weight of a counterpoise. While both are excellent engines in design as well as in workmanship, the Cummer seems to offer a slight advantage for certain classes of work in having the counterpoise which determines the speed of the engine accessible while it is running, so that the speed can be altered to any desired extent while it is in motion, even if at full speed; while in the Buckeye it is necessary to stop the engine in order to get at the springs whose tension controls its speed.

The *Westinghouse Engine*, which is also exhibited, has several features that especially commend it for mining purposes. The engine is a single-acting, double-cylinder, vertical one, all the moving parts being contained in a closed case, partly filled with oil, into which the cranks dip at each revolution, oiling themselves automatically. The cut-off is fixed, hence it is not adapted to work where the load varies considerably and where a high degree of efficiency is needed. While, therefore, it can not compete in efficiency with automatic cut-off engines, it is far more economical than the plain slide-valve engine, since it cuts off very much earlier than the latter can be made to do. For remote places, its lightness, compactness, simplicity, freedom from repairs, and the small amount of skill and care needed to run it properly, combined with its cheapness and very good efficiency, render it attractive. It is much lighter than most other engines per horse-power, and probably far lighter per horse-power than any engine which can compare with it in efficiency. It is extremely compact. There are only about one fourth as many points where wear can take place as in ordinary engines, and it is so designed that its good performance is quite independent of wear, since all wear or lost motion is taken up automatically. The wearing parts are not adjustable, and are not touched till worn out. There are no oil-cups, not a packed joint or a stuffing-box of any kind; not a brass that can be keyed up; it is so self-contained that it is independent of alignment. These features render it possible and, in many cases, advisable for economy's sake to employ unskilled men to run it. Its cost is from 20 to 40 per cent below that of the best automatic cut-off engines, and the makers are prepared to guarantee that these engines when of 100 horse-power or upward will run with three pounds of coal per indicated horse-power per hour—which is not so far below the guarantee of the most economical non-compounding engines. Its makers claim, apparently justly, that the consumption of oil is much less than in other engines. While the valves and pistons are lubricated by an ordinary oil-pump, the cranks and cylinders are automatically lubricated by the splashing of the oil in the internal crank-case, and there are no cross-heads or slides to oil. Its freedom from repairs is well illustrated by its having run in some cases eight months continuously without a stoppage, and without any adjustment whatsoever, not a key or a nut being touched.

The *Porter-Allen Engine* is also exhibited, running under a heavy load at 766 foot piston speed, with apparently perfect smoothness, not the slightest tremor being observable. The design of this engine is probably preferred by a greater number of the most intelligent engineers than that of any other engine, and, as long as its present very high standard of workmanship is kept up, it should yield the palm to no engine yet designed. It requires, however, the greatest care on the part of its makers and of those in charge of it.

Messrs. Kendall & Roberts, of Cambridgeport, Mass., exhibit a very compact double-cylinder *Mine Hoisting-Engine*, with conical drum, the whole design being excellent. They have here also an automatic cut-off engine which has been much admired.

Glass and Porcelain.—Here we find four exhibits which deserve special mention. The Trenton Pottery Company, Trenton, N. J., has a very creditable display. Ott & Brewer, of the same city, have a really most admirable display of very beautiful Belleek china, so-called from Belleek, in Ireland, where it was first made. It is very fine, and some of it seems as thin, delicate, and beautiful as the celebrated egg-shell china, the exterior designs being very clearly and distinctly visible from the inside of the pieces on holding them up to the light, so thin and transparent is it. The Vasa Murrhina Art Glass Company, of Sandwich, Mass., exhibits very beautiful Venetian glass vases and similar designs, the aventurine and other Venetian effects being charmingly reproduced. It is stated that this industry has only just been started here, employing American workmen almost exclusively. Even leaving out of consideration the drawbacks which necessarily attend the beginning of such an industry, these products deserve admiration. The New England Glass-Works, of East Cambridge, Mass., have a very beautiful display; the most striking feature of it being their amberina glass. This ware is largely made into vases and other long articles, which are of a beautiful ruby color at one end, shading off imperceptibly into a charming delicate amber color at the other, the shading being so gradual that it is as impossible to say where the red ends and the yellow begins as it is in general to point out where a hillside ends and where its valley begins. Although a patent has been taken out for making this beautiful glassware, the method and the chemical principles involved are kept secret. As far as can be gathered, the red color is due to the addition of gold and copper to the glass. The beautiful red tints produced in glass by both cupreous oxide and oxide of gold are well known, as is also the fact that gold-bearing glass when first prepared in certain ways is quite colorless until it has been brought a second time to a high temperature, when it assumes a beautiful ruby tint, supposed by some writers to be due to a partial reduction of the trioxide of gold which they suppose exists in the colorless glass. At East Cambridge, the glass is apparently brought to the desired shape, and the end it is desired to color red is then brought close to the glory-hole, from which it is withdrawn we may guess soon after that end has reached the temperature at which the ruby color of gold is produced, and before the color has had time to extend the whole length of the piece. It may be conjectured that the yellow color is due to the presence of metallic copper, as in aventurine glass, though more finely divided; that when the end of the piece is heated, the gold is reduced to ruby oxide, the oxygen which it parts with converting the metallic copper into cupreous oxide. H.

THE HOISTING AND PUMPING MACHINERY OF THE BINDWEIDE MINE, GERMANY.

(WITH SUPPLEMENT.)

As an example of the design and general arrangement of mine machinery of modern type in Germany, we have chosen a series of illustrations accompanying a paper read by Herr Th. Peters, of Berlin, before the German Society of Engineers. We publish this week a supplement, showing the general arrangement of the plant of the Bindweide mine, near Steinebach, which we will follow in rapid succession with three additional plates, giving details of the machinery.

The mine works a system of approximately parallel veins of iron-stone cutting through the strata of the older Rhenish gray rocks. The apex of the veins and the outcrop of the strata are covered with *débris* of basalt partially decomposed and altered to a clay, which, where untouched, more or less effectually protects the mine against the influx of water. Along the outcrop of the veins, this protecting layer of clay has partly been removed by open cuts, and has partly been fissured by caves due to the collapse of underground workings, so that the surface water flows into the mine comparatively quickly. According to the weather, the quantity of water to be kept down is subject to considerable variations. Until recently, the mine had not been opened out below drainage level, but when, in 1880, the reserves had been nearly exhausted down to that level, arrangements had to be made for deep working; and in sinking a new machinery shaft, the leading considerations were to work the ore in the different levels in the shortest time and at the lowest outlay, to provide for the hoisting of both ore and men at the lowest cost, and to place the shaft so that its safety would not be imperiled by the old workings and by future mining. The position of the hoisting-engine and the boilers, in reference to the shaft, was dictated by local circumstances. It was decided to put it near the northeast side of the shaft. The pumping-engine might have been placed in any other position, but it was thought best to place it between the shaft and the hoisting-engine because the space between the hoisting-tower and the engine could thus be utilized, thus making the buildings cheaper and because the whole plant can be served much better. The drawing is so complete that it needs no further description. The measurements are all metric.

NEW YORK STATE CANALS.—The canals will be officially closed December 1st.

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THE MINES AT RIO TINTO, SPAIN.—II.

The Spanish and Portuguese pyrites almost exclusively supply the chemical works of Great Britain. The Rio Tinto Company is one of the syndicate of the three largest mines, the Tharsis, the Santo Domingo or Mason & Barry, and the Rio Tinto, an agreement securing to the latter forty per cent of the English market and the monopoly of supplying the continent. The pyrites for export are carried in six trains daily, composed of 25 cars of 7 tons capacity each, to the port of Huelva, where there are shipping facilities to load four 2000-ton vessels at a time.

The pyrites treated on the spot constitute about three quarters of the entire quantity mined. Formerly, they comprised only one class, obtained by sorting out the export pyrites at the mine. Now the cobbing is much more complete and careful, the use of dynamite in blasting breaking the ore into smaller fragments. Five principal grades are sorted out, namely: 1st, smelting ore; 2d, roasting ore; 3d, ore to be subject to special treatment, in large heaps; 4th, ore to be treated by the new process; and 5th, cupriferous lead ores. The method of treatment of these different classes is as follows:

1. *Working the Rich Ores.*—Ores carrying from 7 to 8 per cent, the quantity of which has increased since opening out the San Dionisio lode, are roasted in heaps or *teleras*, in lots of 600 tons, the product being a mixture of oxide of iron, sulphates of copper and of iron, and kernels. To the roasted ore, is added siliceous raw ore carrying on an average from 2 to 3 per cent of copper, for the purpose of fluxing the oxide of iron. In smelting, old Spanish cinders, with 1·5 per cent of copper and a small quantity of limestone, are also added, the average percentage of copper in the charge being 45 per cent. Eight blast-furnaces, 16 feet high, equipped with a single tuyere, put through from 25 to 30 tons of smelting charge per day of twenty-four hours, with a consumption of 25 per cent of coke, costing delivered 32 francs per ton, and producing from 2 to 3 tons of matte carrying from 38 to 40 per cent of copper and a cinder running 0·4 per cent of copper. Assuming six out of eight furnaces to be steadily producing, the product annually would be from 5000 to 6000 tons of matte, equivalent approximately to 2000 tons of copper.

M. Cumenge gives the following analysis of a sample of this rich matte:

Copper	46·60 per cent.
Tin	26·74 " "
Lead	3·30 " "
Sulphur	21·28 " "
Arsenic	0·26 " "
Silica	0·80 " "
Silver	320 grains per ton.
Gold	4 " " "

This matte is sold in the English market.

2. *Working Roasting Ores.*—The roasting of the ores in large heaps has ceased to be, as it was formerly, the method employed for almost the entire mass treated. At one time, 300,000 tons of ore, roasting in immense heaps or *teleras*, belched clouds of sulphurous acid into the air, so that vegetation was killed for many miles around, and it was, when certain winds prevailed, almost impossible to work in the open cut, and claims for damages were pressing. Now only 50,000 tons are burning in such heaps, and the inconveniences from the fumes have ceased. The ore was and is leached in the manner to be described farther on.

3. *Ore Worked by Special Treatment in Large Heaps.*—Formerly, the ore was first roasted, as above, and was then leached, a process taking years for its completion, so that the old Spanish heaps still furnish copper. A new principle has been introduced, which, according to M. Cumenge, consists in utilizing, for the purpose of hastening the conversion of the copper into a soluble salt, the acid fumes which were formerly such a source of inconvenience. There is one large heap kept at a uniform hight. Around it, are formed smaller *teleras*, which are lighted, and upon which are thrown raw ore, and the ore roasted separately as above. The sulphurous acid produced by the combustion mixes with steam generated by the heating of the moistened heap, and thus sulphuric acid is formed. Whatever may be the theory of the complicated reactions taking place, so much is sure, that the heap composed of roasted and raw ore aggregating four millions of tons evolves no striking quantities of acid fumes. Its upper surface is watered like a vast meadow with great volumes of water, and from its lower portion drain brooks of cupriferous solutions. The latter are conducted by wooden channels or lead siphons into large masonry reservoirs lined with cement or with a mixture of plaster and tar. In passing through these reservoirs, the solutions come into contact with cast-iron or wrought scrap, on which the copper is deposited, while the iron goes into solution. This cement copper or "precipitate" is given the local name of *cascara*. Recently, this product is purified by dissolving out the slightly arsenical subsalts of iron by washing with slightly acidulated water and then with pure water. It is necessary then to dry it only, instead of calcining it in reverberatory furnaces, as formerly, to drive off part of the arsenic.

The precipitate which is sold in England carries from 75 to 80 per cent of copper. In order to avoid the expense of sacking, the waste in transportation, and the deductions for moisture, two large melting and refining furnaces are now constructing.

4. *Treatment of the Smalls by the New Process.*—All the fines and smalls produced in mining and sorting are to be treated by the Doetsch process, which has been applied with success on a large scale after some experimenting. Its principal advantages are, that it avoids previous roasting, reduces the quantity of iron for precipitation, and shortens the time in which returns are obtained. It comprises three operations: the solution of the copper in the raw pyrites by a liquor containing perchloride of iron, the precipitation of the copper in the solution so obtained by iron, and the regeneration of the perchloride liquor. The theory of the process is developed by M. Cumenge as follows:

The copper exists in the ore in the form of bisulphide and protosulphide of copper. In presence of perchloride of iron, these compounds are affected as follows:

$$CuS + Fe_2Cl_6 = 2FeCl + CuCl + S.$$
$$Cu_2S + Fe_2Cl_6 = 2FeCl + CuCl_2 + S.$$

What constitutes the success of the operation is the fact that the perchloride of iron in dilute solution attacks the copper pyrites rather than the iron pyrites, the latter practically remaining almost entirely unchanged. In the place of perchloride of iron, a solution of sulphate of iron and sea-salt is used, which, by double decomposition, produces perchloride of iron and sulphate of soda, the latter salt facilitating the reactions. The perchloride liquor is uniformly distributed by means of platforms on the top of the heaps. Vertical chimneys and horizontal flues, built up of dry masonry, give access of air. When the heap is builing up, the ore is mixed with one half of one per cent of salt and a like quantity of sulphate of iron, the hight of the heaps varying between 13 and 16 feet. When systematically moistened, ore containing on an average 2·68 per cent of copper has yielded 1·34 per cent, or one half, at the end of four months, while at the end of two years 2·20 per cent is extracted. From one eighth to one fifth of the entire quantity of copper in the ore is leached out in the first ten days, and the action becomes slower. It is the intention to take advantage of this, and three large basins are constructing to do the preliminary leaching, and then only will the ore be piled in heaps to follow the course thus far adopted. By way of comparison with the old method of roasting and leaching with pure water, it may be stated that only 1·10 per cent is extracted after the first two years. The preliminary mixing with a perchloride liquor before forming heaps will probably reduce the time required for the heap-leaching also, and it is expected that the ore will be practically exhausted at the end of two years. The liquor, as it comes from the heaps, carries from 5 to 7 kilograms of copper per cubic meter. The copper in this liquor is precipitated by means of iron according to the following formulæ:

$$CuCl + Fe = Cu + FeCl.$$
$$Cu_2Cl + Fe = 2Cu + FeCl.$$

As the solutions contain almost exclusively protochloride, from which one equivalent of iron precipitates two equivalents of copper, it will be readily understood that the consumption of iron is reduced. A record kept for two years proves that the quantity of pig-iron required for precipitating one of copper is 1·12 in the new process, against 1·56 to 1·70 in the old method. The precipitation is carried out in long, shallow masonry basins filled with pig-iron and old rails, which are cleaned out every four or five days, the product being a precipitate carrying from 80 to 85 per cent of copper. In the best precipitating-vats a cupreous mud, called *papucha*, is collected, which, being lower in grade, is smelted. The solution, after the precipitation, contains only 20 grains of copper per cubic meter.

In order to regenerate the liquor, containing almost exclusively protochloride of iron, a current of chlorine gas is passed through it. In order to produce the latter, a mixture of salt and sulphate of iron, collected on the banks of the Rio Tinto River or obtained from the old Spanish ore-heaps, is calcined in a reverberatory furnace, free access being given to the atmospheric air. In order to avoid the generation of hydrochloric acid, and transform into chlorine any small quantity which may be produced, a small amount of oxide of manganese is added to the charge in the reverberatory. The gas evolved in the furnace is conducted into a tower, to the top of which the solutions to be regenerated are pumped, and down which they descend in a shower, absorbing the ascending chlorine gas on the way.

There are now two heaps working containing 150,000 tons of ore each, and a third is preparing. A steam-engine is used to move the liquors, and the corroding action of the liquors upon pumps and pipes has been overcome, so that now the Rio Tinto Company is producing weekly 50 tons of copper by the new process. In order to provide for the development of this part of the business, a large mill has been constructed in order to crush ore to the size required for this special treatment, there being nine Blake crushers and a number of sets of Cornish rolls, with ample screen capacity.

5. *Working the Lead-Copper-Ores.*—There is at Rio Tinto a stock of several thousand tons of ores carrying considerable lead and a percentage of silver not yet sufficiently well ascertained. As yet, nothing has been done to provide for its treatment.

Estimates of Cost.—M. Cumenge has made a series of estimates of cost of production, which he considers will suffice to give a clear idea of the possibilities of the enterprise. He does not claim for them absolute accuracy, but he adds in a supplement a number of figures from other sources which corroborate his data and show his conclusions to be conservative.

COST PER TON OF COPPER DELIVERED IN ENGLAND IN THE FORM OF PRECIPITATE.

Fine Ore taken from Open Cut.

		Francs.
Dead-work and stripping		1·00
Mining, per ton of pyrites, labor, powder, dynamite, etc...	0·80	
Crushing, sorting, loading, and transportation	1·20	
Maintenance of tools, rolling-stock, and track	·50	
Total mining cost:		2·50
Discharging, making canals and heaps, general labor	0·30	
Water	0·25	
Total roasting and leaching cost:		0·55
Charging and discharging tanks, cleaning, maintenance	0·80	
Drying, purifying, and soaking precipitate	0·15	
Pig-iron, 17 kilos, at 100 francs per ton, delivered	1·70	
Total cost precipitation:		2·65
Cost per ton of ore		6·70
Cost of copper:		
100 tons pyrites, yielding one ton of copper in one year at 6·70		670·00
Freight to Huelva		2·50
Freight to England, insurance, cost of marketing, assays, differences in moisture		27·50
Cost of production		700·00
From ore from underground workings:		
Mining, labor, dynamite, etc	2·00	
Loading, hauling, discharging, sorting, and reloading	1·75	
Maintenance of plant and track	0·75	
Cost of mining:		4·50
Roasting and leaching		0·55
Precipitation		2·65
Total per ton of ore		7·70

Under the same conditions, the cost of production per ton of pure copper delivered in England in the form of precipitate would be 800 francs.

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The further working of the heaps, after the extraction of one per cent by the old method during the first year, would cost per ton of copper:

Water	25	francs.
Precipitation	265	"
Transportation	30	"
	320	"

M. Cumenge reaches the conclusion that, as one half the copper is extracted from ores taken from the open cut and one half from subterranean workings, the cost per ton of pure copper laid down in England would be 750 francs, or £30 sterling.

The cost of the ore shipped for export delivered in England, would be:

Mining	4·00	francs.
Freight to Huelva	2·50	"
Freight, insurance, etc	17·50	"
	24·00	

The prices obtained for ore are a matter of agreement. The sulphur fetches 6 francs per unit, or 30 francs per ton, on the basis of 48 per cent. The copper, 2·5 per cent wet Cornish assay, would bring, on the basis of £65 per ton for Chili Bars, 27·75 francs, making the total 57·75 francs, or a profit of 33·75 francs per ton, at the prices then prevailing, but now reduced so that it is probably less than 30 francs.

M. Cumenge gives the following interesting estimate of the cost of producing a ton of 85 per cent precipitate by the new process, based upon the results of four months' working, during which 224 tons of precipitate were made:

Salt for chlorine and for mixture, 0·62 ton, at 68 francs	17·06	
Salt, 0·20 ton at 12 francs	3·00	
Coal, pump, labor	63.75	
Cost of dissolving		83·81
Iron, 1·12 tons	104·00	
Labor	77·16	
Cost of precipitation		181·16
Materials	5·25	
Repairing vats	11·87	
Freight on materials and machinery	4·00	
Maintenance of track	1·20	
Salaries and houses of employés	5·72	
General expenses		28·04
Total cost		293·01
Or per ton of pure copper		345·00

As the yield is at the end of four months 1·34 per cent, 75 tons of ore suffice to produce one ton of pure copper:

75 tons ore at 4 francs	300	francs.
Cost of treatment	345	"
Freight to Huelva, England, and miscellaneous expenses	30	"
Total	675	"

The water question is one that has been the subject of much thought at Rio Tinto. When it is considered that it takes 70,000 cubic feet of water per ton of cement copper produced, and that the quantity falling in the Rio Tinto water-shed is not more than 70,000,000 cubic feet, it will be understood that the production reached its maximum with 10,000 tons. This question has been entirely put at rest by the gigantic work undertaken, and now nearly finished, in the Odill basin at Campo Frio, ten kilometers from Rio Tinto. A dam 80 feet high has been built which will collect the rain-fall of 35 square kilometers, the capacity of the lake formed being about 10,000,000 cubic feet of water. A fifteen-inch pipe brings the water to Rio Tinto, and the supply will be sufficient to vastly increase the producing capacity of the mine.

THE ARLBERG TUNNEL.—The fragments of rock dividing the eastern and western galleries of the Arlberg tunnel were removed November 19th, in the presence of a notable assemblage. Baron Von Friedenthal, the Austrian minister of commerce, delivered an address in German and Italian. There was much enthusiasm. A special train passed through the tunnel from east to west.

MESSRS. KEUFFEL & ESSER, of this city, have just issued a new catalogue (price 50 cents) descriptive of the drawing materials which are their chief specialty, and of which they are both manufacturers and importers. They illustrate also their surveyors' tapes, chains, bobs, rods and poles, mining lamp and plummet, pocket compasses, sun-dials, levels, sextants, pedometers, transits, anemometers, etc.

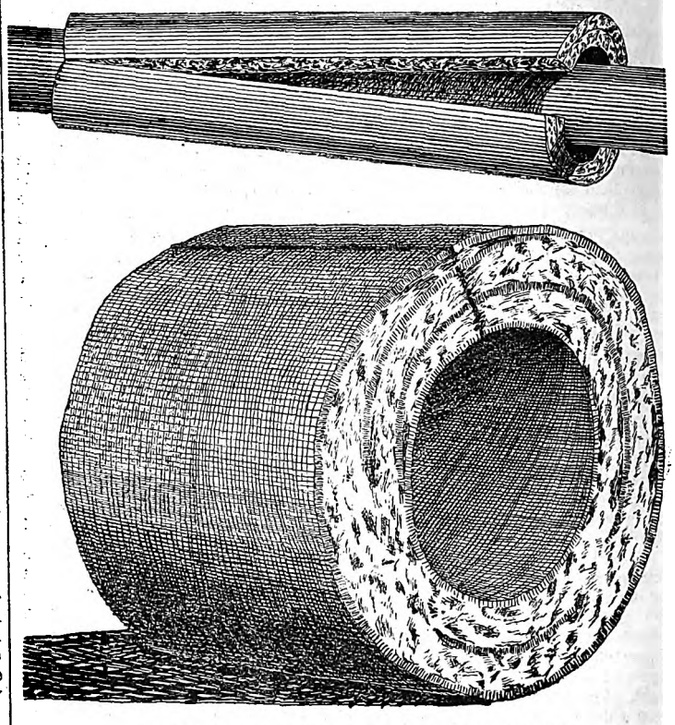
MR. JOHN MILLER, an enterprising business man and respected citizen of Altoona, Pa., died at his home in that place November 13th, at the age of seventy-eight years. While engaged in the coal business, a number of years ago, the deceased discovered and opened the celebrated "Miller vein" of coal in the Alleghanies, which has since been operated with such great success by the Cambria Iron Company. It is one of the finest coals in the State and makes excellent coke.

ECONOMIZING SPACE.—The New York *Sun* "condenses" as follows: "Of all the plans for economizing space," said a patent lawyer, "the man who just left this office evolved the funniest. He had a drawing of a sleeping-car that he wished me to get patented for him. He thought it was a good thing, and would hit the railroad managers hard, because it nearly doubled the number of berths in a car. I saw right away that the beds were ridiculously short. I asked their length. 'Four feet and a half,' he replied, 'and that's plenty long enough. A careful investigation has proved to me that there is really no use in a bed being as long as the person in it. Not one man in fifty ever sleeps straightened out, and women invariably draw up their knees, so that they don't require more than a four-foot bed. It is a discovery of this fact as to sleeping that I wish to protect by the patent. I should stick up in each compartment a printed notice explaining that the middle of the car is much safer than the sides, and, therefore, the closer their legs are hauled in toward the center partition, where their heads are to be, the less they are liable to be hurt by collision.'" The lawyer did not take the case.

A VISIT TO AN ASBESTOS MANUFACTORY.

We have had occasion recently to visit the factory of the Chalmers-Spence Company in this city, which has made the manufacture of many different articles from asbestos fiber a specialty. It needs only a cursory examination of the different processes which the raw material must undergo to appreciate the fact that it requires considerable experience and judgment to make the proper choice. It is convincing too on the point that asbestos may appear to possess every requisite, and yet the same may be practically valueless. The first desideratum is length of fiber; and secondly, a certain toughness and elasticity which many specimens do not possess. We have seen good-looking material which was "rotten," and would warn those of our mining friends whose spirits may run high upon the discovery of asbestos, not to allow their hopes to run away with them, until the material has been examined and tested by parties whose experience in manufacturing has made them competent judges.

The rock, as it is received by the Chalmers-Spence Company, is put through a machine on the ground floor, which by a system of rollers separates the fibers from one another. The material so obtained is carded, by which the rock is taken out and the fiber is separated according to length, the shortest being used as paper stock. It is sent to paper-mills, where board is made of it. The longest fiber is made into yarn on a special machine, the product serving as the basis of all the asbestos textile



CHALMERS-SPENCE PIPE COVERING.

fabrics made. For cloth, there is a special loom. Other grades of the fiber are made into felt by a special machine, which has appliances for insuring uniformity of thickness and the needed degree of cohesion.

Beginning with the yarn, it is used in that form for wick packing for valve-stems; in larger form, it is applied for packing of all kinds; and to better adapt it to that purpose, the packing is prepared with a variety of lubricating materials. The asbestos cloth is used in many different ways which it is needless to enumerate. The boards and sheathing made from the paper stock are shaped into gaskets, and into such forms as are required for steam-joints, etc. The sheathing is used as such for insulating purposes and as a protection against fire between floors. One of the most recent of these applications for fire-proofing is inside of elevators, which have of late years proved such disastrously convenient avenues for the spread of fire in large buildings. It appears much more suitable for that purpose than the sheet-iron lining of elevator shafts, which we have had occasion to notice in some recently finished buildings. As we shall note farther on, asbestos board enters largely also into pipe and boiler coverings, which form the most important outlet for the bulk of the asbestos manufactured. The methods of manufacture of the many varieties of non-conducting coverings are simple. The latest form adopted by the Chalmers-Spence Company is that shown in the accompanying engravings.

As will be seen, it consists of a sheet of asbestos board, upon which is laid a layer of asbestos felt. They are together wrapped into a circular form, so that in section the board has the shape of a spiral, with layers of the loose asbestos fitting between it. The tube is simply slit longitudinally, so that it is only necessary, in order to put on the covering, to force it apart and slip it on, in the manner shown in our engraving. It is necessary to state, however, that our artist has omitted to show a flap, a continuation of the outer covering, which, when the pipe is in place, covers the joint. These movable coverings are made in sections three feet long, for any size of pipe needed. They weigh about one pound per square foot per inch of the thickness of covering. It may be of interest to state here that the Chalmers-Spence Company also makes a non-conducting plaster covering, in which asbestos fiber is used as the binding material, the covering weighing only two pounds per square foot per inch of thickness. This covering, besides its lightness, has special merit as a fire-proof material, and

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is also used for fire-proofing walls, etc. A crucible made from it for purposes of experiment showed it to be capable of resisting the highest heats. The Chalmers-Spence Company also puts up coverings with an air space, using it largely for extensive surfaces as on marine boilers.

The asbestos felt, placed between an inner and outer layer of asbestos board, is also put up in square sheets about one inch thick, to be used principally as a removable covering for boilers, notably for high-pressure steam. Where hair felt is preferred, asbestos sheathing is used in the same way to protect the hair against the singeing due to direct contact with the hot surface. It will be noted that the asbestos industry has been thoroughly developed, and that in one or the other form the prepared material is made to do service for a large variety of purposes. A disposition is shown to meet the wants and fancies of consumers, manufacturers avoiding the error too often committed by those developing a specialty of insisting that there is but one way, and that is the one they have chosen. Asbestos in its many forms is now largely applied by mines, furnaces, mills, factories, and steamships, and it is a gratifying fact that, in the case of the latter, it is no uncommon occurrence for American makers of boiler coverings to be called upon to replace by articles of their own make the covering put on in England.

ADDRESS ON MECHANICS BY COLEMAN SELLERS, SR.

On November 9th, Mr. Coleman Sellers opened the course of lectures in connection with the Franklin Institute with an address on Mechanics. We are indebted to the *American Machinist* for the following abstract: The lecturer began with a review of the origin of their lecture course. During the first season, the lectures were confined to men, but in the following year ladies were admitted, and this has continued to be a feature of the meetings ever since. Although the subjects treated are principally those relating to mechanics, the attendance shows that they are found interesting to ladies.

If we consider what was the state of the mechanic arts at the time the Franklin Institute was first founded, and what is the state of the same arts now, we can form a better idea of what the lecture course was in those days and what is expected of the lecturer of the present day. In business, nowadays, we measure the success of mechanical enterprise very much by the prosperity of the railroads. I think it would be fair to take the success of the railroads as the standard of the progress of the United States during the sixty years that have elapsed since the first lecture was delivered. It was in 1824 that George Stephenson began striving to induce the people of England to build the Liverpool & Manchester Railroad. In 1825 he was laughed at as a visionary. You will find books in the library that refer to the bubbles talked of in 1825, and the contemplated Liverpool & Manchester Railroad is referred to as the wildest of all the bubbles. At that time, the term locomotive as applied to that form of engine was not invented. It was not until 1829, when that railroad was opened, that the term came into use. But we had locomotives before that time. In 1819, Oliver Evans took through the streets of Philadelphia an old scow which moved itself by steam. Evans foresaw the important factor that steam was destined to act in accelerating land transportation. He said the time would come when we should start in the morning from Washington, breakfast at Baltimore, dine at Philadelphia, and sup in New York, and that would be going at a speed of forty-five miles an hour, as fast as a bird flies. Even in 1825 the world was not ready for this. The proposition of traveling at fifteen miles an hour was laughed at. Trains might be run, but they must be slowed down to five or six miles an hour, so as not to ruin the stage coach companies!

Great advances have been made since those days, and all other institutions have moved forward keeping pace with the railroads. To the people in Wall street, railroads merely represent certain values in money. By the people generally they were viewed from a much higher plane. To those who are assembled here in Philadelphia, the railroads are the embodiment of thought, and of more value than can be measured. We see this illustrated in the Pennsylvania Railroad we are so proud of and its fine machinery.

When the Franklin Institute was founded, it was intended to carry on a school of instruction for mechanics, to impart desired instruction which could not be obtained in the public schools. The mechanic indeed must not only be a physicist in the broadest sense of the term, but there is scarcely a limit to the knowledge he must bring to his use in some way. Some one has said that a man must understand matter and apply common sense to it in order to be an engineer. The aim of our institution has been to help mechanics to understand matter and the natural laws underlying their work. In the early days of the institution, the lectures were elementary but essentially practical. They were the best that could be delivered here at the time, and could not be obtained at any other place. What has been the result of this? Gradually the people have begun to recognize the need of more information than is given in the public schools. The high school of Philadelphia is the direct outgrowth of the Franklin Institute. In this and other educational institutions, it is possible for young men to obtain excellent instruction; but so far as is possible for young men to obtain excellent instruction, much improvement training relating to the mechanic arts is concerned, much improvement is needed. It is possible to have taught in the public schools the underlying principles of manual labor. There are a few simple tools that are used in a great many trades. Their use might be very judiciously introduced in the course of study. In our early history, the workshops were not far removed from the schools. It was almost impossible to attend school from one year's end to the other. A lad had to work in the shop or on the farm for some months of the year, and he could attend school the rest of the time. What was the result of this? Its tendency was to produce good solid men who were daily applying their school instruction to workshop manipulation. Who were made by this kind of training? The men who have taken the lead in building up our system of railroads, our workshops, and our factories.

What is the result of the later system of training in the public schools? The students are separated entirely from manual labor, and their heads only are developed, and this development fitting them only for the professions of doctors, lawyers, and what not. And not one single thing has come to them that will help them to enter a workshop. There is a very simple reason for this. The teachers are not mechanics. They are not expected to be. The scholars can more easily learn the things that relate to buying and selling than what relates to mechanic arts. The instruction given in the schools must bear the teacher's idea. Very few teachers in public schools are expected to understand the principles of mechanics. The examples prepared for the scholars are not taught as having relation to mechanical work. Yet many of the calculations apply as correctly to the operations of machinery as they do to the business of buying and selling. If mechanical operations were taught in schools, it would give a rest to head labor, and the hand labor would make the brain stronger.

Mr. Sellers then reviewed at considerable length the lectures of the course and their objects, highly commending all the coming lectures.

Returning to the subject of mechanics, Mr. Sellers said there was a time when the two-foot rule and a few simple tools readily answered all mechanical purposes for measurement. There was a saying in Germany that every hair in a carpenter's head is one eighth of an inch diameter. There was a meaning in that. As a carpenter does not measure so fine as a machinist does, his measuring to a hair's breadth was measuring within one eighth of an inch. That style of measurement led to the expressions "overfull" and a "little scant," which indicated measurements sufficiently close for practical purposes. A change in this respect has come over all mechanical industries. Now the parts of machines are made interchangeable, and accuracy of dimensions must be obtained. One branch of business may need only coarse measurements, while another may require the most minute measurements and accuracy. A two-foot rule may answer for many purposes and be very convenient, but there are measurements in the works which require the use of this convenient little device which measures to one thousandth of an inch. (Here he showed a Brown & Sharpe micrometer caliper. He also exhibited a French micrometer gauge, finely graduated. This he used to measure fine metallic cubes that had been finished by tool work alone, and were surprisingly accurate.) These instruments, continued Mr. Sellers, are remarkably fine; but Mr. Bond, who will lecture during the course, is connected with a shop (Pratt & Whitney's) that makes gauges of various kinds, and there they have perfected a machine which records more closely the actual size of materials than any thing ever made before.

Every thing in nature obeys certain fundamental laws, and all mechanical movements are regulated by these laws. There are certain principles of movement called mechanical powers, as the lever, the wedge, the screw, the pulley, that are used in various forms through all machines. The building of a complex machine seems very much like the forming of a complex sentence. Letters combined form words, words combined form sentences, and sentences make books. In the locomotives that pull trains from ocean to ocean, we have combined all the mechanical elements, wheels, pulleys, levers, and screws. We have beautiful sentences in mechanics as well as in books. One maker produces better arrangements in his machines than others, and so he makes a more harmonious machine than his neighbors. In the same way, one author combines his sentences better than another.

After reading some sentences in Ball's work on mechanics, a book which he cordially commended, Mr. Sellers proceeded by the aid of models and diagrams to elucidate the principles of virtual velocities. In a clear and interesting manner he demonstrated the relations that exist between speed and power in the application of the various forms of levers to machinery.

In computing the power of machines, he continued, friction must be well considered or mistakes will be made. A considerable proportion of the power of machines is absorbed by friction, but friction is valuable to the mechanic for all that. But for friction, a locomotive could not pull a train, because the wheels would slip around without moving ahead. In fact, at first they thought that friction between the plain wheel and rail would not suffice to make a locomotive pull a train, and they proposed to lay down a rack-rail for a cog-wheel on the engine-axle to work in. This was one of the first obstacles to the success of the locomotive; but they soon found that a rack-rail was not needed. Another example of friction is rather striking. The transmission of power from the steam-engine to the various parts of a machine-shop is usually effected by a line of shafting. Now, in quite a large machine-shop, when the belts are thrown off, one man can take hold of the rim of the main pulley and turn all the shafting. Let us see what work the man is doing in relation to what the engine has to do in turning the shaft. The man employs his weight of 150 pounds to the outside of the wheel, and he would have to turn it 120 feet a minute to keep it at the speed the engine has to maintain. Thus you have between 12 and 13 horse-power consumed in running the shafts of that shop. The man does not exercise one horse-power, though he may have a cold and be a little *hoarse*. A horse-power is 33,000 pounds raised one foot in one minute. One pound raised 33,000 feet in one minute would be the same power exerted. On this basis, all engine work is measured.

By means of a Weston differential pulley-block and chain, and also the Harrington hoist apparatus, which has pulleys operated by a worm screw, Mr. Sellers showed the principle of applying power in that way. He also demonstrated the loss of power by friction in the two kinds of apparatus and in a train of wheels. The amount of pull required to operate the chains was ascertained by means of a spring balance. The different apparatus showed a striking difference of loss due to friction of the working parts, but in the best performance the loss was considerable.

Now, said Mr. Sellers, it is the want of this kind of knowledge that should be met by the public schools. That is felt in the community in the ready acceptance of things that are impracticable. It is not a new thing for persons to think that perpetual motion is possible; and it is not a new thing for people to say they have discovered perpetual motion when they know they have not. There are many cranks besides the crank that turns the grindstone, but the worst crank is the crank who is going to improve on the crank. Perpetual motion is a wrong idea. When people become pretty well acquainted with the principles of mechanics and with the laws of the universe, they can be shown that perpetual motion is impossible. Those who understand the laws relating to the conservation of energy know that no power can be obtained without the dissipation of energy. Falling water may keep a mill-wheel going continually till the parts wear out, but the water has been raised above the wheel by the sun's rays. That is no perpetual motion; it is power begotten of heat. Heat may be applied to water to tear the atoms asunder till they exist in the

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form of steam which is capable of doing work; the atoms of water may be still further heated till they are separated into their elementary gases; but the work to be got from them in either case will be less than the heat energy expended. When we burn coal in the furnace of a boiler, it is converted into heat, and heat boils the water, and the water converted into steam drives the machinery, and we call it very justly the steam-engine. The steam-engine does not use all of the heat by any means; probably not more than 12 per cent of the heat coming from the coal is utilized in our best engines. What a long distance between the actual practice and what we may hope to obtain some day in the perfection of mechanism!

More than seventy years ago, a great furor was created in this country by a citizen of this State named Readheifer, who claimed to have invented a machine that would run without the expenditure of power. The pretended discovery was puffed in all directions, just as similar schemes, some of them not a hundred miles from Philadelphia, are advertised to-day, and a great many people believed in Readheifer's machine. The Legislature of Pennsylvania appointed a commission to examine the machine, and Mr. Sellers's grandfather was one of the commission. Like other pretended discoverers of marvels, Readheifer would not permit the commission to take the machine apart. This made a rigid examination difficult; but Mr. Sellers, being a mechanic, discovered that the motive power was clock-work placed in the base of the machine and applied in an ingenious way.

The perpetual motion humbug appears under various disguises. Some time ago, a great stir was caused in England by the alleged discovery of a new power called psychic force. A scientific gentleman in Philadelphia got deceived by this pretended force, and the performance of a spiritualist which he had witnessed confirmed his belief. This gentleman often talked with Mr. Sellers on the subject of this new force, and nothing seemed able to convince him of its fallacy. One evening he called at Mr. Sellers's home, and when they were conversing, another scientific friend came in. The subject of the new force was again discussed, and Mr. Sellers volunteered to show some of its manifestations. He took a round ball which he had previously prepared by putting holes through it, one of them having the form, in longitudinal cast-iron, of a trapezoid. Now, he said, here is a round ball with a straight hole through it, and he pushed a pencil through the hole to prove it straight. Then he pushed a small rope through the ball, and stretching the rope between his hands, he put it in a vertical position and made the ball descend, fast or slow, just as he wished. The credulous scientist at once concluded that Mr. Sellers was exerting mind influence over the ball, but the other set his inventive faculties to find out the trick. He guessed that the hole was not straight through the ball, and that Mr. Sellers controlled the speed of the ball by tightening the rope. This was the truth. Instead of pushing the rope through the straight hole which was there for deception, he worked it through the crooked hole, and by that means was able to control the ball. Here were two men, both of them scientific gentlemen; one of them investigated the phenomenon, and the other believed what he saw.

In the consideration of every thing that is going on in the world, in investigating matters connected with these elementary powers and other mechanical questions, you can not be too well grounded in the laws of mechanics. That will give you ability to understand the kinds of appliances that can be utilized in your work, and will guard you against deceptions.

FAST WORK IN A TUNNEL.—A correspondent of the *Railroad Gazette*, writing to that journal from Moshannon, Pa., says: "The following is a statement of working hours, number of shifts, and distance run during the month of October in the heading of the Moshannon Tunnel on the Beech Creek, Clearfield & Southwestern Railroad, near Snow Shoe, Pa. The material encountered in driving this heading was the sandstone lying immediately below the lowest or 'E' vein of the Clearfield bituminous coal formation.

"The details of the work are as follows:

Number of headings		2
Dimensions of heading	7 feet	16 feet
Distance run from October 1st to 31st inclusive		499 feet
Number of shifts		50
Hours per shift		11

"The drills used were two Ingersoll, supported on columns in each heading. The system of working was the American 'center cut.' The best work for one week of 11 shifts was 119 feet. Each heading was closely followed by a 'bench' over which ran the pipes conveying compressed air to the drills in the heading. As it was necessary to disconnect these pipes when blasting on the bench, the progress of the heading was somewhat retarded. We claim this as the best time on record, and as the question is of general interest, and a discussion of the facts most desirable, we beg you to publish this claim in your valuable paper."

Another correspondent, writing from Binghamton, says: "In the tunnel taken out for use of the south-bound track at Factoryville, Pa., on the main line of the Delaware, Lackawanna & Western Railroad, the heading was driven during the month of April, 1883, 471 feet. The new tunnel being parallel to the old one, and 16 feet of rock left between them, it was found necessary, for ventilation as well as convenience, to draw a 7-foot cross-cut through from the new to the old tunnel. There were no shafts. The cross-cuts driven in April were two, size about the same as the heading, 7 by 16 feet, making a total heading of 503 feet. Nature of rock, blue, red, and gray sandstone making a good roof, with no arching necessary. The drills used were two Ingersoll, supported on columns, in each heading. The system of work was taking out the center cut. The heading was driven in two ends and 11-hour shifts. The drills were worked by compressed air. Benches followed the heading, both worked at the same time. Care was used, which necessitated lighter blasting on account of the old tunnel, about forty trains passing through it every twenty-four hours each way, making it necessary to look after the safety of about eighty trains.

"The work was divided as follows:

North end, 246 feet heading and 16 feet cross-cut	262 feet.
South end, 225 " " " 16 " "	241 "

"This made the total of 503 feet for the month."

We believe that some of our mining friends can contribute "big records" that will match the railroad men.

FURNACE, MILL, AND FACTORY.

Hendey & Meyer, Denver, Colo., are building the machinery for the new ore-sampling works at Denver. Among other things, is a pair of three-foot crushing-rolls, said to be larger than any hitherto constructed.

Lucy Furnace, at Orbisonia, Huntingdon County, will blow out soon on account of the low price of iron. The owner is John Whitehead, the coal operator of Orbisonia.

Messrs. Reis Brothers, of New Castle, have sold their interest in Neshannock furnace to A. L. Crawford for $95,000. Mr. Crawford holds it until the organization of a company now under way is completed. The rebuilding of the furnace is rapidly nearing completion.

Owing to the continued decline in iron, the Pottstown Iron Company, of Pottstown, employing several hundred hands, announces a reduction of wages of about 10 per cent, beginning December 1st. Some other mills in the Schuylkill Valley contemplate similar action.

The Cambria Iron Company, of Johnstown, has notified its 5000 employés that on December 1st wages in all departments will be reduced 10 per cent, owing to the depression in trade.

Work began November 6th at the Kelly Nail and Iron-Works, at Ironton, and the forge department, with fourteen boiling-furnaces, is running double turn. Thursday, the 8th, the plate-mill went on, there being a single set of hands at each of the three heating-furnaces. On that day, too, a few nails were cut by way of experiment. The nail factory was started on the 14th instant, there being sixty machines in position and now in operation. The railroad from the coal mine in the back of town to the mill is now in operation, the coal being dropped from the tipple-house into the cars and from the cars into the bunkers alongside of the furnaces. When the Kelly mill gets to running full, it will give employment to about 800 hands. It is estimated that the building and operation of the mill have added 1500 people to the population of Ironton.

Five barbed-wire machines, capable of making 100 pounds of finished wire every ten minutes, and twisting 18 barbs on the wire simultaneously, and adjustable so as to make either a two or four-point wire, have just been perfected by S. M. Stevens, of De Kalb. These machines are for the Astley Wire Company's works at Joliet, Ill.

The nail and tack mills of Chess, Cook & Co., at Pittsburg, Pa., have not shut down, as was reported. No suspension will take place before the regular one ordered by the Western Nail Association.

Notice of a change of the name of the Northwestern Steel Wheel Company to the Star Wheel Company, a Chicago concern, has been filed and recorded.

The Neshannock furnace, in New Castle, with eighteen acres of land, has been sold by Reis Brothers to A. L. Crawford for ninety-five thousand dollars. William Reis will continue as manager of it.

Andrews & Hitchcock's furnace No. 2 at Hubbard, O., which has been out of blast undergoing extensive repairs, has been blown in again. The furnace has been remodeled according to the latest plans, and, when running smoothly, it is expected will produce over 100 tons of metal per day.

A report from Cleveland says that the late Amasa Stone owned 600 shares in the Kansas Rolling-Mill Company, which collapsed some time ago, and as under the laws of Kansas the stockholders of a stock concern are individually liable, suits have been begun by Myron T. Herrick, who has come into possession of all the claims against John Hay and Samuel Mather, executors of Amasa Stone, to recover $175,000.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

Arizona & Utah Gold and Silver Mining Company, Newton lode.

CALIFORNIA.

SACRAMENTO DISTRICT.

Kenton Mining Company, Kenton quartz mine.

COLORADO.

CENTRAL CITY DISTRICT.

E. E. Wentworth *et al.*, Crystal and Louise lodes. Nels Johns, Carroll lode. Russell F. Lord, Precinct lode. Leopold Sternberger, Di Vernon lode. Chicago & Colorado Mining Company, Yellow Bird lode and mill-site. Nathaniel J. Moss, Oneida lode. Henry M. Thompson, Lewis and Hyland Extension lodes. W. S. Wells *et al.*, Wells, Ina, and Times lodes.

LAKE CITY DISTRICT.

William Krager *et al.*, Dora lode. Henson Creek Reduction Company, Capitol iron placer. Treasure Hill Spar lode, and Mary Lime lode and mill-site. W. Weston *et al.*, Conqueror lode and mill-site. Park Gold and Silver Mining and Smelting Company, Red Gulch lode and mill-site. S. R. Beckwith *et al.*, Alice lode. Green Mountain Mining and Milling Company, Green Mountain, Linda Belle, and Nathaniel Slaight lodes. Michigan & Colorado Mining Company, Silver Urn and Silver Cord lodes, and Silver Islet and Silver Age lodes and mill-sites.

LEADVILLE DISTRICT.

Golden Comet Mining Company, Goddess of Liberty, Pacific, Shenandoah, and Raven lodes. Terrible Mining Company, Terrible lode. Henry Weil *et al.*, New Year lode. N. N. Atakinsou, Charlie Ross lode. Andrew Augustine, Alma lode. R. J. Lipe *et al.*, Willie Warner lode.

DAKOTA.

DEADWOOD DISTRICT.

Cephas W. Carpenter, Rattlesnake Jack lode.

MONTANA.

HELENA DISTRICT.

James A. Murray *et al.*, Sarsfield lode. Montana Copper Company, Iron Side lode. Daniel Garver *et al.*, placer (Silver Bow County). Henry Neill *et al.*, placer (Lewis & Clarke County).

UTAH.

SALT LAKE CITY DISTRICT.

Moylan C. Fox *et al.*, Azure Queen lode. Peter S. Martin *et al.*, Uranus lode. Samuel W. Smith *et al.*, Red Bird lode. Romeo Consolidated Mining Company, Augustus lode. Heirs of Austin Chambers, deceased, Union lode. William F. Williams, coal. A. Lewis Williams, coal. Edward L. Carpenter, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

ATLANTA.—Work on the tunnel at the east end has been discontinued. The carbonate of lead found at the west end does not seem to be in such large quantity as was expected, but lying below these carbonates nickel has been found which may turn out to be a find of some importance for the camp.

TOMBSTONE DISTRICT.

CONTENTION.—The pumping machinery will be ready to start up December 1st. It will have a capacity of 700 gallons a minute.

EMPIRE.—The new shaft is down 18 feet. The course of prospecting in the old workings has been changed since the strike in the Girard, because it is

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thought that the same ore-body extends into this ground, and drifting is now done in that direction, with the expectation of meeting it.

SYDNEY.—This mine lies parallel with the south extension of the Grand Central, and is undoubtedly a very promising property. It is worked through three shafts. The north shaft is down 113 feet. At this depth, a cross-cut and drift have been started. From the south shaft, a cross-cut was run, which, 120 feet west of the shaft, encountered an 8-foot body of chloride ore.

WAY UP.—No more work will be done until after the decision of the pending lawsuits.

MOHAVE COUNTY.

MATHILDE.—All the ore in the mine is high-grade copper rich in gold, of which there are at least 2000 tons in sight, and when the veins of ore in the south end of the claim have been undercut by the tunnel, a large quantity of ore will be exposed. A thirty-ton water-jacket smelter, with sufficient coke to run for two months, is at Aubrey, awaiting transportation to the smelter-site, which is located ten miles from the mine, on Bill Williams Fork, where there is abundance of water. Iron wood and palo verde grow in large quantities within a mile of the smelter-site, and can be delivered there for $4 a cord. Freights on ore from mine to smelter-site are $3.25 per ton. A road has been constructed from the mouth of the tunnel at the mine to the smelter-site.

PIMA COUNTY.

TUCSON SMELTING AND MILLING COMPANY.—The adjourned annual meeting was held at 408 Congress street, Tucson, recently. The new Board of Directors is: James H. Toole, Aaron Mason. H. S. Stevens, Samuel Hughes, R. C. Pearson, R. N. Leatherwood, Joseph C. Perry. Work will be commenced as soon as they can contract for enough lead flux to insure a steady run. There are sufficient iron and lime flux [illegible]. Then the sampling-works will be put up immediately and work begun at once on the smelter.

PINAL COUNTY.

SILVER KING.—Mr. R. W. Phillips has resigned, and Mr. Arthur Macy has been appointed superintendent.

WINDSOR.—Work has been stopped for some unknown reason.

YAVAPAI COUNTY.

ARIZONA QUEEN.—The mines are rapidly opening up. The work on the Chicago mine, owned by this company, is prosecuted night and day, and a new body of good ore for stoping is rapidly developing.

SENATOR.—The old mill is to be started up and run exclusively on custom ores.

CALIFORNIA.

EL DORADO COUNTY.

MORRELL CONSOLIDATED.—This mine adjoins to the once famous Cedarberg. Present developments indicate that the owners have in their property a well-defined ledge rich in gold-bearing rock. The mine has a six-stamp mill. A 120-foot tunnel, now run, shows some very rich gold-bearing quartz. Another tunnel, designed to tap the lode at a depth of 50 feet, is running. The tunnel will give a sufficient test as to the value of the mine. The ledge and ledge matter are two feet thick, and are said to be rich.

FRESNO COUNTY.

A description given of the resources of this county states that many discoveries of late years show much free gold and only await the coming of capital and labor to prove very remunerative. During the last decade, the mining interests of this section have greatly revived under the stimulus of important developments in a number of quartz ledges. Extending from Dry Creek north a distance of about sixty miles, is a country containing large and well-defined quartz veins. Some have been thoroughly prospected and assays have shown the presence of either gold, silver, copper, or iron—in many instances, in paying quantities.

PLUMAS COUNTY—GREENVILLE DISTRICT.

ARCADIAN.—For some months past, a tunnel has been run to explore the ledge at a greater depth. The ledge has been reached, a drift started, and an ore-body opened up that is much superior to any found in the upper tunnels. No great amount of ore has yet been taken out. A succession of tunnels has been run, to test the ledge at different depths.

CHEROKEE.—The mine is in charge of George Standart, and he has a few men at work drifting.

MICHIGAN HILL.—Operations have been resumed.

PLUMAS-EUREKA.—An agreement has been entered into between this company and the owners of the Halstead mine at Rich Gulch, by which the former is to finish a tunnel already partly made, to prospect the ledge. If the company is satisfied with the prospect, it is to have the entire claim of 6000 feet by paying to the present owners $60,000. Work will at once begin.

SANTA CLARA COUNTY.

QUICKSILVER MINING COMPANY.—A dispatch to the New York *Tribune* says that a suit involving $20,000,000 was begun at San Francisco, November 20th, the widow and heirs of John Bowie Gray bringing suit against the Quicksilver Mining Company, of New Almaden. Gray, who was one of the three original proprietors of the mine, died in New York in 1861. The action is based upon the alleged fraudulent administration of the property by Robert J. Walker, formerly Secretary of the Treasury, who had been a partner of Gray, and was until recently the chief representative of the company.

SIERRA COUNTY.

It is reported that very extensive mining operations will begin at once on the Gibsonville and La Porte Ridge, and in the Sawpit country, under the general management of Mr. J. H. Thomas, backed by English capitalists. The company is prepared to expend a large sum of money in developments.

GRIZZLY.—This ledge, which is near the Alaska mine at Pike City, is now reopening by direction of the present owner, M. l'Anson, of Newark, New Jersey. The Grizzly ledge was originally located in 1854 by some miners, who found rich gold quartz in the croppings. At various times since, the ledge has yielded rich specimen quartz, but the vein is a milling ore, carrying fine free gold and sulphurets. A working adit is driving from Texas Ravine that will tap the lode at a considerable depth below the present workings.

CANADA.

NEW BRUNSWICK.

Work on the Dorchester copper mines is progressing. About fifty men are employed.

BELLIVEAU ALBERTITE AND OIL COMPANY.—The diamond drill, at the depth of 650 feet, passed into oil shale, and soon oil in considerable quantities came up with the water used in working the drill, and has continued to flow to a more or less extent to the present time. Since striking the oil, the drill has passed through 100 feet of this oil shale, and now, at the depth of 750 feet, where they are operating, this shale has become very soft, and a larger flow of oil came up than at any one time before. Some of this oil shale is so thoroughly impregnated with oil that, after being brought up and exposed to atmospheric action, quite large globules of pure oil ooze out on its surface.

COLORADO.

BOULDER COUNTY.

DIRIGO TUNNEL.—Work is steadily progressing, the tunnel having already penetrated the mountain 600 feet, intersecting a number of large veins of low-grade ore. The company proposes to continue work steadily until the Yellow Pine vein is reached. The tunnel intersects the New Enterprise and the western extension of the Williamson group. The company owns twenty-two claims on the line of the tunnel.

CHAFFEE COUNTY.

COLUMBUS.—It is stated that the mill will close down for the winter. Operations on the mine will, however, continue during the season.

GILPIN COUNTY.

CALIFORNIA.—The company now employs 30 stamps of its 50-stamp mill in Black Hawk, as also the full capacity of the Hidden Treasure 50-stamp mill on ore from that mine, making a total of 80 stamps now employed. In the California mill proper, there is attached to two five-stamp batteries a Frue vanner, the slimes from the batteries being deposited in a receptacle and thence elevated and treated on the Frue vanner. So far, it has proved very successful, and quite a saving over manual labor.

HINSDALE COUNTY.

ILLINOIS BOY.—This mine has been sold to the White Cross Mining and Milling Company. The mine will be worked at once.

LAKE COUNTY.

AMIE.—The company and lessees are both working, and nearly every shaft on the claim is operated.

CHRYSOLITE.—The shipments of iron ore by lessees have been suspended. The Marden lease on the Chrysolite mine, embracing the northwestern portion of the mine's old workings, has recently disclosed some very high-grade ore, and mineral in considerable quantity is hoisted daily that is literally covered with chloride of silver.

CUMMINGS & FINN.—These works will hereafter be known as the Fryer Hill smelter.

DAISY CONSOLIDATED.—The tramway, about 1200 feet long, running from the mouth of the Daisy tunnel proper down the steep mountain side to the ore-bins in the valley is almost completed. The Daisy tunnel shows ore-bodies that run from 80 to 300 ounces. The ore has an iron base, and carries about twenty per cent in lead. Work in the Elk tunnel of the consolidation has been postponed, owing to the fact that there is no way of taking care of the ore at the present time, nor will there be, perhaps, before spring. The ore in this tunnel is not as high-grade as that of the Daisy, but it shows a higher grade in each week's development. In excavating for the foundation for the hotel, a body of mineral has been exposed which has proved the richest and most extensive of any in the consolidation. It is an eight-foot vein of sulphurets, which runs about 300 ounces in silver and carries thirty-six per cent in lead. The vein has been cut in several places, and shows itself to be a true fissure, from which a large quantity of ore has been taken. Just above and to the left of this unexpected discovery, is another vein of high-grade ore which shows a large body of mineral, the extent of which is not at present known. Drifts, tunnels, and shafts have been made in this body, but as yet the walls are undefined.

LITTLE CHIEF.—The company is continuing to work in the northern end of the claim, securing some fair ore, but no new developments are reported. The sinking of the south or No. 9 shaft is also continued, and the dump shows some fair-looking contact matter, but no ore has so far been encountered.

MATCHLESS.—Operations continue without change, and a regular production is maintained. The exploration-drifts to the north and northeast of the north shaft, for a hundred feet past in seventeen-ounce siliceous ore, have lately penetrated a material carrying more iron, and the outlook for profitable ore-bodies to the north has greatly improved.

ROBERT E. LEE.—The drying and sampling-mill is kept employed continually on the ore hoisted daily from the mine. In addition to these shipments, the mine is shipping between 200 and 300 tons daily of second-class material from the dumps, accumulated during the past year. This material is sent both to stamp-mills and smelters. The dumps, before shipments were begun, contained from 12,000 to 15,000 tons of ore, estimated to contain from 15 to 30 ounces in silver to the ton.

SILVER CORD.—It is reported that the mine shut down November 15th. This is owing to the low price of lead, which greatly affects the ore of the character produced by the Silver Cord, and a disagreement with the smelters, which prevents the ore from being marketed to the best advantage. The company has decided to suspend its output until operations can be conducted more profitably

OURAY COUNTY.

CIMMARON.—The owners of this mine recently met the leading members of the Miners' Union, and proposed a compromise, agreeing to pay $2.75 per day and board. The union called a meeting and considered the matter, agreeing to accept the sum stated, provided the mine would reinstate the strikers. They also demanded other concessions. Twenty-five men went to work on the mines at from $2.50 and board up, and went to work armed. They apprehend another invasion from the strikers.

PARK COUNTY.

CHICAGO SAMPLING AND CONCENTRATING COMPANY.—This company, having purchased the Park County Sampling and Concentrating Works, located at London Junction, and having repaired the same, is now prepared to purchase good concentrating ores for cash.

SUMMIT COUNTY.

A number of mines on Gibson Hill, near Breckenridge, are working under leases and producing regularly. The Mayflower mine, in the same vicinity, is also shipping. The Gibson Hill Mining Company is working fifteen men and shipping from thirty to forty tons of ore a week. The Warrior's Mark mine, nine miles below Breckenridge, worked on a lease, is sending ore to Denver regularly. The mine looks better than ever before. The Brittle Silver Company's mill at Decatur has been started up. The Cashier mine, on Teller Mountain, in the Hall Valley District, was sold recently to an English company. The Little Chicago Mining Company has just let another contract for three hundred feet of work on its property on Sheep Mountain.

ROBINSON CONSOLIDATED.—The mine is again shipping about three cars of ore a day.

DAKOTA.

FATHER DE SMET.—The superintendent writes November 4th: I herewith inclose express company's receipt for bar No. 170, containing 1049·95 ounces of gold, the result of clean-up of mill for last half of October, making a total of 1798·65 ounces for the month. At the mine, the outlook remains about the same, no material changes having taken place to speak of. We have stopped work in Golden Gate south header, for the present, and will confine the work to opening out in ledge for a chamber, the header being far enough advanced for all purposes now. The east cross-cut, third level, has not developed any thing of much value as yet, but I feel hopeful of finding a better quality of ore in there soon. The mill is running well.

IDAHO.

MCNUTT.—This mine is on Moose Creek, in Lemhi County, and consists of a gravel bar, which is something like half a mile wide by two and a half miles in length, and embracing something more than 800 acres. This bar is twelve feet deep where it is now worked, and increases in depth as it goes up-stream. The

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upper hole, where sunk to the bed-rock, is twenty-three feet deep. The deposit contains no large rocks; every thing is run off by the current through the sluices. The washing is done by two Little Giants. The ground has been thoroughly tested over the whole extent, and this prospecting has been going on for ten years past. The gold averages from 930 to 941 fine, and brings $19 per ounce. The cost of machinery and improvements up to this time exceeds $100,000. At present, the washing season lasts only through the spring and summer months; but there is ample opportunity to increase the supply of water by new reservoirs to twenty times the present amount. The cost of such a reservoir is estimated at $20,000, ample material for the same being convenient.

MAINE.

SULLIVAN.—The company is making arrangements to prospect its mine with a diamond drill.

WEST LUBEC SILVER.—This company has temporarily suspended operations in the shaft, and is preparing to lay the foundations for heavy machinery, which will be put in running order this winter.

MEXICO.

A correspondent of the Mexican *Financier* writes from Zacatecas that mining industry there, already very lively, will be given a great boom by the coming of the Mexican Central Railroad; for the mines can be much more profitably carried on than by the slovenly methods now in vogue. The difficulty in the way of working the mines has been, not only the lack of improved machinery, but also the lack of fuel for running the machinery after it had been brought here. Therefore, however much inclined to adopt progressive methods the owners of mines might be, the patio process has been clung to out of necessity.

A great deal of American machinery will be put in here when the railroad is finished; for then the road will settle the fuel problem, bringing coal down from the north at rates which will enable the profitable working of the mines under modern processes. There has already been some American machinery put in here lately, but it has been at a great expense.

There are something like 150 mines in this district, and the output last year was $6,000,000 in silver. The profit, under the expensive patio process, is much curtailed as compared with modern methods, and from the rich character of the ore it may be anticipated that there will be a great demand for American machinery as soon as it is attainable.

The ore is chiefly black sulphurets. Gold is so seldom encountered that it is hardly worth while reckoning it as a product here. Virgin silver is very common in the ore. The ore grows richer as it goes down, but 1200 feet is about the greatest depth that has been attained, owing to the difficulty of pumping by the crude prevailing methods, and on this account many mines have been abandoned at a much less depth than that. Some mines here now yield very high, but the average is about 75 ounces.

MICHIGAN.

The men at the Ludington mine joined the Chapin mine strikers at Iron Mountain November 17th, and, with a brass band, paraded the streets from 800 to 1000 strong. Four hundred of them then surrounded Superintendent Stockbridge, of the Ludington mine, and, upon his refusal to yield to their demands, attacked, kicked, and beat him until he promised them any thing they wanted. The mob then started in search of Superintendent Cody, of the Chapin mine, but he had started for Milwaukee. The men threaten that, unless their demands are conceded, they will compel the stoppage of the pumps at the Chapin mines, and allow them to be flooded. Later reports have not yet been received.

A dispatch to the Boston *Herald* states that the shipments of iron ore from the Menominee and Marquette districts during the week ended November 19th show a still further falling off, compared with the same time last year. The shipments for the week from four lake ports aggregate only a trifle over 38,000 tons, against over 68,000 tons last year, a decrease of about 30,000 tons. The total for the year is very much less than for 1882. The record for this season to date is as follows: Escanaba, for both Marquette and Menominee districts, 1,385,080 tons; Marquette, 682,523 tons; l'Anse, 64,804 tons; and St. Ignace, 55,851 tons—the last three ports shipping for the Marquette District; total, 2,188,313 tons. The total for 1882 to this date was 2,751,226 tons, showing a decrease this season thus far of 562,913 tons. Earlier in the season, it was predicted by many that shipments would increase as the year advanced, and the most sanguine prophets estimated that the total shipments would equal those of last year; but the rate of decrease has grown greater as the season advanced, and the falling off now is greater than at any time before. The extremely cold weather last week led to the belief that the season would close early, and on all sides active work is almost at a stand-still. In most mines, only a small force of men is now employed. At many mines, the work of forwarding ore has ceased for the year. The largest amount shipped from any one mine during the year has been from the Chapin, the output from that mine being over 262,000 tons to date. Next come the Republic, Lake Superior, Champion, and Cleveland, in the order named. Chapin, however, shows a record far ahead of any other. The output of the Republic is about 151,500 tons. The superiority of Chapin's business is believed to rest largely in the fact that the royalty paid there is only 40 per cent, while the average of other mines is over 50 per cent, in some cases being as high as 65 and 70 per cent. At the royalty paid the owner in fee of Chapin, even at the comparatively low rate quoted, the amount so paid will be $108,000 for the season, placing Chapin's output at 270,000 gross tons, which it will probably be. This question of royalties will play an important part in the calculations of operations for the coming year, especially if the present depression in the iron trade continues.

ASHLAND MINING AND EXPLORING COMPANY.—This newly organized company has been at work for several weeks on section 27, town 47, range 47. Ore was recently struck, and a shaft has been sunk to a depth of 10 feet in clean blue hematite of most excellent quality. The extent of the vein has not yet been fully determined.

IRON HILL.—It is stated that work will be resumed soon.

MAY.—A pump and boiler will be placed on this company's property, when explorations will be pushed vigorously. Several test pits put down on the tract show a fair quality of hematite ore. A shaft some 20 feet in depth has been sunk.

PEWABIC.—Developments are watched with interest, owing to a slight improvement underground in the mine.

SAGINAW.—This company has a diamond drill exploring its property adjacent to the Perkins mine. Nothing of value has yet been reached.

VULCAN.—Only a small force of men is now employed. During the winter, the mine will be put in shape for rapid and economical production.

MONTANA.

DEER LODGE COUNTY.

GRANITE MOUNTAIN—On the 31st of October, the company shipped 72 bars of bullion, valued at $157,573. This was the product of 1434 tons of ore. As this was worked in a leased mill, it may be that the company will not be able to have any more milled for several months.

MEAGHER COUNTY.

CLENDENNIN MINING AND SMELTING COMPANY.—One furnace is at work, turning out daily from 150 to 175 bars of silver bullion, mostly from the Silver Bell mine.

MAGINNIS.—The amount of ore worked in October from the Hauser and Holter mines was 330 tons; amount of gold saved, 493 ounces; net value, $8756.75. The average assay value of tailings is $61 in gold and seven ounces in silver per ton—total value in 330 tons, $31,190. Total expense for mining and milling, $4.06 per ton. Owing to the great loss in tailings, the mill has been closed down with the intention of introducing pans in the spring.

SILVER BOW COUNTY.

MOUNTAIN VIEW.—It is said that this mine is an extension of the Anaconda. A shaft has been sunk 500 feet deep, and a fine grade of copper ore in the south 300-foot cross-cut has been struck. A north vein has also been intersected, and with a little more exploration, the extraction of ore on a large and profitable scale will begin.

NEVADA.

ELKO COUNTY.

BELMONT.—Winze No. 1, 55 feet north of face, is down 25 feet and yielding splendid black metal and chlorides. All stopes in south tunnel and Laity ground are yielding first-class ore, some of which assays very high; the mill is doing splendid work; chlorinations average 91 per cent.

GRAND PRIZE.—The mill has started and is working well. Pulp assays, so far, have averaged $224 per ton.

NAVAJO.—The mill is ready to start as soon as work of the drain-pipe through the North Belle Isle is completed.

EUREKA COUNTY.

MERRIFIELD.—This mine, after producing heavily for several years, was closed down last August, and has passed into the control of a New York corporation. All claims against the old management have been settled in full.

STOREY COUNTY.

The following is the report of County Assessor, showing the proceeds of the mines of this county, as they appear on the assessment-roll for the quarter ended September 30th, 1883:

Mine or company.	Ore extracted. Tons.	Value per ton.	Gross value or yield.	Total cost.	Net yield.
Belcher	1,400	$20.00	$29,150.11	$26,828.45	$5,830.02
Crown Point	3,985	13.00	55,309.33	53,511.19	11,061.86
Challenge	374	13.00	5,161.20	7,106.00	1,032.24
Consolidated Imperial	123	13.00	1,704.30	2,346.50	340.86
Kentuck	2,569	22.00	58,018.69	48,811.00	11,603.73
Ophir	773	16.00	12,063.44	27,637.72	2,412.68
Potosi	2,597	12.14	31,552.06	30,253.64	6,310.40
Yellow Jacket	3,325	14.00	46,983.64	75,900.35	9,396.72
					$47,968.52
Lady Bryan	143	$7.00	$1,001.00	$1,072.50	$100.10
Monte Cristo	319	12.69	4,048.31	4,048.31	809.66
Lady Bryan	600	5.00	3,000.00	2,850.00	300.00
					$1,209.76
B. Pfeifer's tailings mill	369	$2.00	$738.00	$738.00	$73.80

ALPHA AND EXCHEQUER.—The work at these mines is prosecuted very economically. During the month of October, the total expense of the two mines was $3400, including wages, salaries, and supplies. The joint west drift from the Imperial shaft on the 600 level has been extended a total distance of 150 feet. It will be run to the west wall, and is expected to cut through a promising body of quartz in its progress.

BEST & BELCHER AND CURRY.—A change of material has occurred in the joint Best & Belcher and Curry winze, below the 2550 level. It is a black, decomposed matter, which looks like slag from a furnace, and contains much base metal, principally iron. They are putting in machinery at the Banner shaft preparatory to resuming work on the 1200 in the Gould & Curry, and are now at work in four different places in Curry.

NEW HAMPSHIRE.

WARREN.—A number of experiments are making in smelting the ore by the vapor fuel process. The ore runs from 35 to 40 per cent zinc, 8 to 10 ounces silver, shows a trace of gold, 11 per cent lead, and about 35 per cent of sulphur. The vein is a true fissure, and is from 4 to 30 feet thick, and has been traced upon the property for a distance of more than 6000 feet. Some 8000 tons of ore are in sight. Two shafts have been sunk, and every thing is in readiness for taking out the ore. A large amount of private capital has been used in putting the property upon its present paying basis.

NEW MEXICO.

GRANT COUNTY.

BONNIE JEAN.—The shaft is down 273 feet and the outlook is very favorable. Sixty-five feet of cross-cutting at the 200-foot level shows up four distinct veins or spurs, running in copper, silver, and gold to the value of $61 per ton. This was above the water-level, which was struck at the depth of 270 feet. A fifty horse-power engine, with hoisting machinery complete, has been purchased and shipped to Shakspeare.

IVANHOE.—The reverberatory furnace has blown in lately and is running satisfactorily. There is enough ore on hand to keep the furnace running all winter. However, a force of men will be kept at work on the mine, taking out ore to fill the contract with the Deming smelter.

CINCINNATI.—This mine has a good pay-streak of silver ore, from which it is taking out about two car-loads per week and shipping to Pueblo and receiving profitable returns.

UTAH.

EMERY COUNTY.

The ore of this new mining district near Cedar Mountain is said to be found in sandstone similar to that of Silver Reef. Ore is said to be abundant, and wood and water plentiful. The country is reported mild and excellent for winter work.

SALT LAKE COUNTY.

TRUE FISSURE.—At this mine, a large body of ore is developing with satisfactory results.

VALLEJO.—The recent strike in this mine is the largest made in Alta for several years past. The ore assays 130 ounces silver, and there are about 200 tons ready for shipment.

SUMMIT COUNTY.

CRESCENT.—At the recent meeting, the following directors were elected: President, E. P. Ferry; Vice-President, J. J. Daly; Treasurer, W. S. McCornick; Secretary, C. H. Withey. The report presented shows receipts from ore sales $348,000. Expenditures: Dividends, $150,000; purchase of Walker & Webster, $50,000; permanent improvements and property on hand, $148,000; total, $348,000. The "property on hand" item includes supplies for the mine sufficient to last until July 1st, 1884.

ONTARIO.—The shaft at the No. 3 has reached a depth of 855 feet, and the work of cutting the stations is to be commenced at once. Burleigh drills are to be used to hurry forward the work. These stations are deeper by about twenty feet than the 800 in No. 2, and when completed a tunnel will be run to carry the water from No. 2 to the tank station of No. 3, from which place it will be thrown to the 600 tunnel by the Cornish pumping-engine. Ore is mined at the 900 station of No. 3, and shipped to the mill. At No. 2, preparations are carried forward to cut the vein at the 900 level, which will be 100 feet deeper than the lowest workings in the mine at the present time. It is calculated that the cross-cut from this station will cut the vein in about sixty feet.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 23.

Business was better and more generally distributed in the mining market this week, and especially was this noticeable in the dividend-paying stocks. Chrysolite formed the chief interest in the market, and was very actively dealt in. It was quite strong at one time, but declined to-day. It is the belief that the advance is to create a "short" interest, as there are no new important developments from the mine. Green Mountain developed considerable strength under moderate dealings. The reports from this property seem to be favorable. Some of the low-priced or fancy stocks foot up a large total in dealings, but they suffered no material change in price. A full summary of the market is given below. The total number of shares sold aggregates 181,788, as against 121,565 last year.

The Comstock shares were very quiet at steady prices. California sold at 25c. Consolidated Virginia was irregular, under a fair business, selling from 45@39@40c. Sierra Nevada was quiet and steady at $3.25. Union Consolidated was weak, declining from $3.70@$3.10 under a small business. Mexican was strong, selling from $2.65 $3@$2.80. Ophir sold at $6. Sutro Tunnel was moderately dealt in at steady prices; it sold from 14@16@15c.

The Leadville stocks were quite strong, and were very actively dealt in. Amie was active and steady, selling from 14@13c. Chrysolite was quite strong under a very active business; it sold from $1.30@$1.70@$1.45. There has been no rich and important strike made in the Marsden shaft, as was currently reported, and an officer of the company states that there have been no new developments made in the mine. Dunkin was quiet at 20c., and Breece sold at 14c. Iron Silver was actively dealt in at irregular prices, selling from $2.40@$2.30. The bullion product from this mine for the month of October amounted to $110,000, and the profit for the month, $21,000. The company states that it will pay its usual dividend next month although the showing for October is not so good as the preceding month. They state, however, that they have ample funds on hand for that purpose. Leadville was weak, under a small business, selling from 55@45c. Little Chief was steady under small transactions, selling from 54@58@55c. Little Pittsburg was quiet and irregular, selling from 55@50@51c. Climax sold from 6@9c., and was actively dealt in.

The Bodie stocks were quiet and steady. Bodie Consolidated sold at 50c. Standard was quiet and steady, selling from $6.25@$6.50@$6.38. Bulwer was weak, under a small business, selling from 49@40c. North Standard sold at 13c.

The Tuscarora stocks were moderately dealt in at steady prices. Grand Prize sold from 33@30c. Belle Isle was quiet and steady at 34@30c. Navajo sold at $4 under a small business. North Belle Isle was quiet and steady, selling from 55@50c. Independence sold at 20c. Elko Consolidated was steady under a small business, selling from 19@18c.

In the miscellaneous list, Eureka Consolidated was irregular, selling from $4@$3.50@$3.75 under a small business. Green Mountain was quite strong, under a small business, selling from $1@$1.20; it is reported that the advance in this stock is owing to reports from the mine that the tunnel is making a progress of eight feet a day, and is rapidly nearing the famous Blake chute. It is also said that the company made a small profit last month. Homestake sold from $9@$8.75@$10, with small transactions. Horn-Silver was strong, under a fair business, selling from $6@$6.63@$6.50. Ontario was weak, selling from $30@$29; the transactions were small. Robinson Consolidated was quiet and weak, selling from 41@36c. Sierra Grande was also weak, under a small business, selling from $1.10@90c. Silver King was strong at $7.

Barcelona was quiet and steady, selling from 22@25c. Caledonia showed a little weakness, declining from 25@20c. under a small business. Central Arizona was quiet and steady, selling from 17@24c. Decatur sold at 5c., with a very active business. Eastern Oregon was very active at steady prices; it sold from 43@45c. Harlem was strong, under a small business, selling from 99c.@$1.10. Lacrosse was considerably dealt in at weak prices, selling from 10@7c. Oriental & Miller was quiet, and sold from 2@6c. Red Elephant sold at 6c. under a small business. Sonora Consolidated was very actively dealt in at steady prices; it sold from 28@25c. North Mexican was listed on the Exchange this week, and was quite strong at 65c. at one time; it declined to-day, however, to 30c., but reacted and closed at 55c. The property of this company is situated in the Magdalena District, Sonora, Mexico, and consists of three developed mines and a two-stamp mill. The company proposes to add six more stamps, which are now on the way to the mines. It is said that the company has expended about $45,000 in developing the property alone. The mines are within ten miles of the Sonora Railroad.

The New York Mining Stock and National Petroleum Exchange and the Exchange for Unlisted Securities have consolidated, the members of the latter Exchange paying $200 for membership in addition to $40 *pro rata* on life insurance fund.

DIVIDENDS.

The Ontario Silver Mining Company, of Utah, has reached the eighty-ninth dividend ($75,000 for October), and aggregating a total paid of $5,075,000. The present dividend is payable at the office of transfer-agents, Lounsbery & Haggin, No. 15 Broad street, on November 30th. Transfers close on the 24th.

The Plumas-Eureka Gold Mining Company, of California, paid a dividend of 50 cents a share, in London, on the 12th ult., aggregating $20,312.50. Total of dividends this year, $40,625.

The Sierra Buttes Gold Mining Company, of California, paid a dividend in London on the 12th ult., of 25 cents a share, aggregating $5625. Total of dividends this year, $11,250.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

The advance in prices two weeks ago from $1.10@$1.19 has been pretty well sustained, the lowest price on the reaction being $1.15¾. On Thursday, amid great excitement, the price was advanced from $1.17⅝, the opening, to $1.19⅞ in New York, and $1.20 in Oil City.

The range of fluctuations during the week has thus been from $1.15¾@$1.19⅞. To-day (Friday) the opening was $1.19⅛, but the market shaded off to $1.18¼, but rallied a little and closed at $1.18¾.

The general tone is decidedly bullish on the decreasing stocks of oil and diminishing production. The bulls freely predict $1.25@$1.30 oil, and claim that the Standard is inclined to advance Refined, which is now 9c., strongly bid, and that it will exercise a very bullish influence on crude; that if, last fall a year ago, prices were put to $1.36, and the past summer to $1.24½, the situation now warrants still higher prices.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Nov. 17	$1.17	$1.17⅝	$1.16⅝	$1.17	6,619,000
19	1.17	1.17	1.15¾	1.15⅞	7,226,000
20	1.15¾	1.18¼	1.15¾	1.18⅛	6,645,000
21	1.18¼	1.19	1.17¼	1.17⅝	8,132,000
22	1.17⅝	1.19¼	1.17⅝	1.19¼	8,697,000
23	1.19⅛	1.19¼	1.18⅛	1.18¾	6,219,000
Total sales					43,808,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Nov. 22, 1883.

The market for copper stocks the past week has ruled extremely dull, but at the same time there is a good degree of firmness to prices, which gives encouragement for a better time coming. There are but few stocks offered for sale at present prices, and, should an active demand set in, we look for a considerable advance, especially on the dividend-paying shares. Calumet & Hecla dropped one point on the early dealings to $237, but quickly recovered and is now steady and in good demand at $238. Franklin advanced from $11⅛@$11¾ on sales of 50 shares. A dividend of $2 per share is talked of as probable some time next month. Quincy sold at $52, same as last week. Atlantic sold at $10; last sale $10¼, September 11th. Nothing doing in the rest of the list.

In silver stocks, there is a firmer tone, and better demand for good stocks. Catalpa advanced from 30@37½c. Crescent sold at 20c. Bowman Silver has been active, and, on good reports from the mine, advanced from 11@20c., with a reaction to 17c. The stock is well held, and higher prices are predicted. Massachusetts & New Mexico sold at 2c. Dunkin, sales at 26@28c., same as last week. Sullivan sold at 94c., closing 90c. bid.

3 P.M.—There was no material change in the market this afternoon. Prices continue firm. Sullivan sold at $⅞. Catalpa, $⅝ bid. Calumet & Hecla, $238; sales closing $237 bid, $239 asked. Quincy, $50 bid, $52 asked. Pewabic, $3½ bid, $4 asked. Atlantic, offered at $11 Osceola, offered at $19, no bid. Silver Islet, $3 bid, $4 asked.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Nov. 16.	Nov. 17.	Nov. 19.	Nov. 20.	Nov. 21.	Nov. 22.
Albion	....	....	....	....	1⅛	1
Alpha	1⅜	....	....	....	1⅜	....
Alta	1¼	1¼	2¼	....	....	....
Argenta	.10	....	....	....	....	....
Bechtel	....	....	....	....	.05	.80
Belcher	....	....	....	....	.35	....
Belle Isle	.35	....	....	....	3⅛	3
Best & Belcher	3⅜	3⅜	3¼	....	.50	.45
Bodie	.50	.35	.40	....	....	....
Bullion	....	....	....	....	.25	.25
Bulwer	.25	.30	.25	....	2	1⅞
California	2	2	2	....	.40	40
Challar	.40	.45	.40	....	1	.85
Con. Virginia	....	.95	.85	....	.20	.20
Crown Point	....	....	....	....	4	....
Elko Cons	....	....	....	....	....	....
Eureka Cons	....	....	....	....	1⅛	1¼
Exchequer	1¼	1⅛	1⅛	....	.35	.30
Gould & Curry	.35	....	....	....	1⅛	1⅛
Grand Prize	1⅛	....	....	....	....	....
Hale & Norcross	....	....	....	....	....	....
Independence	....	....	....	....	2½	2⅝
Martin White	2¾	2⅞	3⅞	....	....	....
Mexican	....	....	....	....	3¾	....
Mono	3	3	3¼	....	3⅞	3⅞
Mount Diablo	3¼	....	....	....	4	4⅛
Navajo	4¼	4¼	3⅞	....	....	....
Northern Belle	....	....	....	....	5⅞	5⅞
North Belle Isle	5	5	5½	....	....	....
Ophir	....	....	....	....	.60	.60
Overman	.60	.60	.65	....	.50	.50
Potosi	.60	.60	.60	....	....	....
Savage	.50	....	....	....	3⅛	2⅞
Scorpion	3⅝	3⅝	3⅝	....	....	....
Sierra Nevada	....	....	....	....	....	....
Silver King	....	....	....	....	3⅝	3¼
Tip Top	3¾	3¾	3¾	....	2¼	2¼
Union Cons	2¼	2¼	2⅜	....	....	....
Utah	....	....	....	....	2¾	2¾
Wales Cons	....	....	....	....	....	....
Yellow Jacket	2⅞	2⅞	2¾	....	2¾	2¾

BULLION MARKET.

NEW YORK, Friday Evening, Nov. 23.

As foreshadowed in our last week's postings, the silver market has declined, and may be reported as still weak under the lower rates of exchange on India, and is likely to recede still farther.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Nov. 17	50 11-16	110⅝	Nov. 21	50½	110
19	50⅝	*	22	50 9-16	110
20	50⅝	110¼	23	50½	110

* 110¼@110⅜.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended November 23d, as compiled from various sources, amounted to $161,000, as against $257,000 reported for the previous week. The receipts from January 1st, 1883, to date are $10,316,443.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended November 17th	$30,750
Corresponding week last year	54,400
Since January 1st, 1883	12,980,109
Corresponding period last year	44,668,621

Imports.

Week ended November 17th	$1,442,751
Corresponding week last year	457,166
Since January 1st, 1883	18,900,413
Corresponding period last year	5,485,335

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £21,000 bullion, but its proportion of reserve to its liabilities was unchanged at 42¼ per cent, against 40⅝ per cent at this date last year. November 22d, the bank lost $193,000 bullion on balance. The weekly statement of the Bank of France shows an increase of 525,000 francs in gold and a loss of 1,475,000 francs in silver.

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Silver for Dimes.—A special purchase of 50,000 ounces of silver bullion has been made by the Treasury Department. It is to be used in coining a sufficient number of dimes to supply an unusual demand for that coin on the Philadelphia Mint.

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of October.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	.....	$779,099
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal....	10,199	199,859
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	.....	426,967
*Boston & Montana, G.	Mont...	2,908	138,015
*Central Arizona, S.	Ariz..	.....	35,845
*Christy, S.	Utah..	17,744	219,459
*Chrysolite, S. L.	Colo....	16,288	327,779
*Consolidated Bobtail, G.	Colo...	6,996	54,982
*Contention, S.	Ariz..	.....	714,637
*Crescent, G. S. L.	Utah...	40,820	266,498
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak..	52,922	388,562
*Derbec Blue Gravel, G. S.	Cal ...	12,464	115,043
Dunkin, S. L.	Colo....	6,291	49,250
Evening Star, S. L.	Colo...	.....	47,061
*Father de Smet, G.	Dak....	29,805	300,681
*Frisco M. and S. Co., G. S. L.	Utah...	.....	$77,084
*Granite Mountain, S.	Mont...	157,573	323,523
Gunnell, S.	Colo...	.....	58,828
*Haile, G., S., C.	S. C....	.....	27,900
*Head Center Consolidated	Ariz..	.....	43,247
*Head Center and Tranquillity	Ariz..	.....	89,108
*Hecla Consolidated, G. S. L.	Mont...	**	633,979
*Homestake, G.	Dak..	99,113	866,709
*Hope, S.	Mont...	.....	82,060
Horn Silver, S. L.	Utah...	263,000	2,737,200
*Howell S. and Mg. Co., G. S. L.	Ariz....	30,588	144,877
Idaho, G.	Cal	.....	150,642
*Independence, G. S.	Nev....	.....	32,991
*Iron Silver, S. L.	Colo...	.....	1,031,952
*Jocuistita, S.	Mex...	.....	‡258,959
*Kentuck, G. S.	Nev	.....	18,596
*Lexington, S.	Mont...	86,843	1,054,551
*Little Pittsburg, S. L.	Colo....	7,133	72,111
*Marguerite, G.	Cal	.....	68,794
*Martin White, G. S.	Nev....	.....	136,317
Morning Star, S. D.	Colo...	.....	84,428
Mount Diablo	Nev....	47,108	428,250
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	33,278	539,105
*Ontario, S. L.	Utah...	211,800	1,807,178
*Oxford, G.	N. S....	3,880	54,055
*Phœnix, G.	N. C....	.....	21,009
*Pinal Consolidated, S. L.	Ariz	.....	181,485
*Plymouth Consolidated, G.	Cal	77,008	373,090
*Satemo, G.	N. S....	.....	2,500
*Silver Bow, G. S.	Mont...	.....	203,947
*Silver Cord, G. S. L.	Colo...	.....	703,333
Silver King, S.	Ariz...	.....	367,802
*South Yuba, G.	Cal	.....	37,272
Standard, G.	Cal	88,397	963,619
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah...	21,761	215,552
Syndicate, G.	Cal	.....	56,008
Tintic M. and M. Co.	Utah...	.....	34,670
*Tip Top, S.	Ariz....	.....	87,868
*Tombstone, G. S. L.	"	59,057	664,618
Wyoming Consolidated.	Cal	.....	31,541
Yellow Jacket, S.	Nev....	.....	265,885
Total amount of shipments to date			$19,604,804

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Nov. 23.

Copper.—The market has been very quiet during the week. The Lake companies are not sellers, there is very little copper offering by outsiders, and the demand is moderate. We quote nominally 15c. for Lake, and 14⅛@14¾c., according to brand, for other kinds. The latest cable for Chili Bars is £59 7s. 6d.

The following are the Board of Trade returns, just received, for the first ten months of the current year, the figures printed last week having been for the first nine months:

	Jan. 1 to Oct. 31. 1883.	1882.
	Tons.	Tons.
Imports:		
Pure in pyrites	12,814	13,161
precipitate	18,465	14,706
ore	13,444	13,045
regulus	7,823	7,193
Bars, cakes, etc.	29,698	29,510
	82,244	77,615
Exports:		
Raw (English)	14,000	10,525
Sheets	12,965	13,569
Yellow metal at 60 per cent	10,008	9,285
Brass at 70 per cent	2,842	2,825
	39,815	36,204
Foreign	9,633	10,814
	49,448	47,018

Tin.—Under a good deal of trading, this metal has weakened further, and is now quoted 19¼c. for spot Straits, cash. This afternoon, London broke to £86 10s. for spot, according to a dispatch received at the Metal Exchange.

Lead.—In the middle of the week, the agent of one of the Western refiners took 1000 tons of Pueblo at 3·70c., and since then a few hundred tons have been sold at that figure. Buyers are too much frightened at the recent rapid decline to show any confidence in the metal, so that some of them who might be induced to take hold if they considered the metal low are holding off, and it would probably be difficult even to place any round lots at more than 3·65c. for Common, so far as the manufacturing trade is concerned. We are approaching a dull season, and there is not much encouragement in the early future for the metal.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

The price is declining, there being more sellers than buyers in the market. Sales during the week foot up to 150 tons of Refined at 3·60c., and 300 tons of ordinary Missouri at 3.50c. Refined will not bring over 3·50c. now.

Messrs. Everett & Post, of Chicago, telegraph us to-day:

Our market has declined slowly since our last report on sales of 110 tons at 3·45c. It closed somewhat better, with sales of 500 tons at 3·47½c.; and though some sellers still ask 3·45c., buyers are shy about anticipating their wants.

Spelter.—There is nothing new to report. Common Western is dull at nominally 4⅝@4½c., with Silesian at 5½c. asked.

Antimony.—This metal is stiffer to-day. We quote at the close, 9¾c. for Hallett's and 10½c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 23.

The following figures, taken from the report of the British Board of Trade, show the exports of iron and steel from Great Britain to this country during the first ten months of this and preceding years:

	1881.	1882.	1883.
Pig-iron	347,242	422,863	245,742
Old iron for remanufacture	74,594	77,002	41,576
Steel unwrought	103,350	122,453	28,471
Tin plates	146,611	182,815	184,251
Hoops and sheets	30,753	31,875	27,538
Bar, angle, bolt, and rod	11,521	18,076	8,064

American Pig.—We print elsewhere an abstract of Mr. Swank's statistics of stock and of the condition of the furnaces, which is encouraging as far as it goes. Briefly, it shows that stocks have fallen off a little, and that the number of furnaces in blast is less. On the other hand, it must not be forgotten that from July to November is the busiest part of the year in many branches, and that though the demand was disappointingly small this year, it is likely to be still less during the next months. This explains the apathy of buyers, and should not be forgotten by producers, or cause any undue rejoicing over Mr. Swank's figures. They will not do for a "bull" argument, but, on the other hand, they do not leave any opening for a "bear" attack. The market for Foundry irons is quiet and dull. We quote Foundry No. 1, $20@$22.50; No. 2, $18.50@$19; and Gray Forge, $17@$18.50, all at tide-water. There has been some business in Bessemer Pig, which we quote $20 @$20.50. Spiegel is quiet at $30.50@$31.

At the Exchange, the following transactions were reported during the week: Saturday, 100 tons No. 1, December, $20; Monday, 100 tons No. 1, March, $20.50; Tuesday, 200 tons No. 1, February, $20.50; 200 do., March, $20.50; 200 do., April, $20.50; Wednesday, 100 tons American Pig, No. 1, March, $20.50; Thursday, 100 tons No. 1, December, $20; 500 do., March, $20.50; 100 do., April, $20.50; 200 do., February, $20.50; 200 do., March, $20.50; 200 do., April, $20⅝; 200 do., May, $20⅝.

Scotch Pig.—The market is dull and depressed, and in spite of the fact that arrivals are moderate, some of the iron goes into store.

We quote ex ship and to arrive: Coltness, $23; Langloan, $23@$23.25; Summerlee, $22.50@$23; Eglinton, $20@$21; Glengarnock, $21.75@$22; Dalmellington, $20@$21.

At the Exchange, the following cable quotations were received to-day: Coltness, 55s.; Langloan, 55s.; Summerlee, 54s. 6d.; Gartsherrie, 52s. 6d.; Glengarnock, at Ardrossan, 52s. 6d.; and Eglinton, at Ardrossan, 46s. 6d. Warrants at the Exchange to-day were 44s. 8d.

Rails.—Business has been confined to the sale of a number of small lots, aggregating probably between 15,000 and 20,000 tons, varying according to time and locality of delivery between $35 and $36.

Old Rails.—Business has been dull. We quote $22.50@$23.

Philadelphia. November 23.

Pig-Iron.—Since Monday morning, a large amount of Gray Forge has been sold, for delivery after January 1st. The average price has been $18. Brokers and representatives of companies here are more confident this week than for two or three months, not of any improvement in price, but of a sufficient demand to absorb all stocks as produced. The decline in producing capacity has gone as far as is necessary, and the corner has been turned by the presentation of requirements which have been withheld all the fall. Forge iron has sold in 500 to 1000-ton lots, and to-day negotiations are pending for 1000-ton lots, which brokers expect to close by Saturday. The outlook is quite encouraging, as far as mill irons are concerned. Standard brands are in better request; that is to say, consumers are coming forward and paying prices which have been asked for a month past. There is still a good deal of inferior iron offered, but it is less troublesome than a few weeks ago. In short, there has been a great deal of quiet purchasing for future requirements. Nothing encouraging can be said of foundry iron. Quotations are, $20@$21 for No. 1, and $18.50@$20 for No. 2. Most of this week's business has been in 25 to 100-ton lots, at $19 and $20.50 respectively.

Foreign Irons.—Movements in foreign irons have practically ceased. Nominal quotations are $20@ $20.50 for Bessemer, and $29.50@$30.50 for Spiegeleisen. Two or three brokers have been selling a few hundred tons of Scotch at all kinds of prices. Supplies here are very light, and there is very little disposition to order for shipment.

Muck Bars.—Business in muck bars is of very small proportions. A number of contracts have been completed, and no new ones are placing. A few sales of small lots have been made at $33.50. Better makes are held at $34@$34.50.

Merchant Iron.—The local manufacturers held a meeting here on last Monday, and reduced the card rate to 2·10c. At the meeting, the opinion was expressed that trade was very dull. Few large orders are coming along; a comparatively small amount of iron is selling above 2c.; the better makes have been sold at this figure; 1·90c. has been taken for some good iron, and there are negotiations pending which will, no doubt, be taken at that price. There is still some competition from the West, and Eastern makers have no recourse but to follow it as far as they can.

Nails.—Nails have weakened, on account of the sharp competition of new mills, which are pushing their product upon the market. Jobbing demand is irregular, and there is less disposition on the part of consumers to buy far ahead, owing to the great excess of capacity. Nominal quotations, $2.80@ $2.90.

Plate and Tank Iron.—The lowest sales of Plate Iron have been at 2·25c.; 2·50c. is the nominal quotation for small lots, and there is a moderate amount of business done at that figure. Shell is nominally 3@ 3·25c.; and Flange, 4@4·25c. The demand is not very active, and consumers are providing merely for pressing requirements; but there is no great falling off in work.

Sheet-Iron.—Eastern Pennsylvania sheet-iron manufacturers report the demand for thin sheets fair, considering the season. Galvanized is less active, and, where large orders are to be had, concessions are heavier than at any time during the fall, as makers are very anxious to secure a winter's work.

Wrought Pipes and Tubes.—Quotations, 70 and 10 @75 per cent off list for gas and steam pipe, and 60 @62½ for tubes.

Structural Iron.—To-day's quotations are 2·40@ 2·50c. for Angles; 2·75@3c. for Tees; and 3·40@ 3·50c. for Beams and Channels. Prospects are favorable for the placing of orders for several thousand tons of bridge iron.

Steel Rails.—Quotations are $35 for late and $36 @$37 for early deliveries, with considerable negotiations in hand. The closing down of two mills, and the intended closing of two more, will, by the 1st of December, restrict the capacity 72 tons per turn, out of a total of 269 tons per turn, or a little over 25 per cent of the output. This will help the steel rail market materially, especially if it should be supple-

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Nov. 17. H.	Nov. 17. L.	Nov. 19. H.	Nov. 19. L.	Nov. 20. H.	Nov. 20. L.	Nov. 21. H.	Nov. 21. L.	Nov. 22. H.	Nov. 22. L.	Nov. 23. H.	Nov. 23. L.	SALES.
Alice, Mon.													
Amie Con., Co.	.14	.13	.14	.13	.14		.14				.13		8,000
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.			.34		.30								600
Bodie Cons., Ca.	.50												50
Breece, Co.			.14										500
Bulwer, Ca.									.49		.40		250
California, Ne.			.25										200
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Castle Creek					1.10	1.05	1.15		1.00				700
Chrysolite, Co.	1.30		1.30		1.60	1.35	1.55	1.45	1.70	1.50	1.60	1.45	22,550
Cons. Va. Ne.	.44	.40	.45		.42				.43		.42	.39	5,100
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.					.20								50
Eureka Cons., Ne.	4.00	3.75	3.50		3.85		3.95		3.75				500
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.					.05								600
Gould & Curry, Ne.													
Grand Prize, Ne.							.33	.30					300
Great Eastern, Dk.			.01										1,000
Green Mountain, Ca.	1.00				1.00		1.20	1.15	1.20		1.20		1,700
Hale & Norcross, Ne.													
Hall-Anderson, N. S													
Hibernia, Co.													
Homestake, Dk.			9.00	8.75					10.00				225
Horn-Silver, Ut.	6.13		6.00		6 63	6.50	6.50	6.25	6.00		6 63	6.25	3,500
Hukill, Co.													
Independence, Ne.			.20		.20								2,500
Iron Silver, Co.	2.45	2.20	2.40	2.35	2.40		2.40	2.35	2.40	2.35	2.35	2.30	8,290
La Plata, Co.													
Leadville C., Co.					.55	.50	.45		.49	.47	.45		2,825
Little Chief, Co.			.54		.54		.55		.55		.58	.55	2,200
Little Pittsburg, Co.			.50		.55	.50	.52				.51		1,100
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.					4.00				4.00				150
Northern Belle, Ne.							4.00		4.00				225
North Belle Isle, Ne.							.55	.50			.50		600
Ontario, Ut.	30.00				29.50		29.00						505
Ophir, Ne.							6.00						100
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.	33.00												100
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.40		.40		.41		.37		.39		.38	.36	3,200
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	.93		.91		1.10						.90		340
Sierra Nevada, Ne.			3.25						3.25		3.25		320
Silver King, Ar.					7.00								100
Spring Valley, Ca.													
Standard, Ca.			6.50		6.25				6.50	6.38	6.38		305
Stormont, Ut.							.10						1,000
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Nov. 17. H.	Nov. 17. L.	Nov. 19. H.	Nov. 19. L.	Nov. 20. H.	Nov. 20. L.	Nov. 21. H.	Nov. 21. L.	Nov. 22. H.	Nov. 22. L.	Nov. 23 H.	Nov. 23 L.	SALES.
Albion													
Alta-Montana													
Barcelona, G	.22		.23		.22		.24		.25	.24	.25		6,700
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'lcher, G. S.													
Big Pittsburg, S. L													
Bradshaw, S.													
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G													
Clav'r's W. & M. Co.													
Cal., B. H., G.	.25	.20			.25	.20							900
Central Ariz'na, S.	.18	.17			.20		.24	.20					3,925
Cherokee, G.													
Chollar													
Climax, Co.	.08	.06	.06		.08	.07	.09						8,100
Cons. Imp'ri'l, G.S.													
Cons. Pacific													
Crowell, G.													
Dahlonega, G.													
Decatur	.05		.05		.05		.05				.05		30,500
Dunderberg													
Durango, G.	.04								.03				2,300
Eastern Oregon	.45	.43	.45	.43	.44	.43	.45	.44	.45	.44	.45		14,400
Elko Cons.					.18		.19				.18		1,700
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.			.99		1.00	.99	1.00		1.00		1.10	1.00	3,200
Hortense, S.													
Imperial													
Lacrosse, G.	.10	.07	.08		.08				.07				2,250
Lucerne													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.	2.85		3.00		2.75		2.80						500
Miner Boy													
Mono													
North Mexican					.60	.50	.65		.65	.60	.55	.30	2,400
North Standard, G.	.13												100
N. Horn-Silv'r, S.L.													
Pri'n'l & Miller, S.					.09		.06						250
Parnell													
Rappahannock, G.													
Red Elephant, S.			.06		.06				.06				1,700
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.28	.26	.27		.27	.25	.26	.25	.26	.25	.26	.25	25,100
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel	.15	.14	.16	.15	.16	.15	.15		.16		.15		7,650
Taylor Plumas													
Unadilla, S													
Union Cons., G. S.					3.70	3.60	3.50		3.10				375

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 63,688. Non-dividend shares sold, 112,050.

BOSTON MINING STOCKS.

	Nov. 16. H.	Nov. 16. L.	Nov. 17. H.	Nov. 17. L.	Nov. 19. H.	Nov. 19. L.	Nov. 20. H.	Nov. 20. L.	Nov. 21. H.	Nov. 21. L.	Nov. 22. H.	Nov. 22. L.	Sales
Allouez													
Amie	.14						.15						300
Atlantic	11.00						10.00						40
Aztec													
Bodie Con.													
Bonanza D.	1.60						1.60				1.63		1,350
Bowman Sil	.12½	.12	.12½	.12	.16	.14	.21	.16	.19	.16	.18	.17	15,800
Bruns. Ant.													100
Bulwer			.50										
California													
Cal. & Hec.							238	237	238		238	237½	46
Catalpa			.52		.34	.32			.38	.35	.37½		2,700
Co. Virginia													
Copper F'lls													
Crescent					.12½		.15		.20	.15	.20		1,450
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin											.28		800
Elko Con							.27						
Empire	.26	.25	.25		.27	.26	.25		.25		.25		7,050
Eureka Con.					4.00						4.00		30
Franklin							11.75		11.75				70
Gila County													
Hancock G.													
Harshaw			.50										200
Horn-Silver	6.50												10
Huron													
Independ'ce													
Indian Queen													
Maumoth					.02								300
Mass. & N.M.									.02		.03		2,050
Milton													
Napa													
National													
Ontario													
Osceola													
Penn-Breck.													75
Pewabic	3.75		3.75				3.75		3.75				
Pine Tree													
Plymouth													
Quincy	52.00				53.00	52.00					52.00		42
Ridge													160
Robinson					.42								
San Pedro													
S'ra Grande													
Silver Islet													
Silver King													
Simpson Gd													300
Sonora Con					.28				.27				
South Pac'c													
Standard													
Sullivan	.94		.94		.94		.93		.94	.93	.92	.87½	1,300
Sutro Tun.							.16		.16				400
Sycamore													
Twin Lead.													
Vizina													

PHILADELPHIA MINING STOCKS.

	Nov. 16. H.	Nov. 16. L.	Nov. 17. H.	Nov. 17. L.	Nov. 19. H.	Nov. 19. L.	Nov. 20. H.	Nov. 20. L.	Nov. 21. H.	Nov. 21. L.	Nov. 22. H.	Nov. 22. L.	Sales.
Amer. Cons.													
Argent	.22		.23		.21		.20	.19			.18	.16	11,400
Arizona So.													
Battle Mt.													
Buena													
California													
Calisas													
Chrysolite													
Cincinnati	.10												1,000
Comprom'e	.17		.18		.17		.19		.20		.23		2,484
Contention													
Con. Virg.													
Dauntless													
Del Monte													
Denver City			.15		.13	.11	.14	.12	.13		.15		37,300
Eureka													
Girard													
Governor													
Grand Uni'n													
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Gulch	.03								.03				14,200
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dis'd													
Little Maud													
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan													
Navajo													
North'n B'l													
Orion													
Orion Pref.													
Palmetto E.													
Pembina											.11		1,000
Penn-Breck.					.06		.05		.06		.06	.04	10,200
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis	.08		.09		.09		.09		.09				1,900
Rara Avis E.	.07		.07		.07						.07		5,600
Record													
Rico Pion'r													
Sierra Apac.							.20	.19					1,500
Sierra Be.la.					.60		.57½	.55					1,100
Sierra G'nde	.92½				.92½		1.05	.90	.90		.87½		6,300
Sierra Nev.													
Silver Cord			1.02½		1.05		1.05	1.02½	1.02½	1.00			2,700
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l													
Tombstone			.75						.75		.77½		950
Victor													
Yale Mt.													

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mented by one or two other suspensions which are rumored in the West. Large buyers are holding back orders in view of a further reduction in prices, which, it is thought, will follow the 10 per cent reduction in wages which has been announced in two mills, and will go into effect in all others.

Old Rails.—A few thousand tons of old rails have been ordered in 500 to 1000-ton lots, mainly American, at $23@$23.25.

Scrap-Iron.—There is a fair demand at $24@$24 50 for No. 1, and $18@$21 for No. 2.

Pittsburg. November 21.

Our leading manufacturers have been talking this week more gloomily than at any time for a year past. They have been interviewed frequently and have expressed themselves without reserve. They are of the same make, cast in the same mold. Demand is irregular, prices low. There is no inducement to continue production; consumers are holding off. Gray Forge is selling slowly at $17@$18. Very little Foundry is moving, and that at inside figures. An occasional lot of Bessemer is called for at $21, four months. Muck Bars are without any activity at $32. A restriction in the output of bar iron has been made. Several mills have come to single turn. A good many puddling-furnaces have been laid off. There is no remedy for the present state of things, excepting a heavy restriction of production. Much demand, however, is held back, which would be presented if the trade were settled. Merchant Bar is selling at from 1·75c. up. Nails, $2.50@$2.60. The five weeks' suspension will help to steady prices for a time; for the fact that producing capacity is far ahead of requirements is likely to prevent any great activity for a long time to come. Wrought pipes are 75 per cent off list. Old rails are wanted in large lots, but buyers' views are 50c.@$1 below those of sellers. Steel rail mills are well supplied with business to the last of the year, and have a few good orders for delivery next year at $35. There are numerous offers at $34@$34.50, which have not been accepted.

The window-glass strike is still unsettled. Manufacturers are resolved to fight the strike, and are importing glass to supply customers' requirements.

The oil trade is manipulated by the Standard Company, and an upward tendency is the result, but it is thought that this will result in a drop.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 23.

Anthracite.

The market for anthracite is getting into an uncomfortable shape, as some of the sizes, which until now have done fairly well, like stove, are beginning to exhibit the signs of weakness that are the result of accumulation, and the market is more now than it has been in buyers' favor. It is unfortunate that the companies do not appear to be able to reach any understanding, and it is understood that one or two of the managers insist that their plans be carried out. The main subject of difference so far as we can trace it, is that some of the companies want to repeat the old-time dodge of three days' stoppage, which means very little in the way of restriction, because the quantity brought to market is only very slightly reduced. The only thing that can be done is to stop for a week at a time, alternate weeks, and keep it up until the supply is in good shape. An announcement of such a decision would have the effect of promptly bringing out requirements now withheld.

Bituminous.

The Cumberland coal trade held a meeting at Baltimore, at which it was unanimously decided to continue the present organization, created at the time of the labor troubles.

Vessels from the Cumberland shipping ports are in better supply. Current business is small, is closely contested for, and is often taken at low figures.

Mr. John H. Jones, official accountant, has issued the following statement of anthracite coal tonnage for the month of October, 1883. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	Oct., 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.....	1,328,809	8,489,686	5,626,994	I. 2,862,692
Central RR. of N. J.....	*.....	1,745,399	3,485,091	D. 1,739,692
Lehigh Valley RR.....	†675,243	5,225,464	4,840,589	I. 384,876
Del., Lack. & W. RR.....	543,515	4,218,650	3,813,712	I. 404,938
Del. & Hud. Canal Co....	‡379,478	2,910,342	2,563,220	I. 347,122
Penna. RR...	298,900	2,288,787	1,973,329	I. 315,457
Pa. Coal Co..	180,087	1,276,682	1,202,423	I. 74,259
N. Y., L. E. & W. RR	38,240	306,783	217,925	I. 88,857
Total. ...	3,426,273	26,461,793	23,723,284	I. 2,738,509

* Included in tonnage of the Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 9275 tons.

‡ In addition, there were 61,928 tons transported from the mines by the Delaware & Hudson Canal Company, during October, which are included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points October 31st, 1883, was 604,865 tons; on September 29th, 1883, 538,490 tons; increase, 66,375 tons.

Buffalo. November 19.

The all-absorbing topic of the past week was the weather which prevailed for several days here and all around the lakes. The velocity of the wind varied from 25 to 60 miles an hour. Heavy snow-storms and occasionally severe frosts diversified the situation. Ice formed on Buffalo River Thursday and Friday. Probably 100 vessels have been lost on the lakes, with property worth over $500,000. The death-roll already numbers forty persons. A newspaper writer says: "It would appear that the lakes are fringed with stranded craft, which are in a more or less critical state of wreck or threatened dissolution." Vessels ashore, waterlogged, or breaking up with valuable cargoes are reported from all points (including several of our finest and largest propellers and barges). Many vessels loaded with coal have not been heard from, and grave doubts are entertained as to their safety. In fact, the storms were the most serious of any recorded for years, and the beginnings of them were unheralded in any way—a sudden change from delightful, balmy fall weather to arctic cold and blustering gales of blinding snow.

President Sloan, of the Delaware, Lackawanna & Western Railroad, is reported to have said that he has made arrangements to establish extensive coal-yards and depots at South Chicago, on the grounds and docks of the Calumet & Chicago Coal and Dock Company. Buffalo is the point whence a line of barges will start, and the road will make its own rates without the necessity of dividing with other railroad companies. If the supply of coal laid in during the summer months should not prove sufficient to fill the demand, the Delaware, Lackawana & Western can forward all the coal it needs directly to the proposed yards during the winter by any of its Western connections.

The St. Paul & Pacific Coal and Iron Company has decided to build a large coal-dock on Connor's Point about three miles from the center of Duluth. The dock will be built solid, and have a frontage of 1000 feet, with an average depth of 290 feet; the storage capacity will be 100,000 tons of coal. The end of the new dock will be 2600 feet from the end of Rice's Point, or about midway between the center of Duluth and Superior. It is proposed to have the structure ready for business by May 1st next. The estimated expense is $50,000.

Chicago. November 17.

The Delaware, Lackawanna & Western Railroad Company is about to follow the example of the Lehigh Valley Coal Company, and establish large coal-yards and distributing depots at South Chicago. These new yards will be located on the docks and grounds of the Calumet & Chicago Coal and Dock Company, from which point the Delaware & Lackawanna has excellent facilities for handling its coal business from its western terminus at Buffalo. The company will run a line of barges from the latter point, which will admit of its making its own rates from the mines to Chicago.

Horsford's Acid Phosphate,
In Seasickness.

Prof. ADOLPH OTT, New York, says: "I used it for seasickness, during an ocean passage. In most of the cases, the violent symptoms which characterize that disease yielded, and gave way to a healthful action of the functions impaired."

ONTARIO SILVER MINING COMPANY,
Mills Building, 15 Broad Street,
NEW YORK, Nov. 19, 1883.

DIVIDEND NO. 89.

The regular monthly dividend of FIFTY CENTS per share has been declared for October, payable at the office of the transfer-agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on the 30th inst.
Transfer-books close on the 24th inst.
LOUNSBERY & HAGGIN, Transfer-Agents.

MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch : 9 miles, 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale. 1 inch : 10 miles. Size, 26×30 inches. Pocket form, $1.50; as a wall-map, $2.

SAN JUAN MINING REGION (COLO.).—Kibbe's Geographical and Geological Map of the San Juan Mining Region. 1881. Shows county lines, wagon-roads, stage routes, trails, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half inch to the mile. 22×27 inches. Includes, on same sheet, a reduced Map of the State of Colorado. Printed in colors, with board covers. $1.50.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S. Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats: Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea-level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch : 10·5 miles. Size, 31×40 inches. Pocket form. $1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, $1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26·6 Mexican Leagues to the degree, and 69·16 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53×41 inches. Printed in colors. Pocket form, $5.

MAP OF MINING CLAIMS ADJOINING LEADVILLE, California Mining District, Lake County, Colo. By Edward Rollandet. 1879. Mounted on muslin, $2.50. In cloth-bound covers, $2.

MINING MAP OF UTAH.—Showing the location of the Mining Districts, over an extent of territory 150 miles from North to South. Compiled from U. S. Government Surveys and other authentic sources. Scale, one inch to four miles. Colored. 1879. Pocket form. $1.50.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored, 1878. $3.50.

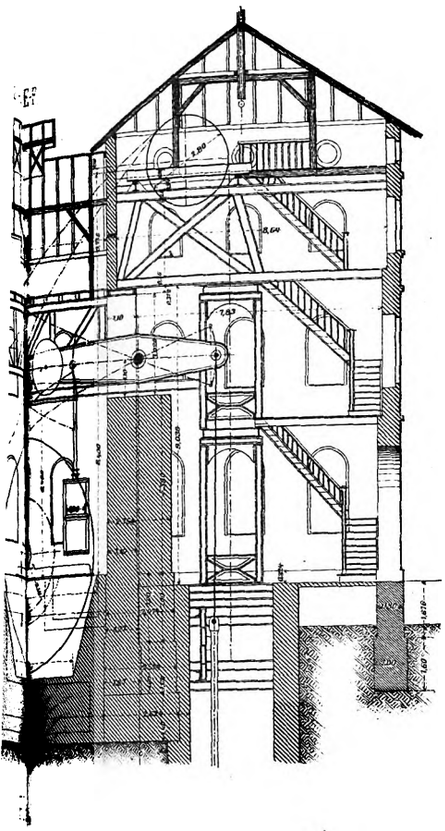
POCKET MINING ATLAS OF THE MINES OF THE UNITED STATES.—Showing the Mines of NEVADA: the Comstock Lode, the Eureka, Treasure Hill, and Tuscarora Districts; CALIFORNIA, including Map of the Bodie District; COLORADO, including the Leadville, Silver Cliff, San Juan, Caribou, and Central City Districts; DAKOTA, including Map of Deadwood; MONTANA, IDAHO, UTAH, ARIZONA, NEW MEXICO, LAKE SUPERIOR REGION, the SOUTHERN STATES. 1880. Printed in colors, and bound in flexible leather covers. Price, $1.

SAN JUAN MINING REGION (COLO.).—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28 × 38 inches. Pocket form, stiff paper cover. $1.50; or as a wall map, $1.50.

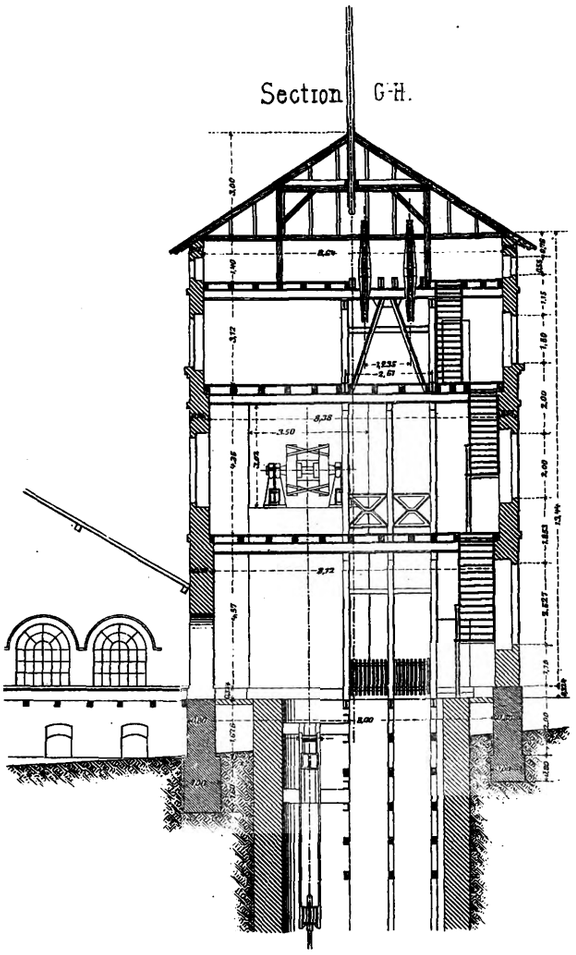
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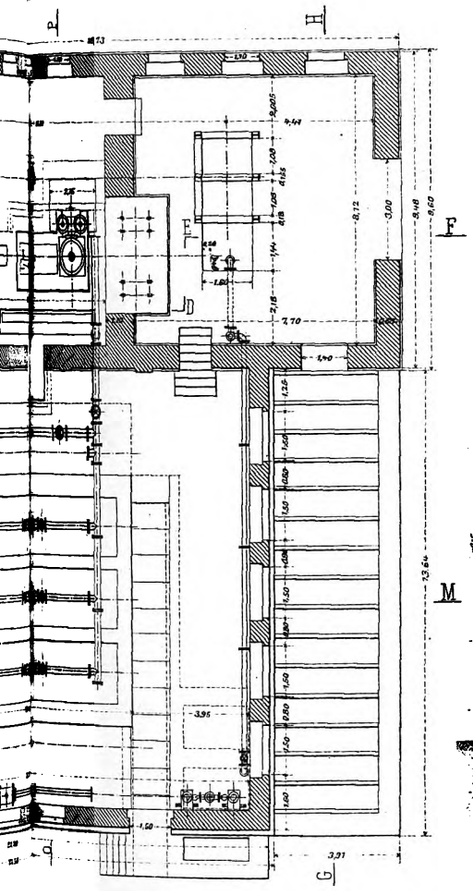
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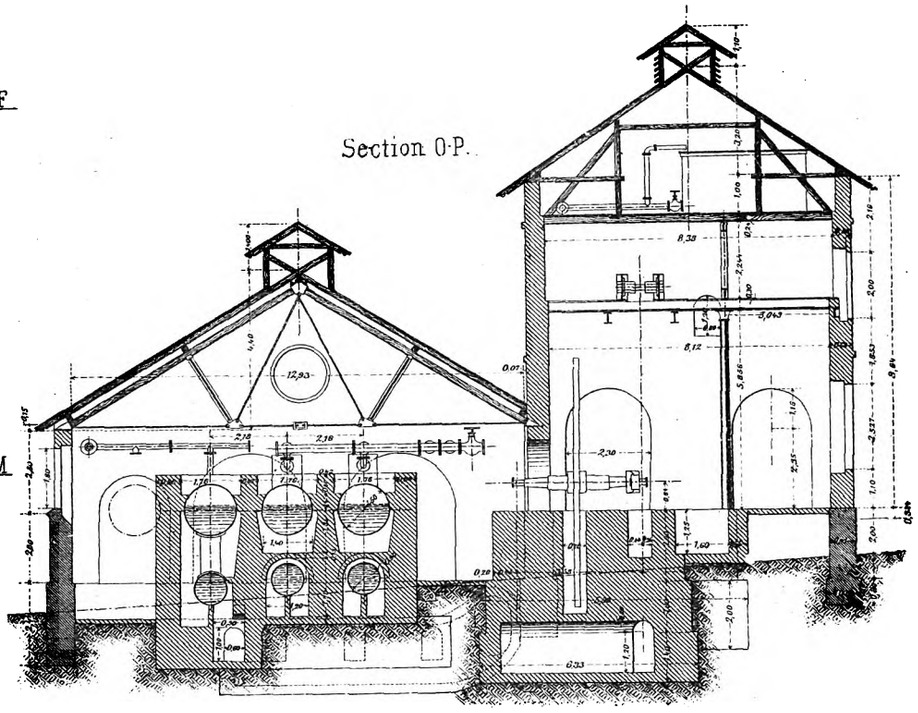


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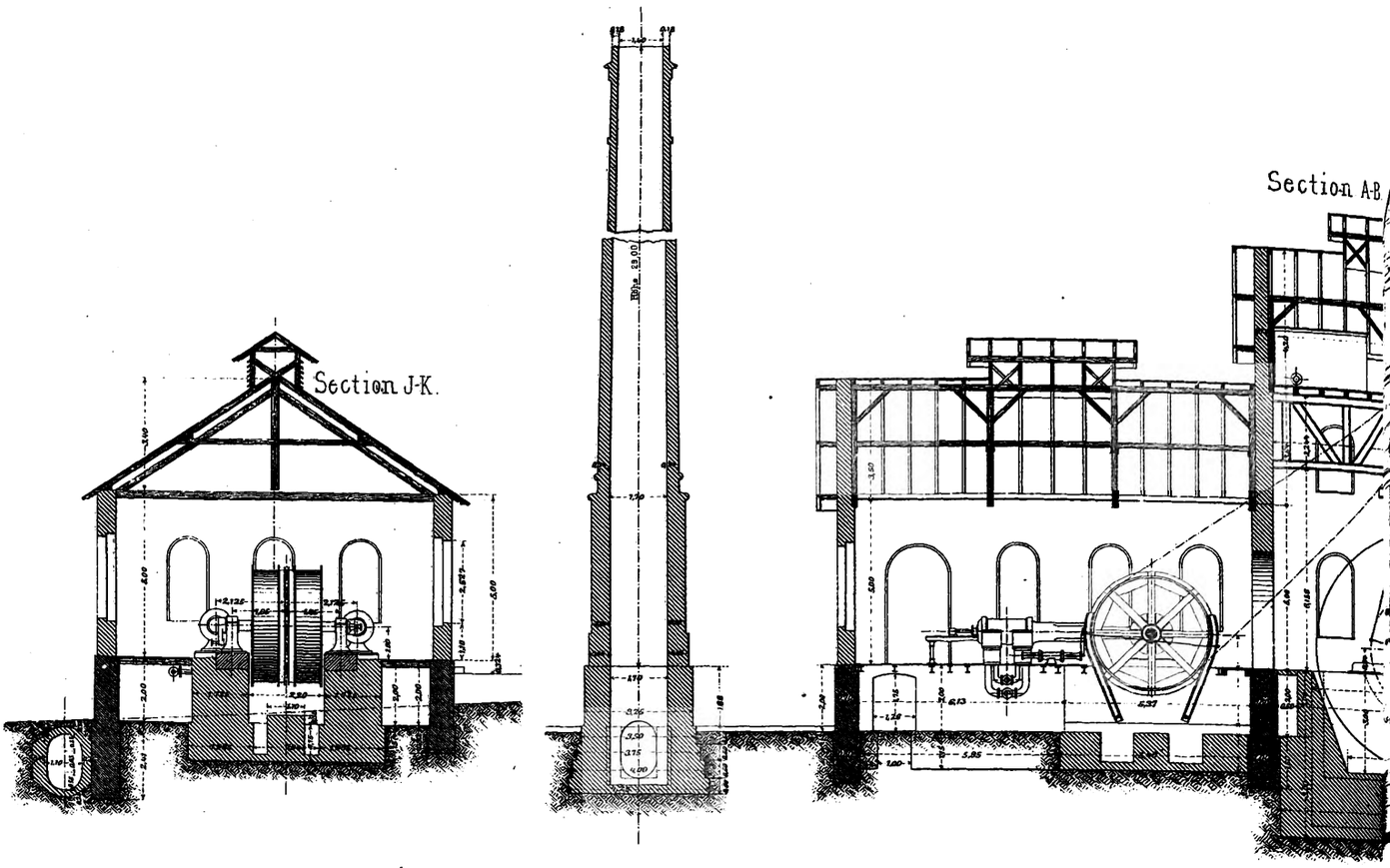


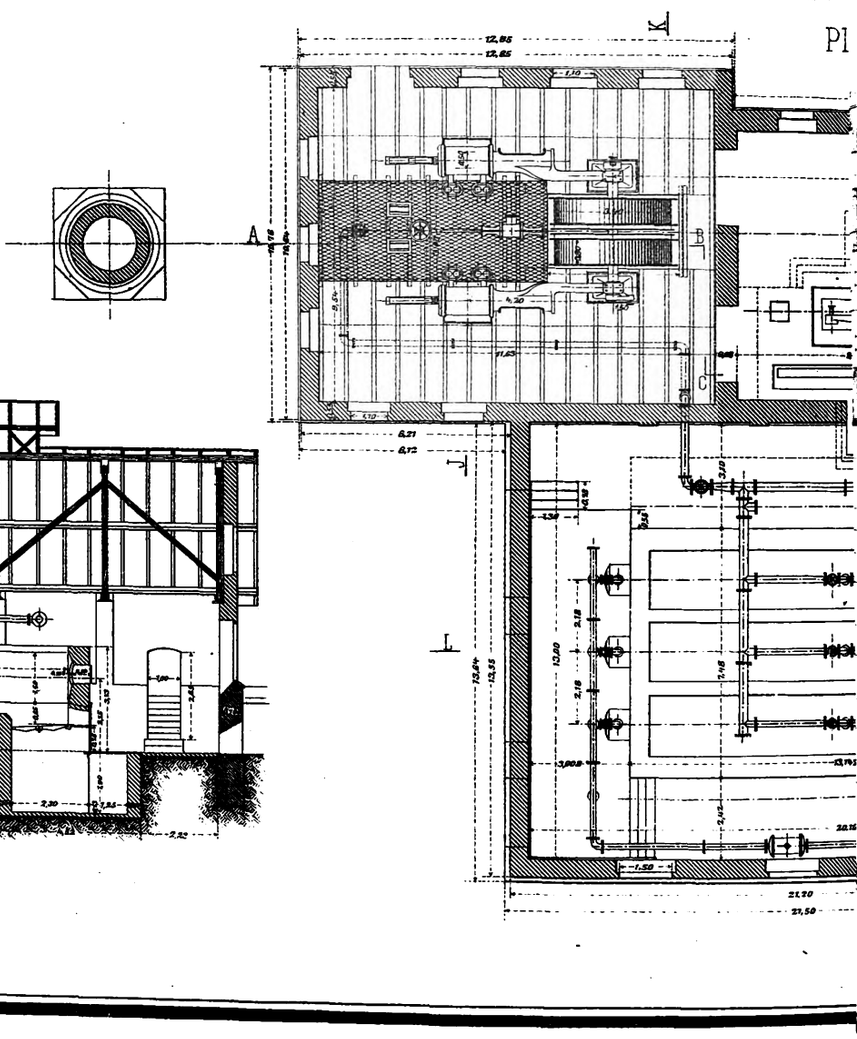
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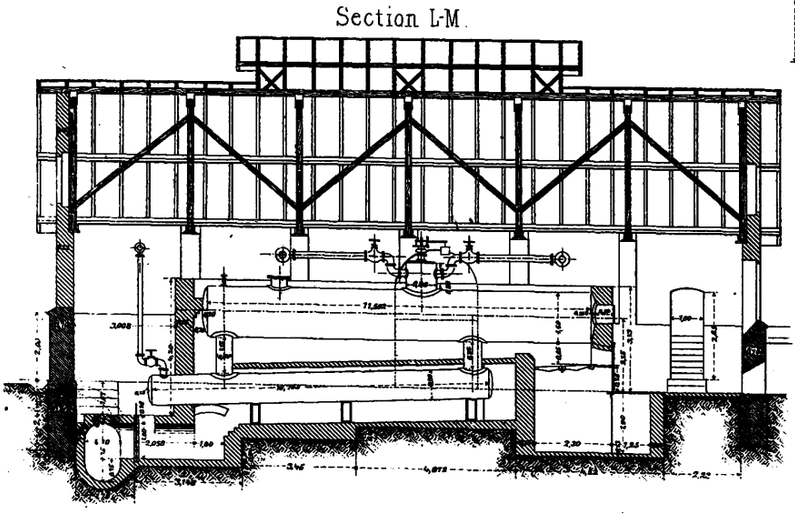


LAN OF THE BINDWEIDE MINE, GERMANY.

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THE ENGINEERING AND MINING JOURNAL

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VOL. XXXVI. WITH SUPPLEMENT. No. 22.

RICHARD P. ROTHWELL, C.E., M.E., ROSSITER W. RAYMOND, Ph.D., CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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WITHIN the past week, several severe accidents have taken place, due to the breaking down of electric light wires and subsequent discharge of the current into the bodies of men and animals who accidentally came into contact with the wire. It is likely that the recognized danger of such wires above ground will lead to an agitation to place them beneath the surface where they can do no harm.

A FACT that is not without its significance as affecting the future of Leadville is the growing quantity of sulphide ores which are now produced by some of the mines. It remains to be seen whether or not their appearance does not mean the depression of the average grade. It is certain that they will, to some extent, increase the cost of production, and another year may see every smelter in the camp provided with roasting stalls, which thus far the Harrison works have been the only ones to build.

A VERY interesting series of figures has been compiled by Mr. WILLIAM HOSEA BALLOU on the time of maturity of the funded debt of the railroads in this country, which is summarized in the following table :

1925	None mature.	1932	$37,652,380
1940	$90,000	1885	37,924,727
1977	508,000	1889	42,265,763
1942	917,000	1896	44,016,000
1970	1,000,000	1912	45,842,000
1933	1,350,000	1895	47,985,982
1984	1,824,000	1901	52,121,500
1980	3,000,000	1891	52,635,032
1976	3,182,000	1894	53,535,000
1924	3,880,000	1897	55,733,00
1914	6,525,000	1915	57,372,000
1928	8,000,000	1906	64,950,142
1923	8,188,000	1898	66,818,500
1929	12,111,300	1930	67,594,189
1884	13,785,809	1908	79,586,128
1886	14,844,600	1919	81,068,500
1926	16,503,000	1933	81,3?6,000
1916	19,305,895	1909	89,114,560
1887	19,602,068	1902	90,978,985
1951	22,550,000	1904	91,009,900
1889	24,675,000	1903	96,651,483
1917	26,520,000	1900	102,187,941
1913	27,200,000	1899	114,892,573
1888	32,138,100	1911	120,200,395
1927	33,397,828	1910	151,075,362
1909	33,547,400	1922	151,878,750
1892	33,928,520	1931	162,381,800
1918	36,245,588	1905	164,985,450
1893	36,300,597	1920	172,533,629
1907	37,061,448	1921	220,424,080

A fact which few apparently realize is, that as an investment the $3,184,415,200 of bonds have proved better than the $3,456,078,196 of railroad stock, the interest on the former exceeding the dividends on the latter by $47,263,946, and how large are the sums running at high interest is shown by the following table giving approximately the amounts paying the different rates of interest :

Per cent.	Amount.	Interest.
3 on	$4,000,000	$120,000
4 on	30,000,000	1,200,000
4½ on	35,000,000	1,575,000
5 on	620,000,000	31,000,000
6 on	1,397,000,000	63,820,000
7 on	991,000,000	69,370,000
8 on	100 000,000	8,000,000
10 on	3,000,000	300,000

The question is often asked whether there is no danger of a financial disaster in times when large amounts of bonds become due. Such a period would be from 1915 to 1922, when in the aggregate $750,000,000 are to be met. Mr. BALLOU holds that it will not, because the amount of money in circulation, at the present rate of increase, would be such that the railroads will find it possible to issue new series at possibly lower rates.

OUR IMPORTS OF IRON AND STEEL.

Though somewhat late, the Bureau of Statistics has issued a volume giving the imports and exports of merchandise classified by countries. The figures are worthy of a close study, because they reveal from whom, principally, we draw our supplies, and who our main customers are.

We have grouped the imports by the countries from which the supplies have come. Beginning with Great Britain, we have the following figures for the fiscal year ended June 30th, 1883 :

IMPORTS FROM GREAT BRITAIN.

	England. Net tons.	Scotland. Net tons.	Ireland. Net tons.
Pig-iron and castings	343,908	143,513	3,437
Bar-iron	34,325	674	.....
Band, hoop, and scroll iron	5,327	227	.....
Iron rails	5,790	.....	.....
Sheet-iron	10,560	126	.....
Scrap	31,952	2,391	150
Anchors, cables, and chains	817	.....	.....
Steel ingots, bars, and sheets	$4,679,008	$167,919	$105,875
Steel rails	108,302	.....	9,145

A second group is Belgium, Germany, France, and the Netherlands, and it should be noted that the bulk, if not probably all, of the iron and steel returned as coming from the latter country is really merchandise in transit from one or the other of the former two countries :

	Germany. Net tons.	Belgium. Net tons.	Netherlands. Net tons.	France. Net tons.
Pig-iron	9,507	10,894	5,475	3,645
Bar-iron	2,518	1,028	.....	.....
Steel ingots, bars, and sheets	$993,678	$3,947,004	$2,180,988	$35,741
Steel rails	3,285	4,410	.....	.....

In the aggregate, it will be seen these figures are large, and the fact that Belgium is so very large an exporter to this country of steel in its various forms is one which we believe very few are aware of. Together, continental works send us steel valued at upward of seven millions of dollars, exclusive of rails, while Great Britian exports to this country only about five millions of dollars in value. Other countries, of course, supply us with comparatively little iron and steel. It will suffice to state that Russia sends to our country nearly one thousand tons of sheet-iron, while Sweden and Norway ship 3869 tons of pig-iron, 19,727 tons of bar-iron, $69,998 worth of steel. It is interesting to note from how many quarters we get scrap-iron. Out of the aggregate of 70,964 tons, valued at $1,240,490, the following countries sent us in the fiscal year 1883 more

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than 1000 tons each, thirty-one countries outside of those mentioned in the following table sending all the way from one to seven hundred tons:

IMPORTS OF SCRAP-IRON.

	Gross tons.
Argentine Rebuhlic	1,084
Belgium	1.452
Brazil	1,121
Denmark	1.770
Germany	12,611
England	31.952
Scotland	2,391
Canada	2,867
British East Indies	4,983
Netherlands	3,300
Peru	1,148
Cuba	2,149

Turning to the metals, exclusive of tin, the imports, of course, are small. Out of the 2751 tons of lead, England sent us 1034 tons, Germany 500 tons, and Mexico 596 tons. Copper ore came to us from Canada to the amount of 526,694 cwts., valued at $120,869. The bulk of the spelter and sheet-zinc, of course, comes from Germany, the record showing imports of 7820 tons of spelter and 667 tons of sheet-zinc, while 621 tons of spelter and 724 tons of sheet came from Belgium. A small quantity coming from England, and by way of the Netherlands, makes up the total of 8662 tons of spelter and 1645 tons of sheet-zinc.

From the detailed statement of the port of entry of the different classes of iron and steel, we select a few to show in which manner the business is distributed:

PORTS OF ENTRY.

	Pig-iron. Net tons.	Bar-iron. Net tons.	Old scrap. Gross tons.	Steel, ingots, etc. Value in 1000 dollars.
Baltimore	72,471	40	293	$1,153
Boston	40,984	31,970	1,708	2,947
New Orleans	6,962	278	24	21
New York	255,248	18,964	31.530	1,266
Philadelphia	79,270	1,618	12,784	76
San Francisco	20,217	5,044	14,800	47

It will be noticed that while Baltimore gets a fair share of pig-iron and a very heavy proportion of the steel, it gets little of any thing else. Boston imports nearly three millions worth of steel and a high proportion of the bar-iron, while Philadelphia, taking a good share of the raw material, is no very favorable place, apparently, to consign finished goods to. As for steel rails, it is principally the Southern and Pacific ports which are favored with that intruder, being, as we have had occasion to remark repeatedly, the weakest points. The following table will illustrate this fact:

IMPORTS OF STEEL RAILS, BY PORTS.

	Net tons.
Baltimore	1,292
Bath, Me	1,535
Beaufort, N. C	2,171
Boston	240
Galveston	5,603
Mobile	6,902
New Orleans	43,399
New York	3,333
San Diego, Cal	3,498
San Francisco	57,167

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Alice Mine of Montana.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Can you aid some of the Eastern stockholders of the Alice Mining Company to obtain late and reliable information about the condition and prospects of the property? What we desire is *dividends;* and if it is not possible to pay them honestly, we wish to know why it is not. When dividends ceased in 1881, it was understood that certain extensive and much needed improvements were to be made. The shaft was to be sunk deeper; the mills were to be reconstructed; the Magna Charta and the Valdemere claims were to be paid; and all this being done, we expected that the property would be in a condition to make larger profits than before.

It is generally understood that the improvements have been made, and that the company is out of debt. In September last, there were rumors that, with the greatly increased production and the accumulation of a reserve fund, dividends would soon be resumed. All the information gathered at the mine and mill by the enterprising local newspapers is favorable and encouraging. We hear that the shaft has been sunk to the 800-foot level, and that stoping has been begun there on the pay-chute. The vein is said to be strong and rich. On the 10th of November, or a short time previous to this date, the mine was reported to be producing 60 car-loads of ore daily, assaying from 150 to 200 ounces per ton; "better ore than any taken out for years." The Magna Charta was also sending from 50 to 60 tons of ore ot the mills daily. The value of the product for the month of October, according to the *Butte Miner*, was $105,836.63, and the disbursements $41,600. According to the *Salt Lake Tribune*, the shipments of bullion from the mine for the year up to November 5th amounted to 641 bars of silver, valued at $859,887.57. It is presumed that this information is correct. The product is large—at the rate of over a million a year—and the showing is favorable, but we have very little information about the management and the expenses. Is the property skillfully and economically managed? Are the ores properly worked? These may be questions for an expert to answer; but it is possible that some of your able correspondents at or near Butte may be disposed to throw some light on the subject.

STOCKHOLDERS.

PROGRESS IN THE MINING INDUSTRY OF YAVAPAI COUNTY, ARIZONA.

Special Correspondence of the Engineering and Mining Journal.

In looking over the work done this year in Yavapai County, we see that much progress has been made, although perhaps not as much as many persons expected, and might have expected at the beginning of the year. We have to record the suspension of work at the Tip Top mine, after a production of about $2,000,000. Whether it is a permanent stoppage or not time will tell. The mine reached a depth of over 800 feet, and throughout the ore has been high-grade; but the misfortune has been, that the vein was narrow and the wall-rocks very hard, making the mining very expensive. There are some "chloriders" at work in the neighborhood of the Tip Top who are doing well, the ores being sent to San Francisco or to Benson.

Some developments of copper ore have been made at Castle Creek, and a smelter erected; but, as is too often the case, the smelter was started before the mine was in a condition to supply the necessary ore, and a suspension was the natural result. In the Peck District, the year's results have been very cheering. The Tuscumbia mill, having passed into the hands of the Black Warrior Company, has been kept steadily at work for some months, thus enabling that company to develop its mine in a manner that it well deserves. All reports of the mine and its management are of the most satisfactory character. The latest reports from the Peck mine say that a splendid body of ore has been struck in sinking the mine deeper, quite worthy of the Peck in its palmiest days. The unwatering of this mine was started something over a year ago, and the ore taken from new openings has more than paid the expenses incurred in putting the works in order, after a suspension of several years. In the Turkey Creek District, several companies have been at work with varied success, but none very promising. Probably the less said about them the more satisfactory to those interested. The main feature of this district has been the discovery of the Pine Spring mine, probably the richest discovery of silver that has ever been made in the territories. The ore is horn-silver and the native metal. In sinking the first fifty feet, some $60,000 worth of ore was taken out—or rather, it netted that to the owners. Of course, this produced great excitement for a time, but not greater than was warranted by such a rich find. The ground was located for a long distance around the discovery, and some of the prospectors have found other bodies of ore, though not as rich as the first discovery. The Pine Spring shaft has reached a depth of 102 feet, and is still in ore. On the heels of this discovery comes another on Pine Flat, also in Turkey Creek District. This is also horn and native silver, and is said to surpass the Pine Spring discovery; but I have learned nothing of the facts as yet, and therefore can say nothing more of it. The rocks of this district are mainly syenitic gneiss. The ores are in most all cases high-grade, but the deposits, so far as known, are not continuous. Still, in no case have they been tested to any depth greater than 100 feet, and seldom that, and but little drifting has been done, so that a positive opinion can not safely be given.

In the Hassayampa District, the Dosoris and Blue Dick mines have been holding their continuous and profitable course, particularly the former mine. I should like much to be able to give you statistics of these and other mines, but that is not possible, as most of the companies of this section are, more or less, private corporations, and therefore reliable figures are not to be obtained, and it is better not to give any rather than to guess at them. There are some chloriders at work in this district, whose ores are hauled to Ash Fork, and find their way to Denver and elsewhere.

In the Lynx Creek District, the Howell Smelting Company has been in continuous operation during the year, and has sent large amounts of bullion out of the country. Nearly all the ore smelted has come from the Belle mine. In the summer, a mill of ten stamps was added to the works, which have been kept running on ore also from the Belle. No other work, except that of prospecting, has been done in this district, and that mostly on old claims. No discoveries of moment have been made.

The next point of interest is the Aqua Frio District, in which is located the Copper Mountain Mining Company's works and the Silver Belt mine. The Copper Mountain Company erected a water-jacket smelter of 30 tons capacity in the spring, and put it in successful blast, but, finding that the mine was not sufficiently opened to keep it going, stopped after a ten days' run, and since then has been engaged in opening the mine. The results of the run made were satisfactory, and it was simply a question of a supply of ore. Good progress has been made in opening the mine, and it is expected that the company will soon be able to make a fair start with the smelter again. At the Silver Belt, a hoisting-engine has been erected, the shaft sunk 130 feet deeper, the drifts are opening fine ore, and all indications are, that the mine is proving richer in depth. There has been a steady production of ore the whole year, part of which was smelted at the Howell works: but most of it has been hauled to Maricopa, for Benson, or to Ash Fork, for Eastern smelters. They have been engaged the last few months, very successfully, in concentrating the lower-grade ore, large quantities of which are on hand in the dump, which is the accumulations of several years.

The porphyritic slate belt in which the Copper Mountain mine is situated crosses the Aqua Frio near that mine, and continues northward to the Black Hills, skirting those hills on the western slope or foot. It has been prospected to a limited extent throughout its length, and several fine openings or discoveries of copper and silver ore have been made; rather I should say argentiferous copper ore, as it is mostly gray sulphuret with heavy oxide and carbonate croppings. The most notable of these discoveries are the Homestake and Rambo mines, at the southwestern foot of the Black Hills. At the former of these two mines, much fine high-grade silver ore was encountered at the start, and extending for a depth of from 20 to 30 feet. The shaft has been sunk to a depth of a little over 100 feet, and the show for a large copper mine is of the most satisfactory nature. At the Rambo mine, two shafts have been sunk, respectively 20 and 55 feet deep. Both of these shafts started on a small streak of ore; but they widen out so much that the bottoms of the shafts are solid ore from side to side. The ore is a mixture of carbonates, and oxide with some gray sulphurets, and will average over 30 per cent in copper, and carries from $30 to $40 in silver per ton. Here and there,

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silver ores occur, and assays as high as $1400 in silver have been obtained. Several other claims in the immediate neighborhood have been opened to some extent, and are showing well. I am strongly of opinion that it is destined to be a very prominent camp in the near future.

The event of the year for this county has been the opening of the mines of the United Verde Copper Company, situated on the northeastern slope of the Black Hills. This work started with the bonding of the Wade Hampton claim last year; and after some work in further proving the claim, it purchased it and several others adjoining, so that the company has now some twelve or fourteen claims. The developments showed large bodies of copper ores, and in the summer a 40-ton smelter was erected. Before this, however, could be done, a road at the expense of some $30,000 had to be built across the hills. The smelter was got into blast, and has been in continuous operation for some three months. The first run of 30 tons of bullion showed a yield of between 17 and 18 per cent of copper. Since then, the ore has been of a higher grade, and the further development of the mines has shown large amounts of silver in the form of chloride and native. The occurrence of the silver has proved most remarkable both in quantity and mode of occurrence. The ore affords in abundance magnificent specimens of plate silver in the fractures of the solid oxide ore, and frequent chunks of horn-silver are mixed with the copper ores. The result in the furnace has been, that the bullion has run up to as high as $900 in silver to the ton, and from present appearances, it is not possible to say what figures may be reached. The profits, so far, have been such as to pay for all the outlay made, and afford a dividend besides, which was paid last month to the owners. This has been done with one smelter, and the show of ore is such that it would be as easy to keep six smelters going as one, as the one has been supplied with ore from the shafts and drifts only. We feel safe in saying that the property can not be equaled by any other in the States for richness and quantity of ore. I hope before long to give you a more detailed description of the mine, and some figures showing what has been accomplished. Work has gone on quietly and patiently, so that probably but little has been known outside of the county and by those interested; but I shall be much surprised if the wonderful developments do not soon set the mining interest of this county in a blaze.

It seems, from the past history of this section, as if some such surprise was needed to give us the start that we want, and that such a rich mineral country deserves. That the ores are here is plain to all who have spent the time to examine. This is more particularly true of the copper ores which are found in such abundance, and in so many different districts, nearly all of which are rich in silver and some gold. I think the time will come when copper from this region will be looked upon as lead is at Eureka and Leadville, that is sold for what it will bring, the silver and gold being the main products of the mines. I will not now attempt to outline the run of the main belts of copper-bearing rocks as far as known, which are very extensive, and every few days we hear of new discoveries.

Much is said of the carbonate camp on the Cataract Creek, near the Grand Cañon, in the north end of this county; but not being able as yet to get any thoroughly reliable data on the subject, I shall leave it for another time. Some say it is to surpass Leadville in extent. The belts or bands of ore show themselves in the cliffs of the cañon of Cataract Creek, and the difficulty of access to them so far has much retarded the proper investigation. Yours, YAVAPAI.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

The society met at eight P.M., November 21st, Director George S. Greene, Jr., in the chair; John Bogart, Secretary.

A paper by S. H. Keating, Member Am. Soc. C.E., upon the Shubenacadie Canal was read. This canal is located between the city of Halifax, Nova Scotia, and the Basin of Mines, an arm of the Bay of Fundy. It was begun in 1826, and the intention was, to build it so as to accommodate vessels drawing eight feet of water, with the idea that, at comparatively small additional expense, it could be used by vessels drawing eleven feet. It was to have 15 locks, 87 feet in length and 22½ feet in width, with a lockage ascending from Halifax of 95 feet 10 inches, and, descending to the Bay of Fundy, of 95 feet 4 inches. The total length is about 54 miles, the greater portion of which was to be in the Shubenacadie River, and in a chain of lakes existing along the line of the canal.

Mr. Thomas Telford, the celebrated engineer, made a very favorable report upon the proposed canal and its prospects. Up to the close of 1831, £72,000 had been expended upon the work, which was, however, in an entirely uncompleted state. Some of the locks near Halifax had not been begun, and large and expensive work remained to be done upon the line of the canal. All the available capital being exhausted, the works were abandoned, and fell into ruin, never having been completed on the original plan. In 1856, a report was made by Mr. W. H. Talcott, C.E., upon a scheme for completing the works upon a very much smaller scale than at first proposed, substituting for certain of the locks an inclined plane near Halifax, with a lift of 55 feet, and a similar plane, with a lift of 33 feet, at another point; the planes to be worked by hydraulic machinery. This report was adopted and the work was completed in 1862, at a cost of $200,000. The diminished canal has, however, proved a failure as a commercial enterprise, and since 1870 no trade of any account has been carried on through it.

There was also presented a description by Charles C. Smith, Mem. Am. Soc. C.E., of an hydraulic canal built at Minneapolis, Minn., during the severely cold winter of 1881. This canal is under Main street, Minneapolis, its entrance being at right angles to the street. It is covered with a semicircular rubble-stone arch of 17½ feet span, and where the line turns the angle of 90 degrees the abutments of the arch were built of curved lines of the radius of 31½ and 48¾ feet. The arch was built of rubble masonry, of stone varying from 4 to 6 inches thick, and from 18 to 36 inches long; the joints at the soffit being slightly hammered off to approximately form beds conforming to the radial lines of the arch. The mortar was made of one part Louisville cement to two parts of sand, and was mixed in hot water without salt. During its construction, the weather was extremely cold, the frost having penetrated the ground to the depth of six feet. An examination of this work having been made quite recently, it was found to be perfectly sound and free from any indication of settlement or rupture two years after its construction.

A discussion followed by the members present, more particularly in reference to the best methods of laying masonry in very cold weather, the experience of a number of members being favorable to the use of a strong solution of salt in the water with which the mortar was made.

The recent adoption of a system of time standards by the railroads was discussed, and Prof. Julius E. Hilgard, Mem. Am. Soc. C.E., gave a statement as to the measures which were in progress in reference to securing a standard prime meridian, together with other measures pertaining to the determination of standard time by the various nations of the world. He also described the results of the recent meeting at Rome, Italy, of the superintendents of the geodetic surveys of various nations.

BESSEMERIZING COPPER MATTES.

During the last days of his life, Mr. Louis Gruner was preparing for publication a short paper on the Bessemerizing of copper mattes, to which frequent reference has been made in the columns of the ENGINEERING AND MINING JOURNAL. This paper has now been published in the *Annales des Mines*, and from it we gather the following data on Mr. Pierre Manhès's method:

Beginning in 1880 at his copper-works at Védènes, M. Manhès started working with matte containing from twenty-five to thirty per cent of copper previously melted in a crucible. As was expected, the sulphur and iron were oxidized very rapidly, the former escaping in the form of sulphurous acid and the oxide of iron forming a liquid cinder with the silica of the lining of the converter. During the first few moments, every thing went well. The heat developed by the combustion of the iron and the sulphur sufficed to keep the metallic bath in a liquid state, but the difficulties appeared toward the end of the operation, which changed very suddenly. The regular oxidation produced by blowing in air was succeeded by a violent ebullition, accompanied with ejection of cinder, and after a while grew so strong that the bath, matte, and cinder were thrown out of the apparatus. On the other hand, as the sulphur was oxidizing, the metallic copper, having a greater density than the matte, sank to the bottom of the converter and chilled there. The tuyeres were gradually obstructed by metallic copper, so that it became necessary to cast the metal before the upper part of the bath had been thoroughly desulphurized. Therefore there was generally a residuum of matte lighter and more fusible than the pure copper. The trials with mattes varying in their percentage of iron and copper were multiplied and changed in many ways, but so long as the ordinary Bessemer converter, with its vertical tuyeres, was used, the difficulties were always the same. It was always necessary to stop the operation before the iron and the sulphur had been entirely eliminated. This, undoubtedly, was what also happened during the earlier experiments in England, and this probably explains the failure of those trials. M. Manhès having recognized that the principal difficulty was the outgrowth of the cooling action of the blast on the copper, substituted horizontal for the vertical tuyeres, forcing the blast into the bath at a point above the bottom of the converter. The blast-box at the base of the converter was replaced by an annular blast-pipe provided with a series of lateral orifices through which the blast was horizontally forced into the metallic bath. With the plant thus modified, the copper did not chill. As fast as it was produced, it sank below the level of the blast, and was kept in a liquid state until the end of the operation. Thus, all the matte could be desulphurized and a copper produced which retained no more than one and a half per cent of foreign substances as a maximum. To overcome the difficulties due to the presence of large quantities of cinder, a number of different processes were adopted according to the character of the mattes. With rich mattes carrying from 50 to 60 per cent of copper, these cinders give very little trouble. By adding quartz, the corrosion of the walls of the converter is diminished; and by introducing into it a certain quantity of manganiferous pig-iron, greater fluidity is given to the cinder. In the case of poor matte, the quantity of cinder becomes so large that, in order to carry out the operation successfully, it is necessary to get rid of it and in some cases even repeat the operation a number of times. These preliminary trials, carried out for a year at the Vedénès works, proved that it was not alone possible, but that it was easy to rapidly convert copper matte into blister copper containing only one to one and a half per cent of foreign substances. The process has been carried out on a working scale in the Old Royal foundry at Eguilles, near Sorgues, where a large water-power is available. Three stacks have been put there for smelting ores, two cupolas for melting matte, and three converters for Bessemerizing the matte. This establishment began operations toward the close of 1881. At an early day, a second works, having also three converters and the necessary smelting-furnaces, will be completed. Now, with three converters, working alternately, the weekly production varies between 85 and 100 tons of copper. The working has been retarded by the great difficulty of procuring copper ores. In France, there are very few mines producing this metal, and the difficulty of marketing small lots of ore has, until now, prevented the opening of known deposits. As for foreign ores, Italian, Spanish, etc., they have been bought for many years by English works, and it is difficult to get the miners to deal with new purchasers; still there is a tendency to shipping at Marseilles, and all the ore which can now be procured is treated. The copper produced is refined at the works in an ordinary furnace, and the entire product is rolled at the Védènes works without the slightest difficulty. The ores are very variable in character. Among them are cupriferous pyrites from Saint Georges d'Hurtières, in Savoy, which are pure but poor, rich but impure ores from Aveyonan or the Pyrenees, ores from Toscana containing from seven to fifteen per cent of copper and from thirty to forty per cent of iron, and ore coming from Tadergount in Algeria, carrying as much as from ten to fifteen per cent of antimony. These ores have been employed mixed with the roasted ores from the manufacture of sulphuric acid, with scrap and cement copper. According to their character, they are smelted in furnaces about sixteen feet high or in stacks only seven feet high above the tuyeres. The great variety of the ores is one of the drawbacks of the market now, because from day to day it leads to the production of mattes carrying only from twenty to twenty-five per cent of copper or a raw material contain-

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ing as much as fifty per cent. This naturally makes the Bessemerizing a difficult matter, since there are variations almost every day in the composition of the matte treated. The manufacture would be very much more simple if the works could procure mattes of a uniform character. The converters which are used at Eguilles are 4·06 feet in diameter and 6·06 feet high. About one foot above the bottom is the blast-pipe provided with eighteen 0·3-inch holes. The operation does not differ very much from that in the Bessemer steel converter. The vessel, heated to redness, receives a charge of one ton of melted matte and is blown at a pressure of one inch of mercury. The temperature rises rapidly, while thick sulphurous gas escapes, and it is only after fifteen or twenty minutes that the vapors become clear. When the matte treated is poor, casting must at once be proceeded with, because otherwise a very violent reaction takes place. With rich mattes, the operation goes on without any difficulty, and a copper containing from ninety-eight to ninety-nine per cent and cinder carrying from three to five per cent of copper are produced. The latter is put through with the smelting charges. In the beginning, it was not possible to make more than from ten to twelve operations in one converter, and the lining was often completely corroded even after seven or eight blows. Now, with the same matte, from fifteen to sixteen and even eighteen operations are made on one lining. At the Eguilles works, mattes containing more or less arsenic, antimony, lead, zinc, and tin have been treated, and these substances are either scorified or volatilized. It would seem that arsenic and antimony ought to remain with the copper; but a number of operations have been made with very impure mattes, and the ease with which the copper produced from them has been rolled furnishes the proof that the arsenic and antimony had almost entirely disappeared. It seems probable that the oxides of these two substances are mechanically carried off by the blast, so that the reducing action of the copper can not take place. Cobalt is partly scorified and partly remains with the copper, while nickel and bismuth are both concentrated in the product. The Bessemer process does not, therefore, remove these substances, with which none of the methods actually in use is able to deal. The elimination of the arsenic and the antimony was one of the most important points to settle, and many trials have shown that, for the greater part, they disappear, and that a metal is produced which will stand ordinary tests. The copper obtained in the converter has a very constant composition, varying little from the following: Copper, from 98·05 to 98·08; sulphur, from ·09 to ·08; and iron, from ·06 to ·04. At the Eguilles works, the machinery is run by water-power. If steam had to be used for the different blowing-engines, a consumption of from three to four tons of coal per twenty-four hours would be required for an output of from three to four tons of copper. For the fusion of the ores in blast-furnaces, between 280 and 300 pounds of coke per ton of ore carrying ten per cent of copper are required for melting the mattes, heating converters, etc.; there is a further consumption of coke of from fifty to sixty pounds per hundred pounds of copper. Taking into account waste and loss, the consumption may rise to two or two and a quarter tons of coke, equivalent to three or three and a half tons of coal; and for refining, about 1400 pounds of coal per ton of copper may be counted upon. The total consumption of coal, therefore, would be about five tons per ton of marketable metal, against from thirteen to sixteen tons by old methods. For works producing one hundred tons of copper per month, the number of men does not exceed seventy, which corresponds to about twenty days' work per ton of copper. In a larger establishment, better fitted out with machinery, this figure would be notably reduced, because at the Eguilles works the hoisting of the ore and mattes, the movement of the converters, the crushing, etc., is all done by hand. At these works, the cost of treatment per ton of refined copper is not more than from 160 to 170 francs, in spite of the fact that the general expenses are large and coke costs 35 francs. In England, with fuel less than half that price, the cost of treatment is estimated to be between 320 and 350 francs per ton of copper by the old method. It is evident, therefore, that, under the same conditions the cost of treatment by the Bessemer process would not be more than one third of the old method. M. Gruner did not hold that the Bessemer process would modify the metallurgy of copper in as radical a way as it did that of iron and steel. In any case, there is a great future for the new method. The labor and the consumption of fuel are reduced very largely, and in those countries where coal is dear the process will permit of utilizing ores which have not, until now, been available.

FREIGHT RATES ON BASE BULLION.

The Leadville *Herald* thus touches upon a topic already discussed by us: The depressed condition of the lead market, and the consequent close margins on which the mines and smelters of Colorado are working, have resulted in renewed exertions toward securing railroad freight concessions that have heretofore been denied Colorado. There is no question but that, on heavy lead ores. Leadville smelters are now running at a loss, and that the present situation can not last any length of time without disastrous results. The smelters all realized this fact, and have recently begun working in unison, toward securing a partial relief from the burden imposed upon the smelting industry by reason of the excessive freight tariff on base bullion. In this measure, we understand, they have the hearty co-operation of local agents, division superintendents, and other subordinate officers of the Colorado railroad companies. In fact, there are few railroad men who will not candidly acknowledge that freight rates on bullion from Colorado points to the Mississippi Valley are excessive. Also, that an increased business would follow a reasonable reduction on this class of freight, and that in the end the railroads would be large gainers by a more liberal dealing with the mining and smelting interests of the Rocky Mountains. The effort is making in a quiet but determined manner, and nothing is left undone that might assist in convincing the railroad officials that a reduction of rates is absolutely necessary to the continued prosperity of Colorado's mining interests, and that a reduction would consequently redound to the benefit of both parties. A great many mines have already reduced their production, and many of those now shipping are only enabled to continue at the expense of the smelters, with whom they have contracts that are simply ruinous to the latter, under the existing state of affairs. There was a time in the history of this camp, when the base bullion produced contained from four hundred to eight hundred ounces in silver to the ton, and could easily bear the great expense of transportation. At present, however, the bullion does not average one hundred ounces, and the value of Colorado's base bullion product is nearly as great in lead as in silver. Under such circumstances, it is apparent that Leadville lead ores are no longer mined principally for the silver, but that the lead must also yield some return; otherwise, the ore will not be extracted and smelted. The costs of mining, smelting, etc., have reached the lowest possible figures, and the only factor in the great industry that has not yet contributed its proportion toward reducing the cost of Colorado lead to a minimum is the railroad. So far, negotiations have advanced very favorably, and, judging from expressions by persons familiar with the matter, there is little doubt but that reasonable concessions will be made.

THE PUMPING-ENGINE OF THE BINDWEIDE MINE, GERMANY.

(WITH SUPPLEMENT.)

The shaft of the Bindweide mine has a depth to the level of the upper adit of 50 meters, and to the level of the deep adit of 86 meters. Below the latter, it is 57 meters deep, a level having been started at 50 meters' depth, which is also to be the distance of future deeper levels. The water is to be delivered to the deep adit, to which also the ore is to be hoisted. Through the upper part of the shaft, the coal for the boilers is to be hoisted from the tunnel level, and is to serve also as the outlet for any rock that it may be impossible to dump into the old workings. For this reason, the dimensions of the shaft in its upper portion are less, being only 4·355 by 2·02 meters, while the lower part is 4·355 by 2·975 meters, divided into two hoisting compartments 1·08 by 1·6 meters, one pump compartment 2·555 by 1·44 meters, inside dimensions, and ladder compartment 0·8 by 3·555 meters.

Careful measurements, carried on for more than two years, showed that the average flow of water from the upper tunnel was 0·403 cubic meter, the maximum being 1·003 and the minimum 0·129 cubic meter. The lower tunnel discharged water at the average rate of 0·960 cubic meter, the maximum being 2·820 and the minimum 0·700 cubic meter. The water flowing from the upper tunnel will certainly not in the future sink to where the pumps must hoist it, and it is to be utilized as feed-water. It was assumed, however, that the water on the lower tunnel would drop lower. It was estimated that the pump on the first deep level would have to cope with a quantity of water equal to the maximum of the lower tunnel, that is, 2·82 cubic meters per minute. For the second level, 2·50 cubic meters was assumed as the maximum; and for the third and fourth, 2·25 cubic meters per minute each. Assuming an average piston speed of 0·75 meter per minute, the dimensions of the plungers of the pumps were computed to be: Diameter of plunger of pump, 1st deep level, 0·42 meter; 2d deep level, 0·40 meter; 3d and 4th levels, 0·37 meter.

In view of the wide variation in the flow of water, it was necessary to choose an engine capable of adapting itself to a wide range of duty. The Kley system was therefore chosen, with one cylinder and without condensation. The dimensions had to be such that cutting off at one quarter stroke and with a pressure of steam of six atmospheres above atmospheric pressure, the engine would be capable of pumping the maximum quantity of water noted from the different levels, down to the 200-meter level. The calculation was made with the following formula:

$$\frac{\pi D^2}{4} p' \left(1 + \frac{0{\cdot}332}{p'} - \frac{p}{p'} - \frac{r}{p'}\right) K \times 2L = WL$$

in which D is the diameter of the steam-cylinder, p' the absolute pressure of the steam after expansion, p the absolute pressure of the steam before expansion, r the average absolute pressure in front of the piston, K the useful effect of engine and pumps, L the stroke of piston and pumps, and W the total weight of the columns of water to be moved. Now p is equal to 6 atmospheres or 70,000 kilograms, p' one quarter of p, or 17,500 cutting off at one quarter stroke, r assuming much compression is 1·5 atmospheres, or 15,000 kilograms, and the useful effect K is 0·70. W is found as follows:

	Kilograms.
Weight of column of 1st level pump ..... = 0·1385 × 50,000 =	6,925
" " 2d " " ..... = 0·1257 × 50,000 =	6,285
" " 3d " " ..... = 0·1075 × 50,000 =	5,375
" " 4th " " ..... = 0·1075 × 50,000 =	5,375
Total ..... W =	23,960

Using these values, D, the diameter of the steam-cylinder, is found to be 0·90 meter, and L, the stroke, twice the diameter, or 1·80 meters. As the piston speed chosen was 0·75 meter, the number of revolutions of the engine is 12·5, making horse-power 120.

We have already dwelt upon the characteristics of the Kley system in a former issue of the ENGINEERING AND MINING JOURNAL, and our Supplement will fully suffice to show the design of the Bindweide engine. The gear is so arranged that the engine stops when the piston reaches the lower position, and does not begin a new stroke until started by the cataract.

PUMPING WATER THIRTY-SEVEN FEET BY SUCTION.—David P. Stewart, of Buffalo, N. Y., writing to the *American Machinist*, says: In all theory, and in my practice, I have been led to believe that it was impossible to raise water by suction over 28 or 30 feet, and that it was not good practice to pump it over 25 feet. But my attention was called to the fact, that at a certain establishment in this city they were pumping water by suction 37 feet, and, having considerable curiosity, I called to investigate. The engineer stated as a fact that they were pumping water by suction 37 feet, that is, from the surface of the water to the suction-valve of the pump, 37 feet, with but slight variations. About 25 feet from the bottom end of the suction-pipe is a tee with nipple and elbow. From this elbow, a stand-pipe of the same diameter of the suction-pipe extends to the same hight, and is covered with a cap. There is a check-valve at the bottom end of the suction-pipe. The explanation is: Fill both pipes with water, then screw the cap air-tight on the top of what I should call the stand-pipe, the action of the pump will suck the water out of the stand-pipe and form a vacuum in it that will sustain the water in the suction-pipe, so that the pump will lift the water the 37 feet without any trouble.

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THE SEVEN NATURAL WONDERS OF THE BAKU PENINSULA, AS SEEN TWO HUNDRED YEARS AGO.*

By Engelbert Kaempfer.

[Engelbert Kaempfer, the son of a Lutheran minister of some property, was born in 1651 at the village of Lemgo, the capital of Lippe, Germany. His first long journey was to Holland, in his seventeenth year. After that, he studied successively two years at Lüneburg, two at Lübeck, two at Dantzic and Thorn, two at Cracow, five at Königsberg, and over one at Upsal, until his thirty-second year. Then, in 1683, as secretary to a Swedish embassy, he traveled through Russia to Persia. On the way, they were detained a month at Shamachia, and he made thence his excursion to the Baku Peninsula. When, at the end of two years, they had gained their object, a commercial treaty, at Ispahan, he for the sake of further travel joined the service of the Dutch East India Company as surgeon, went to Bunderabbas on the Persian Gulf, and spent about a year there. Within the next two years, he went to Tiflis, and was phy-ician to the Georgian prince; but then became ship's surgeon on the Dutch fleet in the Persian Gulf, and visited the coasts of Arabia, India, Ceylon, Sumatra, and Batavia in Java. After eight months here, he sailed in 1690 by way of Siam to Japan for a stay of two years; and at length returned by Batavia, the Cape of Good Hope, and Holland to his native town, where he arrived in his forty-fourth year, and was henceforth court physician until his death at sixty-five, in 1716.

Of his voluminous and handsomely illustrated manuscripts and notes, none underwent the cost of engraving and printing in his lifetime except the *Amœnitates Exoticæ*, a volume of over 1000 small quarto pages of essays intended as a sample of what he had to offer the public. Some manuscripts had been lost at sea; the rest, after his death, were purchased by Sir Hans Sloane, the celebrated physician and naturalist, whose magnificent collection of books, manuscripts, and natural history specimens became in 1753 the nucleus of the British Museum. He encouraged the English translation and publication of Kaempfer's papers, beginning with the history of Japan, that came out in 1727. The other thirty-six manuscripts, large and small, have never been published, and are doubtless still in the British Museum, as they were a hundred years ago. Two other manuscript copies of the history of Japan were discovered at Lemgo, and from them a German edition was published in 1777, with a short life of Kaempfer.

His published works have placed him in the very foremost rank of travelers; and that is the less surprising since he was already one of the most learned scholars of his time before his Eastern travels began. He is very clear, precise, and conscientiously truthful in writing, very painstaking in observing, and very intelligent and sensible in seeking the causes of things, not credulously swallowing marvelous tales with eagerness, nor ever looking for the miraculous rather than the natural. Few, as Hildreth says, have equaled him in picturesque power; and his descriptions, though so complete and finished, are yet unaffected and natural, with much quiet humor.]

NATURAL GAS.

Thence we came from the south to the "Burning Field," white with sand and sprinkled with ashy dust. It gave out sulphury jets from numerous crevices, a varied and pleasing spectacle. For some crevices blazed with a great tumult, and struck horror into the spectators, with fire scattered violently about; others emitted gentler flames, and allowed any body sufficiently close access; others exhaled fumes or scarcely visible vapors that smelt of the very disagreeable spirit of naphtha. The phenomenon occurs throughout a space eighty-eight steps in length and twenty-six in breadth. The fissures were wonderfully narrow, gaping not more than a foot or a palm; some shorter and drawn into a semicircle, others crooked with a long curved bend; just as I have shown accurately and to the life in the subjoined picture, to shorten the description. The edges of the chasms and the ground itself, when the superficial dust is removed, displayed a rotten, light stone almost like pumice; the material of which seemed to consist of bivalve shells and very minute spiral ones. We found about ten men staying there, occupied in different work about the fire; for some with brazen and earthen pots set over a crevice that was not too violent were preparing breakfast for the inhabitants of the neighboring village, Sroganni Ateşgâwa, so called from this fire; others with stones brought from somewhere else and piled up in a heap were burning lime, and were arranging it, when made, in heaps to be carried away in boats; and a couple of foreigners, Indian fire-worshipers descended from the race of the ancient Persians, were sitting quietly near an inclosure built by them, making offerings to the eternal God, while gazing at and worshiping the flame that burst forth. One of the lime-burners came to us, and offered to show something more unusual, if we would be pleased to give him money for the service; and when we had paid it, he fixed upon a fire-shovel some flocks of cotton torn from his tunic, and set them afire; the flame so caught he very quickly transferred to a more distant crevice free from fire and flame. By that very act, the vapor, not at all visible before, broke out into a very high flame, a pleasing and unexpected appearance, but one that in a short time vanished again. Among the prodigies of nature, the first rank belongs to this phenomenon, seen from time immemorial in this part of the peninsula, but not in the same place; for half a mile before you arrive there, seven crevices are seen in one line, from which, formerly, the same flame blazed, and, after it had been extinguished, it burst out in the next place that I have described. Like jets of fire occur here and there in the defile of the Caucasus; of which they call the nearest and most conspicuous those of Mount Shubanai, distant four stages hence.

LIGHT OIL.

Returning thence two miles northwesterly, there was another remarkable thing, and that was a spring of white naphtha, in so very obscure a place that any one coming there would have taken no notice of the liquid if he had not been told. The place has the appearance of an irregular lake or fish-pond, about fifty steps in breadth and a hundred in length, with the shore depressed a couple of fathoms below the general surface of the ground. The bottom is muddy and slippery with clay, for only in the middle was there salt water standing a palm in depth. In its western end there were two wells several steps apart, narrow and, as they said, forty fathoms deep; in which naphtha that had seeped in from subterranean veins sparingly and as it were drop by drop was standing in moderate quantity, to be taken out when wanted. The well-mouths were not surrounded by any railing or wall or closed by covers; only stones placed around strengthened or indicated the mouth, and some bushes planted there protected the well from having small animals fall in. Not far off, there was a third well, but it had long ceased to drip, and exhaled no longer any odor to the nostrils. In the middle of the pond, stones lying in circles and sunk in the water showed the place of seven wells from which liquid had formerly been extracted; for when the passages have become obstructed from some cause, a neighboring place has to be dug until channels are found that flow. Here I was especially surprised at two things: (1) that the extremely volatile liquid is preserved in this open cavity without loss of substance, strength, and crystalline clearness, whereas it can not do so when shut up very closely in earthenware vessels; (2) that such a very rare deposit of nature may be left without any inclosure or custody. In our country, no one would dare to leave it so; if we did not wish to invite thieves to draw it off and curiously mischievous rascals to sacrifice the fountains to Vulcan by setting fire to them. For this naphtha exhales a most volatile gas, by the help of which it catches in an instant the flame of a burning hearth or lamp, and, once kindled, blazes inextinguishably; as the same thing is lengthily related about the naphtha around Ecbatana, by Plutarch, in his life of Alexander, § 12. But the fire catches in fresh liquid, not in that which has been long gathered and kept uncovered, and less in that which has changed from the clearness of water to an amber yellow. For this liquid is oily, extremely thin, like rectified spirits, pellucid, exceedingly penetrating, and easily taking fire. The name is no new discovery, but has been celebrated for many ages, in Strabo, l. xvi., Plin. l. ii. c. 105, Plutarch's life of Alexander, who say it flowed near Babylon, Susa, Arbela, and Ecbatana, cities called to-day Bagdad, Shushter, Ardebil, and Tabriis. It is called, however, by the Turkish name *nafth sefiid*, that is, white naphtha, not from its having such a color, but to distinguish it from the more imperfect kind, that is in fact black, thick, and opaque, to fountains of which we shall come afterward. Although the present naphtha has many and remarkable properties in medicine which Dioscorides, l. i. c. 101, relates, I have never known among the Persians any use for it except to dilute their varnish; for the admixture has given it superiority, and gives incomparable luster to the vessels it is spread upon; indeed, to varnished things that have become dull with use it immediately restores the luster. The masters of the art in Southern Persia prefer the naphtha of Susa, which they distinguish from that of Shirwan only by the characteristic that, when stirred up with varnish according to the rules of the art, it foams promptly, while this does so in a less degree. If you would like to know the nature of Persian varnish, take the following description: Gum sanderuus, when it has been dissolved artificially, is boiled down with linseed-oil to the thickness of an unguent, and so prepared is kept for future use under the name of *rochanni kamuun*, that is, varnish-butter. Sanderuus means sanderach, but consists of large and shapeless lumps, which are brought hither from inland India by Gujarat; you would say that it was amber, except that it is more fragile. When they wish to brush on this varnish, they stir it up with a small rod along with a sufficient quantity of naphtha; and when it is properly diluted, they spread it very thinly indeed with a very soft brush upon any wooden or paper work that has previously been painted in various colors according to taste, and on the top floor of the houses (which in this climate are without roofs) or in places remote from dust they expose it to the rays of the sun, by the heat of which the volatile naphtha with the linseed-oil disappears in a few hours, leaving a most brilliant hard surface; in the same way as in separating gold from silver, when the quicksilver has been removed by fire, the luster of gold remains.

HEAVY OIL.

Going thence two leagues to the west, we reached, in the middle of the peninsula, a third extremely remarkable place that produces black naphtha. This is called *kara nafth* or black naphtha (in Turkish, now the popular language there), both to distinguish it from the more limpid naphtha already described, and because it is foul, dark, and black in color; in fact, very earthy and of inferior quality. The field where it occurs extends from west to east some hundred steps; and the whole space is black with the oil spread on it as if covered with pitch; for when it has dried, it hardens into such a substance. The very vapor gives out a heavy odor, displeasing and almost intolerable to the nostrils of the more delicate, even though they go away to quite a distance. The liquid does not gush out above the surface of the soil, but flows along through the hidden parts of the earth in deep channels, impelled forward, as they say, from the bowels of the overhanging Caucasus, until it falls into the sea close by or gives nourishment to the flames in the "burning field," if it be not intercepted in this place. Wells for that purpose have been dug here at various points and without order, very numerous, rude, narrow, sunken vertically. Some of them yield perennially an abundance of flowing oil; others with intermitted veins have no longer any liquid; others, not having found the channels, have been made in vain. They have a depth of thirty ells and more (in round numbers they say forty); not because the veins flow at that depth, but because they need a deeper cavity in which the liquid that drips out at night can be held until, with returning day, it may be extracted by the workmen. There is no need of much skill in digging; for the soil is clayey and compact, so that it can, without danger to the digger, be dug to any desired depth without any frame-work to keep the sides from caving in. The extraction is done by manual labor with skin bags let down either by hand alone or with a little pulley. One well was richer than the other, surrounded by a curb or stone wall and closed in by a pretty large house built over it, and deeper than the rest and much larger; and in it the naphtha flowed like a torrent with a remarkable noise. The product was extracted with the help of a machine built above, which two horses, by turns moving in a circle, kept revolving; for, except a few hours at night, it did not cease to work. They attributed the richness of the well to the sanctity of the place, in which they say a pious man formerly lived, one of the sacred race of the imams. Another house near that one had a

* Translated for the ENGINEERING AND MINING JOURNAL, from Engelbert Kaempfer's *Amœnitates Exoticæ*, 1712. Fascic. ii., Relatio ii., §§ vi.-xiii., p. 273.

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vaulted chamber, seven steps in breadth, seventeen in length, and of a depth not measured by me, into which, as into safe keeping, a certain quantity of liquid was poured, especially that of the neighboring fountain and hence was called the naphtha store-house; for it was extremely suitable not only for preserving it, but for displaying it, as it was open at each end and built with steps by which you could descend according to the degree of fullness. The oil (inclosed in sheepskins) was carried away in four-wheeled carts to the cities Shamachia and Baku; and from the former place on the backs of camels to all Media, and from the latter was to be carried by sea to Hyrcania, Usbecia, Circassia, and Daghistan. Its only use is to serve for the oil of lamps and torches, which on being kindled give out light with a larger flame than is desired. The opposite shore, Nagajum, does not need this oil; for it has plenty of sturgeon's oil with which both food is prepared and fuel is furnished for lights. About the yield and price of the naphtha I learned this: Thirty-two workmen labor daily, all inhabitants of the adjacent village, to each of whom are paid in general seven *abassi* a month, to others eight, that is, about two rix dollars. Daily 80 four-wheeled carts are sent hence, each loaded with seven or eight skin bags according to size; of which the smallest hold ten, the largest twenty or more *man* or *batman* of the measure of Tabriz, which is equal to nine Belgian pounds. Calculation then shows that about eight to ten thousand *batmans* [say 300 barrels] are extracted and carried away every day, for which, nevertheless, the workmen liberally substituted 100,000; whence the annual return in royal money, subtracting the expenses, they affirmed, exceeded seven thousand *tomans*. One *batman* of white naphtha is sold here for one *shai*, that is, about the eighth part of a rix dollar; one of black naphtha for a little less. But I will not guarantee these figures of price and yield, because, being then ignorant of the Turkish language, I used for inquiry an interpreter who was not sufficiently versed in the vernacular of the region. I saw black naphtha floating on a small stream in the District Ruduun of the Kirman Province, also in a torrent of the Shirwan Province (this one that we are concerned with now), a torrent that enters the river Kuur from the north. In this, it was so abundant that it might be gathered, if the peninsula did not supply it so richly.

* * * * * * *

BITUMINOUS, GASEOUS LAKE.

The next day (January 8th) [1684], we were roused with the first light and led to a new prodigy, which in their language they called the "naphtha refinery," situated not far from the inn, in the same series with the springs, and as it were in line with them. There was an elevation raised you may say into a hemisphere, but a little depressed, and rising not more than three fathoms above the level of the ground, with an oblong round base. On its summit was seen a lake, in circuit, as I took it by conjecture, about fifty steps; for the marshiness of the place and the danger of the shore's sinking in, or fear did not permit going around it. The water had a briny taste, and to the sight a blackish color, and resounded with a perpetual tumult, not only from continually boiling waves on the surface, but more particularly from the movement of boiling liquids in the lowest and apparently the remotest depth of the abyss, a tumult that kept strangers intent with horror and in suspense on the margin of the lake; the foot, too, trembled, for a horrid sounding abyss was felt to be beneath it. With the bubbles arose not seldom a scum of earthy substance, dark and blackish, that they said was refuse of naphtha; of this, driven as it was continually to the shore, and issuing as it did with the larger bubbles through a long term of years, the elevation itself seemed to have been formed; as both the shape indicates that arises from such accretion, and the substance bears witness, that is mixed and cemented together of earth and bitumen. Several little fountains surrounded the lake and were large enough to hold a finger or the hand. I counted twenty-five of them on the top and fifteen lower down, all pouring out water clearer than any crystal, differing too very greatly among themselves as well as from the water of the marsh in taste, especially in stronger or milder saltness; as the neighboring inhabitants particularly showed us among the remarkable things. The lake, although it was perpetually boiling with bubbles emitted from the bottom, nevertheless yielded its own water in quite small quantity, a fact that I observed likewise in regard to many of the small fountains, in which the water did not seem so much to gush out as merely to be agitated by the issuing gas. I add the following from the oral philosophy of the rustics who were over the works: All the naphtha flows forth by subterranean channels from the innermost bowels of the neighboring mountains; and while it flows through the laboratory of this swamp, it separates its refuse and is refined, and otherwise it would produce a thicker, useless product in the wells where it is extracted; whatever slips past these wells without being intercepted is filtered by a longer space into the appearance of a transparent and very pure liquid, which, under the name of white naphtha, shows itself in the remoter place that we looked at yesterday; while another part of the same, and that the greatest, in the Field of Vulcan, as if it had fallen upon a blazing wick, nourishes smoke and perpetual flames, that would quickly burn out there if all the fuel could be intercepted on the way.

ASPHALT.

Hence, mounting our horses, after midday we came to the fifth wonder, namely, a remarkable hill of a black, thick, bituminous liquid, which it poured forth. It was situated in a moist, depressed tract of land, that had the appearance of a broad lake, but one of stagnant water. Through this rapidly flowed a rivulet of a palm in depth and five steps in width, purer than any crystal, but most intensely salt, washing the very base of the hill with a moderate circuit. The hill had in front a round shape, and the hight (as I conjectured from its looks) of twenty fathoms or more. The lowest part was of red mud mixed with sand or gravel; the middle part was a combination of shells of various kinds with earth; the uppermost part was a purer mud covered with a green sod; the top was adorned with a fertile field, extending by the narrow surface of the sloping ridge to the upper neighboring plains. The liquid, which they call cruder naphtha, trickling forth from the very top in many places, not only did not overflow the whole face of the hill, but by no means reached the base toward the south and west, because in its descent the ground absorbs part, and a part, too, is hardened by the sun's rays and incrusts the hill. The country folks dig up this material, and carry it in two-wheeled carts to distant villages, to burn for heating baths. It is a substance that makes a blaze and keeps afire a long time, black and tough, like pitch; within, if you break it, reddish-black and earthy.

A MUD VOLCANO.

After looking at the hill, we hastened without delay to see another phenomenon in the northern end of the peninsula, where we arrived with three hours' slow riding; first through deserted and uneven plains, then soon through a hilly country, and at last across a depressed plain notable for a couple of large lakes. What filled the mind with admiration was a hillock of a conical shape (if it had an apex) raised to eight fathoms in vertical hight, bare of all grass and turf, rough and uneven; from the top of which moist clay, such as is worked by the potter's hand, issued, being protruded by an extremely slow and scarcely perceptible movement; and when it had risen to the moderate hight of several spans, unable to sustain itself, it flowed down on every side, but particularly toward the south, as if natural inclination directed it that way. For here, the declivity was abrupt, and there was a great pool of earth of cushion shape, which both received the earth that flowed forth and with the falling showers that washed it out sent it forward into the neighboring plains. The hillock, which they called *Jugtopa*, having at a distance the appearance of a small tower, was situated on a somewhat high elevation of the ground, which in this place showed mud of a slightly reddish color, and, further on, a somewhat black soil, and fields that were not unsuited to the plow. The clay, I say, issuing from this source, when it had been dried on the edges by the sun and in many years had settled down, seemed to have formed in the process of time the tower-shaped heap; through the central cavity of which either the subterranean forces of fires and gases, or even the heavier weight of the overlying earth and hills upon the thin mass constantly ejected this earth. The inhabitants of the neighboring village Sishaan said the clay was not always ejected with the same steady movement; that it often burst forth with violence and was thrown out to a hight; that they had heard from their parents that it sometimes sent out huge stones mixed with earth, which, being tossed far out and high, had threatened to cut off egress from their village, although it was distant a quarter of a league, so that they were not allowed to live there safely, until by the advice of the magians they had pacified the wrath of the impelling subterranean Æolus with the blood of a sheep slain at the hillock's jaws. In order to examine the matter more thoroughly, with the safe guidance of a man that went before and cut steps, we explored up to the very summit, not without risky inconvenience; for the ascent was precipitous and everywhere slippery, and the material for us to tread on was fragile and friable. Around the summit, we found the tracks of men who had been there before us; also a cavity cut out by the hand of man, where a single spectator could safely stand; goat-dung, too, by what chance brought there I know not. The size of the issuing clay was not too great for me to encircle it with three spans. I took the risk of riding around the base, in truth not without danger; for on the southern side which slopes down into the pool, when I had spurred the horse on, I like to have been submerged with the horse in the abyss of softer clay accumulated there for a long time; the crust broke that treacherously concealed the swamp.

SALT-WORKS.

There remained the last sight to be seen with eagerness, namely, the salt-works half a league distant, not far from the king's highway, at the entrance to the peninsula. We entered on this road afoot, as we had sent the beasts forward to feed. It was an oblong round lake of nearly a league in circuit, of little depth, surrounded by four rather small villages that were inhabited by a rabble of shepherds, who also work the salines. The bottom extends with a scarcely perceptible descent a hundred steps and more from the shore, all (until the brine is reached) free from liquid, flat, hard, clayey, and slippery. This brine, of which the greatest depth was said to be three feet, produces an abundance of the most splendid salt, not elaborated by artificial means, but solely by the heat of the sun; in fact, while its rays draw out the fresh water as lighter and superfluous into the air, the liquid remains heavy with salt, which, condensing into what you might call snowy layers, goes by degrees to the bottom and subsides there. So from the bottom by means of a wooden rake it is scraped together, and then is taken out with a shovel, and placed upon four-wheeled carts that carry it off. When it has been carried to the eastern shore, it is arranged in cubes of definite size, and is beaten with beetles while carefully heaped together, so that the remaining moisture may be driven out and sufficient firmness given to insure the heaps against accident or any atmospheric injury. The hired laborers had stopped at the time of our arrival; in order, nevertheless, to gratify our desire, they sent back one carter with a horse not yet unharnessed to the place where they had left off collecting; and he, in our sight, with short delay and without any trouble, filled the vehicle he stood in with the whitest salt; which, when it had been carried to the shore, we found hardly to drip noticeably any more, because part of the abundant moisture had fallen from the drawing apparatus and part from the cart. The cubical form of the heap pleases them because thereby the quantity collected can be more exactly known, and an estimate arrived at about the sale and carriage. There were forty heaps, at a distance counterfeiting the appearance of a village, if the color were not different; for they have the shape and size of villagers' little houses. They said that a cube was collected each day; in summer one, in winter hardly half a one, because then, on account of the abundance of moisture, the salt gathers more sparingly. It is carried away on two-wheeled carts and on the backs of camels, partly to the port of Baku, to be sent abroad by sea, and the rest in various directions through the provinces.

PROPOSED MINING EXHIBITION.—Steps are taking to hold an International Mining Exhibition in London next year. The arrangements are in the hands of Mr. A. Zeehandelaar, who was awarded a diploma of honor at the Amsterdam Exhibition for his display of minerals from over four hundred mines in Utah, Montana, and Idaho, and it is intended as far as possible to bring together every thing appertaining to mines and minerals in the world.

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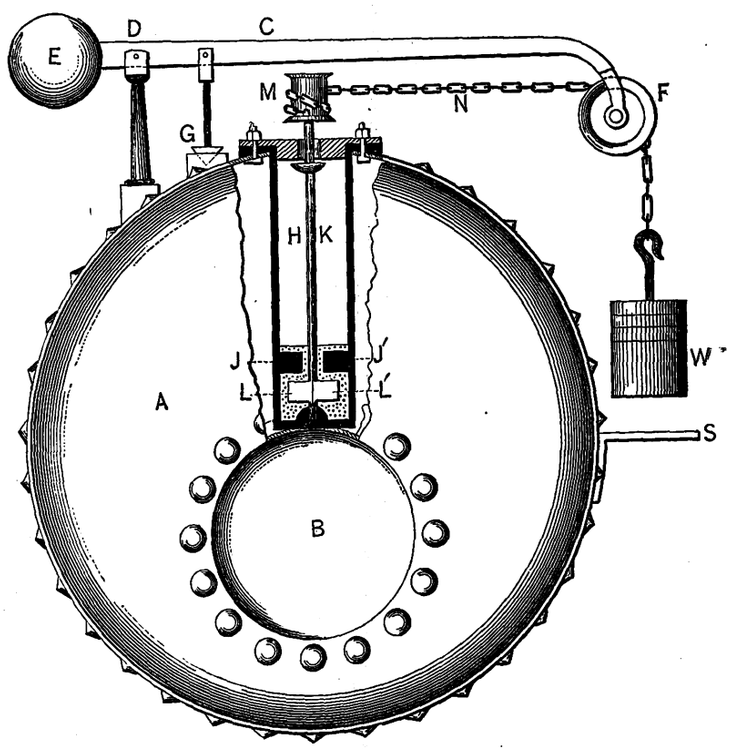
THE EVANS SAFETY-GUARD.

Written for the Engineering and Mining Journal by Joseph M. Locke, C.E., M.E., Salt Lake City, Utah.

The frequent occurrence, of late, of steam-boiler explosions has aroused considerable interest in the various methods devised for their prevention; and the article in this JOURNAL of August 18th, 1883, upon "The Schwartzkopff Safety Apparatus for Steam-Boilers," by C. A. Stetefeldt, suggested to me the advisability of drawing attention to the Evans Safety-Guard, a device invented by the late Cadwalader Evans, of Pittsburg, Pa., and patented in the decade between 1840 and 1850. This device has apparently been forgotten, although the existence of the present steamboat laws is largely due to the discussions it aroused by the vindictive opposition it met from large numbers of steamboat engineers. Like the apparatus of Schwartzkopff, it provides against—1st. Undue pressure. 2d. Low water-level. 3d. Firing empty, and subsequently injecting water on the heated flues and sheets. 4th. Retarded boiling, that is, the condition in which the water reaches a higher temperature than the pressure indicates.

The resemblance is further carried out by the use of an alloy fusing at a predetermined temperature; but the method of using the alloy is entirely different, as shown by the accompanying sketch, which represents a steam-boiler and ordinary safety-valve, with the device of Evans attached.

A is a boiler with flue *B*. A part of the head is represented as cut away, so as to show the interior arrangement (which is drawn in section). *C* is the lever of an ordinary safety-valve, with fulcrum at *D*, having a counterweight *E* on one end, the other end being bent down and forked to receive the sheave *F*. *G* is a valve and seat of ordinary construction. Through the top of the boiler *A* is inserted a tube *H*, with lugs *J J'* in the inside, and the lower end closed and resting on the flue *B*. Within the tube *H* is a spindle *K*, having near its lower extremity projecting wings *L L'*. Upon the top of the spindle *K* is firmly secured the spool *M*, to which is attached the chain *N*, which chain *N* is wound two or three turns upon the spool *M*, then carried over the sheave *F*, and finally to the end is attached the weight *W*, which is supported a short distance above the shelf *S*. The lower end of the tube *H* is filled to a little above the lugs *J J'* with an alloy (represented in stipple) which will melt at such a temperature as corresponds to the pressure desired to be the maximum to which the boiler should be subjected. The action is as follows:



I. If the weight *W* is less than is requisite to hold the valve *G* closed at the maximum pressure, then the valve will act as an ordinary safety-valve when the pressure in the boiler reaches a point where it exerts a force on the valve *G* slightly above the counteracting effect of the weight *W*.

II. If the weight *W* is too great for the pressure on the valve *G* to raise it at the pre-arranged maximum pressure, then, upon the pressure ariving at that point, there will be the corresponding rise of temperature and consequent melting of the alloy in the tube *H*, in which condition the weight *W* acting through the chain *N* upon the spool *M* will freely rotate the spindle *K* (as the alloy being melted no resistance is offered by the lugs *J J'* and wings *L L'*), the weight *W* will descend to the shelf *S*, thus relieving the valve-lever of all weight; then the counterweight *E* will throw the valve open. Immediately upon the reduction of pressure within the boiler, there will be a corresponding reduction of temperature and consequent solidification of the molten alloy, resulting in immovability of the spindle *K*. Hence the weight *W* can be raised and the chain *N* wound a turn or two upon the spool *M*. Then every thing is again in order.

III. During the firing of the boiler, whenever the water becomes so low as to expose the top of the flue, the alloy becomes molten and the valve consequently flies open. Any attempt to close it by winding the chain upon the spool *M* will fail, as the alloy remains fluid until the flue is allowed to cool, which will generally require the fire to be drawn.

IV. An attempt to steam without a proper supply of water will be futile for reasons stated under III.

V. In those peculiar cases known as "retarded boiling" (in which the water becomes heated above the temperature corresponding to the pressure in the boiler), such a condition is indicated and calamity averted by the fusion of the alloy, and consequent opening of the valve prior to the accumulation of such an amount of heat within the water as to endanger the safety of the boiler by its sudden liberation in the form of steam.

The successful action of the apparatus in the cases III., IV., and V. is in no way affected by the weight *W* being heavy or light.

If an electric alarm, in addition, should be thought desirable, then a break-circuit ratchet could be put upon the spindle *K*, which would actuate the alarms whenever the device is called into action.

From the preceding, it appears to me that the old device of Evans has, over the more recent apparatus of Schwartzkopff the following advantages:

1st. It not only gives the alarm of danger, but at the same time automatically actuates the safety-valve so as to prevent an explosion.

2d. Being purely mechanical in its action, no battery is required.

3d. The apparatus may be brought into action an infinite number of times without requiring the removal, replacing, or renewal of the alloy.

4th. In case of deficiency of water, the valve can not be closed until the boiler is cooled down, so as to admit of water being added with safety.

5th. Neither steam nor water enters the chamber containing the alloy, nor comes in contact with any of the moving parts of the device.

OIL IN CALIFORNIA.

J. W. McKinley, writing to the Pittsburg *Dispatch*, gives the following account of the California oil-field at Newhall:

On the edge of the town, is located the refinery of the company, connected by pipe-lines with the wells a few miles distant. Leaving Newhall, we drove to Pico Cañon, the principal producing territory of the region. As we approached, we saw, away up on the peaks, the tall derricks in places which looked inaccessible; but no spot is out of reach of American enterprise and perseverance. In one of the wildest spots of the cañon, about thirty men were making the mountains echo to the strokes of their hammers upon the iron plates of a new 20,000-barrel tank. Along the cañon, are scattered the houses of the employés of the company, most of whom have recently come from Pennsylvania. Near one of the houses, was a graded and leveled croquet-ground with a little oil-tank on a post, for lighting it at night. Farther up, we came to a cluster of producing wells, with others at a little distance on the sides of the mountains, or even at the top, hundreds of feet above our heads.

The first well was put down about eight years ago, but more has been accomplished in the last two years than in all the time previous. One well which we visited has produced 130,000 barrels in the last three years, and is still yielding. There have been no very large wells, the best being 250 per day, and the average being about ninety barrels, but they keep up their production with scarcely any diminution from year to year. Drilling has been found difficult, as a great portion of the rock is broken shale lying obliquely. The tools slip to one side very easily, and a number of "crooked holes" have resulted. One driller lost his tools altogether in a well, and finished it with new ones. The cost of putting down a well is from $5000 to $7000, depending upon depth, etc. Most of the wells are from twelve to fifteen hundred feet, but some have yielded at a much less depth. One well of 270 feet depth produced 40 barrels per day for about three years, has been deepened, and is now yielding even more. Another one of 800 feet is said to have produced 200,000 barrels in the last five or six years. Drilling has been very successful in striking oil in paying quantities wherever there were indications of its presence.

The Pacific Oil Company now has 27 wells producing or drilling, and during the last two years has been rapidly widening the scope of its operations. It has now from thirty to forty miles of pipe-lines, and is preparing to lay twenty miles more, to connect its land with ocean shipping at Ventura. The producers of California have a great advantage in their proximity to the ocean, which gives them free commerce with the outside world. Crude oil is now sold at $3 per barrel in Los Angeles, and the oil companies are making immense profits. There is a very large amount of oil territory as yet undeveloped, and a rich reward awaits enterprise in these regions. In the Camulos District, which lies west of the San Fernando, are even stronger surface indications of oil than there were in the Pico Cañon. We first went up the Brea Cañon, in which are numerous outbursts and springs of oil. Ascending the mountain west of this cañon, we could plainly see the break in the mountains crossing from the San Fernando through this district to those beyond which have been developed. A couple of miles farther west, the Hooper Cañon stretches back over two miles into the mountain, and is full of oil. Great pools of oil fill its water-courses that are dry at present. Hundreds of barrels of oil must be wasted away and evaporated during a year. A well put down only 90 feet by horse-power struck light oil in considerable quantity, and, had it not been for the death of one of the owners and the consequent suspension of operations, would doubtless have yielded in large quantities at the depth of a few hundred feet.

The mountainous territory between these two cañons will probably in a few years be the scene of great activity. In the Little Sespe District, a few miles west of Camulos, a 125-barrel well was struck at 1500 feet recently. The Santa Paula region, a little farther west, is also yielding large profits to the parties developing it.

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THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Motion to Dissolve Temporary Injunction against Removal of Ore from Disputed Ground.—A case has just been decided by Judge Church, in Dakota, which is of considerable interest. The case was that of the Richmond Silver Mining Company *versus* John A. Davey *et al.*

The premises in question are situated in Bear Butte Mining District, Lawrence County, Dakota, on the northerly slope of what is known as Custer Hill. Nearest to the bottom of the slope and therefore farthest north, is the defendants' claim or location called the Sitting Bull, the longitudinal course of which is substantially east and west; parallel with and adjoining this on the south is the Tiger Tail claim or location, also the property of the defendants; then follow in the order named, successively, the Surplus, Fraction, and Silver Terra locations, the property of, or at least claimed by, the plaintiffs in these three actions respectively, all of which are located substantially parallel with the Sitting Bull.

The Sitting Bull claim was entered for patent January 8th, 1883; the Silver Terra, May 8th, 1883. None of the others has as yet been entered for patent.

The plaintiffs allege that they are the owners and entitled to the possession of the three several claims above named, and that, at the time of the entry by defendants, they were in the actual possession thereof, and had expended large sums of money for their development, and were and are contemplating the erection of extensive mills and other works in connection therewith.

The defendants, having started a tunnel upon their Sitting Bull claim, have extended the same, with numerous collateral drifts, in a direction somewhat east of south, across their Tiger Tail claim and the Surplus and Fraction claims of the plaintiffs, until, at the time they were stopped by the injunctions, the face of the tunnel had reached a point slightly within the northerly side-line of the Silver Terra location drawn vertically downward. This is the main working tunnel of the defendants, and from it, as the plaintiffs allege and the defendants do not deny, the defendants have extracted a very large amount of valuable silver ore, which they have milled and reduced in their own works located near by. At the time the injunction was granted, this work was vigorously prosecuted by defendants.

The defendants also have another tunnel started on their Sitting Bull claim at a point some distance west of the main tunnel, the workings in which have been extended across the Sitting Bull and Tiger Tail to a point slightly within the northerly side-line of the Surplus, extended vertically downward.

Upon learning of this action of the defendants, the plaintiffs took steps to arrest the work. Actions were begun against the defendants to recover possession of the ground upon which they had entered, and for damages, and orders were granted requiring defendants to show cause why an injunction should not be granted restraining them, during the pendency of the actions, from the prosecution of their work in the disputed territory.

The demand for a dissolution of these injunctions appears to rest mainly upon three propositions:

First. That plaintiffs have failed to show affirmatively the performance by themselves, or those under whom they claim of the acts necessary to constitute valid mining locations under existing laws and regulations, and that therefore they have no standing in court to challenge the acts of the defendants, even though they be mere trespassers.

Second. That before the plaintiffs can question the defendants' right to mine and remove the body of ore in which they have been working, they must also show a continuous vein or body of ore extending to the ground in controversy, and the top or apex of which is within the surface-lines of their location, drawn vertically downward.

Third. That defendants have themselves established the existence of a continuous vein or body of ore, the top or apex of which is within the surface-lines of their Sitting Bull location, and which extends without interruption to the ground in controversy; and that defendants by their tunnel workings were following this vein, as they were entitled by law to follow it, in its departure from the perpendicular, or as commonly expressed, on its dip (which is its deflection from the horizontal), until they were stopped by these injunctions.

Judge Church's discussion of the second and third points is of particular interest.

The common law rule is familiar; the ownership and possession of the soil extended to the center of the earth, and "usque ad cœlum," and included every thing upon its surface and within its bosom.

It is conceded by defendants' counsel that the possessory rights of one having a valid mining location are co-extensive with those acquired by patent.

We find that the thing, the substance of which the U. S. statute treats, is, "lands valuable for minerals," and that it is for the disposition of these "lands" that provision is made in chapter vi. of the Revised Statutes. It is the "lands" in which mineral deposits are found which are "open to purchase."

It is "land claimed and located for valuable deposits" which is the subject of application for patent, and where the patent of the U. S. issues, it is for the "land" at so much per acre. The definition of "land" given in our territorial statute is concise: "The solid material of the earth, whatever may be the ingredients of which it is composed, whether soil, rock, or other substance." In the absence of any thing to the contrary in the statute, I think it might well be concluded that one becoming the owner or possessor of any of these lands would hold them with and subject to all the incidents of ownership and possession at common law.

It should be borne in mind that, before the enactment of any statute recognizing and regulating his possessory rights, the mining locator, as between himself and the United States, was technically a mere trespasser upon the public domain, and that, even although he might have conformed in his location to the rules and customs adopted in the mining districts in which his claim was situated, yet, so far at any legal right existed to hold his claim against a new-comer, that right rested upon possession merely; hence the statute. United States Revised Statutes, p. 910.

The government, however, having, in pursuance of its policy of encouraging the discovery and development of its mineral wealth, long tacitly recognized the possession of the miner has now by statute not only given an express license to those establishing their possession in the prescribed method, and provided a way by which the locator may become the owner in fee of the land embraced within the lines of his claim, but has also declared that such locators "shall have the exclusive possession and enjoyment of all the surface included within the lines of their location, and of all veins, lodes, and ledges throughout their entire depth, the top or apex of which lies inside of such surface-lines extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side-lines of such surface locations."

This statute undoubtedly introduced an important modification of the common law rule; it gives to the proprietor of a vein a right unknown to the common law, the right to pursue such vein beyond his own lines, outside of that particular segment of the earth embraced within the lines of his claim extended vertically downward, and it is therefore to that extent an enlargement of his common law right. But on the other hand, inasmuch as the same right is granted to every locator under the statute, each holds his possession subject to the same right in others, and is therefore liable to have his land entered by an adjoining proprietor pursuing his vein in its course beyond his own side-lines; and to this extent, therefore, his common law possession is abridged.

Two points can not fail to be noticed in this connection;

First. That this enlargement of the common law possessory right is incident only to a claim located in the manner provided by law; and

Second. That the exercise of such right operates to the abridgment of the possession of every tenement penetrated or intersected by a vein having its top or apex in a superior tenement.

Such I understand to be the effects of the statute. I am unable to see that in any other particular the rights of possessors of mineral lands differ from those of other lands.

I must therefore conclude that one holding a mining claim by mere right of possession, while on the one hand not receiving that enlarged power incident to a valid mining location, and on the other hand being subject to intrusion by the lawful proprietor of any vein which may be found in its course downward to penetrate or intersect his claim, holds his claim in other respects with and subject to the incidents of possession at common law, and may defend his possession of the surface and of that segment of the earth included within the surface-lines extended vertically downward, with all that it contains, against every one not claiming under superior title.

This disposes of the first two propositions above stated and brings me to the consideration of the third.

The defendants undertake to justify their intrusion upon the plaintiffs' ground by virtue of their alleged proprietorship of a vein having its top or apex within the surface-lines of the Sitting Bull location and extending in a continuous body to the ground in controversy.

At the time these motions were argued, no answers had been filed. There is no denial, therefore, by answer, nor, indeed in the affidavits submitted, of the equities of the plaintiffs' complaint.

Their prior possession of the ground in controversy (under the views I have above expressed), the entry by defendants, and the injury and damages complained of are not denied.

Defendants seek to justify under a right conferred by statute, depending for its lawful exercise upon the existence of certain facts which they must establish affirmatively by preponderance of evidence.

This is clearly new matter, and although the affidavits by which it is sought to establish the necessary facts are very voluminous, yet they are met by an equally imposing array of depositions on the part of the plaintiffs.

In my judgment, as far as I am now able to apprehend the nature of this controversy, the question thus raised is the one upon which the essential rights of the parties depend.

To determine it now would be, in effect, to determine the whole controversy. In such cases, the well-settled rule and practice of courts of equity forbid the dissolution of the injunction by which the property is preserved *in statu quo* until the trial. I do not remember that this point was discussed on the argument, but I observe that defendants' counsel in their brief contend that while this was the old rule in equity, it has been entirely changed by the code.

Besides, I am unable to say that a consideration of all the testimony satisfies me of the existence of those facts upon which the right claimed by defendants depends. Even taking the affidavits submitted upon the part of the defendants by themselves, some facts are therein disclosed which do not seem to me entirely consistent with the theory that they are pursuing a vein which, departing from the perpendicular, extends in its course downward beyond the side-lines of defendants' claim into the ground of the plaintiffs.

But recognizing the unsatisfactory character of testimony thus adduced, I can not but feel that justice to both parties demands that the final hearing be entered upon unembarrassed by a previous decision of this important question.

The character of the injury complained of, too, threatening as it does the entire destruction of the estate in controversy, would upon equally well-settled principles demand a continuance of the injunction.

I am not unmindful of the considerations, so strongly urged, of possible injury to the defendants from the continuance of these orders, but these considerations can not justify a disregard of settled principles of equity jurisprudence. The peril to the plaintiffs must also be considered, and it should be observed that, as disclosed by the plaintiffs' affidavits and not denied, the defendants have prosecuted this work with full notice that their right to do so would be contested.

These motions were finally submitted September 25th; on the 26th, I left for Yankton to attend the fall term of the Supreme Court, and since my return have been almost constantly engaged in the trial of jury cases. Amid this multiplicity of duties, I have given to these motions all the time and consideration practicable, and have come to the conclusion that they should be denied.

Iron Ore Contract.—The Cleveland *Western Machinist* prints the following:

A decision of considerable importance to producers and consumers of iron ore was rendered the past week by A. J. Ricks, Esq., appointed by the United States Circuit Court of this city to hear the case of the Florence Mining Company against the Receiver of Brown, Bonnell & Co,

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From the evidence adduced, it appears that the Florence Mining Company, as vendor, contracted on the 13th of February, 1882, with Brown, Bonnell & Co., as vendee, to sell to the latter 30,000 tons of iron ore of its standard quality, deliverable at Cleveland and Ashtabula during the season of navigation of 1882, on the docks of the New York, Pennsylvania & Ohio and the Lake Shore & Michigan Southern railroads respectively, as nearly one sixth of the total quantity per month as practicable, the ore to be paid for at the rate of $5.75 per ton in eight equal payments of $21,562.50 each, payable on the 15th days of May, June, July, August, September, October, November, and December, 1883, respectively, in cash, making in all $172,500. Under this contract, the vendor had delivered to the vendee, prior to February 19th, 1883, 20,762 tons of the ore specified. On February 20th, 1883, Brown, Bonnell & Co. went into the hands of a receiver. On the day preceding, the vendor temporarily suspended shipment of ore, under fear of the insolvency of the vendee. Up to this time, the contract had been complied with by both parties, and 9238 tons remained undelivered. The vendor failed to deliver any part of the balance, because of the insolvency of the vendee, but claimed to have had the ore ready for delivery, and would have so delivered it had the vendee made any demand for it. The vendee, however, made no such demand and plainly indicated its desire to rescind the contract. Under these circumstances, it was the privilege of the vendor either to concur in the vendee's wish to end the contract or to insist upon its fulfillment. It claims to have done the latter, and asks for the full amount due under the contract.

The turning point of the Special Master Commissioner's decision is upon the fact that the sale was made on credit and not for cash. If it had been for cash, the vendor would unquestionably have had the right to make tender for cash, and on refusal to accept and pay cash on the part of the vendee, the vendor could have sold the undelivered ore at the market price at the time of the breach, and have offered to credit on vendee's notes the sum realized; but the vendee having contracted to pay for the ore in its notes, the vendor, if it intended to insist upon enforcing the contract, should have tendered the ore on credit, according to contract. Having failed to do so, the Master is of the opinion that the vendor elected to concur in the recision of the contract, as the vendee, by its conduct, may fairly be held to have offered to do. The issues were therefore found with the defendant.

THE POETSCH SYSTEM OF SINKING THROUGH QUICKSAND.

We have repeatedly alluded to the Poetsch system of sinking through quicksand, and the interest taken in it in Europe warrants the reproduction from the *Colliery Guardian* of the following account by the well-known writer on mining subjects, Mr. George G. André, who says:

I have been so often questioned of late concerning my opinion of the merit of Poetsch's system of sinking through quicksands that I have thought it desirable to form one as speedily as possible. For it must be confessed that, in common with many others, I had regarded the invention as deserving of but little attention. One is too apt to view in this narrow light what may be described as deviations at right angles from the ordinary ways of experience. As long as new methods of procedure run parallel with or diverge but slowly from these beaten paths—in other words, so long as they differ from known and well-tried methods only in the details of their application, or in the manner of their execution—all are ready to lend an eager ear to the inventor, and to give hasty credence to his exaggerated promises. But when a system of working which, like that of Herr Poetsch, is novel in principle and wholly dissimilar in all its features from every thing that has gone before, the originator soon discovers, to his cost and chagrin, that he has to deal with ears that are deaf, and with heads that have a propensity for shaking. Poetsch's system has been described in some of the technical journals solely for the purpose of holding it up to ridicule, and in others to afford the writer an opportunity for exhibiting his cleverness in discovering insuperable difficulties in the way of its application. That the scheme was something more than the dream of a visionary man was, however, made evident by the announcement a short time ago that the system was to be put to the test of actual practice at the important mine known as the "Grube Archibald," and by the rapidly growing interest in the matter, which prompted the questionings to which I have already alluded. To convince myself by personal observation of the truth concerning some contradictory reports of the success attained at this first trial on a practical scale, I resolved to see without delay what was really being done at "Grube Archibald." The evidence there obtained upon the spot is sufficient to remove all doubts upon certain points, and goes far to show that a very important addition has been made to the art of mining.

For those readers who may not yet have heard of this system, it will be well to describe it briefly. It consists, then, in freezing the water through which the shaft has to pass, and in excavating the frozen mass by the ordinary means. In this way, not only is the sand and water taken out in solid and hard blocks, but a walling of ice about three feet thick is left around the excavation to keep back the water. This novel idea was generally acknowledged to be exceedingly clever, and sound in principle, but its practicability, and even the possibility of carrying it out at all, were doubted. This point has now been set at rest by the results of the trial at "Grube Archibald." In about fifteen days, the ground covered by the area of the sinking, and 30 inches around, was made solid with ice, and so firmly was it frozen that it was hard to break up the blocks that were taken out; no scratch could be made upon them with the finger-nail. In commencing a sinking over a known water-bearing stratum, the shaft is laid out, and carried down to the sand, of a diameter slightly larger than what is intended as the ultimate size. A circle of small bore-holes, about three feet apart, is put down a little outside the true shaft, that is, just within the sides of the shaft as it will be when excavated to its required diameter. A second circle of bore-holes inside the first, and consequently within the area to be excavated, is next put down, and a single hole in the center completes the set. As far as the character of the ground will permit, these holes are bored simultaneously with the sand-pump. Over the holes, and raised a little above the bottom of the sinking, is an annular distributing tube, from which small copper tubes provided with cocks descend to the bottom of the bore-holes. At bank is a Carré freezing-machine which, by the ammonia process, produces a high degree of cold. Heat is abstracted from a concentrated solution of the chlorides of magnesium and calcium, the freezing-point of which lies between 35 and 40 degrees Centigrade. This solution, at about a temperature of 25 degrees Centigrade, is driven by a small force-pump into the annular tube, whence it flows down the copper tubes to the bottom of the bore-holes. It then ascends in the lining tubes and passes back through a common ascension-pipe to the machine. In this way, a constant circulation is kept up. It will be seen that while ascending in the bore-holes this cold solution abstracts heat rapidly from the water in contact with the outside of the lining tubes, and that the greatest action takes place at the bottom. This gives a gradually increasing mass of ice from the top to the bottom of the bed—that is, a truncated cone of ice in the watery stratum, a circumstance happily in accord with the increasing pressure of the water. When the ground has been sufficiently frozen, a fact to be ascertained by boring, the work of sinking begins. It consists merely in excavating the solid mass of ice and sand, and in building up the brick or iron lining (walling or tubbing) inside the ice-bound sides of the shaft. As there can be no influx of water, the work presents no difficulty. For security, the circulation of the freezing liquid is kept up in the outer circle until the shaft has been sunk completely through the quicksand. At the "Grube Archibald," the system could not, unfortunately, be carried out in the most convenient manner; for the sinking was not commenced from the surface, but from the bottom of an already existing shaft 100 feet deep. The shaft is rectangular, 10 feet 4 inches by 14 feet 6 inches, and the quicksand bed is 13 feet thick. All the bore-holes in this case, twenty-three in number, have necessarily been placed inside the shaft, where they are seriously in the way of the sinkers. But in spite of this unfavorable circumstance and some other disadvantages attendant on all first attempts, enough has been accomplished to place the practicability of the system beyond doubt. It is yet too early to compare the cost with that of the ordinary methods; but it is easy to see that when there is much water to be dealt with, Poetsch's system must be an economical one; it certainly affords a high degree of safety in working.

This matter of dealing with water recalls to my mind a dam lately constructed in a coal mine in Belgium for the purpose of shutting off a large body of water that had broken in from some old workings. This dam is remarkable only for its good design and excellent construction. It consists of three semicircles of bricks, each 3 feet thick, and separated one from another by 4 inches of clay puddling. This constitutes the dam proper; but above it, that is, on the water side, is a stopping of clay, 8 feet thick, and behind it, as a support, there are 33 feet of rubble masonry. The character of the Belgian coal-fields renders damming of very frequent application in the mines, and numerous good examples of these constructions are to be met with.

A TEST OF THE NOTEMAN ROTARY ENGINE.

Prof. Robert H. Thurston, of the Stevens Institute of Technology, Hoboken, N. J., has addressed to Messrs. Ledoux & Ricketts, of this city, an abstract of a report upon the performance of the Noteman engine, from which we take the following: The tests have been unusually complete, and, although not in precisely the same manner as I had originally intended, have furnished all essential facts relating to the efficiency of the engine, and its value, as compared with reciprocating engines of equal power. The engines tested, and those inspected by me previous to the tests, are generally well made, and capable of doing the work for which they are intended. The efficiency of the engine from which the data to be given were secured is somewhat impaired by defective fitting, as shown on inspection after test, and this being remedied, the machine should do even better than here indicated.

The tests consisted in the determination of the gross and net power of the engine by the indicator and dynamometer, the consumption of water and steam, the friction of parts and of the engine as a whole, and the action of the inertia in the production of unbalanced stresses. The variation of the rotative effort at the shaft was also determined and its influence upon the size of the fly-wheel needed.

After these points had been worked up, the engine was compared with reciprocating engines of similar power, to ascertain their relative standing, the points compared being the economy, the smoothness of motion as affected by the variation of rotating effort, the amounts of clearance, the balance, and the liability to loss by cylinder condensation. The performance of this engine is also compared with that of other rotary engines, tested under my order as chairman of a committee of the Board of Managers of the Exhibition of the American Institute having charge of the Machinery Department, in the year 1873, of which tests the results were published later in London *Engineering*, and in *Spon's Dictionary*. These determinations and comparisons lead to conclusions which may be briefly summarized as below. The report in detail will require some time for preparation.

The engine tested was rated at ten horse-power. It was tested under 80 and under 60 pounds steam pressure. The indicated and the dynamometric power, at 60 pounds pressure by gauge, were respectively 14·8 and 12·4 horse-power, showing a loss of 16 per cent by friction in the engine. The consumption of water and steam amounted to 656 pounds, or 43 pounds per indicated and 50 pounds per dynamometric horse-power per hour. The speed of the engine was made, in this trial, 350 revolutions per minute. It ran smoothly and evenly, and gave no trouble from heating, or any other cause, during a run of two hours. Every thing was in good shape at the close of the trials, and the engine in as good condition to continue its run, at the excess of 50 per cent above its rated power, as at the beginning. The indicator diagrams taken were quite similar in their general proportions to those obtained from other small engines of usual forms and of the same power. The point of cut-off was not far from half-stroke, and the lines of the card were good, from the beginning of the steam line to the end of the expansion curve. The cushion line has a peculiar form, which comes of the special method of terminating the exhaust, which is due to the construction of the engine. It has no important effect upon the efficiency of the machine. In consequence of the variation of the volumes of cylinder exposed to action of the steam, throughout the stroke, the real ratio of expansion is about two thirds the apparent

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ratio, or 1·4, instead of 2. The weight of the steam accounted for by the indicator is about 75 per cent of that actually measured at the tanks in which the exhaust was condensed. The cylinder condensation thus amounted to 25 per cent of the total weight of steam entering the engine.

In making a comparison of this engine with others, it is found that its consumption of steam, and consequently of fuel, is vastly less than either of those of which the results of tests were published as above. It demanded but one third as much as the best of those engines, and but one tenth as much as the least economical of that set. Its greater power will account for a part of the last enormous discrepancy, but not for the superiority of the Noteman to the most economical, which was of similar rating and of two thirds the actual power. In comparing the Noteman with a reciprocating engine, one of the latter class was selected which was known to be of good repute and to be able to run at high speed with safety. It was six inches in diameter of cylinder and of eight inches stroke of piston, and at the same speed of revolution, cutting off at the same actual point of cut-off, that is, having the same real ratio of expansion, would develop the same power. The engine was judged to be one which could be relied upon to do its work under these assumed conditions. It was one of the best of its class. The clearance and "dead spaces" in this engine were about one fourth, or less, than those of the rotary. The loss of steam is correspondingly greater in the latter; but this loss can, and should, be very much reduced, and can be made comparatively unimportant by rearranging the cut-off valve in such manner that the valve-seat shall be brought down close to the cylinder-port.

Comparing the areas of internal surface productive of cylinder condensation, as measured up to the point of cut-off, it was found that the rotary had 15 per cent greater area than the reciprocating engine. It would be expected that it would be at some disadvantage in this respect; but this is not indicated by test, as the Noteman engine exhibited very much less loss in this direction than we are accustomed to find in the small reciprocating engines which are fairly comparable with it. The loss from this cause in larger reciprocating engines, as constructed by the best makers, very rarely falls below that observed in this little rotary.

On studying the action of the rotary with respect to uniformity of moments producing rotation of the crank-shaft, it was found that it has no "dead-center" at all, and that its action upon the shaft is very much more uniform than can be that of any single reciprocating engine. This difference is two and a half to one in favor of the rotary. It therefore indicates that the latter would require a fly-wheel less than half the size of the common form of engine, or with the same weight of wheel, it would regulate correspondingly closer. The same superiority is apparent in the comparison with a view to determine the tendency to shake the engine loose from its foundation. The superior speed of rotation, in consequence of this feature, of the rotary engine is the merit upon which superiority has been claimed for it by its advocates from the time of its first introduction, and which has been usually relied upon to compensate what have been supposed to be its defects economically and commercially. These claims are here well sustained, and probably have never been denied. An elaborate calculation of the losses in detail, due to the friction of the parts of the mechanism, has been gone into. This confirms, as closely as need be desired, the results of the test of the rotary, and a comparison with the friction of the reciprocating engine indicates that the latter has a superiority, in this respect, of less than ten per cent of its amount; and this means but about one and a half per cent of the power of the engines compared.

TIN ORE IN DAKOTA.

By William P. Blake, M.E.

Since my former communication upon the discovery of tin ore in the Black Hills of Dakota, other localities have been found. One especially, upon Spring Creek, is worthy of notice. The ore occurs there not only in alluvial deposits in crystalline grains and masses about the size of grains of corn, but in veins of considerable extent and regularity. Samples sent to me show the tin-stone (black tin) disseminated in a gangue or veinstone of white quartz, with a little white mica in small crystals, thus approximating to the composition of typical "greisen." The chief vein is said to be about three feet wide, and to be traceable, but with occasional breaks and interruptions, for a mile or more. It traverses a mica slate.

Samples of supposed tin ore sent to me from Harney Peak consist chiefly of black tourmaline, or schorl. They do not contain tin in any visible quantity, but the black mineral has been mistaken for tin ore by some, and has given rise to local reports of the discovery of enormous deposits of tin-stone.

Development-work has begun on the Etta or Tin Mountain claims, and the ground opens in a very encouraging way, showing large masses of the greisen well charged with cassiterite. A mill has been contracted for and will soon be erected for the purpose of crushing and concentrating this ore. As the concentrations will be very pure and of high grade, it is proposed to ship them to a smelter until arrangements are made for smelting at the locality.

A PATENT DECISION.—The Commissioner of Patents has ruled that distinct and independent inventions, which are differently classified, may not be embraced in one invention. In cases where distinct inventions are dependent upon each other, and mutually contribute toward the production of a single result, the office classification when it obstructs must give way.

MANITOBA & NORTHWEST FARMERS' UNION.—This society has been organized at Brandon. The object is to secure to the province the control of its lands, timber, and minerals; to have the duty on agricultural implements reduced, and to obtain the building of more railroads. One of the speakers at the meeting suggested secession from the Dominion of Canada unless the rights of Manitoba were secured.

FURNACE, MILL, AND FACTORY.

There has just been completed at the F. C. Wells Pump-Works, Chicago, and shipped to the North Chicago Rolling-Mill Company, for its steel-converting works at South Chicago, the largest heavy-pressure pumping-engine ever made in the West. The steam-cylinder of this engine is 32 inches in diameter by 3 feet in stroke, operating on a water-cylinder 11½ inches in diameter. The engine weighs 13½ tons and is 37 feet long over all.

Two Pratt & Whitney machine-guns have just been completed at Pratt & Whitney's works in Hartford, for Gen. U. S. Grant, as presents to the Viceroy of China and the Mikado of Japan. The guns are Pratt & Whitney's improvement over the gun once known as the Gardner gun. The two presentation guns are of the most perfect and elaborate workmanship. Other guns of the same model have a government record of 505 shots a minute, and have been fired at the rate of 700 shots a minute, and 5000 shots in thirteen minutes and twenty-six seconds.

The old Bay furnace machinery, consisting of four boilers, two engines, and a hoist, has been purchased by the Emmet Mining Company for its new furnace at Iron River, Michigan.

A prominent mining engineer informs us that, after severely testing the emery wheel and machine made by the Tanite Company, of Stroudsburg, Pa., for grinding down ore-crushing rolls in place, he has found it to be a great success.

At Croton Falls, N. Y., the Bull's International Iron and Steel Company is putting up a plant to make iron directly from the ore by the Bull process. We understand that the works are to be ready by the 1st of March.

The Boston & Colorado Smelting Company has placed its order with the Lechner Manufacturing Company, Columbus, O., for another chain elevator, and an additional order for roller detachable chain belting, for use in its works at Argo, Colo. This company has also furnished F. L. Carroll & Son, Nona, Texas, and Christie & DeGraff, Detroit, Mich., with detachable chain.

George Point, of Doylestown, O., has leased 250 acres of land in the extreme southwestern portion of Summit County, O. He claims to have discovered a mineral earth or plant which can be used in the place of white lead.

The Lloyd Valve Company, of South Bethlehem, with a capital of $150,000, has been chartered.

The works of the Pittsburg Forge and Iron Company, at Verner Station, have put on another turn, and are now running double in all departments.

The capital stock of the Dunbar Furnace Company has been increased $100,000 and its indebtedness $800,000. The company's two furnaces are located in Fayette County, Pa.

The Iron City Nut Lock Company, Limited, has organized. The capital is $150,000, and the officers are H. W. Oliver, Jr., President; George B. Edwards, Vice-President and Treasurer; John Noble, Secretary; and George B. Edwards, James B. Oliver, H. W. Oliver, Jr., J. H. Noble, T. B. Kerr, and D. B. Oliver Managers.

A party of gentlemen visited the east end of Toronto, Canada, recently for the purpose of selecting a tract of land on which to erect rolling-mills and blast-furnaces. The project is promoted by United States capitalists. No definite step, it is said, will be taken until the government is approached for the purpose of better terms in order to enable the company to compete with British and United States iron-men.

At a meeting of the stockholders of the Scranton Steel Company, held November 27th, it was unanimously agreed to increase the capital of the company from $600,000 to $1,500,000, for the purpose of building a new blast-furnace.

The report of the suspension, on account of a lack of orders, of Miller, Metcalf & Co.'s mill is untrue. The mill is running in every department, and the proprietors report that orders are plentiful.

According to dispatches, the firms of S. B. Lowe and Lowe & Kirk, of Chattanooga, Tenn., made assignments November 26th. The liabilities are about $60,000 and the assets less than $50,000. Lowe & Kirk were in the foundry and machine business, and S. B. Lowe was a manufacturer of metallic paints, and was engaged in a general iron commission business. The Lowe Metallic Paint Company is not affected by the assignment.

Creditors of the Steel Company at Danville, Pa., have proposed to buy the establishment and pay all debts, which amount to $222,000, in one annual and six semi-annual installments. Should this proposition be accepted by the stockholders, the works will run on; if not, a forced sale will cause a suspension. The assets of the company are computed at $234,000.

Center Furnace, at Ashland, Ky., will blow out December 15th, and will not make a blast next year.

A dispatch from Cleveland, O., dated November 26th, says that the new turn taken in the affairs of Brown, Bonnell & Co. creates considerable excitement among iron manufacturers. The scheme of the Brown-Bonnell men is now said to be to get the matter out of court by the payment of the original claim, on which a receiver was appointed; but whether it can be paid or not is a question, as there are other creditors with claims footing up to over a million of dollars. Arguments in support of the intervening bills, put in by the Pittsburg Citizens' National Bank, will be heard before Judge Walker in a few days.

Alan Wood & Co., J. Wood & Brothers, and J. Wood Lukens, iron manufacturers of Consbohocken, Pa., have posted notices around their respective works announcing a general reduction of wages, which will go into effect on Monday, December 3d. The wages of employés receiving $1.50 per day and upward will be cut down 10 per cent; hands who receive $1.40 will be reduced to $1.30; and laborers' wages will be lowered from $1.17 to $1.15 per day. This sweeping reduction applies to all mill hands except the puddlers, who are working under a scale of Pittsburg and Philadelphia prices. The puddlers were "cut" several weeks ago, and it is understood that they will suffer another reduction in a short time. Dullness of the iron trade is given as an excuse for the lowering of wages; and it is understood that the iron-workers will submit to it with a good grace.

For several weeks past, Colebrook Furnace No. 2, at Lebanon, Pa., has been using bituminous coal as a fuel in place of anthracite, and the experiment has given excellent results. The product of the furnace for last week, with all coke and bituminous coal, using Cornwall ore exclusively, was 602 tons. At present, the charge of fuel is 1950 pounds of coke, to 150 pounds of bituminous coal. When anthracite was burned, it was not found possible to use more than 1500 pounds of coke in a charge of 2100 pounds. The use of bituminous coal secures lighter pressure and generally better results. This we believe to be the first furnace east of the Alleghanies to use bituminous coal and coke exclusively.

GENERAL MINING NEWS.

ARIZONA.

The Florence *Enterprise* says that the Pioneer mill, five stamps, started up May 1st, and has produced, up to October 31st, $64,025 in bullion and $9480 in concentrations, making a total of $74,355 for the six months' run. The Howard mill, 10 stamps, started up July 1st, and produced, up to October 31st, $48,672 in bullion as the result of a four months' run. Considering the fact that these companies have had some trouble with their employés and delays caused by the non-arrival of supplies, the showing made is a highly creditable one. Until Mr. W. B. Hellings was given full charge, the output, comparatively speaking, amounted to very little; but under his able and energetic superintendence, order was restored out of chaos and the above splendid showing made. The Howard mill is now shut down for the purpose of changing it to a dry crusher and putting up roasters, the ore now being too base for raw amalgamation. As soon as the necessary change can be made, the mill will be started up again. The Pioneer shipped two bars of bullion this week valued at $2968.

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CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED.—The secretary reports that the mine is looking well and gradually increasing its product. The output for the first half of November is valued at $47,189.

KERN COUNTY.

SUMNER.—A recent fire has done considerable damage to the property. The latest dispatches from Caliente, where the mine is located, state that the fire is in the upper and 160-foot levels, and that it is impossible to say how far the flames are progressing or to estimate the damage. The works are situated at Kernville, forty miles distant, and cost from $750,000 to $1,000,000. The origin of the fire is unknown. There is no insurance on the property.

MONO COUNTY—BODIE DISTRICT.

Mr. Irwin C. Stump, assignee in insolvency, sold at Bodie, November 19th, the mining ground and all appurtenances and fixtures of the Noonday Mining Company, the North Noonday, and the Red Cloud Consolidated Mining Company, to satisfy judgments amounting in the aggregate to over $550,000, besides costs. The property was sold to the highest bidder, Mr. A. E. Davis.

SIERRA COUNTY.

ALASKA.—The hoisting-works, which were some months ago destroyed by fire, have been rebuilt and started up. The water in the shaft has been lowered seventy feet.

SIERRA BUTTES.—At the mine, grading has been commenced preparatory to building a tramway between tunnels No. 8 and 9. The new mill at No. 9 tunnel is nearly covered.

CANADA.

PROVINCE OF MANITOBA.

A dispatch from Winnipeg to the New York *Tribune* states that a glowing account of newly-discovered mineral wealth in the Rocky Mountains comes from the terminus of the Canadian Pacific Railroad. Persons just returned from those regions declare that the mountains in the vicinity of the Bow and Kicking Horse rivers, as well as many smaller streams, contain gold. Scores of men have spent their time in prospecting, and the numerous rich finds show how their exertions have been rewarded. Leads have been discovered and claims staked out in every direction. Castle Mountain is said to be rich in silver ore. Among other places where promising leads have been found are Johnson's and Baker's creeks, while some which are considered the best yet discovered are situated in the Kicking Horse Pass and are owned by the Tunnel Mountain Mining Company. This company owns several claims carrying both gold and silver. Samples of the ore have been sent to Montreal for assay, and the returns show them to be very rich. The company will open an office at Bow River Forks, and intends to begin operations as soon as the weather will permit in the spring. The gold is chiefly free milling.

NOVA SCOTIA.

COXHEATH COPPER MINING COMPANY.—Thirty-four assays of ore taken from various parts of the mines at separate times, showing from 5·8 per cent to 26·6 per cent copper, have averaged 13·3 per cent. At a depth of 150 feet in the main shaft, the ore next the foot-wall of the vein has contained a considerable showing of silver with a high grade of copper.

ONTARIO.

CALABOGIE.—The first car-load of iron ore from this mine has reached Kingston. The Kingston & Pembroke Railroad now connects with the mine, and a siding has been built for the acommodation of the company.

COLORADO.

CRŒSUS *vs.* COLORADO LAND AND MINERAL COMPANY.—The Denver *News* says that the suit of the Crœsus Mining and Milling Company *against* the Colorado Land and Mineral Company has occupied a good deal of the time of Judge Hallett, in the United States Circuit Court. Each company filed adverse suits against the other for the possession of certain mining property. The matter in immediate controversy in the suit is the adverse claims between the Bernadotte & Maximus and the Nova Scotia Boy No. 2 lodes, in the Ten-Mile District, Summit County. The jury trial resulted in a verdict for the plaintiff for possession. The defendant moved for a new trial. A great many of the leading attorneys in the State are engaged in the case, which opens up some important questions in an old and long-standing suit. Judge Thatcher appeared as senior counsel on one side, and Hon. Thomas M. Patterson on the other.

CLEAR CREEK COUNTY.

HUKILL.—The mine has been leased.

PAY ROCK.—The mill has been shut down for the winter, owing to freezing. The mill, during the past season, has worked to entire satisfaction and with good returns for the company. In the spring, work will be resumed. The lower level of the Pay Rock, which lately was filled with water, has been pumped almost dry, and developments will soon begin.

DOLORES COUNTY.

GRAND VIEW & PHŒNIX.—Work was begun on these mines November 1st. The vein in the last-named mine varies in width from two to four feet, and the character of the ore is lead carbonate. The ore in the Grand View is of a quite different character, and is very peculiar, difficult to sort with any accuracy. Preparations are making to blow in the small furnace, and the run will begin on Phœnix, Grand View, Silver Bell, and Little Maggie ore.

FREMONT COUNTY.

ROCKY MOUNTAIN MINE DEVELOPING COMPANY.—The copper plant of this company is rapidly approaching completion. The plant is new throughout and in all its parts adapted to the economical reduction of copper ores. The company's mine is thoroughly developing, and by the time the smelter is in operation will be capable of maintaining a large daily output.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY.—A four-foot vein of galena, rich in gray copper, assays giving from 107 to 170 ounces, has been struck in the third level, at a surface depth of 120 in the Ute mine.

LAKE COUNTY.

BRIAN BORU.—A new strike of fine carbonate ore was recently made. The mineral consists of a dark sand and light-gray hard carbonates. The ore all contains a great deal of lead, and will doubtless also carry some gold and silver.

CUMMINGS & FINN.—The price paid by Messrs. Grant, James & Eddy for these smelting-works, several mill-sites, and a number of mining claims is stated to have been $150,000.

ENTERPRISE.—The Forepaugh shaft of this company, situated just east of the Little Sliver mine, is passing through material presenting a very encouraging appearance. The shaft has a depth of 370 feet. The bottom of the shaft is in iron.

HENRIETT.—Some of the low-grade dump material is concentrated by the aid of hand-jigs with very gratifying results. The jigs are stationed in Stray Horse Gulch, a few hundred feet from the mine, and water forced up by steam is used to wash the ore. The washing is done on a royalty of twenty-five per cent, and proves profitable to both the mine and the parties operating the jigs. The low-grade ore runs about four ounces in silver to the ton and from ten to twelve per cent in lead. The concentrates by assay contain seventeen ounces in silver and fifty-four per cent in lead.

LA PLATA.—Four of the large furnaces at the reduction-works of this company have been blown in. The works had been out of blast since September 15th, at which time they were closed down on account of the inability of the management to secure ore on contracts that would leave a profit on the operation of the works. The suspension of work was also due in a large measure to the necessity of making improvements and alterations, without which it would have been impossible to operate the smelter successfully and profitably.

LITTLE CORINNE.—A lease for eighteen months has been secured by several gentlemen at a reasonable royalty. The lessees propose to put the mine into good working shape.

LUZERNE.—The mine is again taking out some fine sand carbonate ore. The shaft and workings of the mine are evidently not as deep as they should be to admit working to the best advantage, as the ore-bodies are not drained and the mineral comes up wet and mixed with waste. The difficulty, it is stated, will soon be remedied by sinking the shaft deeper. A new shaft has been started about one hundred yards northeast of the Luzerne, which has attained a depth of 120 feet.

ST. LOUIS.—This mine, formerly the Miner Boy and Colorado Prince mines, is hipping about fifteen tons of ore a day. The product of the mine is of good grade, carrying considerable gold in addition to the silver.

OURAY COUNTY.

The Cimarron and Union mines have closed down, as a result of the strike of the Miners' Union. It is expected that the Smuggler will also close down.

MENDOTA.—A strike has been made in the lower level, which is run at a distance of 125 feet from the surface. The ore runs extremely high, averaging 250 ounces in silver. The vein-matter is principally composed of gray copper, brittle silver and ruby. The lessee is taking out about twenty tons of ore a day.

PARK COUNTY.

Brunk's mill, at Montgomery, will run all winter with ten stamps, and will do custom work for the mines in that neighborhood. Among other works, Mr. Brunk expects to run considerable ore for the Crystal Lake and Sovereign companies.

WYANDOTTE.—The new developing tunnel is progressing finely. It will reach the contact about the 1st of February.

SUMMIT COUNTY.

The Leadville *Herald* states that some of the creditors of Mr. Greer, of Kokomo (lessee of the Robinson mine), became uneasy recently and attached Mr. Greer's concentrating mill. The first attachment was made at the instance of Messrs. Ellis & Lowe, the owners of the Colonel Sellers mine in Ten Mile, who have a claim of two thousand dollars. When their action became known, Messrs. Gleason & Lovell, the lessees of the White Quail mine, also attached the mill to secure three thousand dollars still due them on ore shipped to the Greer mill. Mr. Greer is making an effort to extricate himself from the financial embarrassment into which he has been precipitated by the action of his creditors.

CLINTON.—Mr. W. W. Burr, manager of the Clinton mine on Battle Mountain, near Red Cliff, has returned from Philadelphia and reports the sale of this mine to Mr. Whitaker Wright and others.

INGERSOLL.—The owners of this placer claim have begun suit against the Denver, South Park & Pacific Railroad Company for thirty thousand dollars damages. The plaintiffs are the owners of the Ingersoll placer, situated in Little English Gulch, in California Mining District, and said placer contains 156·28 acres. In the placer, there are two lode claims, called the Lincoln and Hurricane.

DAKOTA.

ESMERALDA.—Work has been suspended at this mine and mill. The Black Hills *Pioneer* says that no reason is as yet announced; but it is rumored that the Lancaster Company is to acquire possession by purchase or lease, and that cessation of work will be temporary only.

ETTA.—According to the *Index*, A. J. Simmons contracts with the other owners, for one half of their several interests in the property, to place machinery on it consisting of ten stamps, Blake crusher, concentrators, tramway from mine to Grizzly Gulch, and to open the mine. Work has been begun. With the machinery proposed, it is expected to produce two and a half tons of clean oxide a day, which will be shipped out for smelting until the mine pays for erecting the necessary smelter, which it is thought may be advisable to place in Rapid City.

FATHER DE SMET.—The superintendent's report for the week ended November 15th shows: Ore extracted from first level, 1200 tons; second level, 600 tons; third level, 300 tons. Ore milled, 2100 tons. Golden Gate cross-cut, third level, was advanced two feet; Golden Gate south header, third level, advanced four feet.

MINNESOTA.—The mine has been bonded, but not sold, as reported. Work will be commenced soon.

GEORGIA.

KEYSTONE.—Work has been resumed at this mine, which has been idle for some time.

IDAHO.

ELKHORN.—The expense of operating this property—situated near Ketchum—from December 7th, 1882, to November 7th, 1883, just eleven months, was as follows:

Labor, salaries, board	$24,536.23
Incidentals, taxes, assaying, etc	505.91
Tools, iron, candles, etc	2,480.72
Hauling ore, etc	5,102.18
Timber for mine houses, etc	2,595.29
Incidentals	152.00
Total	$35,373.53
Ore sold	161,841.22
Net profit	$126,467.69

Besides this, 200 tons of ore have been delivered at the smelters, for which the company will receive $90.25 per ton, making about $18,000 to add to the net profits of the eleven months' operations.

HOLYOKE.—This company is working three claims in the Snake River, the Juniper, Omaha, and Bonanza Bar. The prospect for a long continuance of bullion production are very favorable.

MIDA.—The company's grounds, besides carrying fine free gold, contain large quantities of black sand, which is also rich in the precious metal, and the company's methods enable them to save the gold and black sand in bulk, which may be concentrated so that one ton of it will yield from $200 to $800. These concentrators can be used by the smelters in making up their charges, which will increase the value of the bullion produced. During the past season, which has been spent largely in experimenting, the company has washed about 200 yards of sand daily. In the spring, it will start up more extensive machinery, which will enable it to treat 1000 yards of dirt every twenty-four hours.

PHILADELPHIA MINING AND SMELTING COMPANY.—E. G. Mathews, president, and Mr. Rhodes, vice-president of this company, recently inspected the smelting-works before shutting down for the winter. The mildness of the weather has permitted the hauling of ore and the running of two stacks, which turn out an average of 17 tons of bullion a day.

WOOD RIVER.—The Bullion and Ophir mines yield from 20 to 30 tons a day. The recent discharge of some 75 men from the Bullion mine took place because a great deal of dead-work which had to be done is completed.

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MICHIGAN.

The following table, given by the Marquette *Mining Journal*, exhibits, in gross tons, the total lake shipments of iron ore from upper peninsula ports the present season, up to and including November 21st, together with the amount shipped from the same ports during the corresponding period of last year:

Name of port.	1882.	1883.
Escanaba	1,728,458	1,404,469
Marquette	941,288	692,906
L'Anse	70,543	64,803
St. Ignace	59,157	56,558
Total	2,799,426	2,218,736

Showing a decrease of 580,690 gross tons.

CANAL.—The exploration workings are about midway between Crystal Falls and Republic. A reddish-brown ore, claimed to be Bessemer in quality, has been struck in one test pit. The volume of water is so great that it prevents sinking beyond a certain depth, which is not very great. Nothing but a hand-pump is now used.

DETROIT.—The mine has finished its contract with the Vulcan furnace, at Newberry, and has ceased shipments from the mine for the season. About 10,000 tons were sent out this year. The property is now in first-class shape and can make a much better showing the coming year.

KNOWLTON.—According to the *Iron Agitator*, a party of Ontonagon County citizens has secured control of the old Knowlton copper mine, and is making preparations to operate it. Arrangements for adequate machinery for unwatering the mine are making. The Knowlton lies between the Mass and Caledonia mines, and has been filled with water to the adit level for several years past. Above this point, some work has been done by tributers, and some large masses have been encountered. The tributers have used only mass and barrel work, as there were no facilities for stamping, and it is thought that it is the intention of the new company to erect stamps to treat the copper rock that has thus far been thrown aside. The mine has produced 263 tons 973 pounds of copper, and it is believed by those having the property now in hand that they will make a success of it. The Knowlton, Mass, and Butler veins cut across the southeast corner of the property.

SEDGWICK.—Mr. Henry R. Mather, receiver, advertises that he will sell, December 17th, at public auction, in the city of Marquette, the property of this company—the northeast quarter of southeast quarter and south half of southeast quarter of section twenty-eight; the northeast quarter of northeast quarter of section thirty-three; and one and a half acres of land in southeast corner of southwest quarter of section twenty-eight (being 15 rods north and south by 16 rods east and west), all in township forty-eight, north of range twenty-six, west.

MONTANA.

LEWIS & CLARKE COUNTY.

HELENA MINING AND REDUCTION COMPANY.—The company has about completed its works, and has an 80 and a 150-ton concentrator, and two 20 ton furnaces, and a 20-ton mill. The company will mine at least 250 tons a day. The bulk of this will be concentrated and shipped. This company's property formerly belonged to the old Alta Montana Company.

SILVER BOW COUNTY.

GENEVA.—The lead, located southwest of the Bonanza, on being prospected, shows an average return of 86 ounces silver and $4.90 gold.

SHONBAR.—A rich chute of ore has been opened in the 220-foot level for a length of 200 feet, with splendid results. The new strike is three feet wide, and samples $100. The company is now working fourteen men, has 2000 tons of $40 ore on the dump, and has produced $100,000 in the last fifteen months. It has a complete hoisting and pumping plant.

NEVADA.

A dispatch, dated November 26th, states that the Holmes Mining Company has obtained a judgment of $360,000 against the Northern Belle Mining Company for trespass.

ELKO COUNTY.

NAVAJO.—The mill has been started up and works satisfactorily.

EUREKA COUNTY.

ALEXANDRIA.—The Diligent shaft is down 250 feet, and will be carried to a farther depth of 50 feet, when drifting will be commenced from that point. At present, the work of development is slow, but when spring opens, will be pushed ahead rapidly. Tributers are exploring the old works, and are successful. One set at work on the Sterling tunnel has about twelve tons of rich ore on the dump, which will be sent to the Eureka Consolidated furnaces as soon as it is sacked and ready for shipment.

EUREKA CONSOLIDATED.—Dr. J. C. McKenzie, president of this company, stated, in an interview with a *Sentinel* reporter, that the Selby Works had reduced the cost of refining 6 per cent on the previous cost of refining. The machinery at the Logan shaft is entirely inadequate to do the required work, and part of it will have to be removed. Contracts have been made for coal up to July next, for twenty-five cents per bushel. The dump-pile has not been sold.

EUREKA TUNNEL.—Under date of the 17th ult., Dr. G. H. Thomas, W. Pardy, G. W. Baker, A. Skillman, Gen. P. E. Connor, trustees, and J. Pardy, secretary, have published a circular, of which the following is the substance:

The Eureka Tunnel and Mining Company commenced its work on Prospect Mountain, Eureka, Nevada, January, 1878, since which time the work has been continuous. About December, 1881, the tunnel was into the mountain 2007 feet, having cross-cut 950 feet of ore-bearing limestone, without encountering any large body of ore. Here the primary object of your organization was completed, and the second object, that of mining, commenced. A drift was started on a small showing of ore to the south, resulting in the finding of the present vein or ore channel, which has yielded in gross about $150,000. At the period of this find or strike, the records of the company show its indebtedness May 10th, 1882, $67,986.21, and properly belonging to the cost of tunnel and prospecting drifts therefrom. At this time, a question of title to the ground in which the ore was found arose, resulting in the purchase of a portion of the El Dorado Mining Company's patented claim, at a cost of $21,000. Following this purchase, a call on the stockholders was made of 25 cents per share. On March 6th, 1883, the present board entered upon its duties, when the official report of the secretary showed the indebtedness to be $47,451.60, of which sum $29,443 was in notes issued December, 1881, and a note of May 10th, 1882, for $12,246, a total of $41,689, drawing interest at 18 per cent per annum. To this indebtedness, incurred mostly during the tunnel construction, may be traced the present embarrassment of the company. September 1st, 1883, the report of the secretary shows the company still in debt $47,060.54, to which should be added a sum of accrued interest, not then taken into account. Thus it is shown that the debt of March 6th and that of September 1st, 1883, is approximately the same; during which period the same report shows $52,113 netted to the treasury from the ore product of the six months ended September 1st, 1883, which sum was expended in exploration, production, machinery, and improvements to and surrounding the mine. To the present time, the extraction of ore has been doubly expensive. From the fact that we cut over and down, whereas recent openings from the new shaft will enable us to cut under and up, a difference which miners fully appreciate in cost of ore extraction; that during these explorations we did not find ore in greater quantity, and sufficient to pay the old debt, together with the running expense and cost of improvements, is simply a fact; but our operations were stopped in ore both in the carbonate vein and the chloride vein, first level, while the cross-drifts from the bottom of the new shaft, second level, 700 feet below the surface, show streaks of ore.

The notes of this company having passed into the hands of third parties, payment has become a pressing necessity, and has finally caused the loss of local credit and the present disaster. The property being in the hands of judgment creditors, to rescue it and enable it to resume operations at the mine, we consider it our duty as your trustees to appeal to you for a sufficient sum of money to at once relieve the company from the present and we think also any future embarrassment, and therefore we have made a call for 50 cents per share. It is proper to state to you that a claim for damages is made by one Hartnett for the sum of $23,000, growing out of a transaction between him and General Connor over the purchase of mining ground which he claims the company is liable for, being a deed to this company of the Indus mining claim, and he has brought suit against this company for the above sum based upon such claim. The truth is, that this company never had any transactions with the said Hartnett of any kind or nature, and never purchased said claim from him, and any and all negotiations which were had with him were prior to the organization of said company, and were entered into if at all by Gen. P. E. Connor, and we are advised by our solicitors that the claim is not and can not be a legal charge against this company.

LINCOLN COUNTY.

The Bullionville smelter has closed down after a successful run. Since the smelter started up, it has turned out over 300 car-loads of bullion. This bullion was extracted from a portion of the tailings of Pioche ores, and still it is not half of the precious metals they contain; for, after being run through the concentrating-tables, the residue averages $15 per ton in silver.

STOREY COUNTY—COMSTOCK LODE.

GOULD & CURRY AND BEST & BELCHER.—The winze below the 2500 level passed through a very peculiar formation resembling slag. The rock contained iron, and was exceedingly porous. It has now passed out of the bottom, which is in a formation of block porphyry. A little water is coming in, but not enough to interfere with operations. At the Gould & Curry, the old Bonner shaft is getting into working order. Explorations will be commenced in the old levels which were abandoned several years ago.

NEW JERSEY.

GOVE.—This mine, situated near Drakesville station, one of the most promising iron deposits in Morris County, was to have been sold at public sale at Morristown, November 26th. The ore is of the richest quality, lying upon the celebrated Hurd Mine range, and the workings already done show the existence of a large quantity of ore.

NEW MEXICO.

DOÑA AÑA COUNTY.

SIERRA GRANDE.—Since the opening of shaft No. 11, it has yielded 166 tons of first-class ore, averaging 100 ounces to the ton. The Southwest *Sentinel* says that this ore, which promises to rival the famous Bridal Chamber, lies directly under the road, half-way between the company's office and boarding-house. It cropped to the surface and has been traveled over ever since the first location was made in the camp. The ore in shaft No. 18, which is another new strike and yielding handsomely, proves a connection between the ore-bodies in No. 11 and the strike of last summer, in No. 7. In shaft No. 14, the ore proved eleven feet in thickness, six feet of which are milling, the rest shipping ore, and every indication is, that it will open up larger as work goes ahead. Another new opening has been made on Sierra Grande ground, on what is known as the Railroad claims. This is on the east slope of the second ridge, and is yielding handsomely. This last strike is very encouraging, as it shows a continuation of the ore in the second tier of claims in the Sierra Grande group. Similar bodies of ore had previously been discovered on Bella ground in the same relative position, which yielded largely.

GRANT COUNTY.

GUNSIGHT.—The mine shows a well-defined lead of mineral for its entire length. Parties have begun work on the claim, for an interest.

IVANHOE.—The Kansas City Smelting-Works have contracted for 250 tons of Ivanhoe ore. Shipments have already begun.

MIMBRES.—It is stated that the works have been shut down temporarily. The company intends to make arrangements to resume work on a grand scale.

NORTH CAROLINA.

CID.—Operations were begun the first of this year, and have been continously carried on ever since. The main shaft has attained a depth of one hundred feet, and a tunnel has been opened at a depth of thirty-eight feet, and driven over 100 feet into the south hill. In this tunnel, a five-foot vein of black oxide, containing from forty to sixty per cent of copper, was struck. It is in large quantities. A vein of galena was struck in the shaft. Thousands of tons of copper have been taken out, ranging from carbonates containing three per cent to oxides containing sixty per cent.

CONRAD HILL.—The mine is now worked at a depth of three hundred and seventy-five feet, and yields fifty tons of sulphurets, concentrated to sixteen tons, averaging 7 per cent copper, and milling from eight to ten dollars gold per ton. A twenty-stamp mill running twelve hours a day produces an average of eight hundred dollars a week. The weekly copper product is from twelve hundred to fifteen hundred dollars. About one hundred and twenty-five men are employed. The output of the mine is increasing.

UTAH.

JUAB COUNTY.

EUREKA.—The company recently discharged one hundred miners. One hundred and twenty-five men had been employed, and the monthly output amounted to 1200 tons. Regarding this movement, no explanation is given, but it is believed that it results from the fact that the market is already overstocked with Eureka ore, and that the smelters are getting more of it than they can use to advantage.

MAMMOTH.—The latest reports regarding this company—the difficulties of which we have referred to several times—state that the Englishmen who are interested in the company's property at Tintic have consented to pay the creditors of Bowers & Butler twenty-five cents on the dollar, and, for the purpose of effecting an arrangement on this basis, Mr. Cunningham, one of the original owners of the mine, is circulating among the creditors an agreement for signatures. The Salt Lake *Tribune* says that nearly all the large creditors, representing claims to the amount of $109,000, have already signed the document, and the effort to obtain additional signatures is now making among the small creditors. It is understood that the McIntyre Brothers will stand their proportion of the twenty-five cent settlement, and when they get signatures representing claims to the amount of $125,000, they will, on their own responsibility, buy up the remaining indebtedness at such figures as they can. In view of this proposition, the old assistant-superintendent, A. C. Litchfield, has collected the claims of the miners and other small creditors in his hands, and is holding them in the hope of securing their full payment for the benefit of the interested parties. The claims he represents amount to $25,000, and every effort which has been made to get him into the settlement has thus far failed. It is confidently expected, however, to straighten out the affairs of the company within a short time, and start up work again on the mine.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 30.

There was but a small business in the mining market this week, and it was quite evident that the two holidays helped to further demoralize the dealings in mining shares. The business was not so generally distributed as was the case last week, but was mostly confined to the low-priced stocks. Of these, Gold Stripe was the most prominent on account of its strength. Decatur, Eastern Oregon, and Sonora were very largely dealt in, but show no important change in price. Of the dividend-paying stocks dealt in, Horn-Silver shows some strength under a small business. Standard was quite strong to-day at the Stock Exchange. Northern Belle suffered a decline of fifty per cent from its price of last week, owing to the Holmes Company obtaining a large judgment against it. The remainder of the market was of but little interest. We give a complete summary below. The total number of shares sold aggregates 106,617, as against 181,738 last week.

The Comstock shares were almost neglected, and of those on the list only the low-priced stocks were dealt in. California sold at 25@23c. Consolidated Virginia was quiet and irregular, selling from 37@32@35c. Sutro Tunnel sold at 15c. under a small business.

The Leadville stocks were quiet at steady prices. Amie sold from 13@12c., with a small business. Chrysolite was quiet and steady, selling from $1.45@ $1.35@$1.40. To-day, 25 shares were sold at $1.30. Dunkin was quiet and steady at 26@25c. Iron Silver was moderately dealt in at steady prices, selling from $2 30@$2 25. Leadville sold at 45c. Little Chief records a small business at irregular prices; it sold from 56@52 53c. Little Pittsburg was steady under a small business, declining from 47@50c. Climax was quiet and irregular at 8@6@7c.

The Bodie stocks were also quiet and steady. Bodie Consolidated was quite strong, under moderate transactions, selling from 50@80@75c. Standard was very quiet and was strong to-day; it sold from $6.25@$7. Bulwer was quiet and steady, selling from 49@46.

The Tuscarora stocks record but a small business at steady prices. Belle Isle sold at 33c. Navajo was dealt in to the extent of 100 shares at $3.75. Independence sold from 20@18c. Elko Consolidated was very quiet at steady prices, selling from 17@18c.

In the miscellaneous list, Alice was quiet and steady, selling from $2.40@$2.50. Eureka Consolidated was weak under a small business, selling from $3.50@ $3.25. Gold Stripe showed some strength and was very active; it sold from 5@10c. Green Mountain was strong, under a small business, selling from $1.30@ $1.35. Homestake was quiet and a little stronger; it sold from $10@10.50. Horn-Silver was moderately dealt in at strong prices, selling from $6.13@$6.50. Northern Belle was quiet and weak, selling from $2.95@$2. The sharp decline in this stock is attributed to the fact that the courts have decided against the company in a suit brought by the Holmes Mining Company for $360,000, the facts of which we have already published. Robinson Consolidated was a little weak, under a small business, selling from 36@32@34c. Sierra Grande was quiet and steady at 90c. Castle Creek sold to the extent of 700 shares at $1.

Barcelona was moderately dealt in at steady prices, selling from 26@28@27c. Bradshaw was quiet and steady at 20@17c. Caledonia was quiet and steady, selling from 14@15c., assessment unpaid. Central Arizona sold at 23c. under a small business. Decatur was very active at steady prices, selling from 6@4c. Eastern Oregon was also very active and was steady; it sold from 47@45c. Harlem was strong, under a moderate business, selling from $1 @$1.10. Sonora Consolidated was very active to-day at steady prices; it sold from 26@24@25c. North Mexican sold on Saturday last to the extent of 1200 shares at 55@50c.

We print elsewhere the substance of a statement by the trustees of the Eureka Tunnel and Mining Company.

MEETINGS.

The Bremen Silver Mining Company, office of Lester W. Clark, No 16 Exchange Place, New York City. A special meeting of stockholders, December 8th, at two o'clock P.M., for the purpose of considering and voting on the question of selling, assigning, transferring, and conveying to Martin W. Brennan, absolutely the owner of not less than one third in amount of all the stock of said company, for the nominal consideration of one dollar, all the estate and property, real, personal, and mixed, of said company, and of dissolving said company.

The New Central Coal Company, Nos. 6 and 6½ Trinity Building, New York City. Annual meeting of stockholders and election of directors, December 11th, from twelve M. to two P.M.

The Silver Link Mining Company, No. 1323 Broadway, New York City. Meeting of stockholders for the purpose of increasing the capital stock from $200,000 to $250,000, December 20th, at twelve o'clock M.

DIVIDENDS.

The Charleston (South Carolina) Mining and Manufacturing Company announces a quarterly dividend of three dollars and fifty cents per share, payable December 1st.

The Lehigh Coal and Navigation Company has declared a semi-annual dividend of three per cent, clear of taxes.

The Morning Star Consolidated Mining Company, of Colorado, has declared a dividend (No. 19) of twenty-five cents a share, amounting to $25,000, payable November 22d.

The Spring Mountain Coal Company has declared a semi-annual dividend of three and a half per cent, payable on and after December 10th.

PIPE LINE CERTIFICATES.

There was a marked falling off in the business done this week in oil certificates, and with the single exception of Wednesday the market was dull and almost featureless. On that day, there was considerable activity displayed, and the market broke and closed weak. To-day's fluctuations have been of a limited character, and although at one time strong, the market broke in the afternoon and closed weak.

It is rumored in the oil-fields that the report of the development-work for November will be "bearish." There has been good clear weather during the month, and this has been favorable to the erection of rigs and the drilling of wells. Besides this, the high prices that have ruled lately have naturally stimulated producers to increase their output.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Nov. 24	$1.18¾	$1.18⅞	$1.17⅝	$1.17¾	4,023,000
26					
27	1.18¾	1.19	1.17⅝	1.17⅝	5,502,000
28	1.17⅞	1.17⅞	1.15¾	1.16⅝	11,054,000
29					
30	1.16¾	1.17⅝	1.16⅜	1.16½	5,345,000
Total sales					25,924,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Nov. 23.	Nov. 24.	Nov. 26.	Nov. 27.	Nov. 28.	Nov. 29.
Albion	....	....	....	....	....	....
Alpha	....	....	....	1⅛	1	....
Alta	1	....	1	1⅛	1	....
Argenta	....	....	....	....	....	....
Bechtel	....	....	....	....	....	....
Belcher	.80	.90	....	.80	.80	....
Belle Isle	....	....	....	....	....	....
Best & Belcher	2¼	2⅞	2⅜	2⅝	2¾	....
Bodie	.55	.85	1¼	.70	.85	....
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.25	....	....	.20	.20	....
Challar	2	2	1⅞	1¾	1¾	....
Con. Virginia	.40	.35	.35	.30	.35	....
Crown Point	.90	.90	.80	.70	.80	....
Elko Cons	.20	.20	.20	.20	....	....
Eureka Cons	....	....	....	....	....	....
Exchequer	....	....	....	....	....	....
Gould & Curry	1¼	1¼	1⅛	1	1	....
Grand Prize	.30	.30	.35	.25	.30	....
Hale & Norcross	1¼	1¼	1⅛	1	1	....
Independence	....	....	....	....	....	....
Martin White	....	....	....	....	....	....
Mexican	2¼	2¼	2¼	2⅛	2⅛	....
Mono	....	....	....	....	....	....
Mount Diablo	....	....	3¼	3¼	....	....
Navajo	3⅞	3¾	3¾	3¾	3¾	....
Northern Belle	4⅛	3⅞	2	2	2	....
North Belle Isle	....	....	....	....	....	....
Ophir	5⅞	5¾	5⅛	5¼	5¼	....
Overman	....	....	....	....	....	....
Potosi	.65	.75	.65	.65	.65	....
Savage	40	.40	.35	.30	.30	....
Scorpion	....	....	....	....	....	....
Sierra Nevada	2⅞	2¾	2⅝	2⅝	2⅝	....
Silver King	....	....	....	....	....	....
Tip Top	....	....	....	....	....	....
Union Cons	3⅛	3	2¾	2⅛	2⅛	....
Utah	2⅛	2	1⅞	1⅛	1⅛	....
Wales Cons	....	....	....	....	....	....
Yellow Jacket	2⅛	2⅛	2¼	2	1⅞	....

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, November 29, 1883.

Owing to the occurrence of two holidays the past week, the market for mining stocks has been extremely dull, and without any feature whatever. Calumet & Hecla sold at $238, the same as last week. Franklin, on sale of 20 shares, advanced to $12. The reports from the mine are very favorable, and it would not surprise us much to see higher prices for this stock at an early day. Quincy continues to be dealt in only in a small way at $52@$51¼. Huron sold at $1— a decline of $⅝ since last sale, September 12th. Nothing doing in the rest of the copper stocks.

In silver stocks, Bonanza sold at $1½. Catalpa advanced from 35@45c., and at the Mining Board sales were made at 48@50c. Crescent sold at 20c., the same as before. Sullivan, 88@92½c. Bowman Silver, steady at 16@19c., but with less activity than last week, although the reports from the mine are of a favorable character. Massachusetts & New Mexico in good demand at 3c. bid. Dunkin, steady at 26@28c. Sullivan sold at 90@93c., and continues to be in active request.

3 P.M.—The afternoon Boards were extremely dull, and without any material change in prices.

BULLION MARKET.

NEW YORK, Friday Evening, Nov. 30.

DATE	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Nov. 24	50⅛	110	Nov. 28	50⅝	110¼
26	50⅛	110	29	*	Holiday.
27	50⅛	110	30	50⅛	110

* 50⅛@50⅝.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended November 30th, as compiled from various sources, amounted to $214,000, as against $161,000 reported for the previous week. The receipts from January 1st, 1883, to date are $10,530,443.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended November 24th	$386,109
Corresponding week last year	368,661
Since January 1st, 1883	13,366,218
Corresponding period last year	45,037,282

Imports.

Week ended November 24th	$558,668
Corresponding week last year	323,534
Since January 1st, 1883	19,459,089
Corresponding period last year	5,809,861

METALS.

NEW YORK, Friday Evening, Nov. 30.

Copper.—Nothing has happened to change the quiet tone of the market, and while quotations are nominally 14⅞@15c., it would be difficult, probably, to get much Lake at the lower price. Other brands are nominally 14⅛@14⅝c., according to quality, with little offering. Undoubtedly the market here is statistically in good shape.

London cables Chili Bars slightly better, the latest figure being £59 10s., with Best Selected quoted last, £66.

Tin.—The week has been a quiet one, the market closing with Straits spot at 19@19½c. for large lines, and Australian 19⅜@19½c. At the Amsterdam auction yesterday, Banca went off at 53½ guilders and Billiton at 52⅝ guilders. London cables to-day, £87 5s.

Lead.—Buyers still maintain their attitude of indifference, and in spite of the fact that lead is undoubtedly low, we see very little cause likely to induce them to take hold. It remains to be seen what producers will do. There seems to be some wild talk in Colorado of "syndicates" to buy the surplus metal and carry values to preposterous figures. We have little faith in such statements when they assume an extravagant form. The gathering of the stock in a few strong hands acting in concert would of course do good, if it were a question of tiding over a momentary panic or convincing consumers that bottom had been reached. We do not believe that such a course would do the

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DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Nov. 24. H.	Nov. 24. L.	Nov. 26. H.	Nov. 26. L.	Nov. 27. H.	Nov. 27. L.	Nov. 28. H.	Nov. 28. L.	Nov. 29. H.	Nov. 29. L.	Nov. 30. H.	Nov. 30. L.	Sales.	
1	Alice, S. C.	Mont	$10,000,000	400,000	$25	*				$400,000	Dec.	1881	.10					2.40		2.50						200	
2	Amie Con., S. L.	Colo.	5,000,000	500,000	10	*				320,000	Oct.	1883	.05					.13	.12	.12						1,200	
3	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	220,000	Feb.	1883	$2.00														B.
4	Argenta, S.	Nev.	10,000,000	100,000	100	275,000	Jun.	1883	.25	40,000	Feb.	1880	.20														
5	Barbee & Walker, S.	Utah	1,000,000	100,000	10	*				60,000	Nov	1880	.10														
6	Bassick, G. S.	Colo.	10,000,000	100,000	10	*				300,000	Nov	1883	1.00														
7	Belle Isle, S.	Nev.	10,000,000	100,000	100	85,000	May	1883	.20	300,000	Dec.	1879	.25							.33				.30		950	
8	Belcher, G. S.	Nev.	10,400,000	104,000	100	2,588,000	Apl	1883	.25	15,397,000	Apl.	1876	1.00														
9	Birdseye, G.	Cal.		15,000							Dec.	1882															S.F
10	Black Bear, G.	Cal.	3,000,000	30,000	100	15,000	Sept	1879	.50	895,000	May	1883	.20														
11	Bodie Con., G.	Cal.	10,000,000	100,000	100	225,000	Aug	1883	.50	1,295,000	Nov	1882	.20	.50				.80	.75					.75		600	S.F
12	Bonanza Developm't	C&M	3,000,000	300,000	10					135,000	Oct.	1882	.15														
13	Boston & Mont. G.	Mont	2,000,000	200,000	10	*				310,000	Jan.	1883	.05														
14	Breece, S.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01														F.
15	Bulwer, G.	Cal.	1,000,000	100,000	100	30,000	Dec.	1877	.50	165,000	July	1883	.15					.49	.46							150	
16	California, G. S.	Nev.	54,000,000	540,000	100	962,000	Sept	1883	.20	31,320,000	Dec.	1879	.50					.23								200	B.
17	Calumet & Hecla, C.	Mich	2,500,000	100,000	25					24,350,000	Oct.	1883	5.00														
18	Carbonate Hill, S. L.	Colo.	2,000,000	200,000	10	*				60,000	July	1883	.05														
19	Caribou Con., S.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10														
20	Carolina Queen, C.	N. C.	200,000	100,000	2					8,000	Oct.	1882	.02														
21	Castle Creek, G.	Utah	100,000	100,000	1					51,000	Oct.	1883	.03											1.00		700	B.
22	Catalpa, S. L.	Colo.	3,000,000	300,000	10	*				240,000	Jun.	1883	.10														
23	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,670,000	Feb.	1883	3.00														
24	Christy, S.	Utah	6,000,000	60,000	100	12,000	Sept	1883	.20	90,000	Jan.	1883	.10														B.
25	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*				1,600,000	Dec.	1881	.50	1.45	1.35			1.40		1.40				1.80		3,425	
26	Con. Bobtail, G.	Colo.	1,136,850	227,326	5	*				147,762	Mch	1880	.10														
27	Con. Gold Mining, G.	Ga.	500,000	100,000	5	*				108,000	Nov	1883	.02														S.F
28	Con. Virginia, G. S.	Nev.	54,000,000	540,000	100	1,005,000	July	1883	.20	42,930,000	Aug.	1880	.50					.37		.34	.32			.36	.35	1,550	
29	Contention, S.	Ariz.	12,500,000	250,000	50					‡2,481,500	Jun.	1883	.25														
30	Copper Queen, C.	Ariz.	2,500,000	250,000	10	*				1,225,000	Oct.	1883	.50														
31	Crescent, S. L. G.	Utah	15,000,000	600,000	25	**				150,000	Oct.	1883	.05														S.F
32	Crown Point, G. S.	Nev.	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00														
33	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*				†900,00	Jan.	1883	.10														B.
34	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*				210,000	Oct.	1883	.05					.26		.25						1,400	
35	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	300,000	Sept	1883	.50	4,767,570	July	1882	.25							3.50	3.25					150	S.F.
36	Evening Star, S. L.	Colo.	500,000	50,000	10	*				1,300,000	Nov	1883	.50														
37	Excelsior, G.	Cal.	10,000,000	100,000	100	360,000	Aug	1883	.60	875,000	Oct.	1880	.25														
38	Father de Smet, G.	Dak.	10,000,000	100,000	100					630,000	Oct.	1883	.20														
39	Findley	Ga.																									
40	Franklin, C.	Mich		54,000		360,000	Jun	1877		243,000																	
41	Freeland, S.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.25														S.F.
42	Fresno Enterprise, G	Cal.	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10														S.F.
43	Gem S.	Colo.	125,000	125,000	1					23,750	May	1883	.02														
44	Glass-Pendery, S. L.	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10														
45	Glen, S.	Colo.	100,000	100,000	1					7 000	May	1883	.01														
46	Gold Stripe																										
47	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	3,584,000	Nov	1883	.50	3,826,000	Oct.	1870	10 00	.05				.09	.06	.10	.09			10	.09	13,100	S.F.
48	Grand Central, S.	Ariz.	1,000,000	10,000	10					625,000	Dec.	1882	.25														
49	Grand Prize, S.	Nev.	10,000,000	100,000	100	47),000	Jun.	1883	.25	450,000	Sept	1830	.25														
50	Granite, S.	Colo	125,000	125,000	1					6,250	May	1883	.01														
51	Great Eastern, G.	Dak.	300,000	300,000	1	*				16,000	July	1880	.01														
52	Great Western, Q.	Cal.	5,000,000	50,000	100	35,500	Aug	1873	.15	262,500	Oct.	1882	.25														
53	Green Mounta n, G.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½					1.35	1.30	1.35						400	
54	Hale & Norcross, G. S	Nev.	11,200,000	112,000	100	4,174,000	Nov	1883	.50	1,593,000	Apl	1871	5.00														S.F
55	Hall-Anderson, G.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.05														B
56	Hecla Con., S.	Mont	1,500,000	30,000	50					537,500	Nov	1883	50														
57	Henriett, L.	Colo.		270,000						27,000	Feb.	1883	.10														
58	Hibernia, S. L.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40														
59	Holyoke, G.	Idah.	200,000	200,000	1					52,000	Nov	1883	.02														
60	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	2,262,500	Nov.	1883	.20	10.00				10.00		10.50				10.50		355	
61	Hope, S.	Mont	400,000	8,000	50	*				113,036	Oct.	1883	1.50														
62	Horn-Silver S. L.	Utah	10,000,000	400,000	25	*				2,800,000	Nov	1883	.50	6.38	6.25			6.13		6.25	6.13			6.50		1,130	
63	Howell S. & M. Co	Ariz.	375,000	187,500	2	*				3,750	Aug.	1883	.01														
64	Hukill, G. S.	Colo.	1,000,000	200,000	5	*				210,000	Dec.	1873	.10														
65	Idaho, G.	Cal.	310,000	3,100	100					3,300,850	Oct.	1883	1.00														
66	Independence, S.	Nev.	10,000,000	100,000	100	245,000	May	1883	.30	225,000	Sept	1879	.25					.20						.18		200	B.
67	Indian Queen, S.	Nev.	250,000	125,000	2	*				368,750	July	1883	.03														
68	Inyo, G.	Cal.	500,000	100,000	5	*				45,000	Apl.	1882	.05														S.F
69	Iron-Silver, S. L.	Co o.	10,000,000	500,000	20	*				1,200,000	Oct.	1883	.20	2.30	2.25			2.25		2.25				2.25		4,700	
70	Jocuistitta, S.	Mex.	10,000,000	100,000	100					95),000	Nov	1883	.50														
71	Kentuck	Nev.	3,000,000	30,000	100	342,000	Nov	1881	.30	1,267,000	Nov	1883	.10														E.
72	La Plata, S. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30														
73	Leadville, S. L.	Colo.	4,000,000	400,000	10	*				310,000	Oct.	1883	.05							.45				.45		600	S.F.
74	Leeds, S.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15														
75	Little Chief, S. L.	Colo.	10,000,000	200,000	50	*				720,000	Oct.	1883	.10	.55				.55	.54	.56				.53	.52	2,400	
76	Little Pittsburg, S. L	Colo.	20,000,000	200,000	100	*				1,050,000	Mch	1880	.50	.56						.48	.47			.50		1,700	S.F
77	Marguerite, G.	Cal.	500,000	25,000	20					18,750	Oct.	1882	.25														B.
78	Martin White, S.	Nev.	10,000,000	100,000	100	1,025,000	Sept	1883	.25	90,000	July	1879	.30														
79	Minas Nuevas, S.	Mex	300,000	100,000	3	*				20,000	July	1883	.10														
80	Morning Star, S. L.	Colo.	1,000,000	100,000	10					615,000	Oct.	1883	.25														
81	Mount Pleasant, G.	Calf.	150,000	150,000	1	*				60 000	Sept	1883	.15														
82	Mt. Diablo, S.	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	50,000	Nov	1883	.25														
83	Napa, Q.	Cal.	700,000	100,000	7					290,000	Jan.	1883	.10														
84	Navajo, G. S.	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	225,000	May	1883	.25							3.75						100	
85	New York Hill, G.	Cal.	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10														
86	New York & Colo., G.	Colo.	1,250,000	50,000	25					25,000	July	1879	.10														B.
87	Northern Belle, S.	Nev.	5,000,000	50,000	100					2,400,000	Apl.	1883	50					2.95		2 80	2.75			2.00		750	
88	North Bell Isle, S.	Nev.	10,000,000	100,000	100	95,000	May	1883	.20	30,000	Aug.	1881	.15														B.
89	Ontario, S. L.	Utah	15,000,000	150,000	100					5,075,000	Nov	1883	.50														
90	Ophir, G. S.	Nev.	10,000,000	100,000	100	3,645,000	Aug	1883	1.00	1,595,000	July	1882	1.00														
91	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	935,000	Oct.	1883	50														S.F.
92	Oxford, G.	N. S.	100,000	100,000	1	*				3),000	Aug.	1883	.05														
93	Pleasant Valley, G. S.	Cal.	10,000,000	100,000	100	30,000	Sept	1883	.15	30,000	Dec.	1882	.05														
94	Plymouth Con., G.	Cal.	5,000,000	100,000	50	*				300,00	Nov	1883	.50														
95	Polonia, S.	Colo.	200,000	8,000	25					12,000		1882	1.50														
96	Prussian, S. L.	Colo	1,500,000	150,000	10					132,000	Jan.	1883	.10													10	P.
97	Quicksilver, pref., Q	Cal.	4,300,000	43,000	100					654,000	July	1882	6.00					30.00									
98	" com., Q	Cal.	5,700,000	57,000	100					151,000	July	1882	.40														S.F.
99	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,384,000	July	1883	3.50														
100	Renfrew, G.	N. S.	60,000	30,000	2					4,800	July	1882	.02														E.
101	Richmond, S. L.	Nev.	1,350,000	54,000	25	*				4,042,587	May	1883	1.25														
102	Rising Sun, S.	Dak.	750,000	150,000	5	*				52,000	May	1881	.07¼													1,000	
103	Robinson Bar, G.	Idah.	100,000	100,000	1	*				9,000	Dec.	1882	.03														
104	Robinson Con, S. L.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50	.36	.32					.34				.34		2,400	
105	Robert E Lee, S. L.	Colo.	250,000,000	500,000	500					100,000	Dec.	1882	.10														E.
106	San Francisco, C.	Cal.	5,000,000	50,000	100	45,000	Sept	1880	.50	20,000	Feb.	1883	.05														
107	Savage, S.	Nev.	14,200,000	142,000	100	5,596,000	Nov	1883	.50	4,460,000	July	1869	3.00														B.
108	Shoshone, G.	Idah	150,000	150,000	1					7,500	Apl.	1883	.01														
109	Sierra Buttes, G.	Cal.	225,000	22,500	10					1,450,933	Oct.	1883	.25														E.
110	Sierra Grande, S.	N. M.	10,000,000	400,000	25					700,000	Oct.	1883	.25	.90										.90		600	
111	Sierra Nevada, G. S.	Nev.	10,000,000	100,000	100	5,350,000	Aug	1883	1.00	102,000	Jan.	1871	1.00														P.
112	Sta Primas Eureka, G	Cal.		40,625							Apl.	1883															B.
113	Silver Cord, G. S. L.	Colo	4,500,000	450000	10					223,000	Nov	1883	.25														S.F.
114	Silver King, S.	Ariz.	1,000,000	100,000	100					1,275,000	Jun.	1883	.25														
115	Silver King, S.	Colo.	1,000,000	50,000	2					50,000	Aug.	1881	10														
116	Smuggler, S. L.	Colo.	600,000	6,000	10					66,700	Aug.	1883	25														
117	Socorro, C.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾														B.
118	South Yuba, G.	Cal.	2,000,000	40,000	50	*				150,000	Oct.	1881	.75														
119	Spring Valley, G.	Cal.	2,000,000	200,000	1	*				50,000	Jan.	1881	.25														
120	Standard, G. S.	Cal.	10,000,000	100,000	100					4,275,000	Nov.	1883	.25	6.50	6.25									7.00		227	
121	Stormont, S.	Utah	200,000	200,000	1	*				155,000	Nov	1881	.05														E.
122	St. Joseph, L.	Mo.	1,000,000	100,000	10	*				390,000	Dec.	1882	.20														
123	Tip Top, S.	Ariz	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov	1881	.20														B.
124	Tombstone, G. S.	Ariz.	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10														
125	True Fissure, G. S. L.	Utah	1,500,000	150,000	10	*				75,000	Jun.	1883	.15														
126	United Gregory, G.	Colo	3,000,000	300,000	1					42,000	Apl.	1883	.25														
127	United Gold Min. Co.	Colo.									Oct.	1883	.05														E.
128	Vizina, S.	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1882	.10														B.
129	Yellow Jacket, G. S.	Nev.	12,000,000	12 ,000	100	5,358,000	Feb.	1882	1.00	2,184,000	Aug.	1871	1 50														
130	Yuba, G.	Cal.	5,000,000	200,000	25					4,000	Sept	1881	1.00														

*Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ This company, as the Western, up to December 10th, 1881, paid $1,475,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British companies. ‖ Total number of shares, 500,000; 50,000 shares have never been issued, and are still held by the company. Dividend shares sold, 40,287. ** Non-assessable for 3 years.

metal any good in the long run. Either production must be curtailed by agreement or by the irresistible logic of unprofitable prices, or consumption must come forward to relieve the market. The latter is not likely to take place for the next six weeks, while voluntary reduction of output when there are so many conflicting interests is out of the question with a stock of many months of ore at the smelters, and, as yet, no wide-

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NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Nov. 24. H.	Nov. 24. L.	Nov. 26. H.	Nov. 26. L.	Nov. 27. H.	Nov. 27. L.	Nov. 28. H.	Nov. 28. L.	Nov. 29. H.	Nov. 29. L.	Nov. 30. H.	Nov. 30. L.	Sales.	
1	Advance M & M. Co.																						
2	Albion, s. L.	Nevada	$15,000,000	150,000	$100	$622,500	July	1883	.50														S. F.
3	Allouez, c.	Michigan	2,000,000	80,000	25	200,000	January	1883															B.
4	Alpha Con., g. s.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50														S. F.
5	Alta, s.	Nevada	10,080,000	100,800	100	2,137,290	July	1883	.25														S. F.
6	Alta-Montana, g.s.L.	Montana	5,000,000	500,000	10																		
7	American Flag, s.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25														
8	Barcelona, g.	Nevada	5,000,000	200,000	25	*				.27	.26			.28	.27	.27				.27		6,100	
9	Battle Creek																						
10	Bear Creek	California	300,000	300,000	1																		
11	Beauce																						
12	Bechtel Con., g.	California	10,000,000	100,000	100	185,000	January	1883	.10														S. F.
13	Best & Belcher, g. s.	Nevada	10,080,000	1 0,800	100	1,446,190	Septemb'r	1883	.50														S. F.
14	Big Pittsburg, s. L.	Colorado	20,000,000	200,000	100	*																	
15	Black Jack, g.	California	250,000	100,000	2½																		
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	
17	Bonanza King, Cons.	California	2,000,000	200,000	10	*																	
18	Boudholder	Colorado	5 0,000	200,000	2½				.25														
19	Boston Con., g.	California	13,000,000	100,000	100	9.,,000	October	1882															
20	Boulder Con.	Colorado																					
21	Bradshaw, s.	Arizona	2,25 ,000	225,000	10															.20	.17	1,500	
22	Buckeye	Colorado	2,000,000	400,000	5	*																	
23	" preferred	Colorado																					
24	Bull Domingo, S. L.	Colorado	10,000,000	200,000	50	*																	
25	Bullion, g. s.	Nevada	10,000,000	100,000	100	3,787,000	Nov.	1883	.20														S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	
27	Calaveras, g.	California	500,000	500,000	1	*																	
28	Cal. W'r & M. Co, g.	California																					
29	Caledonia, S. H., g.	Dakota	10,000,000	100,000	100	490,000	October	1883	.10	.15	.14			.15						.15		1,630	
30	Castle Creek																						
31	Catskill, s.	Nevada	1,500,000	30 ,000	5																		
32	Central Arizona, s.	Arizona	10,000,000	1 0,000	100											.23						1,000	B.
33	Chapparal	California																					
34	Cherokee, g.	California	1,500,000	15 ,000	10																		
35	Chollar, s.	Nevada	11,200,0 0	112,000	100	633,000	August	1883	1.00														S. F.
36	Climax									.06	.06			.07								1,100	
37	Colorado Cent'l, s.L.	Colorado	3,000,000	300,000	10	*																	
38	Columbia Con., g. s.	Nevada	5,000,000	100,000	50	25,000	November	1883															
39	Con. Imperial, g. s.	Nevada	50,000,000	500,0 0	100	1,450,000	May	1883	.05														
40	Con. Pacific, g.	California	6,000,000	6 ,000	100	150,000	March	1883	.15														
41	Crescent, s. L.	Colorado	3,000,000	300,000	10	*																	B.
42	Crowell, g.	North Car.	500,000	500,000	1																		
43	Dahlonega, g.	Georgia	250,0 0	250,000	1	*																	
44	Darqanelles, g.	California	1,000,000	100,000	10																		
45	Decatur									.06						.04				.04		15,500	
46	Dunderberg, s.	Colorado	1,500,000	150,000	10	*																	
47	Durango, g.	Colorado	500,000	500,000	1	*																	
48	Eastern Oregon																						
49	Elko Con., s.	Nevada					October	1883	.15	.17										.18		600	
50	Empire, s.	Utah	10,000,000	100,000	100																		B.
51	Enterprise	Colorado																					
52	Exchequer	Nevada	10,000,000	1 0,000	100	650,000	June	1883	.20														
53	Fannie Barret, s.	Colorado																					
54	Globe Copper	Arizona																					
55	Gold Placer, g.	Colorado	5,000,000	200,000	25	*																	
56	Goodshaw, g.	California	10,000,000	10 ,000	100	210,000	June	1883	.10														
57	Granite Mountain, s.	Mont.	10,000,000	400,000	25	*																	
58	Granville, g.	North Car.	300,000	300,000	1	*																	
59	Harlem M. & M. Co, g.	California								1.00				1.05		1.05				1.10		1,800	B.
60	Harshaw, s.	Arizona	10,000,000	100,000	1 0																		
61	Head Center, s.	Arizona	5,000,000	200,000	25	100,000	May	1882	.20														
62	Hortense, s.	Colorado	2,000,000	20 ,000	10																		
63	Julia, g. s.	Nevada	11,000,0 0	110,000	100	1,405,000	April	1883	.10														
64	Kossuth, g. s.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15														
65	Lacrosse, g.	Colorado	1,000,000	100,000	10	*																	
66	Leviathan, s.	Nevada	10,000,000	100,000	100	38 ,000	September	1882	.25														
67	Lucerne, s.	Colorado	5,000,000	500,000	10	*																	
68	Mariposa pref., g.	California	5,000,000	50,000	100	1,687,500	December	1881															
69	" common, g.	California	10,000,000	100,000	100	1,975,000	February	1883	.25														
70	May Belle, g.	California	10,000,000	100,000	100	84,000	December	1881	.20														
71	Mayflower, s.	Nevada	1,0 0,000	100,000	100	35,000	February	1883	.10														
72	Mexican, g. s.	Nevada	10,000,000	100,800	100	2,420,200	Septemb'r	1883	1.00														S. F.
73	Michoacan Synd.	Mexico																					
74	Miner Boy, g. s. L.	Colorado	5,000,000	500,000	10	*																	
75	Miller	Nevada	5,000,000	200,000	25																		
76	Mono, g.	California	5,000,000	50,000	100	535,000	January	1883	.20														S. F.
77	Moose Silver, s.	Colorado	3,000,000	300,000	10	*																	
78	Moulton, g. s.	Montana	10,000,000	400,000	25	*																	
79	Nevada Syndicate																						
80	North Standard, g.	California	10,000,000	100,000	100	20,000	November	1881	.10														
81	North Horn-Sil., s. L.	Utah		400,000																			
82	North Mexican									.55	.50											1,200	S. F.
83	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00														
84	Old Dominion, c.	Arizona	3,000,000	300,00	10	*																	
85	Oriental	Nevada	2,000,000	200,000	10																		
86	Oriental & Miller, s.	Nevada	10,000,000	400,000	25																		S. F.
87	Overman, g. s.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25														
88	Parnell																						S. F.
89	Potosi	Nevada	10,200,000	112,000	100	640,840	Septemb'r	1883	.25														
90	Quartz Creek				100																		
91	Rappahannock, g.	Virginia		250,000		*										.08				.08		1,500	
92	Red Elephant, s.	Colorado	500,000	500,000	1	*																	
93	Retort M. & M. Co.	Colorado			10																		
94	San Pedro, g. s. L.	New Mex.		400,000																			B., P
95	Silver Cliff, s.	Colorado	5,000,000	200,000	25	*																	
96	Silver Islet	Canada	1,.00,0 0	40,000	25																		
97	Sonora Con.	Mexico								.26				.26		.25				.26	.24	18,500	
98	South Bodie, g.	California		100,000		100,000	March	1882	.15														
99	South Bulwer, g.	California	10,0 0,000	100,000	100	193,000	May	1881	.25														
100	South Hite	California	10,000,000	100,000	100		January	1883	.05														
101	South Pacific	California			5																		B
102	State Line, No. 1, s.	Nevada	200,000	200,000	1																		
103	" No. 2, s.	Nevada	5,000,000	20 ,000	25																		
104	" No. 3, s.	Nevada	5,000,000	20 ,000	25																		
105	" No. 4, s.	Nevada	5,000,000	200,000	25																		
106	" Nos. 1 and 4, s.	Nevada			25																		
107	" Nos. 2 and 3, s.	Nevada																					
108	Sullivan, g. s. L.	Maine	500,000	100,0 0	5	125,000	December	1882	.25														B.
109	Sutro Tunnel	Nevada		2,000,000		*				.16										.15		2,300	B., P
110	Taylor-Plumas	California			10																		
111	Tioga, g.	California	10,000,0 0	100,000	100	285,000	October	1882	.10														
112	Tuscarora, s.	Nevada	10,000,000	100,000	1 0	110,000	October	1881	.15														
113	Unadilla, s.	Colorado	50,000,000	500,000	100	*																	
114	Union Con., g. s.	Nevada	10,000,000	100,000	100	1,720,000	October	1883	.50														S. F.
115	Utah, s.	Nevada	2,000,000	20,000	100	1,440,000	October	1883	1.00														
116	Vandewater	Nevada	20,000,000	200,000	100	*																	
117	Washington	Arizona	2,000,000	200,00	10																		
118	Whalen Copper	Nevada	2,5 0,000	100,000	25																		
119	Wide West																						
120	Willshire	California	250,000	50,000	5	*																	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 66,330. Total shares sold at all the exchanges, 106,617

spread decline of the output of the mines. With the freight question on base bullion and refined lead as yet unsettled, the time for speculative purchase has not yet come.

During the week, about 600 tons of Common lead have been sold for January and February delivery at 3·65c., while for spot lead 3·70c. is asked, with nothing doing.

Messrs. John Wahl & Co., of St. Louis, telegraph as follows to-day:

Our market is quiet and dull, with prices unchanged. We quote Refined 3·50c., and Common 3·44@3·50c.

Messrs. Everett & Post, of Chicago, telegraph:

Our market has declined slowly since our last report, the demand being only moderate. There is very little doing, because buyers refuse to take at the price asked, and sellers decline to take less. We quote nominally 3·40c.

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The Leadville *Herald* prints the following: The effect that the low price in lead is having on many mines in this district is illustrated in the following actual returns received for ore-shipments:

Four months ago, a mine shipped ore containing six ounces of silver, three tenths of an ounce in gold, and twenty-eight per cent in lead. For the various metals in the ore it received respectively, $5.95 for the silver, $5.40 for the gold, and 40 cents a unit for the lead, or $11.20; making a total of $22.55. From this amount $8.50 was paid for treatment, and $7 was deducted for the cost of mining and cartage, aggregating $15.50, which, deducted from the original value of the ore—$22.55—left a margin to the miner of $7.05.

At present, the mine is receiving the same amount for the silver and gold contained in the ore, but only 20 cents a unit for the lead, or just one half of former prices, being $5.60, instead of $11.20. This leaves the total receipts per ton reduced to $16.95. Where heretofore the ore was treated at $8.50 per ton, $9.50 is now charged, to which add the $7 for expenses of mining and cartage, and the mine-owner has a profit left of only 45 cents per ton. It is needless to add that, until a change for the better is experienced, such mines will not ship any ore.

Spelter.—There is nothing new to report. We quote Common Domestic unchanged, at 4⅝@4¼c.

Antimony.—The London market has risen, in consequence, it is said, of a falling off in the ore supply. Here, the advance realized has been maintained, with considerable business doing. We quote: Hallett's, 10¼c. and Cookson's, 11¼c., with futures ⅛c. higher.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 30.

American Pig.—There have been some slight indications of a better feeling; and notably in foundry irons, there is a tendency to greater firmness which has not yet, however, developed into any thing that will warrant even the slightest stiffening in price. It is not believed that for the near future any notable change in the situation can be looked forward to. Gray Forge is in a relatively poorer condition, buyers holding off persistently. We quote $20@$22.50 for No. 1; $18.50@$19.50 for No. 2; and $17@$19 for Gray Forge, all at tide-water. Bessemer Pig is dull and unchanged, while Spiegel is weaker at $30@$30.50 for 20 per cent metal.

At the Exchange, the following transactions were recorded: Wednesday, 300 tons No. 1, March, $20.25 and 100 tons No. 1, April, $20.50.

Scotch Pig.—There has been a slight increase in the number of inquiries, and the sales are in the aggregate larger.

We quote ex ship and to arrive: Coltness, $23; Langloan, $23@$23.25; Summerlee, $22.50@$23; Eglinton, $20@$21; Glengarnock, $21.75@$22; Dalmellington, $20@$21.

At the Exchange, the following lower cable quotations were received to-day: Coltness, 54s. 6d.; Langloan, 54s.; Summerlee, 53s.; Gartsherrie, 51s. 9d.; Glengarnock, at Ardrossan, 52s. 6d.; and Eglinton, at Ardrossan, 47s. 6d. Warrants at the Exchange to-day were 44s. 2d.

Rails.—The fact has become known here within the past few days that the price taken for the 25,000 ton and other lots of rail, deliverable at Chicago, was really $35, not $36 as reported. One lot of 25,000 was taken by a Pennsylvania mill, and the price is therefore equivalent to $32.25 at mill. It is stated to have been the result of a fight between two Pennsylvania mills, endeavoring to gain a footing in Chicago, and the Chicago companies. There has been little business done this week. Quotations remain unchanged at $35 at mill.

Old Rails.—We quote $22.50@$23.

Philadelphia. November 29.

All things considered, the iron trade is in a little better shape than last week, owing mainly to the fact that a dozen or two large buyers have purchased pig-iron for the next quarter's delivery. If the offers made are accepted, a number of heavy transactions will be closed next week. Some buyers have assigned as a reason for their movement just at this time, that January generally shows a hardening tendency in prices, owing to the fact that so many consumers hold off until the opening of the year, and then rush into market for supplies. A few makers and holders of good brands have shown a willingness to dispose of a slight accumulation of stocks, and the statement is made that sales of between 15,000 and 20,000 tons have been quietly made, covering all kinds of iron, from inferior foundry up to best, and from inferior forge up to two or three special brands. In fact, some makers of special brands claim to be well sold up, and the same favorable report comes from some makers of standard brands. The talk in this direction, if adhered to, will have a good effect upon some buyers who are prowling around the market, waiting for still lower prices, or for the bottom to fall out of the market. Although a slight increase is shown over last month's production, yet the fact that demand is largely withheld shows some of the shrewd buyers that, should the legitimate requirements be presented, prices, especially for the standard brands, would harden at once, and hence it is that they have bought with more freedom. The policy of carrying larger stocks is admitted to be the wise one, and a good many more sales have been made, more for this reason than any other. Gray forge iron of standard make is in fair demand, and the example of two or three large buyers will be followed by others next week, resulting probably in a slight improvement in these brands. Inferior brands are abundant at $17 at furnace. No. 1 Foundry ranges from $20.50@$21.50, with specials at $22@$22.50; No. 2, $19@$20.

Foreign Irons.—A little Scotch iron has been selling this week, but buyers seem indifferent as to future requirements. Spiegeleisen is nominally $30.50 for 20 per cent. There are a few bids in at $29.50, but not much anxiety at this. Bessemer is nominal at $20.50, but buyers are not anxious to place large orders at the present or prospective price of steel rails. Foreign iron, as a whole, is without interest at present writing, and there are no probabilities of any large sales being effected.

Muck Bars.—Sellers are asking $33.50@$34, and sales of between 3000 and 5000 tons could be made at once if $33.25 would be taken.

Blooms.—Small lots are moving as usual at $55@$56 for Charcoal and $47@$48 for Anthracite.

Merchant Bar.—The merchant bar trade is in a very unsettled condition, and it is difficult to state actual prices, although the range is from 1·80@2·10c. Perhaps more iron has sold below 2 cents than above it, and the fact that several mills purpose shutting down at an early day indicates that the demand is far from encouraging. Besides this, reductions in wages have been announced and will take place at once. No objection will be made to this. Common labor is also reduced, and every effort will be made to tide over the dull trade that must be met between this and February 15th. Some manufacturers claim that, after the first of the year, a great deal of demand that is now waiting will be presented and improve prices.

Nails.—The movement in nails continues irregular, and buyers can not be induced to purchase except for actual requirements. Small lots are held at $2.85, and large lots are selling at from 10c. to 15c. less.

Plate and Tank Iron.—Plate iron is without any particular activity this week. Mills are fairly supplied with orders up to the end of the year, but after that there will be sharp competition. Tank iron sells in small lots at 2·50c.; Boat Plate, 2·35@2·40c. A few small lots of plate iron have been ordered this week for January delivery. Boiler-shops are working out old contracts, and are looking confidently for some large orders which will have to be filled soon after the opening of the year.

Structural Iron.—Orders from bridge-works this week show a fair degree of activity, with prospects that a large amount of work will be presented at an early day, and there are large inquiries to hand this week; but the business to which they refer will not be placed until the early part of next year. Quotations are unchanged.

Sheet Iron.—All mills are slacking up, and large orders are solicited at greater concessions than heretofore extended.

Wrought Pipes and Tubes.—There is no change in quotations, and demand is dull.

Steel Rails.—There are rumors of large transactions having taken place in Western mills at $34@$35, but it is thought that no further cutting below $35 will take place. It is said that one or two mills besides the ones already reported will close down. From 8000 to 10,000 tons, in small lots, were ordered here during the week at $36@37.

Old Rails.—Brokers here are moving around lively, looking up American stocks, and the demand is active; but buyers have not had their wants provided for, owing to the difficulty of getting enough material at their own prices. Two sales have been made at $23.25 for Tees and $25 for Double-Heads, but most of the orders in hand are at lower prices.

Pittsburg. November 28.

A fair demand has been kept up all through the week for standard brands of Gray Forge iron, for which, in most cases, $18 was paid. Inferior brands are in less active demand at $17.50; Coke Iron, Foundry, $19@$20; Bessemer, in 50 to 100-ton lots, $21; offers at $20@$20.50, cash. Muck Bars are quiet at $32. The merchant iron trade continues very unsatisfactory, and a further closing down of mills takes place this week, and it is given out that four or five other mills will close down next week; but this will depend upon the course of business for the next few days. Consumers are holding off as much as possible, and will not place large orders until the close of the year. Prices are 1·75@1·90c. More iron has been sent East, and sold at the latter figure. Stocks, however, are very light in first and second hands, and this will have a favorable effect should demand improve. But it is not likely that any great improvement can take place very soon, owing to the heavy capacity that has been laid off. Nails are weak and fluctuating at $2.50@$2.60. The complications in the affairs of Brown, Bonnell & Co., of Youngstown, stand in the way of a settlement. Reports from Wheeling, Youngstown, Sharon, and some of the outlying towns between Pittsburg and those points, show a heavy falling off in output and scarcity of orders for merchant iron. Steel Rails are held here at $35.50@$36 for winter delivery. Some large requirements are held back until there is a further reduction. Small railroad material is active. A further restriction in the production of merchant steel has taken place. Prices are irregular. Crop-Ends, $23.50 for American. A fair movement is in progress in Wrought Scrap at $22@$22.25 for No. 1. Car-Axles, $30@32; Car-Wheels, $19.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 30.

On Tuesday, and again to-day, there were numerous conferences among the managers of the coal companies, the usual course of one or two going about laboring with their fellow magnates having been adopted. As the matter now stands, the majority have signified their willingness to do whatever the state of the trade requires. All apparently agree that there must be curtailment, but there are two of the presidents who insist that their way is the best to do it. One demands that there shall be three days of work every week, chiefly because it suits his company best, but ostensibly because he has no stock of engine coal, because there is danger of disaffection among the men, etc. The other wants a cessation of mining for two weeks in December, January, and February, to keep the supply within the capacity of a restricted market. We believe that the latter plan is the only one which can effectually keep our market from falling off worse than it has done already. Stove coal is selling as low as $4.05@$4.15, and there is enough in sight to keep buyers supplied for some time to come, unless the weather takes a more favorable turn.

Bituminous.

There are no new features. The vessel supply at shipping points is getting better than it has been.

Horsford's Acid Phosphate.

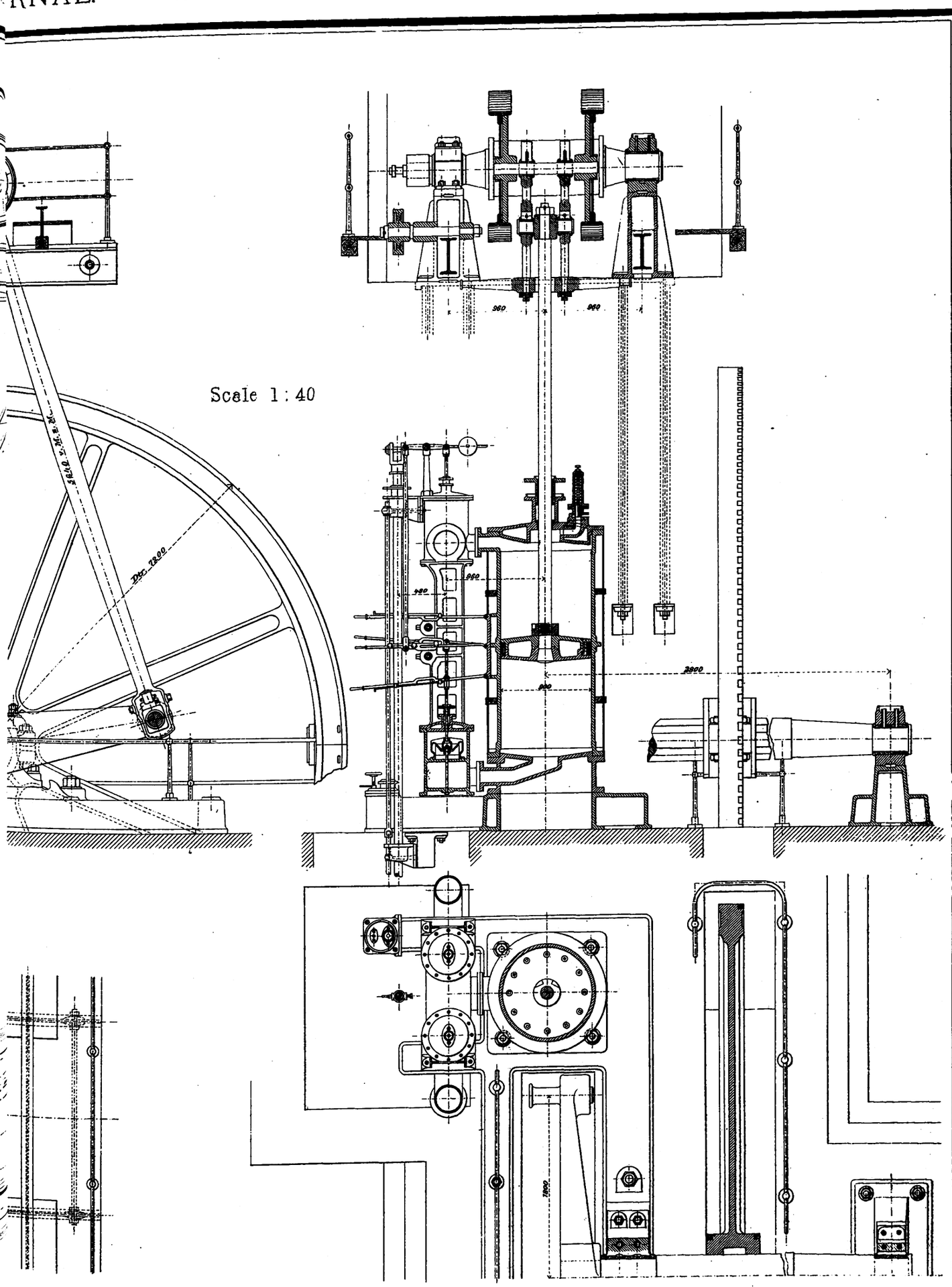
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THE ENGINEERING AND MINING JOURNAL

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CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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UNDER the energetic and efficient management of Dr. A. VON GRODDECK, the Clausthal School of Mines has evidently kept abreast of the progress of the times. A well-illustrated pamphlet which has just reached us gives an interesting sketch of its history, of the great mines and works in its vicinity, which afford such exceptional facilities for the study of practical mining and metallurgy, and of the elaborate system of instruction it offers to students.

SOME time since, the world was informed, through the medium of an associated press dispatch, that a new process sounding the oft-repeated death-knell of the puddling process had been tried at the Edgar Thomson Steel-Works with much success, a steel very low in carbon being produced. We understand that it is a slight modification of the Bessemer process, consisting in running in the spiegel before the usual time and blowing till a steel very low in carbon is produced. We are informed that the product is excellent, and is likely to overcome the troubles hitherto experienced with Bessemer metal for structural and machinery purposes.

THE Second Geological Survey of Pennsylvania, of which Mr. CHARLES A. ASHBURNER is geologist in charge, is about to issue four additional sheets of the survey of the anthracite coal-fields. Three of these sheets are a reproduction, with certain additions, of the topographical map constructed for the Lehigh Valley Coal Company, by STEPHEN and JOSEPH S. HARRIS and A. J. WOMELSDORF, from 1868 to 1875, and supplemented by maps of special areas constructed by LEWIS A. and S. RILEY, and the Second Geological Survey. This map gives the topography in 10-foot contour lines of that portion of the Western Middle coal-field between Quakake Junction and Mount Carmel. To the original map have been added north and south and east and west lines, 2000 feet apart, referred to the true meridian, and the approximate outcrop of the lowest, the Lykens Valley coal-bed, and a number of other features. The fourth sheet gives the details of the Mount Carmel, Centralia Coal Ridge or Montana, Germantown, and Mahonoy basins, on the general plan repeatedly referred to in our columns.

Here, we may call attention to the fact that the Survey has recently made a modification in its plan of selling these maps which will commend itself very favorably to intending purchasers. Hitherto, the Survey has not offered them for sale before an entire atlas was completed. Now two hundred copies of each sheet, of an unfinished atlas, will be sold singly, as soon as printed, and those who have immediate use for them can therefore procure them by addressing Mr. WILLIAM A. INGHAM Secretary, 907 Walnut street, Philadelphia. The topographical sheets referred to above will, we understand, be sold at a price of eleven cents each.

THE following figures, from the report of the Bureau of Statistics for the year ended June 30th, 1883, show who during that time had been our principal customers for copper, in the form of pig and ore, the former, we presume, including matte, while the latter embraced probably black copper as well as the refined metal:

	Ore.		Pig, Bar, and Sheet.	
	Cwts.	Value.	Pounds.	Value.
Belgium	10,080	$3,550	.....	.....
Central American States	.....	.....	6,656	$1,128
Chili	.....	.....	2,000	370
Danish West Indies	.....	.....	1,634	497
France	.....	.....	6,101,301	989,626
Germany	6,454	65,449	234,270	37,259
Great Britain	96,045	871,122	1,282,115	188,172
Canada	.....	.....	339,042	33,341
British West Indies	.....	.....	806	153
Hong Kong	.....	.....	2,753	405
Hawaiian Islands	.....	.....	3,579	757
Mexico	.....	.....	2,685	805
Netherlands	344	3,650	220,183	35,525
Cuba	.....	.....	7,890	20,089
Colombia	.....	.....	6,257	1,364
Venezuela	.....	.....	10,192	2,456
Total	112,923	$943,771	8,221,363	$1,293,947

France, therefore, takes by far the bulk of the finished product, while Great Britain calls for the largest quantity of the raw material. It is, of course, impossible to give any estimate of the quantity of copper contained in the ore and matte sent away; but even making allowances for the fact that there is usually silver in both, a comparison of the values indicates that the 113,000 cwts. of "ore" contain at least as much as 8,000,000 pounds of copper.

THE opening of Congress has unfortunately been marked with strong indications of a revival of the discussion of the tariff that has caused some uneasiness. The business community has for some time past, in looking into the future, regarded the fact that next year is again to see a struggle for the presidency as one of the leading grounds for setting aside hopes of a marked improvement. The possibility that our tariff policy is to be made one of the leading issues in the struggles for the ascendency of one or the other party is not reassuring. The election of Mr. CARLISLE as Speaker of the House of Representatives, as the leader of a section of his party pronouncedly in favor of a further reduction in the tariff, is a new phase, aggravating in its character. It is not likely that any sweeping or general changes will be made during the present session of Congress, because it is too early to appreciate the effect of the recent reductions in the duties upon the revenue. We believe that public opinion will demand that a pause be made to note whether there was a gain, and how much it amounted to. Thus far, the main object of the revision of the tariff, a reduction of the income of the government, has been disappointing. It was estimated that the falling off in revenue would be about $55,000,000. In reality, it has been only $20,000,000, in spite of the fact that business has been poor. The President does not appear inclined to sanction any radical changes, and yet it is likely that repeated and well-directed efforts will be made to make political capital out of measures looking toward a "tariff reform." The policy followed will, we believe, be similar to that adopted previous to the general onslaught on the tariff, that of selecting individual industries for an attack. It is not

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likely that much will be accomplished; but the agitation and suspense will not be conducive to an encouragement of buyers whose hand-to-mouth tactics have wrought so much harm during the past year.

THE suggestion has been made that those interested in mining and allied industries take some united action to secure a continuation of the work so worthily begun under the auspices of the United States Geological Survey, of officially collecting the statistics of the production of coal, oil, minerals, and the base metals. A number of individuals and newspapers have, with commendable zeal and enterprise, devoted much earnest work to carrying out what they know to be a matter of the highest importance to their respective industries or constituents. And yet few of them will fail to acknowledge that they have not at their command the means, the time, and the *prestige* which the work really demands. We can speak frankly on this subject because we have ourselves had a good deal of experience. We have met with the most graceful and hearty co-operation on the part of the majority of those to whom we have applied, only to find that misrepresentations, purposely made, endangered, unless carefully guarded against, our whole work. We have reached the conclusion that individuals may reach a point where they can vouch for their figures as close approximations, but they can not, unless they have exceptional facilities, attain absolute accuracy. When gathered under the auspices of such a department as the Geological Survey, data are obtainable which are withheld from any body else, because they go into the hands of entirely disinterested parties who ought to command and do command absolute confidence.

Our own personal acquaintance with the gentleman who conducted the recent work of the Survey gives us the right to state that we believe that its progress would be as little hampered by red tape as is possible in a government office. A suggestion has been made, in which we heartily concur, that a petition be circulated in which a special appeal be made to Congress, through the intermediacy of the Geological Survey, to provide ample means for this work. We have no doubt that such an influential body as the American Institute of Mining Engineers would give the movement its hearty indorsement, if its co-operation could be secured in time. Unfortunately, its next meeting will not be held until February next, so that action from that quarter can not be looked forward to, to be available in time.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Our Imports of Steel from Belgium.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your interesting Summary of Statistics of Imports of Iron and Steel, you observe, with reference to the large quantities of steel imported from Belgium, that you "believe very few are aware that Belgium is so large an exporter of steel to this country." As a matter of fact, comparatively little, probably not more than twenty per cent of the steel which figures as imported from Belgium, is really made in that country. The large Westphalian and Rhenish steel-works (Germany) can ship at about equal cost to Rotterdam (Netherlands) and Antwerp (Belgium), and to either port more cheaply than they can to Hamburg or other German ports. Consequently, the bulk of the German exports of steel figures as from Holland and Belgium. Yours truly, P. B.

NEW YORK, Dec. 5.

The Dora Coal-Field, Virginia.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the November number of *The Virginias* is contained a review of the report on the *Mineral Resources of the United States*, recently published by the United States Geological Survey, which contains the following: "In Mr. Charles A. Ashburner's report on anthracite coal, page 32, is this statement concerning the *Dora coal-field:* Of one of the reported anthracite localities in Virginia, that in Augusta County, recent tests with the diamond drill would seem to prove the presence of anthracite," etc. In explanation of the above, I would like to state that, by referring to the report reviewed, on page 24 will be found a foot-note as follows: "Mr. Ashburner's contribution and statistics end here." I only stand responsible for a *portion* of the statistics relating to the anthracite region in Pennsylvania (pages 7 to 24 inclusive). I desire to make this explanation public from the fact that I do not wish to be held accountable for *questionable data* relating to a coal-field of a very uncertain character, and which I have never examined. Yours respectfully,

PHILADELPHIA, PA., Dec. 5. CHARLES A. ASHBURNER,
Geologist in Charge Penn. Anthracite Survey.

DELAWARE & HUDSON CANAL.—The last loaded boat on the Delaware & Hudson Canal started from Honesdale, Pa., November 29th, for Roundout. The total shipments by the canal this season have been 1 114,875 tons.

THE CABLE GRIP PATENT INFRINGED.—A dispatch from San Francisco says that the Cable Railroad Company, owner of the street-car patent cable grip, the same that is used in Chicago, has begun a suit against the Market Street Cable road, owned by Stanford & Crocker, for $100,000 damages for infringement on the cable grip patents.

THE VERMONT METHOD OF HEAP-ROASTING COPPER ORES.

Written for the Engineering and Mining Journa

For heap-roasting copper-bearing pyrites, the conditions of success are few and simple: Arrangement of wood under the heap, proper sizing of the ore, volume of the heap, firing, and covering. But all these must be properly performed. It is scarcely necessary to say that the bed upon which the ore is roasted must be well drained. It is constructed precisely like the traffic way of a city street, seventy feet wide, and the center six inches higher than the gutter on each side. The roast-heaps are laid across the bed, and are best twenty-four feet wide and fifty feet long. For convenience in covering and stripping them, they should be placed about eight feet apart, or even a little more. Each heap will then occupy about thirty-two feet of the length of the bed. The wood used should be four feet long, sound, and partly seasoned. It may be three inches diameter, or as heavy as one man can well handle. Ordinary split wood is best, of course. Brush, rotten timbers, or any thing else that will burn may be used; but a good roast will certainly not be obtained with any such material.

The plan of the heap should be laid off in the form of a parallelogram, 24 feet wide and 50 feet long, and wood piled 9 inches deep all over the plan. The work is begun by laying sticks of wood, about 3 inches diameter, end to end, across both ends of the plan and about 6 inches within the boundary. Vertically across these, the best wood on hand is piled closely, and to the required depth, bringing the outer ends evenly to the boundary. The ends of the piles will be part of the sides of the heap. Split sticks are used at those ends, and they are so piled that they will form a nearly vertical wall nine inches high; otherwise, ore will roll off in building the heap. The small sticks first laid will keep the outer ends of the wood away from the ground, and thus facilitate firing. Next, small wood is laid, end to end, along so much of each side of the plan as is not already covered, and about six inches within the boundary. Vertically across these, wood is piled to the required depth, bringing the outer ends evenly to the boundary. There is now a border four feet wide all around the plan. The space within this is yet to be filled. Work is begun at one end of it and wood piled in, laying all the sticks parallel with each other and with the long axis of the plan. Here the largest and smallest sticks are used, the best wood being in the border mentioned. A close inspection must now show that there are no spaces through which ore may fall to the ground. If the work has been well done, the wood will be closely piled nine inches deep all over the plan, and will reach evenly out to the boundary all around it, and these form a sort of vertical wall of that hight; and further, where the ends of the sticks reach the boundary, they will be raised away from the ground by the small sticks first placed for that purpose. The wood is now properly arranged for firing.

Ore in 1½-inch cubes is a good size for roasting. But unfortunately, after passing through the rock-breaker, it is all sizes, from two-inch cubes down to dust. It is first passed over an iron screen inclined thirty degrees below the horizon, and with holes 1⅛ inches in diameter. What passes through this is allowed to fall upon another screen with ¼-inch meshes. What passes over this screen is called "ragging;" what goes through, "fines."

The heap is begun by putting a layer of ore three feet deep all over the wood, as already arranged, and pushed out to the boundary until the slopes are as steep as can be made to stand without ore falling off the wood. Pains should be taken to make all slopes plane surfaces. Another layer two feet deep, and yet another two feet deep, are now put on, taking pains to keep the slopes as steep as they will stand and to have them plane surfaces. The ore is piled seven feet deep above the wood. Upon the top of this one foot deep of ragging is put, and the heap is complete. After the fines have been arranged in piles all around the heap, and about three feet distant from it, all is ready for firing. To do this, a fire is built at once up against the wood all across both ends of the heap. In an hour, the wood under it will take fire, and in another hour the ore will begin to ignite. It must henceforth have every attention. As soon as the ore has ignited, from the ground one foot upward, fines by the shovelful are dashed evenly upon the ignited part until it is covered half an inch deep. The ignition will proceed upward, and from both ends inward toward the center of the heap. As it does so, the scattering of fines upon it is continued, so that only the edge of the ignited ore may be visible. The heap for a week or more will grow hotter and hotter, and yet no part of it must be allowed to fuse. The covering of fines must be kept nearly cool enough to allow of one's hand being held upon it, and this can be done only by increasing the thickness of the covering. As it warms up to the proper temperature, more fines are scattered on with a shovel, and with the back of it they are patted down to keep them in position. When the fire reaches the top of the heap and begins to move along it, fines are thrown up there, and the workman climbs up an angle to the top and scatters on the covering where the ore is ignited. The fumes will be found very disagreeable, but it is safe to walk over the entire pile when fully ignited. There is no danger of suffocation, and no ill effects follow. Much arsenic in the ore might alter this. The writer has had no experience with such ores. As to the temperature of the top of the heap, it must be kept as hot as will permit a man to walk over it and work upon it for a few minutes at a time. And speaking generally, the covering on no part of the heap should ever become hotter than boiling water. When any part reaches that temperature, the thickness of covering is increased. Where sulphur melts upon the covering and trickles down it, the ore is fusing, and not roasting, in the region beneath.

If the covering has been gradually thickened to check combustion as the heap warmed up, at the end of seven or eight days nearly three inches deep of fines have been put upon the slopes, and upon the top nearly four inches deep of fines. Thereafter, it will be necessary about twice daily to search for parts unduly warm, and upon these put a little more covering. In about ten days, the heap will require no more attention, and, in about eleven weeks from the time of firing, will be ready to remove to the furnace.

The heap as built will contain something over 850 short tons. If the method as here detailed has been followed, and no part of the heap has been allowed to fuse, it should give not over twenty tons of ore requiring any further roasting. The remainder should be thoroughly roasted.

Speaking by averages, the material, after passing through a rock-breaker, will come out—ore, 82 per cent; ragging, 7 per cent; and fines, 11 per cent. Ore and ragging will readily roast, but there will always be an excess of fines. After laying out the plan of a heap, about eight inches deep of these fines are first put on it, and the wood is piled upon that. If they do not sufficiently roast under the heap, they will at least harden into a mass that may be broken into lumps and scattered through a heap for final roasting. Or the fines may be piled a foot deep on any unoccupied ground, and there remain until the mass hardens. It may then be broked up and scattered through heaps for roasting.

It is most economical to build heaps of the dimensions given. They may be made 20 feet by 50 feet and 5 feet deep above the wood, containing about 250 short tons and requiring ten weeks for roasting; but they will contain, after roasting, nearly as much half-roasted as a bed of 400 tons, and proportionately are more costly for fuel and attendance.

The skill in roasting comes in covering the heaps. This must be done well and in time. There is no reason to fear extinguishing the fire; for it is far better to do that than to let the heap fuse. Furthermore, it is really difficult to do.

At not less than nine different mines lying along the ore-belt, and between North Alabama and Central Vermont, has heap-roasting been practiced. And at only two neighboring mines lying in Central Vermont can it be said to have entirely succeeded. As a type of the other seven, we shall not be far wrong in taking one of them, results at which Dr. Egleston gives in his paper, "Investigations on the Ore Knob Copper Process" (American Institute of Mining Engineers, May, 1881). At these works, he writes, "About three fifths of each heap are roasted," the remainder going into other heaps for re-roasting. His analyses show that the roasted ore contained from 6·76 per cent to 7·64 per cent of sulphur.

The first really good results in this country were obtained at the Ely mines, in Vershire, Vt., when under the management of William H. Long. He succeeded so perfectly in roasting the ores that all of each heap went directly to the furnace. He made no failures. And by his advice, the method as here detailed was adopted at the Elizabeth mine, in Strafford, Vt. At these works the entire heaps are smelted, the fines being transported separately and weighed in due proportion into each charge. None of the ore requires re-roasting. The heap just smelted there was a fair average. It contained 380 tons, and the sample of it gave 4·62 per cent of sulphur by the method of oxidation with fuming nitric acid. Another determination, by fusion with niter and soda, gave 4·61 per cent of sulphur. The sample was an average of the entire heap, except the covering of fine ore, which, however, was mostly smelted with the remainder. The ores are pyrrhotite with chalcopyrite, carrying about 33 per cent of subphur, and nearly 6 per cent of copper, and are very basic.

W. G.

STRAFFORD, VT., Dec. 1.

NOTES ON LIXIVIATION.

Written for the Engineering and Mining Journal by Ottokar Hoffmann, San Francisco, Cal.

Additional Chlorination after the Ore is Discharged from the Furnace.—If silver ores which have been subjected to a chloridizing roasting are left in a pile, after discharge from the furnace, they will retain a dark-red heat for many hours, during which time the process of chlorination continues. Mr. Stetefeldt made very interesting observations in this matter with the ore of the Lexington mine. The ore is of such a nature that only about 47 per cent of the silver can be chloridized in the shaft of the Stetefeldt furnace. Mr. Stetefeldt removes the ore from the furnace to the cooling-floor, where he leaves it for twelve hours in a red-hot state. He thus gains an additional chlorination of over 43 per cent.

That chlorination continues after the ore is discharged from the furnace, if left in a red-hot state, is well known; but that such an enormous gain can be obtained by it, and a chlorination of 47 per cent be increased to 90, is remarkable and very interesting. It seems, however, that if the roasting is carried on in the furnace to a high percentage, say from 85 to 88 per cent, the additional gain does not amount to more than one or two per cent, and this is mostly obtained in the first few hours, while, if cooled with water, especially in presence of chloride of copper, the chlorination will quickly increase. If the ore does not contain much copper, I use part of the concentrated base-metal solution from the leaching-vats to cool the ore and to improve the chlorination considerably. The proper way, therefore, is to let the red-hot ore lie for about two hours, then to moisten it well with water or with the chloride solution of the base metals, and not, as practiced in some lixiviation-works, where the ore is immediately spread on the cooling-floor, and then charged dry into the leaching-vats.

Another additional chlorination takes place in the vat during base-metal leaching which even exceeds that on the cooling-floor. I made this observation first with Silver King ore. That the lixiviation tailings from the vats are always poorer than those obtained in making the chlorination test from samples taken at the time of furnace discharge, was nothing new to me, but I attributed it to the additional chlorination on the cooling-floor. I found, however, that only a part of the gain has to be credited to the process on the cooling-floor, while the rest took place in the vat during base-metal leaching.

I give the results of roasting charge No. 952, which in its final chlorination represents the average of over 1100 charges:

	Per cent.
1. Chlorination at the time of furnace-discharge	85·30
2. After two hours hot on the cooling-floor, then moistened with water, the sample being taken at the time of charging the vat	88·3
3. Chlorination calculated from the vat-tailings after lixiviation	94·2

In this case, an additional chlorination of 3 per cent took place on the cooling-floor, and 5·90 per cent in the vat, or in all 8·9 per cent.

In another case, I found the roasted ore, when charged into the vat, to be only chloridized to 82·5 per cent, while the tailings, after leaching, showed a final chlorination of 95·3 per cent, or an additional chlorination in the vat of 12·8 per cent. As a matter of course, the loss in weight which the ore sustained during leaching had been ascertained in each case, and was brought into the calculation. The chlorination tests were made in a manner similar to the treatment of the ore in the vat, namely, leaching first with water, then with hyposulphite of soda.

If I am not mistaken, Mr. Stetefeldt made the observation that his chlorination tests showed higher chlorination if the sample was leached first with water, and then with hyposulphite of soda, than they did if the hyposulphite of soda was applied directly without previous leaching with water. The conditions for additional chlorination, however, are more favorable in a vat, where the ore is exposed during a longer time to the action of a more concentrated solution of base-metal chlorides, caused by the thicker layer of ore. The base-metal leaching with Silver King ore took from three to four hours, but only during the first half-hour was the outflowing solution of such concentration that it could possibly act on the silver.

Application of Steam in Chloridizing Roasting.—The advantage of using steam in chloridizing roasting is doubted by many metallurgists, because repeated experiments in California, Nevada, and Mexico failed to prove the same to be great enough to justify the increased consumption of fuel. At Monitor, California, I experimented with very rich concentrations, but without obtaining any marked improvement, either in regard to a diminished loss of silver or in regard to a more rapid and energetic removal of the base-metal chlorides. I had, however, a different and very interesting experience with the ore of the Silver King mine, in Arizona. The Silver King ore is very refractory, and consists of large quantities of zinc-blende, antimonial fahlore, peacock copper ore, galena, copper and iron pyrites, silver-copper glance, and native silver. The latter is so prominently represented that sometimes half of the assay value of the ore is present in the form of native silver. The zinc-blende predominates, and appears in all varieties—yellow, green, brown, and black. The gangue consists principally of heavy-spar, then porphyry and quartz. The average value during the year 1881 was $196.92 silver per ton—no gold.

I roasted the ore with 10 per cent of salt in the Hofmann furnace, which is a furnace fed by charges, and consists of a revolving cylinder provided with a fire-place and flue arrangement on both ends. The fire is kept alternately on one and on the other end, and the flame made to reverse its course through the furnace accordingly. In using this furnace, I had all the facilities to procure a uniform roasting at the lowest possible heat. But notwithstanding this precaution, the roasted ore showed the enormous loss of 38 per cent of the silver. I immediately made arrangements to pass in steam through the center openings of the furnace, and applied steam as soon as chemical action commenced. The injection of steam was continued during the whole time of roasting, and I had the satisfaction to find the volatilized silver reduced to a very small percentage. During 1881, the production of bullion showed an extraction of 89·2 per cent of the assay value. There was a loss of 6 per cent left in the tailings and of 4·8 per cent caused by roasting, dusting, and other sources of loss. Allowing 0·8 per cent for dusting and handling, the loss was thus reduced by the application of steam from 38 per cent to 4 per cent. It seems that steam is most effective if zinc-blende and antimonial ores are simultaneously present. It did excellent service in chloridizing the native silver.

Lumps Formed in Roasting.—If the salt is well mixed with the ore before charging the furnace, the lumps formed in roasting will be found to be almost as well chloridized as the finer part of the ore; and if they are porous and not burned to cinders, the chloridized silver may be easily extracted from them by lixiviation. In case of too many lumps, the silver extraction will be retarded.

Silver Dissolved by Base-Metal Chlorides.—A concentrated solution of base-metal chlorides will dissolve chloride of silver. It is therefore not advisable to use deep lixiviation-tanks, even if the ore permits free filtration. If the water passes through a thick layer of ore, it becomes so highly charged with the chloride salts that considerable chloride of silver will be dissolved. But, on the other hand, if the layer of ore is kept too thin, the operator loses much of the advantage of an additional chlorination in the vat. The best results will be obtained with vats 3 feet deep, and filled with ore to about six inches below the rim.

To prevent the base-metal solution from dissolving silver, I admit the water from below the filter bottom, and by slight pressure force it to ascend through the ore to the top. Thus, the concentrated solution accumulates above the ore, and the chloride of silver, together with some antimony and lead, is precipitated by dilution with a stream of water. If the diluted solution is then permitted to flow back, and out of the tank through the filter-bottom, the precipitated chloride of silver will remain on and in the ore, and is afterward extracted with the remainder of the silver. This operation delays the base-metal leaching about an hour and a half, and if such a delay should be objectionable, the dissolved silver can be regained by conveying the solution into large tanks, where the precipitation with water can be effected. After a vigorous agitation, the precipitate is allowed to settle, and the clear solution decanted. If enough precipitate has accumulated, it is removed to cotton cloth filters, strained, dried, and melted together with the silver precipitate in a cupelling-furnace. The value of the dried precipitate varies from one to three dollars per pound. If lime is used as a precipitant, a very base and bulky precipitate is obtained, which it is best to charge together with ore into the roasting-furnace.

Test to Ascertain the End of Silver Leaching.—As long as the solution of hyposulphite of soda is rich in silver, the precipitate with polysulphide of calcium is of a black-brown color; but this color changes, as the silver diminishes, into a light red-brown. The chloride of silver dissolves more easily in hyposulphite of soda than the sub-chlorides of the base metals and sulphate of lead: the solution, therefore will continue to show precipitate with sulphide of calcium long after all the silver has been extracted, especially if very diluted solution is used. It is impossible for even the most experienced lixiviator to tell by the color and appearance of the precipitate the time when all the silver is extracted. Still, it is important to know the exact time, in order to avoid a loss of silver by incomplete leaching or a loss of time by too long-continued leaching, in which latter case a great deal of base is unnecessarily added to the silver precipitate. I use the following simple and quick test: A tumblerful or two of the solution is precipitated with sulphide of calcium, the precipitate allowed to settle, the clear solution decanted, and the precipitate poured into a small paper filter. After being well washed with hot water, a part or all of it is introduced into a test-tube and boiled with nitric acid until

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dissolved. Then the tube is held in cool water, to hasten the settling of the sulphur. The clear nitric acid solution is decanted from the sulphur into another test-tube, and tested for silver with a few drops of salt water or muriatic acid. The white precipitate is boiled with water to dissolve chloride of lead. As long as there remains a precipitate or the solution retains a milky appearance, leaching must be continued. It is of importance to wash the precipitate well with water before dissolving in nitric acid, as otherwise only a partial precipitation will take place with salt water, or none at all if only small quantities of silver are present.

Consumption of Sulphur and Lime.—The consumption of polysulphide of calcium depends on the amount of silver contained in the ore, and on the amount of base-metal subchlorides formed in roasting. Ores containing lead will consume more than those carrying copper. But, all in all, the consumption does not amount to much. Treating different kinds of base ore, I found it to be from 1 to 1·25 pounds of sulphur to the pound of fine silver produced, and about twice as much lime. At Silver King, during the year 1881, I produced 42,000 pounds of fine silver and used 43,149 pounds of sulphur, or about one pound to the pound of fine silver produced.

Filters for the Precipitate.—I use the following filtering arrangement, which will be found convenient, as it requires very little attention and handling: A square frame 6 feet by 6 feet is divided by cross-pieces into four squares 3 feet by 3 feet, and covered with unbleached cloth, forming in each square a filter-bag from 10 to 12 inches deep. Three of the dividing scantlings are provided with a cut 18 inches long and 1·5 inches deep. The precipitate from the tanks flows through a trough into the first filter, and, if this is filled, finds its way through the cut into the next, and so on until all four are filled. The set of filters is supported by frame-work above a square tank 6 feet by 6 feet and 10 inches deep, which is connected by a pipe with the pump-tank. According to the size of the works, there may be two or three such sets of filters. The flat tanks are made to communicate with each other by inserted pipes, and only one of them is provided with an outlet, which leads the filtrate back to the pump-tank. This outlet ought to be about 3 inches above the bottom, in order always to keep 3 inches of solution in the bottom of the tank, and to give the precipitate which may be forced through the cloth during the manipulation of washing, an opportunity to settle. At Melrose, Cal., I drained and dried the silver precipitate in a small centrifugal machine with good results, in a very short time. A larger centrifugal had been built for the Silver King mill; but it was built too light, and not well balanced, which made its use so dangerous that I had to abandon it after a few minutes' run. So far, no further experiments have been made with the centrifugal machine, which doubtless before long will take the place of the filters.

Treatment of the Precipitate.—After the main part of the solution has passed through the filters, which takes about three quarters of an hour, the precipitate remains on the filter in a soft, muddy condition, and has to be well washed with hot water. Then it is piled by means of a round pointed wooden spatula in cone shape in the center of the filter, and left to drain for a few hours. I do not press the precipitate, as this manipulation, without giving much advantage—especially if the precipitate has been well washed—is very unclean and troublesome, and causes considerable waste, but remove it direct from the filters into a small reverberatory furnace, where it is dried, and the main part of the sulphur burned off. To melt the precipitate in crucibles with iron and borax is expensive and is slow work. It does very well in small works; but if large quantities have to be melted, this ought to be done on a lead bath in a cupelling-furnace. For the Silver King works, I erected a German cupelling-furnace with this modification, that the hearth was stamped into a perforated cast-iron pan 5 feet 6 inches in diameter, and 10 inches deep, which afforded a free escape for the moisture. As hearth mass, I used three parts of pulverized lime-rock and one part of clay. In this furnace, I melted the precipitate in lots of 2000 and 3000 pounds, and obtained, after from eight to ten hours, silver bullion 995 fine, with a consumption of from 1 to 1½ cords of wood. I could use the same hearth for two, and sometimes three, meltings. The melting in a cupelling-furnace offers, besides cheapness and quickness, the advantage of obtaining fine bullion in one operation, which can not be done in crucibles if the precipitate contains lead.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Coal Lands in Alabama.—The following case is one of a large class that harass the official mind, growing out of the passage of the act of March 3d, 1883, exempting mineral lands of Alabama from the operation of the mineral land laws. The facts in brief are, that Yost made a homestead entry September 18th, 1869. He was unable to comply with the law as to residence, and so on September 26th, 1882, he made a cash entry under the act of June 15th, 1880. In the following December, a special agent reported to the Commissioner of the General Land-Office that the land contained valuable deposits of coal. A hearing was ordered; but the government abandoned the case and it never came to trial. September 1st, 1883, the commissioner took up the case and held the entry of Yost for cancellation, taking as a basis for this action the report of a special agent as conclusive evidence as to the character of the land, and deciding, as a matter of law, that the entry was not cured by the act of March 3d, 1883, because the entry-man had not resided upon the land to the date of his entry.

M. D. Brainard, Esq., counsel for Yost, in his appeal from the above decision to the secretary, says the case presents two questions for his determination: (1.) Has the Commissioner of the General Land-Office the lawful right to cancel a perfected land entry upon the mere *ex-parte* report of a secret agent without first allowing the entry-man a fair and open opportunity of proving his *bona fide*, and showing that the land is agricultural in character? (2.) Is the construction given by the commissioner to the act of Congress of June 15th, 1880, and March 3d, 1883, correct or erroneous? and argued that the cancellation upon a secret report was an arbitrary exercise of power and in direct violation of Article 5 of the Constitution of the United States. He quoted numerous authorities confirming the correctness of the latter position. Upon the second point, counsel shows that the entry of Yost was perfected under the provisions of the second section of the act of Congress of June 15th, 1880, which provides "that persons who have heretofore under any of the homestead laws entered lands properly subject to such entry . . . may entitle themselves to said lands by paying the government price therefor," etc. This is a remedial statute, and its legal effect was to excuse the default of residence under the homestead laws, and allowed the entry to be perfected by paying cash for the tract; the character of the entry remained the same; it was a homestead entry perfected by the payment of money instead of the usual five years' actual residence required by the general homestead law. And further, "being completely absolved from residing on the land, and excused for his former default, the claimant made application, paid the government price in money, perfected his homestead entry, and received his final certificate. Upon the face of the record, this entry was valid; and if there were any latent defects in it—if the land was mineral in character—the burden of proving that fact, by legal and constitutional methods, was upon the party assuming the affirmative of that issue, the government. The commissioner undertook, in his decision, to determine this question of fact upon the mere *ex-parte* report of a secret agent." . . . "If the land was mineral in character, and that fact was established in an open and lawful manner, the entry was voidable and subject to cancellation. This was the status of the entry prior to March 3d, 1883. . . . Said act abolished all distinction between mineral and agricultural lands in Alabama, and classified all of the lands in that State as agricultural in character."

The decision of the commissioner, and that of the secretary, are given in full below, by which it will be seen that the latter reverses the former:

COMMISSIONER'S DECISION.

REGISTER AND RECEIVER, MONTGOMERY, ALABAMA:

GENTLEMEN: I have this day examined Frederick C. Yost's cash entry No. 17,800, covering the S. ½ of the S. E. ¼ and the N. E. ¼ of S. E. ¼ of Sec. 14, Tp. 21 S., R. 4 W. The records of this office show that Yost entered the land September 18th, 1869, per homestead entry No. 1857. This entry was canceled by this office for abandonment February 27th, 1879. September 26th, 1882, the same party made his cash entry No. 17,800, under the second section of the act of June 15th, 1880.

Special Agent A. A. Mabson, having investigated the case under instruction from this office, states in his report, dated December 8th, 1882, that the land lies in the Lower Cahaba coal-field, and is in the locality where the finest grade of coal in the State is found; that there is an opening in Section 14, above referred to, where mining operations were carried on as long ago as during the late war, and that the tract in question is exceedingly valuable for its coal. He also says that the claimant never lived on the land. The mineral character of the land is clearly shown by the agent's report, as well as the fact that the claimant has not complied with the homestead law. The second section of the act of June 14th, 1880, expressly excepts from its provisions all lands which were not subject to entry under the homestead law, and as the coal lands in Alabama were at the date of the cash entry reserved from the operation of said laws, the entry under consideration was improperly allowed, the land not being of the character subject to such application. It follows, therefore, that the entry can not be passed to patent, unless it is done under or by virtue of the provisions of a later act of Congress. The act of March 3d, 1883, which is the only one upon the subject, confirms or authorizes the patenting of homestead entries made in good faith, where the claimants have complied with the homestead law in all respects except as to the provisions relating to mineral lands.

As the claimant in this case has not complied with the homestead law in regard to residence on the land, the entry is not embraced in the confirmatory provisions of the act of March 3d, 1883.

Mr. Yost's entry is therefore illegal, and it is accordingly held for cancellation. You will notify him that he will be allowed sixty days for appeal. Very respectfully, N. C. MCFARLAND, Commissioner.

SECRETARY'S DECISION.

DEPARTMENT OF THE INTERIOR,
WASHINGTON, D. C., November, 1883.

THE COMMISSIONER OF THE GENERAL LAND-OFFICE:

SIR: I have considered the appeal of Frederick C. Yost, from your decision of September 1st, 1883, holding for cancellation his cash entry No. 17,800, Montgomery, Alabama, made September 26th, 1882, upon the S. ½ of S. E. ¼ and N. E. ¼, of S. E. ¼ 14, 21 S., 4 W.; under act of June 15th, 1880 (21 Stat., 237), the land having been originally entered by him as a homestead September 18th, 1869. The only objection suggested by you is the fact that, after examination by a special agent, and in December, 1882, the land was reported to contain coal, and a hearing was ordered to determine the value of the alleged deposit. This hearing was subsequently dismissed by the register and receiver, and no final issue has been tried. It is claimed that the Act of March 3d, 1883 (22 Stat., 437), excluding the mineral lands in Alabama from the operation of the mineral land laws, had the effect to remove the necessity of further inquiry from entries of this class, consummated prior to its passage, and to confirm the same.

This construction has, to some extent at least, been favored by the department, and I do not think further action is required in a case like this, especially where an investigation has already been discontinued at the instance of the government, and no bad faith has been shown by proper hearing to attach to the claimant in the matter of his entry. Your decision is reversed. H. M. TELLER, Secretary.

Alleged Coal Lands—Instructions.—A special agent of the General Land-Office reported certain tracts in Colorado to be coal lands, whereupon the commissioner instructed the local officers to note the same in their tract-books, and "in every case of entry (not under the coal land law) for these lands where proof of settlement and cultivation is not required, such as additional homestead entries under the statutes for the benefit of soldiers and sailors, before issuing a certificate as a basis for a patent, a hearing must be had to determine the character of the land, after due published notice, according to the method prescribed in the circulars of this office relating to lands returned by the surveyor-general as mineral. In cases of pre-emption and homestead proof, the hearing as to the character of the land may be had at the date of proof, in accordance with the present practice; but in the notice of intention to make proof, notice must be given that testimony will be taken to determine the question as to whether land is or is not mineral in character, and copy of the notice

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must be posted on each lot or 40-acre subdivision thereof. Parties appearing at the time appointed for the hearing, to testify to mineral value of the land, should be allowed to give testimony and cross-examine witnesses as in contested cases. Existing instructions authorizing hearings in some instances as to the character of tracts in respect to the agricultural or mineral value are modified hereby, so far as the lands in question are concerned.

Taxation of Stock in California, the Property being in another State.—Shares of stock in a mining corporation whose principal office is in California and whose entire property is in another State are, when held by citizens of California, taxable in that State, although the corporation is obliged to pay taxes on its property in the other State, according to the decision of the California Supreme Court in the recent case of San Francisco *vs.* Fry.

THE STEEL FOR THE MONONGAHELA BRIDGE, PITTSBURG, PA.*

Every heat of steel was tested and its quality determined before any more work was done to it. For the compression members and pins, the steel was required to stand the following tests on specimen bars $\frac{7}{8}$ inch diameter: Elastic limit, 50,000 to 55,000 pounds per square inch; ultimate strength, 80,000 to 90,000 pounds per square inch; elongation in 8 inches, minimum, 12 per cent; reduction of area at fracture, minimum, 20 per cent; cold bending, 180 degrees around its own diameter without crack; cold punching of holes in flat 3 by $\frac{5}{8}$-inch bars, $\frac{3}{16}$ inch from the edge without crack or distension of metal.

All specimens and shapes were required to be finished at nearly the same heat, as it was observed that rods finished at a lower heat would give higher tension results than samples of same steel finished at a higher heat. The Andrew Kloman firm, in Pittsburg, had contracted to procure the steel and to furnish the steel shapes. The intention was to use Bessemer steel for the compression members; a large lot of Bessemer steel was tested, but few samples were found to stand the desired tests. The difficulty seemed to consist in controlling the uniformity of the steel within close limits for quality and strength. After a while, the attempt was given up and open-hearth steel was substituted. No trouble was then experienced in getting a uniform grade of steel of prescribed quality. The top chord sections consist of four leaves, which were originally designed to be each a 20-inch steel plate with 4 by 4-inch angles for flanges. In ordering the steel, it was discovered that enough plates of that width could not be procured in the required time. Therefore, the chord sections were changed to 10 inch and 12 inch steel plates, with 4 by 4-inch angles, composed as shown in the drawings.

Notwithstanding the great care used, the finished plates and angles were by no means a uniform product. Accordingly as they in rolling were finished at a higher or lower heat, they would have different degrees of hardness. Steel plates and angles finished at a lower heat had a smooth surface, and the noise of punching them resembled pistol-shots, while plates finished at a higher heat had a rougher surface, and there was hardly more resistance to punching than in wrought-iron.

The specification for riveted steel work provided that the punched rivet-holes, three quarters of an inch diameter, should in the assembled parts be enlarged to one inch diameter by reaming. The time for the delivery of the steel work growing short, the question was considered whether the reaming of the holes could be avoided, to hasten the completion of the work at the shops. Messrs. Kellogg & Maurice, of Athens, Pa., had the contract for this part of the work.

To that end, the following experiments were made: Ten specimens were cut from the same steel plate a quarter of an inch thick; one specimen was tested, to ascertain the tensile strength of the steel specimen. The nine other specimens, all alike in form, were prepared, for the purpose of ascertaining the effect of punching holes, of punching and reaming, and of drilling. The tests were expected to show the amount of reaming required, and whether any annealing effects from the hot rivet on the injured steel around the punched hole could be observed.

The conclusion from the tests was, that the injured steel (of the quality used in this instance) around the punched hole was in part restored by annealing in contact with the hot rivets, the size of which was large in proportion with thickness of steel plates and angles as used in the chords. The reaming of the punched holes to a greater extent than to make the rivet-holes smooth and straight was therefore dispensed with, and a reduction in the price for the finished work agreed upon. The steel pins are 6, $5\frac{1}{4}$, 4, and $3\frac{1}{8}$ inches in diameter. The same quality of steel as for the compression members was used for them; they were forged from solid steel billets, and turned to size. No appreciable difference in the hardness of the metal in the pins was observed.

For tension members and rivets, the steel was required to stand the following tests on specimen bars five eighths of an inch in diameter: Elastic limit, 45,000 to 50,000 pounds per square inch. Ultimate strength, 70,000 to 80,000 pounds per square inch. Elongation in 8 inches, minimum, 18 per cent. Reduction of area at fracture, minimum, 30 per cent. Cold bending, to a loop 360 degrees around its own diameter, without crack. Cold punching in 3 by $\frac{5}{8}$-inch bars of 1-inch rivet-holes, one eighth of an inch from the edge without crack or distension of metal. Open hearth steel of the above and uniform quality was obtained without trouble.

The eye-bars were made by the Kloman process—that is, the bars were rolled from billets between reversible and adjustable rolls, in such a manner as to leave the ends thicker than the bar. The ends were then spread and forged to the proper shape of the eye under a steam-hammer. The heaviest steel bars for this bridge were 28 feet $6\frac{1}{2}$ inches long, center to center of eyes, and $1\frac{1}{16}$ inches thick. All steel billets and all steel bars required very close inspection for flaws, the detection of which was sometimes difficult. It has been stated that, for the detection of flaws in steel or iron, a magnetic needle had been used with success, though the manner of its use the writer has not heard stated. A device for the certain discovery of flaws in steel bars is certainly needed. Where the solid metal sections are proportioned very economically to the work they have to do, flaws are a source of great danger, especially in attenuated steel structures; flaws in wrought-iron are more likely to happen in the direction of the fiber, but in steel they can as well happen crosswise to the direction of the tension strain as any other way. Three steel bars 9 feet long between centers of eyes, and 4 inches by $1\frac{1}{16}$ inches in section were tested, to ascertain the effect, if any, of annealing the finished bars.

The results were as follows:

	Bar A. Annealed.		Bar B. Not Annealed.		Bar C. Not Annealed.	
	Eye.	Eye.	Eye.	Eye.	Eye.	Eye.
Diameter of eye in inches	9	9	$9\frac{1}{16}$	$9\frac{1}{16}$	10	9
Least cross-section of eye in sq. inches	5·72	5·82	5·83	5·72	6·83	5·77
Excess of metal in eye over bar, p. c.	29·4	31·7	38·1	35·5	57·7	33·2
Reduction of area in eye at pin-hole, p. c.	7·9	3·6	3	3·2	3	3
Elongation of pin-hole in inches	0·4	0·72	0·45	0·44	0·38	0·4
Average section of bar in square inches	4·42		4·22		4·33	
Average reduced area after test in sq. in.	3·96		3·97		3·89	
Reduction in per cents	10		5·1		10	
Reduction at fracture, per cent	43·87		37·5		37·55	
Elongation of whole bar, per cent	10·5		10·3		11·1	
Elongation for 12 in. near fracture, p. c.	24·6		23·2		22·1	
Elastic limit per square inch	43,140 pounds.		45,360 pounds.		40,940 pounds	
Ultimate strength	74,310 "		78,180 "		73,760 "	

All pin-holes were $3\frac{1}{16}$ inches diameter.

Pin-hole in one eye of bar C was bored one quarter inch out of center-line of bar, and accounts for its lower ultimate and elastic limit.

A specimen from the same heat of steel, of which the above bars were made, showed on a three-quarter inch round: Elastic limit, 46,389 pounds per square inch. Ultimate limit, 78,898 pounds per square inch. Elongation in 8 inches, 18 per cent. Reduction, 30·2 per cent. The net section of the heads through the pin-holes for all eye-bars being at least 50 per cent more than the bars, and the good effects from annealing being doubtful in the above tests, it was not thought necessary to anneal the steel bars. For steel rivets, the above quality of tension steel proved very suitable. The rivets were tough and tenacious. It was, however, observed that the manufactured rivet-heads would easily break off with few blows, the fracture in each instance showing a fine granulated appearance. Rivet-heads, however, made by hand or riveting-machine were very tough, and could not be broken off; they had to be cut off. The cause for the brittle rivet-heads was supposed to be the upsetting by blows, in forming the head at a high heat in dies, producing sharp corners under the rivet-head and around the rivet-stem.

* From a paper by G. Lindenthal, read at the annual meeting of the American Society of Civil Engineers.

THE USE OF STEAM IN THE BESSEMER CONVERTER.

Captain William R. Jones, of the Edgar Thomson Steel-Works, Braddock, Pa., in the specification of patent No. 287,687, dated October 30th, gives an historical sketch of the causes leading to the invention, and a well-written account of its advantages and special applications. The same subject, it will be remembered, was recently dwelt upon by Mr. Robert Forsythe, in this paper on the South Chicago plant, read before the Troy Meeting of the American Institute of Mining Engineers, a full abstract of which was printed in our report. Captain Jones says in his specification:

In the early practice of the Bessemer method for reducing cast-iron to homogeneous malleable iron or steel (ingot metal), the charge of pig metal in the converter did not much exceed five tons in weight. Owing to the insufficient power of the blowing-engines, and to other causes, it was not feasible to work any greater weight of metal at one blow, and even then the conversion of the charge, which was obviously dependent upon the quantity of oxygen supplied, usually consumed twenty-five minutes, and frequently required much more time. In the interval between heats, the crude pig metal tapped from the cupolas accumulated in the collecting-ladles and steadily fell in temperature. For this reason, but more especially because of the long duration of the treatment, it was necessary that the pig metal should contain a high per centum of silicon (usually about three per cent), or of other heat-developing material—such, for example, as manganese—which would burn out in the course of the subsequent blow, and keep the metal in condition best adapted to effect its satisfactory conversion. The "chilling" of the charge was the evil to be guarded against, and the presence of the silicon or its equivalent in high proportion was an essential precaution. If the metal should for any reason become overheated, as sometimes occurred, then a small amount of scrap—such as rail ends, butts, clippings, etc.—not to exceed five hundred pounds, and rarely that much, in weight, was added to the charge, either in the converter or in the casting-ladle, to reduce the temperature, and thus to save the ingot-molds from being "cut" by the hot metal. In the latter stage of the art, the improvements in blowing-engines and other machinery and the increased capacity of the converter and of the tuyeres have enabled the operator to work ten tons and upward of metal at a single heat and to effect its conversion in from eight to fourteen minutes (rarely beyond the latter), where some twenty-five minutes were necessary before to reduce five tons. This marked difference in the amount of the charge, the rapidity of conversion, and the frequency of the heats has been attended with other important changes. There is now but brief chance for the converter to cool or for the metal to accumulate in the collecting-ladles. The metal is oftentimes tapped directly from the blast-furnace, and hence the conditions are all such as tend to make the temperature higher and constantly increasing as successive charges are worked. The crude pig-iron is no longer high in silicon, but is preferably made to contain less than one per cent, though this may not be diminished too greatly in the working of the blast-furnaces without risk of introducing a hurtful per centum of sulphur in the metal. Despite all precautions, the energy and rapidity of the converter reactions frequently develop an overheated condition of the charge, which is attended by an emission of peculiar smoky vapors that obscure the flame so that the operator may not accurately determine when the blow should end. The overheated metal attacks the molds in casting and speedily destroys them. To add scrap or clippings of metal, either in the converter or casting-ladle, as may be necessary and was practiced before, has become troublesome, expensive, irregular in its results, and not always effective. From two thousand to seven thousand pounds are now frequently added

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to the charge, which, quite aside from loss of time and uncertainty in determining what amount is requisite, involves the consumption of materials sometimes not conveniently obtained and having quite as high a market value as the finished metal itself. Besides, there is much risk of introducing objectionable or inferior grades of metal into the charge.

My invention is designed to obviate the use of this large quantity of clippings, etc., and to regulate the temperature of the charge at any stage of the conversion in a simple, expeditious, and inexpensive way, so that "over-heating" is prevented. The flame is kept clear and free from obscuring vapors, so that the operator may determine with great nicety when the blow should end, and the ingot-molds are no longer subject to the destructive attacks of "hot" metal. This object I have accomplished by the use of steam, in conjunction with the air-blast, in the following manner:

When, at the beginning of the operation, the metal has been run into the converter and the air-blast has been turned on in the usual manner, steam is admitted from a pipe connected to the blast-pipe, and passes with the air through the tuyeres until the temperature of the metal is sufficiently reduced to insure a clear flame, when the steam will be shut off and the air-blast continued alone until the completion of the blow. The length of time during which steam will thus be admitted to the converter will depend upon the size of the pipe delivering the steam, as well as upon other conditions, such as the nature of the metal, the pressure and volume of the air-blast, etc.; but I have found in practice that in working a ten-ton converter with steam delivered at about fifty pounds pressure through a pipe of one and one half inches in diameter, the steam may be forced with the air about six minutes, or about one third to one half the length of the blow. It will also be found of advantage in some cases to inject steam with the air-blast for a short time just before the completion of the blow, if the heat of the metal is shown by the flame to be excessive, and, in fact, the steam may be introduced at any time when the appearance of smoky vapors or other indications in the flame familiar to the operator show that the metal is becoming too hot. The skilled operator will readily understand, however, at what stage and for how long a time the steam may be advantageously employed, depending, as it must, somewhat upon the varying conditions under which the work is performed.

Instead of using the steam at the commencement of the blow, it may be introduced first at some latter stage, or, again, may be used continuously throughout the entire period of conversion in connection with the air-blast. Again, in lieu of steam, it may be expedient to introduce a spray of water in finely-divided (atomized) condition, together with the air-blast, though, as the chilling effect is much greater than where the steam is employed, the more equable action of the latter makes its use preferable in practice, as heretofore indicated.

When scrap is used to chill the charge, the tendency is, as before stated, to reduce the per centum of silicon in the pig metal to the lowest working limit, because thereby less heat is developed in the converter and the amount of scrap to be added is correspondingly diminished; but in so far as the silicon is reduced, there is danger of more and more sulphur passing into the iron while it is being smelted in the blast-furnace; hence it is an obvious and important advantage of the present invention that it allows for the use of a grade of pig metal which shall be high enough in silicon to uniformly avoid the presence of an objectionable per centum of sulphur, and yet which, despite its greater heating capacity, is under the easy control of the operator, who may quickly and cheaply counteract any harmful increase in temperature that may develop during the blow.

The skulls from the ladles, butts from the ingots, and the like, which ordinarily accumulate about the mill, may be utilized by re-melting with subsequent charges in the converter, as heretofore; for while the present invention enables the scrap metal to be entirely dispensed with, there is nothing detrimental in such additions. Besides, the scrap metal of a single mill is but a minor percentage of the additions which the invention is designed to save.

THE DAFT ELECTRIC RAILROAD.

A trial of the Daft electro motor for propelling railroad cars took place at Saratoga, N. Y., on November 24th last.

In the Siemens Berlin electric roads, the current to operate through the motor is sent through wires overhead, it having been found inconvenient to so insulate the track as to use the rails therefor, and also because, unless properly covered and insulated, the rails would be highly dangerous to other travel. Mr. Daft, by a subdivision of his dynamo, claims to obtain a current of such low tension that all danger from contact is avoided; but the insulation was by no means thoroughly effected by his sending the current through a third rail in the center, of which the fastening spikes were removed from the rail by a strip of vulanized rubber. Then, although one could touch the rails without feeling any unpleasant shock, it was very evident that many were temporarily "excited" in crossing the tracks on the occasion referred to, while no less than four horses fell on the track from the effect of the current, and had to be helped off.

The actual performance consisted in the hauling by a two-ton motor of a five-ton car, with probably five tons more in weight of passengers, a distance of a mile and an eighth. This was up a grade of 70 feet to a mile, with one sharp curve, and was effected in eleven minutes. On the return, the motor was thrown from the track, and several who were on it had narrow escapes; but the accident was due to a make-shift rope coupling, and did not involve Mr. Daft's principle at all. The dynamos at the factory for generating the current were 500 feet from the track, and were operated by a 30 horse-power engine. The motor itself seemed entirely too small and light for the work expected from it, the dynamos thereof and connections occupying a box only about four by six feet. The current for these is taken up from the central track by a contact-wheel, which transmits it to a receiving dynamo, and thence by connection with a steel belt through the axles to the outside rails causes the revolutions. The apparatus is easily operated, and evidently was entirely under control. Mr. Daft was warmly congratulated on the degree of success obtained, and most of the numerous party present were confident that the trial was a proof of the practical success of the system.

THE PUMPS OF THE BINDWEIDE MINE, GERMANY.

(WITH SUPPLEMENT.)

The pumps chosen were those designed by Carl Kley, of Bonn, repeatedly tried with good success. As will be seen by a reference to the drawings in our Supplement, they have the form of a reversed pressure pump, the plunger being a stationary suspended pipe, while what is the cylinder in ordinary pumps moves. The piston-rod passes through the entire pump, being attached at the lower end to a cover which is removable. The pumps lift the water on the upward stroke of the rods, and their advantage is, that therefore the latter are strained in tension instead of compression, that the impurities in the water which have a tendency to settle can not so easily get into the stuffing-box, and that the latter is more easily packed. The mud gathering in the plunger may be readily got rid of by unscrewing the bottom, though it would seem that possibly a simpler way would be to provide a cock sufficiently large to flood it out. In order to provide as large a suction as possible for the passage of the water, three beat-valves of the Thometzek type were chosen, packed with leather rings. As the drawings show, they are easily got at.

The pump-rods are made of cast-steel, the purpose being to make them as light as due regard to safety will permit—an object attainable only by using the best material. Under the circumstances, the rods are strained only in tension, the maximum being 6·6 kilograms per square millimeter. They were made 105 millimeters in diameter immediately below the mouth of the shaft, 96 millimeters to the first deep level, 80 millimeters to the second level, and are to be 50 millimeters in diameter below that level. In order to be able to provide guides at any point, and to make sure that the material of the rods was not defective at any point, the rods were turned off the slide-guides used. The manner in which the different sections of the rods are connected is fully shown in detail in the drawings, so that it is not necessary to go into any further description of them.

A WATER-GAS FURNACE AT ELGIN, ILLINOIS.*

By P. Barnes, Joliet, Ill.

In a paper recently read before the Institute by Mr. W. A. Goodyear, a useful presentation was made of the subject of the production of water-gas on a large scale, by the use of a regenerative form of apparatus. By way of supplement to that paper, a brief statement of the details of a plan which was carried out at the works of the Elgin National Watch Company at Elgin, Ill., may be of interest, although the ultimate result of the working of the producer was not successful or satisfactory. This company had decided to build a gas-works for the supply of illuminating gas to its factory, on a much larger scale than that of the petroleum works which had very successfully supplied the smaller buildings for many years, and in March, 1882, the material for a gas-making cupola furnace was purchased. A few weeks later, it was decided to make the attempt to burn the gas under the steam-boilers of the establishment, and a second set of material was ordered.

In July, 1882, when the writer took charge of the work of construction, it was agreed, after a study of the probabilities of the situation, to make an attempt to utilize the waste heat developed in the process for preheating the air-blast and the steam used to the highest possible point, so that the fullest practicable limit of economy should be reached. This was believed to be the more needful, because of the obvious requirement that the gas should be furnished at the least possible cost, to meet the competition with coal fired directly under the boilers. The material which had been purchased was utilized as fully as it could be in building two fire-brick stoves, and the fire was put in a rectangular fire-box, which was attached to the stoves by short direct flues. The plans for this work were completed in August, 1882, and the furnace was set at work in February, 1883.

It was soon found that, although the proposed preheating of the blast and of the steam was very fully accomplished, yet the shape which had been adopted for the fire-box was not such as to secure the intense concentration of the heat needed to secure the complete fluxing of the furnace which had been undertaken. It was also found that the chilling of the slag, which was run down in considerable quantities by the steam blown in during the gas-making, was so complete that it became quite unmanageable, and that it would lodge in the base of the fire-box below the line of fusion, and also above this point, with so little fuel remaining in or near the masses of slag that they could not be remelted when the blast was turned on again. This action of the steam in cooling the slag was anticipated, but the trial was thought to be worth making.

A considerable quantity of gas was made in the furnace with the regenerative fixtures as first erected, the holder which had been provided for the storage of the illuminating gas being used for the fuel-gas during the trials which were made. This was burned under the boilers, using simple perforated iron pipes for burners. A considerable evaporation was reached, but it was found that, in order to compete with direct coal firing, even with the market price then current for coal used under the boilers, of $5 per ton, the gas must be furnished for decidedly less than five cents per thousand cubic feet, even if the cost of labor, as compared with direct firing, were to be wholly omitted in making up the estimate.

The saving of the waste heat was found to be very complete, the products of combustion and the water-gas both escaping from the apparatus at a temperature very close to the boiling-point of water. It was found that the splintering of the brick-work in the lower part of the fire-box, due to the removal of the very stubborn clinkers which were formed, would lead in any event to a very short life of that part of the apparatus as then constructed, and in view of some other important local reasons it was considered advisable to abandon the regenerative fixtures, and the expectation of using the gas under the boilers. The furnace was then rebuilt and fitted up for making illuminating gas only, upon the plan which had been used for some years in Chicago under the patents of Mr. T. G. Springer. The whole was put into very successful operation in July, 1883.

*Read at the Troy Meeting of the American Institute of Mining Engineers.

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THE LEAD PRODUCTION OF COLORADO.

The Leadville *Herald*, in a recent issue, prints a timely article on the production of lead in Colorado, from which we make the following extract:

During 1882, Leadville shipped to the Eastern refineries 43,000 tons of lead in base bullion. During that year, Grant's large works were in operation until the latter part of May, and the Elgin smelter the last half of the year. The remaining smelting-works were in blast with remarkable regularity during the entire twelve months.

During the first ten months—up to November 1st, 1883—the product of the Leadville smelters is still 4500 tons in arrears of the product for the corresponding period of last year. During the first four months of the year, the Elgin smelter was idle. The Harrison works, by the destruction of their establishment in the spring, and inability to secure ore later on, lost about three months' time. The La Plata smelter, which started up last week, also lost several months. At present, all the works are in full blast, with the exception of perhaps one small furnace at the La Plata. As a consequence, it is reasonable to suppose a slight gain will be recorded for December, over the product of the corresponding month of last year, leaving the year's work of this camp to sum up about 39,000 tons of lead, against 43,000 tons during 1882.

During the year 1882, there were shipped from Leadville 90,102 tons of ore. During the first six months of this year, the shipments amounted to 75,100 tons, and for the year it will be safe to place them at 140,000 tons. Compared with last year, these figures will show an increase in the ore shipments of 50;000 tons. Estimated on the usual basis of twenty per cent of lead, this exhibit would show that Leadville will ship lead in ore, in excess of the same class of shipments last year, 10,000 tons, from which, after deducting the 4000 tons of lead that the Leadville smelters will fall short this year of the production of 1882, leaves a net gain in the lead product of the Leadville District of 6000 tons. This, however, is believed to be above the actual figures, as much of the ore shipped during the past six months was iron ore, which was sent to Denver, Pueblo, and Salt Lake City, and devoid of lead, being used chiefly as a fluxing material, though carrying from six to fifteen ounces in silver to the ton. Making some allowance for this feature, say 2000 tons of lead, and we have an estimate of the entire product of lead of this district for 1883, which is 47,000 tons, or only 4000 tons in excess of the yield of 1882—excluding in the calculation 90,000 tons of ore as an offset on an equal amount shipped last year, and not taken into consideration in the above computation. In these figures are included what lead ores from neighboring camps found their way into the hands of Leadville smelters and ore-buyers, which this year was much less than for two years past.

To carry these estimates out, and include the product of the whole State, is a more difficult matter, and one that can not be done with as much assurance as the calculation on Leadville. Last year, we placed the product of lead for Colorado at 70,000 tons, and the refiners credited this State with 68,000 tons, when several months later they submitted a statement of their year's work to a government statistician.

The 90,000 tons of ore shipped during 1882 were estimated to contain twenty per cent of lead, or 18,000 tons. Taking the ore shipped from Leadville this year, 140,000 tons, and estimating it to contain eighteen per cent of lead, net, it would give a yield of 25,200 tons; which, added to the actual smelters' product of 39,000, would give a total for Leadville of 64,200 tons. Added to this amount the ore shipments from Eagle County, containing 4000 tons; ore and bullion shipments from Summit County, 2000 tons; ore and bullion shipments from Chaffee County, 3000 tons; and from other portions of the State, 2000 tons, aggregating 11,000 tons, which, added to the amount previously accredited to Leadville makes the estimated total lead product of Clorado 75,200 tons. A great quantity of ore, the lead of which has been calculated and is included in the above figures, will, however, not be smelted between now and January 1st, so that probably 73,200 tons will represent fairly the amount of lead converted into bullion during the year. An approximate proof can be found of this in figures representing the probable yield of the different smelters in the State. Leadville, 39,000 tons; Denver, 15,000 tons; Pueblo, 14,000 tons; Cañon City and lesser smelting towns, 5000. Total for the year, 73,000 tons, an excess for the State over 1882 of 5000 tons of lead.

As an offset on this increase, we learn that the Missouri and Mississippi River valleys are still eight thousand tons in arrears of their production for the corresponding period of last year, and the Nevada mines also show a decided falling off. New Mexico shows a gain of a few thousand tons, also Idaho, with probably a small increase in a few other territories. From these figures it would appear that, if there is a stock of twenty thousand tons of lead now in the market, the consumption is not as great as has been reported, and will not show a material increase over last year.

The excess of lead now in stock and seeking a market is not definitely known, but unquestionably quite large. Until the bulk of this is worked off and consumed in the industries, there is no hope for the price of the metal attaining what might be considered fair figures. In order to permit the consumption of the present stock, the production must be temporarily decreased. A united action of the lead-producing mines in this direction can not be secured. They are too numerous to pool their issues, as the corroders have done, and as a consequence the mines will continue competing with one another in the production and sale of lead. No one mine or district will voluntarily suspend production to help the market, and see others take advantage of the situation. The weaker must therefore be forced to the wall. This is a task that will not be accomplished without a struggle. It is therefore not likely that the product will be reduced immediately, or before a greater decline in the price of lead is experienced. This being the situation, Leadville must prepare herself to contend with other sections to furnish lead just as cheap as can be supplied by the mines of Missouri, Utah, and Nevada. From all reports, Missouri mines are already crowded to the wall, and a great many have closed down. The Utah mines are favored by railroads in the matter of freight rates, so that at present they possess an advantage over Colorado that our mining interest are now attempting to have equalized by a proportionate reduction on freight rates from Colorado. If this can be secured by a proper representation to the railroad companies of the mutual benefits that will result from a concession on their part, Leadville and the State will be enabled to hold out until better prices are again to be obtained; otherwise, the stability of the lead mining districts is doubtful. The present decline in lead and the exorbitant freight rates, together with the expense of desilverizing, have reduced the value of lead on board of cars in Leadville to $28 per ton—doubtless less than it is worth at any other smelting center in the United States. This being the situation, it is plainly to be seen that Leadville and several other Colorado points have the worst of the present situation, and are fully justified in calling on the railroads and demanding the relief that is necessary to place them on an equal footing with other sections in the important matter of freight rates on bullion.

LIQUID FOR DETERMINING THE SPECIFIC GRAVITY OF MINERALS.—Nearly all natural minerals are heavier than water, and therefore sink in it. But when they are placed in a heavy liquid which does not dissolve them, some sink and others float. If two minerals of unlike gravity occur in the same rock, they can be separated by pulverizing the rock and putting them in a liquid intermediate in weight between both. A new liquid for this purpose has been devised by C. Rohrback, having a density of 3·57. According to his paper in *Wiedermann's Annalen*, it is an iodide of barium and mercury, and is prepared as follows: 100 parts of iodide of barium and about 130 parts of red iodide of mercury are mixed with about 20 c. c. of distilled water, shaken and heated on an oil-bath to 150 or 200 degrees C. until dissolved, and then concentrated until it will float a crystal of topaz. After standing several days, the clear liquid is decanted and filtered. It has a yellow color, boils at 145 degrees C., and refracts light strongly. It can be used for separating axinite, epidote, heavy mica, some garnets, and nearly all hornblendes; also olivine, orthite, nearly all members of the pyroxene group, saussurite, titanite, topaz, heavy tourmaline, vesuvianite, and basaltic rocks. In diluting it to obtain any special density, it is mixed with a dilute solution of the same, so as to avoid precipitation. After the separation, the powdered minerals are washed with a few drops of iodide of potassium.

FURNACE, MILL, AND FACTORY.

The Babcock & Wilcox Company reports the following sales during the four weeks ended November 24th. The figures given are horse-power: New York Steam Company, New York, 1250; Ponemah Mills, Taftville, Conn., 200; Maitland, Phelps & Co., New York (for export), 104; Arbuckle & Co., Brooklyn, N. Y., 208; Nathan R. Yewdall, Philadelphia, Pa., 104; McCracken, Stark & Co., Philadelphia, Pa., 35; Dager & Cox, Bridgeport, Pa., 104; Edison Electric Illuminating Company, Tiffin, O., 92; Edison Electric Illuminating Company, Mount Carmel, Pa., 51; Edison Electric Illuminating Company, Newburg, N. Y., 146; Edison Electric Illuminating Company, Hazleton, Pa., 92; Edison Electric Illuminating Company, Bellefonte, Pa., 82; William Lea & Sons, Wilmington, Del., 125; McCullough Iron Company, Northeast, Md., 104; W. W. Taylor, Havre de Grace, Md., 20; Westinghouse Air-Brake Company, Pittsburg, Pa., 92; Lucy Furnaces, Pittsburg, Pa., 832; Pittsburg Steel Casting Company, Pittsburg, Pa., 416; Black & Germer, Erie, Pa., 92. Total, 4149. The New York Steam Company, which is at the head of the above list, has now ordered 8999 horse-power of these boilers. The various Edison companies, including those in the United States, London, Paris, and Milan (Italy), have ordered 3356 horse-power. The business of the New York Steam Company is to convert the heating power of coal into steam, and distribute the same to its customers. The business of the electric illuminating companies is to first convert the heating power of coal into steam, and then use the mechanical energy of this steam to make light. With both of these businesses, the largest item in their whole expenditure is the cost of fuel. It is therefore very necessary for them to select the boiler which will economize fuel to the utmost extent.

The ground is staked off for the erection of the mill of the new Charter Iron and Steel Company, Limited, at Mansfield, Pa., and building will soon be commenced.

It is stated that the Pennsylvania Steel Company, at Steelton, will shut down its entire works early next year, on account of lack of orders. This stoppage, if it takes place, will be the first that has occurred in the history of the company.

William Tod & Co., of Youngstown, O., recently furnished the West Newton, Pa., mines with a hoisting-engine and drums, and are now preparing a set of double reversible hoisting-engines with 6 foot 6 inch drums, which will be the second outfit of this character furnished the Port Royal Coal and Coke Company, at Port Royal, Pa.

Hall's Automatic Feed-Gas Fuel Company has recently been organized in Chicago with H. V. Bemis as President and Treasurer; T. J. Wheeler, Vice-President; George Dickinson, Secretary; J. J. Hall (the inventor), Superintendent; and A. K. Tappan, Assistant-Superintendent. This company will manufacture Hall's improved automatic-feed furnace.

The articles of incorporation of the Volta Iron Company, Limited, have been filed for record in the recorder's office in Pittsburg. The object of the company is to deal in iron, its products, galvanized iron, and to galvanize iron. The capital stock is $300,000, and is held as follows: Philip H. Laufman, $52,500; Sarah B. McElroy, $52,500; Joseph M. Bigham, $48,333.33⅓; John Evans, $48,333.33⅓; J. J. Vandegrift, Jr., $24,166.66⅔; W. Batchelor, $24,166.66⅔; Herman C. Mechling, $50,000. The stock is divided into 3000 shares, and is valued at $100 per share. The Apollo Iron-Works has been consolidated with this enterprise.

The Omaha Water-Works Company has lately ordered of the Knowles Steam-Pump Works, of New York, a pumping-engine of five million gallons daily capacity. This pumping-engine will be of the compound condensing duplex design of Knowles's improved construction, and will take the place of some pumping-engines that have not proved powerful enough for the very exacting duty required in these water-works. The pressure which this new engine will have to work against will be equal to a head of nearly four hundred feet elevation.

No. 5 furnace of the Pennsylvania Steel Company, at Steelton, Pa., was recently damaged by fire.

Manager Watson, of the Cleveland Rolling-Mill Company's Central Furnace, has designed and put in operation an ingenious buggy, which will dump its load upon the bell much more effectively than does the old style. It is built on an angle of about 30 degrees, and empties by the swinging outward of the entire side.

The Cuyahoga Forge and Iron Company, Cuyahoga Falls, is placing in its works a new 20-inch train for the manufacture of Ostrander's patent mandrel rolled hollow bar, in either round, hexagon, or square shape. This hollow bar iron is used principally for the manufacture of sleeve-nuts for bridge and car purposes. Its present eight-inch train will be used as heretofore for the manufacture of its patent hollow stay-bolt bar.

The Cummer Engine Company has just completed an extension to its works which will increase the capacity of its machine-shop about twenty-five per cent.

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Among some of the more recent orders of this company are the following: A pair of 16 by 30 engines for the Underground Electric Light Company, Philadelphia, Pa.; a 14 by 30 for the Wellington Milling Company, Wellington, Ohio; a 14 by 30 for Ballard & Ballard, Louisville, Ky.; a 14 by 30 for J. E. Hart, Jacksonville, Fla.; a 10 by 20 for Mr. Caleb Loud, paper manufacturer, Loudville, Mass.; an 18 by 36 for the Cypress Lumber Company, Appalachicola, Fla.; a 10 by 20 for E. M. McGillin & Co., a 10 by 20 for George Worthington & Co., and a 14 by 24 for Taylor & Boggis, Cleveland, Ohio; a 15 by 24 for the St. Louis Basket Company, St. Louis, Mo.; a 13 by 24 for Brose & Arnold, Evansville, Ind.; and a 20 by 42 for the Stearns Lumber Company, Neponset, Mass. This company deserves to be congratulated upon its success at the exhibitions this fall. Not only has it obtained the gold medal and the $100 special award for the best automatic engine at the Cincinnati Exhibition, but it has again been distinguished at Louisville by receiving the gold medal, which was the highest award offered by that exhibition.

The Lechner Manufacturing Company, Columbus, Ohio, has received orders for roller chain for driving purposes, from P. Andrews & Co., Cincinnati. The company has also furnished Jarvis Barnes & Co., Lansing, Mich., with one chain conveyor; the Columbus Elevator Company, with three elevators; and A. Bonnat & Son, Louisville, O., with two elevators.

Before Vice-Chancellor Van Fleet, at Newark, John H. Emery, counsel for Park Brothers & Co., of Pittsburg, lately appeared in behalf of an application for a decree to compel the Grant Locomotive Company, of Paterson, to render an accounting. When, some years ago, the Grant Company became embarrassed, in order to prevent its works from going into the hands of a receiver, it gave to Park Brothers & Co. and other creditors certain amounts of stock, agreeing to divide with these creditors the net profits of the company in liquidation of the debts, the stock to be surrendered when such indebtedness became canceled. Park Brothers & Co. assert that about $50,000 has been made by the company since this agreement, and that none of the net profits have been made over to them. Ex-Chancellor Williamson contended for the company that the apparent profits were not real, but appeared only as a matter of bookkeeping. The company, however, agreed to render the accounting, and the matter was postponed one week.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

CALIFORNIA.

SACRAMENTO DISTRICT.

T. E. Sterrett *et al.*, Sterrett quartz mine.

COLORADO.

CENTRAL CITY DISTRICT.

Franklin Strauser, Oscar Wilde and Zulu lodes. John L. Hopper *et al.*, Gold Dust lode and mill-site. John S. Meade, Kitty Clyde lode. Matthew Boellert *et al.*, Ouray lode. Samuel Heilner, White Pine lode. American Consolidated Gold and Silver Mining Company, Mexican lode. Ralph Salmon *et al.*, placer. Valley Mining and Milling Company, Doc Beers and Irene lodes. Joseph B. Johnson, Globe lode. Charles F. Hendrie *et al.*, Silver King lode. Oliver H. Harker *et al.*, Last Chance lode. Leadville & Pennsylvania Consolidated Mining Company, Cross lode and mill-site.

DURANGO DISTRICT.

San Miguel Gold and Silver Mining Company, Golden Crown lode.

LAKE CITY DISTRICT.

Harry Lloyd *et al.*, Iron Duke and Parole lodes. John H. Maugham *et al.*, Martha L. lode.

LEADVILLE DISTRICT.

T. P. Gere *et al.*, Little Madge lode. George H. Clegg, Little Alice lode. Charles Keissig, *et al.*, War Eagle lode. J. L. Kelly *et al.*, Bullion lode. Alburtus E. Pogue, Michigan Boy lode. H. C. Bostwick *et al.*, Pinafore lode. J. S. Doughty, trustee, Ute lode. John Thompson, Pennsylvania lode. Mary Boetnner *et al.*, Leadville No. 1 lode. James H. Neal *et al.*, Iron Mask lode. Charles Bottcher *et al.*, Bottcher No. 2 lode. James McC. Creighton, trustee, *et al.*, Truesdell lode. T. D. W. Youley *et al.*, Champion lode. Josiah J. Hochstetter *et al.*, Silver Queen lode. Small Hopes Consolidated Mining Company, Ranchero lode. Asher Helm *et al.*, Fancy lode. Wilson Smelting and Mining Company, Engle placer. E. A. Sperry *et al.*, Kangaroo lode.

PUEBLO DISTRICT.

Christian Wahl, Elzy Gray lode and mill-site. Bassick Mining Company, Triangle, Frank, and Spring lodes. John W. Bailey, Keystone and Belfast lodes.

MONTANA.

HELENA DISTRICT.

William A. Clark, Missing Link lode.

NEVADA.

CARSON CITY DISTRICT.

John Chiatorich *et al.*, George Washington lode.

EUREKA DISTRICT.

William O. Mills, Jr., Oversight lode. Michael Lyons *et al.*, Trail lode. A. P. Hegeman *et al.*, Patroon & Grand Delivery Consolidated lode.

WASHINGTON.

OLYMPIA DISTRICT.

John B. Scott, coal. Joseph H. Sinton, coal. William H. Burrage, coal Harold W. Nickerson, coal.

WYOMING.

EVANSTON DISTRICT.

Utah-Wyoming Improvement Company, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

The Florence *Enterprise* says that Messrs. White & Salsbury, of the Benson smelting-works, have bought the tailings of the Vulture mill—50,000 tons—carrying gold and lead. They will put up concentrators at the dump and ship the concentrations to their smelter at Benson. There will be sampling-works put up at Tucson soon by this firm, which is also putting in a new 50-ton galena furnace, and will also add a copper furnace soon.

COCHISE COUNTY—TOMBSTONE DISTRICT.

Work at the various mines continues as usual, and there is nothing of special interest to report. Great interest is manifested in the starting up of the powerful pumping machinery at the Contention, which, it is stated, will take place December 10th.

MARICOPA COUNTY.

NIAGARA.—A new arrastra has been put up at Cave Creek. The ore worked yields about $75 per ton. The shaft is now down some 29 feet, and a very rich pay-streak some six inches in width is exposed at that depth.

PIMA COUNTY.

The proposed smelter at Tuscon—reference to which we have made several times—will probably not be built. Mr. Aaron Mason, who was prominently connected with the scheme, has withdrawn. His action has caused a great flurry among the citizens of Tucson.

YAVAPAI COUNTY.

From Prescott comes the news that the city attorney has decided that the proposition to aid in the erection of a smelter by the city issuing bonds to the amount of $25,000, could not be legally complied with. The local press, speaking of ways of aiding the enterprise, says: Let our citizens agree to remit all taxation on plant and capital invested for a series of years, and in addition they can by subscription raise enough to purchase a good site and present it to any company which complies with the requirements.

CALIFORNIA.

INYO COUNTY.

SWANSEA.—The smelter is about completed, and was to blow in December 1st. The new furnace is one of Rankin & Brayton's best thirty-ton two-section water-jackets, with the new improvements and appliances. The new works are built about one mile east of the old Swansea works, and on the toll-road from Swansea to Cerro Gordo. The location is convenient, and elevated sufficiently to give plenty of fall for ore to the feeding or charging-floor, and also for a slag-dump. Water is furnished by the old well at Swansea, which gives a permanent and unfailing supply, and is forced up to the new works by a powerful steam-pump. The dumps at the furnace are crowded with smelting ores and rich slags from the old Swansea works. The company mines at Cerro Gordo are worked with encouraging results, and are producing ore in considerable quantities. The company is said to be financially sound, and the new works will start up without one dollar of indebtedness.

MONO COUNTY.

MAY LUNDY.—For some unknown reason, some seventy-five men were recently discharged.

BODIE DISTRICT.

BODIE CONSOLIDATED.—The recent reports show that the stopes have yielded only a fair quality of ore. It is, however, expected that better ground will be reached soon. An improvement has occurred at a point between the fifth and sixth levels, south. This portion is now opening, and in the course of two or three weeks it is believed ore will be sent from it which will grade the pulp higher again.

STANDARD CONSOLIDATED.—The usual progress is reported. The stopes throughout the mine continue to have the same good appearance.

PLUMAS COUNTY—GREENVILLE DISTRICT.

INDIAN VALLEY.—Work was stopped at the mine on account of the flow of water in the bottom of the shaft. The bottom of the shaft is now in much better ore than any before found in the mine, and the ledge is looking better than ever before. The quartz has changed from its tough, hard character higher up, and promises to be much easier worked.

SOUTHERN EUREKA.—The mill has probably started. From present appearances, a successful run is expected.

SIERRA COUNTY.

MARGUERITE.—Active work is going on at the mine in making preparation for running the hoisting-works by water-power. A wire cable capable of transmitting 300 horse-power will connect the water-wheel with the hoisting and pumping gear, the two being 1460 feet apart.

WISCONSIN EXTENSION.—In this gravel mine, softer rock has been encountered in the uprise started recently about twenty feet out from the face of the main tunnel. The Wisconsin tunnel has been run in a distance of 2200 feet, through hard rock, at a cost of $56,000. The entire work has been wholly of a prospective character.

COLORADO.

CLEAR CREEK COUNTY.

NEW YORK MINING AND MILLING COMPANY.—The mill, which is said to be one of the largest in the county, was erected to treat the ore from the Big Chief mine, a large quantity of which is now ready for milling.

GILPIN COUNTY.

FANNY.—The lessee is putting the main or discovery-shaft in working order.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY.—It is announced that all differences are settled, and that the English capitalists have paid up the arrearages and the deferred payments on the original purchase.

WHITE CROSS MINING AND MILLING COMPANY.—The Illinois Boy, the property of this company, is to be thoroughly developed. There are now over two feet of galena, which also carries 6½ per cent of copper, and a copper streak running 14 to 24 per cent; two and a half feet of clean shipping ore; and probably over five feet of concentrating ore.

LAKE COUNTY.

CATALPA.—Settlements just made for fifty tons of ore returned fifty dollars per ton. The output of the mine the past month will aggregate about $8000, and leave a profit to the company of probably $2500. Miners working the upper shaft on a lease reported having struck some ore in the eastern end of the claim, but the extent or value of the discovery is not yet known.

CARBONATE HILL.—The Yankee Doodle mine, the property of this company, is looking well and producing regularly. The earnings of the mine for the past month exceeded $5000.

CHRYSOLITE.—None of the company's dumps will be leased. The "Iron incline," driven in Chrysolite ground from the Colorado Chief shaft, has advanced to within 140 feet of the Roberts shaft. The face of the incline is in fine-looking iron ore.

COLONEL SELLERS.—This company has made a contract with the Boston & Colorado Smelting Company for five thousand tons of second-class ore, to be delivered within the next six months. A contract has also been made with the Arkansas Valley Smelting Company for four hundred tons of first-class ore a month. This, in addition to the contract of seven hundred and fifty tons a month with the Harrison works and odd lots shipped to other smelters in Leadville, Kansas City, and other points, enables the mine to make a fair showing again.

DUNKIN.—It has been decided by the new management to abandon the old working-shaft on this property, and hereafter work the mine through what is commonly known as the deep shaft. This shaft is provided with a commodious shaft-house and better hoisting machinery than at the old shaft. Some stringers of ore have been disclosed in the old mine.

HENRIETT.—The working force at this mine has been reduced.

HIGHLAND CHIEF.—The property was recently bought at trustee's sale by George Trimble for the bondholders.

IRON HILL CONSOLIDATED.—The shaft on the Imes lode owned by this company is nearly seven hundred feet in depth. A new hoist was recently put in this shaft, and work is now in progress at a depth of 435 feet, the line of contact between the limestone and porphyry. A fine streak of galena ore is reported to have been discovered.

MARIAN.—The Cyclops and other mines owned by this company, and bonded by Homer Pennock, are reported to have reverted to the company.

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MIKE & STARR.—This company is still prosecuting work actively, notwithstanding the poor success that has attended exploration-work for many months past. The working force of the mine at present numbers about eighteen men, and the property is worked at an expense of about $2500 per month. Just now, a drift is extending to the southward, cutting through an immense body of pyritiferous ore, low in silver and lead.

NEW PITTSBURG CONSOLIDATED.—Work is pushed in a number of places. The Keene shaft, which had been idle for some time, is worked again. The shaft has a depth of 308 feet. A drift is now driving south from the lower level. The sinking of the new shaft, located a short distance north of the Keene shaft, is making good headway. The shaft was begun only a short time since and has already attained a depth of 120 feet. The bottom of the shaft is in porphyry, which it is expected to pierce daily. The Pierson shaft and contiguous workings are leased and also some other portions of the mine.

OPULENT & AUSTRALIAN.—The ore-body developed in these mines on the north side of Little Ellen Hill has developed an unusual size. As shown at present, the ore-chute has a width of forty-five feet and an average thickness of nearly thirty feet. The chute has been opened and worked for several hundred feet. The mineral extracted at present nets fifteen dollars per ton, and contains from one fourth to one and one half ounces in gold to the ton.

SILVER CORD.—Another reduction in the working of this mine has taken place. The force remaining now does not exceed twenty men, constituting the contractors who are advancing the main incline, engineers, and a few surface men. The construction of the ore-bins has also been suspended, as well as other surface work.

ST. BERNARD VS. BROOKLAND.—The suit brought by stockholders of the St. Bernard Mining Company, asking for an injunction prohibiting the consolidation of the St. Bernard and Brookland companies, has been decided by Judge Goddard in favor of the defendants. The consolidation will now be perfected without delay. A meeting of the stockholders of both companies will take place in a few days, and the organization of the Adams Mining Company, embracing both properties, completed. The sinking of the Clontarf shaft to greater depth has been commenced. The shaft is now down 515 feet, and by sinking it still deeper, it is thought that it will catch some of the water now flowing into the Brookland and Wolfe Tone shafts. If the flow of water can be equally divided between the three shafts, each of which is supplied with good Cornish pumps, no further trouble will be experienced in handling it. If successful, work will immediately be commenced in the Brookland shaft, where a large body of fine ore is now exposed.

OURAY COUNTY.

PANDORA & ORIENTAL.—This company has closed its mine and mill. It has been paying out on an average from $8000 to $10,000 per month. The strike of the miners is the indirect cause.

PARK COUNTY.

GRANITE.—This company sold to the Gem Mining Company, for 125,000 shares of the latter's stock, the Orphan Boy lode, in Hall Valley District. So the Leadville *Herald* reports.

SUMMIT COUNTY.

CLINTON CONSOLIDATED.—The property purchased for $60,000 by the syndicate composed of Philadelphia capitalists, headed by J. Whitaker Wright, comprises the Florence, Clinton, Cleopatra, and Prince claims. Regarding these mines, the Red Cliff *Shaft* says: The property is in good condition and most favorably located. Each claim is well opened up and all show mineral. The main incline on the Clinton is down 750 feet, the branch incline into the Cleopatra is down 650 feet. Besides these, the Cleopatra has an incline from the surface of 125 feet, which has exposed seams of handsome carbonates. The Prince is only a fraction of a claim thirty feet in width. It contains a distinct ore-body from the others, that will prove a bonanza when more thoroughly opened up. At present, only a small force is employed. A large working force is to be put on the first of December. The property is all to be operated from the Clinton incline, and is well equipped with a good engine and hoister and a comfortable shaft-house. The sale of the Clinton claim was mentioned in our last issue.

EL CAPITAN.—Some 700 pounds of ore from the mine were shipped to Philadelphia for treatment. The owners are endeavoring to find some process by which they can treat their ore with more success than has been done yet.

HORN-SILVER.—This mine, at Red Cliff, recently purchased by Joseph Chaffee and others, has made its first shipment of ore under the new management.

DAKOTA.

Local papers report that quite a number of strangers are arriving in the Harney District for the purpose of prospecting for tin. New locations are made every day, and the most flattering indications are met on every hand.

CALEDONIA.—According to the Black Hills *Pioneer*, work has been resumed in this mine by contract with Morris Jones and Frank Workman, each of whom is engaged running a 100-foot drift. The probabilities are, that the main shaft will be sunk 100 feet, and another station established. It is also rumored that the mill will be enlarged to twice its present capacity, or to 120 stamps. The mill will not, it is thought, start up before spring.

FATHER DE SMET.—Under date of November 15th, the superintendent writes: At the mine, work is going on steadily, showing very little changes. We have stopped work on east cross-cut, third level, and begun running south on the ledge instead. The face is now in four feet, all in ore, low grade in quality. Golden Gate chamber, second level, is opening well, and looks encouraging. The report for the week ended November 21st shows: Ore extracted from first level, 1000 tons; second level, 600 tons; third level, 350 tons. Ore milled, 1950 tons. Golden Gate south header, third level, advanced 5 feet. I herewith inclose you express company's receipt for bar No. 171, containing 722·53 gold, the result of run of mill for the first half of November. At the mine, work is advancing with the usual speed, showing no important changes taking place in any of the ore-breasts. Golden Gate chamber, second level, continues to look favorable, and is very promising. South header, third level, shows an improvement in the character of the ore, which is very important, this being the deepest point on the Golden Gate ledge. The mill is in fine condition.

GUSTIN BELT.—On account of the hardness of the rock, little progress is made in running the tunnel. Some high-grade ore is exposed, and the prospects are said to be flattering.

MINERVA.—At the stockholders' meeting, held in Deadwood recently, it was decided to begin work at once removing the Bogle mill and improving the tunnel. It is believed that the mill will be in operation within sixty days.

PORTLAND.—At this mill, the stamps will all be taken out and Blake crushers substituted. The new machinery will all be in position, ready to start up some time in February.

GEORGIA.

There is nothing of importance to report. Work at all the mines in Lumpkin County progresses well, and almost all the mills are in full operation.

IDAHO.

IMPERIAL.—The parties who recently purchased this claim for $2900 have recently sold fifty tons of ore that averaged $105 per ton. The shaft has attained a depth of 150 feet. Two levels and two tunnels have been run. A vein 10 feet wide of second-class ore carrying a streak of solid galena which varies from two to 20 inches in width is exposed. This galena is all that is extracted now. Next spring, jigs will be erected at the mine. Work will be continued all winter.

NARROW GAUGE-BANNACK.—During the past three months, these mines have produced about $125,000, most of which was from the concentrates of second-class ore which had accumulated on the dump before the jigs were put in.

PHILADELPHIA MINING AND SMELTING COMPANY.—It is stated that the ores reduced at the company's works this year averaged 149 ounces, and paid to the seller an average of $102 per ton.

KENTUCKY.

Attention is now attracted by the Kentucky oil-fields. This district lies on the boundary line of Kentucky and Tennessee. There are at present two shallow wells on a tract of 20,000 acres owned by a Mr. Marshall; and each of the wells has been producing three barrels each since 1873. R. P. Crawford, the well-known operator of Pittsburg, is said to have leased 30,000 acres adjoining the Marshall tract, for a Pittsburg syndicate, and the intention is to begin drilling at once. It is also said that a syndicate, with Michael Murphy and Mr. Whetmore, of Warren, at the head, has been formed to develop the Marshall tract. All the test-wells so far drilled in this district have only been put down to the first sand; but it is now the intention to drill to the fourth sand, if such there be in the district.

MAINE.

Three companies, composed of Auburn, Bath, and Newcastle capitalists, have been operating feldspar mines in Edgecomb. The Auburn Company, which was the pioneer in the industry, has taken out upward of 1200 tons of feldspar. The Bath Company, after having taken out some 200 tons, has suspended for the winter, but will start a much larger operation in the spring. The Newcastle Company, which is the latest organization, began operations the first of the present month, and took out forty tons in one week. The industry is yet in its infancy. Other valuable lodes have been discovered, and new companies will undoubtedly be started next season. The rock is loaded on vessels at a wharf two miles distant, and is shipped to Trenton, N. J., where it is manufactured into crockery ware. It sells for $6 per ton, giving an estimated profit of $2 a ton. It should be mined much cheaper, and will be when the mines are operated on a larger scale. Valuable quartz is also taken out with the feldspar, which is sold to sand-paper manufacturers in Malden, Mass. Merchantable mica is also found in considerable quantities.

DOUGLAS.—The leaching-works are in full operation, and during the present month 130 barrels of cement copper have been obtained from ore removed from the mine since the first of November. It is estimated that from this cement there will be obtained sixteen tons of refined copper as the monthly output.

MICHIGAN.

The Marquette *Mining Journal* estimates the output of the mines of the Marquette and Menominee districts at 2,300,000 gross tons, including ore shipped by rail and hauled to local furnaces. The last cargo of the season left Marquette recently.

DEXTER.—Operations will be resumed shortly, but will be confined principally to preparatory work during the winter.

LAKE SUPERIOR SLATE COMPANY.—This company has just been organized at l'Anse. Among the incorporators are the Messrs. E. T. and R. R. Williams, E. L. Mason, and E. H. Hayes. The capitalization is $1,000,000. The company owns 640 acres of valuable slate lands, located about one mile from l'Anse, and convenient to the Marquette, Houghton & Ontonagon Railroad. It is the purpose of the company to proceed at once with the work of development.

OLD ABE.—An assessment of two per cent has been levied upon the capital stock of the company.

PENN IRON COMPANY.—At both the Norway and East Vulcan mines, the working force will be increased. A new cage shaft just begun at the Norway will be sunk to a depth of 300 feet, and supplied with a large Cornish plunger-pump, which will raise the water from all the different pits. The shaft is located in the hanging-wall, about 200 feet north of the machine-shop.

MONTANA.

GALLATIN COUNTY.

Dispatches from Bozeman state that there is great excitement throughout Western Montana over rich mineral discoveries in the Cœur d'Alène Mountains. Prospectors who have returned state that no mines have ever been discovered in the history of the Western States and territories that equal the riches and volume of the newly discovered field. The minerals consist of silver, tellurium, and free-milling gold; $100 per day being taken out of the rim rock of gulches, while in the gulches from $25 to $40 per man per day are panned out. The streams are in the northern part of Idaho, near Eagle City, forty miles from Heron, on the Northern Pacific Railroad. There are now about 500 people in camp. The above reports are no doubt greatly exaggerated.

JEFFERSON COUNTY—BOULDER DISTRICT.

From this district, considerable activity in mining operations is reported. Two of the best-looking silver-lead mines are the Emma Bell and Adolphus, which have been bonded for $60,000.

LEWIS & CLARKE COUNTY.

BOSTON & MONTANA.—Work at the Gloster mine and mill will start up December 10th. The recent improvements made, it is stated, will enable the company to save at least 90 per cent of the value of the ore. It is proposed to run the mill 180 tons per day.

MISSOULA COUNTY.

BITTER ROOT SMELTER.—The first bar of bullion has been produced. This trial smelter has been recently erected, and works satisfactorily.

SILVER BOW COUNTY—SUMMIT VALLEY DISTRICT.

The prospects of all of the leading mines of the district continue to be good and all the mills and smelters are in full operation.

HARRIS TUNNEL.—Ever since the development of the rich copper-silver leads in the Anaconda and St. Lawrence mines, operations in the Harris tunnel, on the Johnstown, Little Idahoan, and Pennsylvania claims, which join the St. Lawrence on the east, have been regarded with great interest. The three claims are each full size, 1500 by 600 feet, extending east and west, the Pennsylvania lying south of the others, the Johnstown on the north side, and the Idahoan between the two. There is also a fraction 200 feet wide and the full length of the claim lying north of the Pennsylvania, which has been added to that property by purchase. The tunnel was started on the Pennsylvania ground 500 feet from the western line and 250 feet from the southern line of the claim, and has been run into the hill, trending a point east of north, a distance of 1142 feet. The country rock the entire distance is micaceous granite, and the ground is so solid that it has not been found necessary to use a stick of timber in the tunnel. A number of small veins have been cut through, all bearing the same characteristics of quartz carrying gray sulphurets of silver, with pockets of decomposed quartz mixed with carbonates. It is stated that the owners are in negotiation with a representative of London capitalists for its sale.

NEVADA.

The Virginia City *Chronicle* says that the Northern Belle Company will appeal from the recent verdict of $860,000 damages in favor of the Holmes Company. There are two points relied upon—first, that the U. S. Circuit Court did not have jurisdiction of the case; secondly, that the ground claimed by the Holmes Company, from which the ore was purloined by the Northern Belle, was government land.

ESMERALDA COUNTY.

MOUNT CORY.—In the suit of J. M. Brazell *against* J. C. Flood, G. R. Wells,

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and others, a motion to dissolve a temporary injunction secured by the plaintiff has been granted. The action is brought to recover an eighth interest in the Mount Cory mine. The decision allows the defendants to proceed with their management of the mine without prejudice to the original action.

EUREKA COUNTY.

EUREKA TUNNEL.—Work has been resumed. This has been accomplished through an understanding with the judgment creditors.

NYE COUNTY.

BELMONT.—The company's mill is running by the leaching process entirely, which, it has been demonstrated, pays better than any other process for Belmont ores. The mine is reported to be prospecting well.

STOREY COUNTY—COMSTOCK LODE.

CALIFORNIA AND CONSOLIDATED VIRGINIA.—Senator John P. Jones has leased the upper levels from the California and Consolidated Virginia mining companies for a period of three years. He contracts to mine and mill all the ores that may be extracted from those mines above the 1550 level of the Consolidated Virginia, and to account to the company for 70 per cent in bullion of the assayed value of all such ores, and deliver to it all bullion extracted from said ore. All such bullion shall be sold at the earliest opportunity, and at going rates, and the proceeds derived from the sale shall be distributed to the payment of the Sutro Tunnel royalty, to the payment of 50 cents per ton to the company for all ore mined and milled, to expenses, to the payment of $9 per ton to Jones for milling and transporting such ores, and the balance to go to the company after the payment of all such sums. Senator Jones gives his bond for $10,000 for the faithful performance of the stipulations in the contract. This is said to be a favorable arrangement for the companies. The work in the lower levels will be prosecuted as usual.

HALE & NORCROSS.—In the north drift on the 2700, some fine ore, showing both chloride and black sulphurets and assaying high, is reported to have been found. The streak from which this assay was taken is about 15 inches in width, with a considerable width of black clay and low-grade quartz. The winze below the 2700 is now rapidly sinking. The water on the 2700 is not allowed to flow into the winze, but is caught up at the station.

OPHIR.—The old Morgan mill, formerly called Yellow Jacket, has been purchased by this company, and will run hereafter on Ophir ore from the upper levels. The price paid was $16,000. The mill is situated near Empire, on the Carson River.

NEW YORK.

RUSSELL.—The people of Ellenville are excited over this old gold mine situated at Fairtirskill. The existence of gold in the rock at that place has long been known, but the ore was not sufficiently rich to warrant reduction by any of the old processes. For some months past, however, an assayer of New York City has been experimenting with the ore. At a large public meeting, he stated that he believed the mine was the most extensive and valuable gold and silver deposit in the State. The ore seemed practically inexhaustible, and would yield by his process of reduction from $6 to $10 per ton. He thought that at a depth of fifty feet it would yield perhaps as high as $50 per ton. The assayer offered to take the mine and work it with New York capital, but Mr. Russell and the other owners prefer a home company, which will doubtless be organized at once. It is thought that the mine can be opened for work at a cost of $2000.

PENNSYLVANIA.

Mr. John Eyerman, of Easton, sends us the following notes: The corundum mine, near Shimersville, Lehigh County, has been working regularly since my last visit, an account of which was given in the JOURNAL of October 6th. About 15 shafts have been sunk, ranging in depth from 5 to 30 feet. A considerable quantity of corundum has been raised. Small quantities of menaccanite still accompany it. It is stated that five barrels were shipped to Philadelphia. An analysis by Mr. E. F. Smith gave: Al_2O_3, 85·75 per cent; SiO_2, 3·28 per cent; H_2O, 1·37 per cent; Fe_2O_3, 4·26 per cent: T_1O_2, 2·74 per cent; CaO, 1·99 per cent; MgO, trace. The specific gravity, also by the same person, was found to be 3·898. Several new shafts have been sunk about 300 yards from the old workings. On a former visit to the mines, and during the fair week at Allentown, I found all the mines idle, the men having gone to the fair.

The deposit of mica in Salisbury township, on Lehigh Mountain, has proved a failure. The lease is still held by Dr. Heller.

The brown hematite mines in Williams township, near Easton, have discontinued work, there being no demand for the ore. The Glen Iron Company's mines are still working.

A cave-in occurred a few weeks ago in an iron mine near Zionsville, Lehigh County, by which one man was killed.

As a matter of mineralogical interest, I may say that the finest specimens of botryoidal pyrite I have ever seen came from an iron mine near Shimersville, Lehigh County.

UTAH.

JUAB COUNTY.

BULLION BECK & CHAMPION.—The company is so well pleased with the progress of work that it contemplates the erection of smelting-works for the reduction of the ores. It has an iron mine within four miles of the property, which will be able to provide all the fluxing material that is required. There has been a strike of high-grade silver ore.

MILLARD COUNTY.

DESERET.—It is stated that this property is to change hands, the new owners being a wealthy firm of Detroit, Mich., and that it will pay up the old indebtedness. The E. P. H. mine should pay handsomely. The ore shipped to Chicago went 26·4 per cent copper, and after deducting $65 per ton expenses, netted about $20 per ton.

SUMMIT COUNTY.

APEX.—Thirty tons of low-grade ore were lately shipped to the Macintosh sampler. The ore went twenty ounces of silver and twenty-five per cent lead.

CRESCENT.—This mine will be worked all winter. The prospects are so favorable that the management has decided to increase the working force and to push the development of the mine.

ONTARIO.—The new developments in the west drift are very satisfactory. Three hundred men are employed, and the mine is reported to be in better condition than ever.

WISCONSIN.

Exploration for iron ore at Black River Falls will begin soon. The parties will use a diamond drill in the work. Considerable work of an exploratory nature was done by these gentlemen at the place in question during last year, and developments made that make a continuance of the work at this time warrantable.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED NOVEMBER 6TH, 1883.

287,817. Process of Manufacturing Porous Siliceous Materials to be used as Fire-bricks, Filters, etc. Adolph Frank, Charlottenburg, Prussia, Germany.
287,831. Coal Elevator and Bucket. Albert L. Hitchcock, Pawtucket, R. I.
287,840. Ore-Concentrator. Hinche P. Mabry, Fort Worth, Tex.
287,842. Process of Manufacturing Bessemer Steel. Samuel McDonald, Braddock, Pa.
287,864. Open-Hearth Steel-Melting Furnace. Charles M. Ryder, Chester, Pa.
287,866. Portable Drill. William Sandiford, Joliet, Ill.
287,876. Crushing and Grinding Machine. George J. Shimer, Freemansburg, Assignor of one half to Samuel J. Shimer, Milton, Pa.
287,905. Coke-Oven. Francois Carvès, St. Etienne, France.
287,937. Utilization of Exhaust-Steam. Moritz Honigmann, Aix-la-Chapelle, Germany.
287,945. Ore-Reducing Furnace. George A. Lawrence, New York City, and Edward J. Frost, Philadelphia, Pa.
287,981. Process of and Apparatus for Amalgamating Ores. Charles E. Tripler, New York City.
287,986. Metal-Drilling Device. Palmer C. Wright, New Haven, Conn.
287,996. Molding-Machine for Foundry Use. Frank Bardez, San Francisco, Cal.
288,0f0. Pulverizing-Machine. Ryerson D. Gates, Chicago, Ill.
288,079. Steam-Boiler Furnace. Fountain Livet, London, England.
288,176. Roll for Rolling Metal. William E. Harris, St. Louis, Mo., and Edwin B. Evans, Covington, Ky., Assignors of one fourth to Samuel Knight and George H. Knight, both of St. Louis, Mo., and Octavius Knight, Washington, D. C.

REISSUE.

10,400. Process of Roasting and Disintegrating Gold and Silver Ores. David W. Birmingham, Clifton, N. Y.

GRANTED NOVEMBER 13TH.

288,337. Brick-Machine. James Hodkinson and Franklin P. Miller, Chambersburg, Pa.
288,347. Brick-Kiln. Henry Konhorst, Henderson, Ky.
288,359. Wire-Stretching Machine. Daniel W. Norris, Elgin, Ill., and Wesley Young, Dayton, Ohio; said Norris Assignor to said Young.
288,403. Boring-Machine. Hibbard T. Bowen, Philadelphia, Pa., Assignor of one half to Philemon P. Bowles, same place.
288,416. Furnace. Thomas M. Fell, Brooklyn, N. Y.
288,418. Furnace for Steam-Boilers, etc. William C. Ford, Brooklyn, N. Y.
288,421. Nailing-Machine. Louis Goddu, Winchester, Mass., Assignor to Gordon McKay, Newport, R. I., and James W Brooks, Cambridge, Mass., Trustees.
288,422. Nailing-Machine. Louis Goddu, Winchester, Mass., Assignor to Gordon McKay, Newport, R. I., and James W. Brooks, Cambridge, Mass., Trustees.
288,423. Nailing-Machine. Louis Goddu, Winchester, Mass., Assignor to Gordon McKay, Newport, R. I., and James W. Brooks, Cambridge, Mass., Trustees.
288,424. Nailing-Machine. Louis Goddu, Winchester, Mass., Assignor to Gordon McKay, Newport, R. I., and James W. Brooks, Cambridge, Mass., Trustees.
288,425. Nailing-Machine. Louis Goddu, Winchester, Mass., Assignor to Gordon McKay, Newport, R. I., and James W. Brooks, Cambridge, Mass., Trustees.
288,435. Air-Compressing Engine. Friedrich Honigmann, Aachen, Germany.
288,436. Steam-Pump Regulator. William D. Hooker, St. Louis, Mo.
288,437. Air-Supplying Device for Steam-Boiler Furnaces. James Bowden, Glasgow, County of Lanark, Scotland.
288,445. Gas-Burner for Heating and Metallurgical Purposes. James E. Karns, Apollo, Pa.
288,466. Kiln for Burning Brick, Tiles, etc. Henry McCue, St. Louis, Mo.
288,477. Hydrocarbon-Furnace. Orland D. Orvis, Chicago, Ill.
288,484. Seal for Miners' Squibs. John R. Powell, Plymouth, Pa.
288,501. Rolling-Mill. Thomas Shaffer, Phœnixville, Pa., Assignor to the Phœnix Iron Company, same place.
288,505. Fuel-Feeding Device. George Sinclair, Leith, County of Mid-Lothian, Scotland.
288,510. Drilling-Machine. George C. Taft, Worcester, Mass.
288,520. Gold-Separator. Hiram C. Walker and William Bacon, Silver Cliff, Colo.
288,550 Ore-Separator. Joseph A Coombs, New York City, Assignor of one half to John Henderson, Baltimore, Md.
288,554. Smoke-Consuming Furnace. George W. Davisson, St. Louis, Mo.
288,574. Drier for White Lead and other Materials. George L. Irwin, Alleghany, Pa., Assignor to himself and R. L. Orr, same place.
288,575. Sheet-Metal Machine. Whitfield E. Jones, Brooklyn, N. Y.
288,607. Blast-Furnace for Burning Gaseous Fuel. Levi D. York, Portsmouth, Ohio.

GRANTED NOVEMBER 20TH.

288,622. Carburetor. Charles F. Copeland, Boston, Mass., Assignor to the Thermo Gas Carbonizer Company, of Maine.
288,632. Gas-Engine. Wilhelm Hammerschmidt, Philadelphia, Pa.
288,638. Tool for Facing Emery-Wheels. Joseph D. Huntington, Chicago, Ill.
288,649. Brick-Machine. Gaylord Martin, Milwaukee, Wis., Assignor of two thirds to Thomas C. Gurney, same place.
288,677. Wire-Rope Machine. Thomas S. Stevenson, St. Louis, Mo.
288,701. Process of and Apparatus for Making Heating and Illuminating Gas. Thomas M. Fell, Brooklyn, N. Y.
288,706. Blasting-Tool. Henry Iwan and Lewis Iwan, Streator, Ill.
288,716. Process of Manufacturing Charcoal. Jean A. Mathieu, Philadelphia, Pa.
288,724. Attrition-Mill. John J. Newsom, Oakland, Assignor of one half to James C. Plunkett, San Francisco, Cal.
288,741. Apparatus for the Manufacture of Gas. Roland H. Smith, Pittsburg, Pa.
288,745. Ore-Pulverizing Mill. William I. Tustin, San Francisco, Cal.
288,750. Roller-Mill. Abraham N. Wolf, Allentown, Pa., Assignor of one half to Winslow Wood, same place.
288,752. Gas-Machine. Joseph S. Wood, Brooklyn, N. Y.
288,760. Dumping-Car. Andrew Beckert and William E. Ludlow, Sandusky, Ohio.
288,761. Coke-Oven Door. William H. Beckwith, Latrobe, Pa.
288,813. Dumping-Wagon. Robert Hudson, Gildersome, County of York, England.
288,827. Compound Metal-Working Machine. Gilbert McDonald, Georgetown, New Mexico, Assignor to himself and James A. Lucas, same place.
288,840. Steam-Hammer. Frederick B. Miles, Philadelphia, Pa.
288,844. Middlings-Purifier. Theodore H. Neander, Wataga, Ill.
288,868. Carburetor. John H. Saunderson, Trenton, N. J.
288,874. Coke-Oven. Georges Seibel, Cransac, France.
288,877. Gas-Producer. Charles W. Siemens, Westminster, County of Middlesex, England.
278,878. Gas-Producer and Furnace Operating in Connection therewith. Charles W. Siemens, Westminster, County of Middlesex, England.
288,882. Ratchet-Drill. Albert Söderström, Stockholm, Sweden.
288,894. Brick and Tile-Machine. William W. Wallace, Frankfort, Ind.
288,895. Clay-Crusher. William W. Wallace, Frankfort, Ind.
288,936. Machine for Bending Metal. Thomas Rice Freeman, Sioux Falls, Dak., Assignor to himself and James Bradley Vandaworker, same place.
288,940. Crushing and Pulverizing Apparatus. Amos E. Griffiths, Philadelphia, Pa.
288,952. Combined Gas-Engine and Carbureting Apparatus. Henry L. Muller, Birmingham, England.
288,957, Self-Oiling Drill-Chuck. Albert Söderström, Stockholm, Sweden.

GRANTED NOVEMBER 27TH.

288,979. Compound for the Manufacture of Steel. Edward Coyle, St. Louis, Mo.
289,018. Ore Concentrator. Jonathan Miller, Concord, N. H.
289,024. Brick-Kiln. James W. Penfield, Willoughby, Ohio.
289,064. Apparatus for Extracting the Precious Metals by Means of the Lead Bath. William Walton Brown and Lewis Adelbert Gates, San Francisco, Cal.
289,085. Process of Purifying Molten Iron. William Griffith, Pittsburg, Pa., Assignor to himself and James C. Gray, same place.
289,086. Process of Purifying Molten Iron. William Griffith, Pittsburg, Pa., Assignor to himself and James C. Gray, same place.
289,087. Process of Purifying Molten Iron. William Griffith, Pittsburg, Pa., Assignor to himself and James C. Gray, same place.
289,088. Process of Purifying Molten Iron. William Griffith, Pittsburg, Pa., Assignor to himself and James C. Gray, same place.
289,089. Process of Purifying Molten Iron. William Griffith, Pittsburg, Pa., Assignor to himself and James C. Gray, same place.
289,110. Hand Drilling-Machine. Daniel E. Kempster, Boston, Mass., Assignor to George W. Smith, same place, and Benjamin F. Smith, Somerville, Mass.
289,143. Cupelling-Furnace. Bernhard Roesing, Friedrichshütte, Upper Silesia, Germany.
289,152. Ore-Concentrator. Peter A Simmons and Charles J. Henry, Leadville, Colo.
289,201. Gas-Burning Puddling-Furnace. Joseph C. Williams, Etna, Pa.
289,231. Mine-Shaft Elevator, Michael F. Coleman, New York City.
289,261. Ore-Separator. Benjamin Hershey, Erie, Pa.
289,293. Apparatus for Concentrating Sulphuric Acid, Samuel T. McDougall, Brooklyn, N. Y.
289,300. Rock-Drill. John Naylor and Robert Thornton, Stawell, Victoria.
289,343. Smoke-Consuming Furnace. Patrick W. Frain, St. Louis, Mo.
289,354. Apparatus for Feeding Fuel to Furnaces. James McMillan and William A. Robertson, Glasgow, County of Lanark, Scotland.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Dec. 7.

Business in the mining market this week was mostly confined to a few stocks, and outside of these there was but little of interest. The principal feature in the market was the weakness of Northern Belle. The sharp decline in this stock, as we stated last week, was owing to a large judgment having been rendered against the company. The production of the mine for the last half of November is said to be $25,000; and, if this is the case, the judgment obtained should not affect the price of this stock to the extent it has. Another feature of the market was the sharp decline in Iron Silver. It is said that, owing to the low price of lead, the production of this mine is not so large now as it has been recently. The dealings in Eastern Oregon and Sonora Consolidated continue to be very large, but no material change in price is recorded. The general character of the market, with but few exceptions, was weak and unsettled, and it may be said to have closed in that condition to-day. The total number of shares sold aggregates 110,538, as against 106,617 last week.

The Comstock shares were generally weak and were but moderately dealt in. California was quiet and weak, selling from 20@22@12c. Consolidated Virginia was weak under a small business, selling from 34@29@31c. Sierra Nevada was also weak; it sold from $2.65@$2.45 with small transactions. Union Consolidated was quiet and steady at $2.20@$2.55. Savage was very weak, selling from $3.50@85c. assessment unpaid; the sales amounted to 500 shares. Sutro Tunnel was quiet and steady at 16c.@15c.

The Leadville stocks were quiet at steady prices. Amie sold at 11c. under a small business. Chrysolite was moderately dealt in and was strong; it sold from $1.30@$1.40. Dunkin was steady, selling from 25@27@26c. Iron Silver was very active and was quite weak; it sold from $2.25@$1.80. An officer of this company stated that the decline in this stock was owing to the weakness of the lead market. Leadville was quiet and steady at 47@46c. Little Chief was fairly dealt in at steady prices; it sold from 54@59@58c. Little Pittsburg, under a small business, sold at 51c. Climax was quiet and steady at 7@6c.

The Bodie stocks were quiet at weak prices. Bodie was quiet and weak, selling from 90@70c. Standard was a little weak, selling from $7@$6; the latter price is ex dividend of fifty cents, under a fair business. Bulwer was very quiet at 48c.

The Tuscarora stocks sold at weak prices under a very small business. Grand Prize sold from 30@25c. Belle Isle was quiet and weak, selling from 30@20c. Independence sold from 6@4c., with small transactions. Elko Consolidated was quiet and steady, selling from 17@18c.

In the miscellaneous list, Eureka Consolidated was quiet and steady at $3.50. Father de Smet was also steady under a small business, selling from $2.50@$2.25. Gold Stripe was very quiet at 9c. Green Mountain sold at $1.20. Homestake was quite strong, under a small business, selling from $10.50@$11.50. Horn-Silver was irregular under a moderate business, selling from $7@$6.25@$6.75. Northern Belle was very weak, selling from $1.75@95c.; the stock was moderately dealt in. Robinson Consolidated was quiet and weak, selling from 32@29c. Sierra Grande was quite weak, under a small business, selling from 72@62@68c. Silver King was strong at $7.50. Castle Creek was quiet and steady, selling at $1.

Barcelona was quiet and weak, declining from 27@24c. Bradshaw sold at 16@15c. under a small business. Central Arizona was quiet and steady, selling from 24@22c. Decatur records but one transaction at 4c. Eastern Oregon was very active at steady prices; it sold from 44@46@45c. Harlem was strong, with a fair business, selling from $1.05@$1.15. Lacrosse sold at 8c., and was quiet. Sonora Consolidated was very active at steady prices; it sold from 27@25c.

A special meeting of the stockholders of the Hibernia Silver Mining Company was held at No. 46 Exchange place, this city, on Saturday last, to vote upon the question as to whether the recent contributions, made for the purpose of recovering the property, should be returned or not. There seemed to be but one opinion expressed at the meeting, and that was against returning the contributions, the sense of the meeting being that, on the contrary, it would be better to continue to push suit against the parties now holding the property. The president stated that the present board of directors had done every thing they possibly could to benefit the company and recover the property, but that, owing to the unfortunate state of affairs, caused greatly by their inefficient counsel at Leadville, up to the time of the meeting, had succeeded in making very little progress toward the recovery of the property. The contribution of the stockholders was safe, however, and the interest on it had, by economical management, defrayed all expenses.

The general feeling among those present was, that it was best to continue the fight, and a stockholders' committee of three was appointed to draw up a circular giving a statement of the condition of affairs, and soliciting the individual expression of the stockholders.

DIVIDENDS.

The Leadville Consolidated Mining Company, of Colorado, has declared a dividend (No. 9) of $20,000, payable December 20th.

The Mount Diablo Mining and Milling Company, of Nevada, has declared a dividend (No. 4) of twenty-five cents per share, payable November 26th.

The Plymouth Consolidated Gold Mining Company, of California, has declared a dividend (No. 7) of $50,000, payable immediately.

The Standard Consolidated Mining Company, of California, has declared its usual monthly dividend of twenty-five cents per share, also an extra dividend of twenty-five cents per share, both payable December 12th, at the Farmers' Loan and Trust Company.

DIVIDENDS PAID FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of November.	Since January 1, 1883.
Amie Consolidated, S.	Colo.		$25,000
Atlantic, C.	Mich.		80,000
Bassick, S.	Colo.	$100,000	300,000
Black Bear, G.	Cal.		6,000
Boston & Montana, G.	Mont.		10,000
Bulwer Consolidated, G.	Cal.		35,000
California, G.	Colo.		65,000
Calumet & Hecla, C.	Mich.		2,000,000
Carbonate Hill, S.	Colo.		60,000
Castle Creek, G.	Idaho.		30,000
Catalpa, S.	Colo.		30,000
Central, C.	Mich.		60,000
Christy, S. L.	Utah.		6,000
Colorado United, S.	Colo.		16,750
Contention, S.	Ariz.		375,000
Con. Gold M. Co. of Ga.	Ga.	2,000	24,000
Copper Queen, C.	Ariz.		500,000
Cosmopolitan.	Utah.		50,000
Crescent, S. L.	"		150,000
Deadwood-Terra, G.	Dak.		20,000
Dunkin, S.	Colo.		10,000
Evening Star, S. L.	"	25,000	75,000
Father de Smet, G.	Dak.		100,000
Gem, S.	Colo.		7,500
Glen, S.	"		3,000
Granite, S.	"		3,750
Hecla, S.	Mont.	15.000	165,000
Henriett, S.	Colo.		27,000
Holyoke, G.	Idaho.	4,000	44,000
Homestake, G.	Dak.	25.000	500,000
Hope, S.	Mont.		45,216
Horn-Silver, S. L.	Utah.	200.000	1,100,000
Howell S. & M. Co., G. S. L.	Ariz.		3,750
Idaho, G.	Cal.		72,850
Indian Queen	Nev.		3,750
Indian Spring Drift.	Cal.		1,000
Iron Silver, S. L.	Colo.		300,000
Jocuistita, S.	Mexico.	50,000	200,000
Juniper, G.	Idaho.		2,000
Kentuck, S.	Nev.	3,000	24,000
Leadville Consolidated, S.	Colo.		60,000
Lexington, S.	Mont.		200,000
Little Chief, S.	Colo.		20,000
Morning Star, S. L.	"		50,000
Mount Pleasant, G.	Cal.		60,000
Mount Diablo, S.	Nev.	12,500	49,500
Navajo, G. S.	Nev.		125,000
Northern Belle, S.	"		100,000
Ontario, S. L.	Utah.	75,000	225,000
Osceola Consolidated, C.	Mich.		160,000
Oxford, G.	N. S.		30,000
Plymouth Cons, G.	Cal.	50,000	300,000
Prussian, S. L.	Colo.		15,000
Quincy, C.	Mich.		380,000
Richmond, S. L.	Nev.		270,000
San Francisco, C.	Cal.		2,500
Shoshone, G.	Idaho.		6,000
Sierra Buttes, G.	Cal.		11,250
Sierra Grande, S.	New Mex.		500,000
Silver Cord, G. S. L.	Colo.	45,000	225,000
Silver King, S.	Ariz.		150,000
Smuggler, S.	Colo.		36,000
Standard Cons., G.	Cal.	25,000	275,000
Total Wreck.	Ariz.		50,000
True Fissure, G. S. L.	Utah.		75,000
United Gregory, G.	Colo.		12,000
		$631,500	$9,857,816

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

MEETINGS.

The St. Joseph Lead Company, No. 152 Broadway, New York City. The special meeting of the stockholders of this company for the purpose of increasing the capital stock from $1,000,000 to $1,100,000, which was to have been held on December 4th, has been postponed to December 18th, at one o'clock P.M.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, New York, report as follows on the market for the past week:

Last Friday, the highest market price was $1.17⅝. Saturday, the highest was $1.17. Monday, the highest was $1.17. Tuesday, the highest was $1.16⅞. Wednesday, the highest was $1.15⅝. Thursday, the highest was $1.14½.

Thus it will be seen that each day the market lost ground, and it appeared that large holders who had greatly influenced the sharp advance from $1.10 to $1.20 had marketed a large part of their holdings, and were willing to see lower quotations, if not to help the market to a lower range of prices.

There was no adverse news from the field, and the only bear points, outside of speculative considerations, were based on the theory that the refined oil market was not in a healthy condition, and that the shipments from the oil regions were likely to grow smaller as the winter advanced.

The trade in petroleum is now so extended that it takes some time to hear from the different markets, to determine what the drift of sentiment is as to the market. There is probably, however, a general feeling that during this winter higher prices will be attained both for crude and refined.

Both of the New York Petroleum Exchanges have appointed committees to confer on the question of consolidation, and the prospect is fair that the best sentiment of both Exchanges will favor a union of the two.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
Dec.	1	$1.16⅛	$1.17	$1.16	$1.16⅝	4,138,000
	3	1.16⅛	1.17	1.16⅛	1.16⅛	3,139,000
	4	1.16¼	1.16⅞	1.15⅝	1.15⅝	2,558,000
	5	1.15¼	1.15⅝	1.13½	1.13⅝	7,894,000
	6	1.13¼	1.14⅛	1.13⅜	1.13⅞	7,480,000
	7	1.14¼	1.15¾	1.14⅛	1.15⅝	6,231,000
Total sales.						33,440,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Nov. 30.	Dec. 1.	Dec. 3.	Dec. 4.	Dec. 5.	Dec. 6
Albion	....	....	.70	....	1	1
Alpha	.90	.75	.85	.80	.95	....
Alta	....	....	....	....	....	.05
Argenta	....	....	....	....	....	....
Bechtel	....	....	....	....	....	....
Belcher	....	....	.80	.80	.90	.90
Belle Isle	....	....	....	.30	....	....
Best & Belcher	2¾	2⅝	2⅛	1⅝	2⅛	2⅛
Bodie	.90	.75	.75	.75	.75	....
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.20	....	.20	.20	.20	.20
Challar	1⅞	1¾	2¼	1⅛	1¾	1¾
Con. Virginia	.35	.35	.30	.30	.25	.30
Crown Point	.80	.80	....	.60	.75	.90
Elko Cons	....	.20	....	....	.20	....
Eureka Cons	3½	3¼	3⅛	3	3	....
Exchequer	....	....	....	....	....	....
Gould & Curry	1⅛	1	.95	.85	.95	.80
Grand Prize	.30	.30	.25	.20	.25	.25
Hale & Norcross	1⅛	1	.85	.70	.85	.85
Independence	....	....	....	....	....	....
Martin White	....	....	....	....	....	....
Mexican	2¼	2	1⅞	1¾	2	2
Mono	....	....	....	....	....	....
Mount Diablo	....	3⅛	2⅞	1⅞	2⅞	....
Navajo	3¾	3¾	....	3¾	3¾	3⅝
Northern Belle	1⅛	1⅛	1¼	....	.80	.50
North Belle Isle	....	....	....	....	....	....
Ophir	5¼	5⅛	5⅛	5⅛	5⅛	....
Overman	....	....	....	....	....	....
Potosi	75	.70	.65	.65	.70	....
Savage	30	.30	.15	.70	.75	.70
Scorpion	....	....	....	....	....	....
Sierra Nevada	2½	2⅜	2¼	2¼	2¾	2⅛
Silver King	....	....	....	....	....	....
Tip Top	....	....	....	....	....	....
Union Cons	2⅝	2⅛	2¼	2¼	2⅝	2⅛
Utah	1⅝	1½	1¼	1	1⅛	1¼
Wales Cons	....	....	....	....	....	....
Yellow Jacket	1¾	....	....	1½	1¾	1¾

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, December 6.

The market for mining stocks continues to rule extremely dull and inactive, although for Calumet & Hecla there has been a fair demand and all the stock

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offered for sale has been taken at $239@$240. There has also been a little more demand for Franklin at $11⅛@$11¼, on the report that a dividend will be declared next month. Outside of these two stocks, there have not been sales of over fifty shares all told. One share of Quincy sold at $52 ; five shares of Osceola at $18⅛ ; five shares of Pewabic at $3⅛ ; three shares of Atlantic at $9; and 35 shares of Huron at 50@62½c. All the transactions at the Board would hardly give a broker a fair day's work. How long this condition of things is to last, is a conundrum which we brokers should like to have answered. The reports from the mines generally continue favorable. The November product of the Franklin was 200 tons, against 180½ tons last year. The Huron has called for an assessment of $1 per share, for the purpose of furnishing another set of stamps. The product for November was 73 tons. The Pewabic shows a falling off to 45 tons as compared with 71 tons last year.

In silver stocks, Silver Islet sold at $3. Catalpa declined to 35c. ; Bowman Silver, to 13c. Massachusetts & New Mexico was freely offered at 3c. Dunkin 27c. bid, without sales. Sullivan, steady from 87½@92c. State street gossip says the Sullivan mine is taking out some remarkably rich ore for a Maine property. The estimated assay is $2000 per ton. How much ore there is of this grade is not stated.

3 P.M.—At the afternoon Board, Franklin sold at $12 ; Pewabic, at $3 ; Sullivan, at 90c. ; San Pedro, at 15c. ; Catalpa, at 35c.

BULLION MARKET.

NEW YORK, Friday Evening, Dec. 7.

There has been some advance abroad in rates of exchange on India, with a corresponding rise in silver, but the immediate future of the market may be regarded as uncertain.

DATE.	London. Pence.	N. Y Cents.	DATE.	London. Pence.	N. Y. Cents.
Dec. 1	50 9-16	110	Dec. 5	50¾	110⅜
3	50 9-16	110⅛	6	50 13-16	110⅜@⅛
4	*	110¼	7	50 13-16	110⅜

* 50⅝@50 11-16.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended December 7th, as compiled from various sources, amounted to $288,000, as against $214,000 reported for the previous week. The receipts from January 1st, 1883, to date are $10,818,448.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended December 1st	$338,500
Corresponding week last year	133,148
Since January 1st, 1883	13,704,718
Corresponding period last year	45,170,450

Imports.

Week ended December 1st	$261,484
Corresponding week last year	428,680
Since January 1st, 1883	19,720,565
Corresponding period last year	6,237,549

United States Assay-Office at New York.—Statement of business for the month ended November 30th, 1883 :

Deposits of gold :		
Foreign coin	$1,492,600	
Foreign bullion	1,956,700	
United States bullion	499,700	
United States bullion (re-deposits)	243,500	
Jewelers' bars	92,500	
Refined gold	130,000	$4,415,000
Deposits of silver :		
Jewelers' bars	20,000	
Foreign coin	7,500	
Foreign bullion	16,500	
United States bullion (contained in gold)	9,200	
United States bullion (re-deposits)	1,800	
United States bullion, Arizona	3,800	
Colorado	24,000	
Dakota	17,800	
Idaho	11,600	
Lake Superior	5,100	
Montana	246,000	
New Mexico	16,700	
Utah	96,000	
Refined silver	137,000	613,000
Total deposits		$5,028,000
Gold bars stamped	$3,787,238	
Silver bars stamped	469,216	$4,256,455

United States Mints.—At the mint in Philadelphia, during November, 8,129,000 pieces, valued at $1,972,410, were coined.

The Treasury Department has purchased 300,000 ounces of fine silver for the Philadelphia and New Orleans mints.

Foreign Bank Statement.—The governors of the Bank of England, at their regular weekly meeting made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £152,000 bullion, and the proportion of its reserve to its liabilities was reduced from 43 3/16 to 42¼ per cent, against 40 5/16 per cent at this date last year. The weekly statement of the Bank of France shows a gain of 4,425,000 francs gold and a loss of 1,525,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible ; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy ; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of October.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	$106,835	$885,934
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal.	10,199	199,859
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	.....	426,967
*Boston & Montana, G.	Mont.	5,216	140,323
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah.	17,744	219,459
*Chrysolite, S. L.	Colo.	16,288	327,779
*Consolidated Bobtail, G.	Colo.	7,761	62,743
*Contention, S.	Ariz.	76,752	791,389
*Crescent, G. S. L.	Utah.	40,820	266,498
*Custer, G. S.	Idaho.	.....	43,572
*Deadwood-Terra, G.	Dak.	52,922	388,582
*Derbec Blue Gravel, G. S.	Cal.	12,464	115,043
Dunkin, S. L.	Colo.	6,291	49,250
Evening Star, S. L.	Colo.	.....	47,061
*Father de Smet, G.	Dak.	29.805	300,681
*Frisco M. and S. Co., G. S. L.	Utah.	.....	$77,084
*Granite Mountain, S.	Mont.	157,573	323,523
Gunnell, S.	Colo.	.....	58,828
*Hailé, G.	S. C.	2,725	34,625
*Head Center Consolidated	Ariz.	2,093	45,340
*Head Center and Tranquillity	Ariz.	.....	89,108
*Hecla Consolidated, G. S. L.	Mont.	**	633,979
*Homestake, G.	Dak.	99,113	866,709
*Hope, S.	Mont.	.....	82,060
Horn-Silver, S. L.	Utah.	263,000	2,737,200
*Howell S. and Mg. Co. G. S. L.	Ariz.	30,588	144,877
Idaho, G.	Cal.	.....	150,642
*Independence, G. S.	Nev.	.....	32,991
*Iron Silver, S. L.	Colo.	.....	1,031,952
*Jocuistita, S.	Mex.	.....	‡258,959
*Kentuck, G. S.	Nev.	1,954	20,550
*Lexington, S.	Mont.	86,843	1,054,551
*Little Pittsburg, S. L.	Colo.	7,133	72,111
*Marguerite, G.	Cal.	.....	68,794
*Martin White, G. S.	Nev.	.....	136,317
Morning Star, S. D.	Colo.	.....	84,428
Mount Diablo	Nev.	47,108	428,250
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	33,278	539,105
*Ontario, S. L.	Utah.	211,800	1,807,178
*Oxford, G.	N. S.	3,880	54,055
*Phœnix, G.	N. C.	.....	21,009
*Pinal Consolidated, S. L.	Ariz.	.....	181,485
*Plymouth Consolidated, G.	Cal.	77,008	373,090
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	.....	203,947
*Silver Cord, G. S. L.	Colo.	.....	941,305
Silver King, S.	Ariz.	.....	367,802
*South Yuba, G.	Cal.	.....	37,272
Standard, G.	Cal.	88,397	963,619
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah.	21,761	215,552
Syndicate, G.	Cal.	.....	56,008
Tintic M. and M. Co.	Utah.	.....	34,670
*Tip Top, S.	Ariz.	.....	37,868
*Tombstone, G. S. L.	"	59,057	664,618
Wyoming Consolidated.	Cal.	.....	31,541
Yellow Jacket, S.	Nev.	.....	265,885
Total amount of shipments to date			$20,047,204

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Dec. 7.

Copper.—Under a light business, the market has remained practically stationary. A number of small lots of Lake copper have changed hands at 14⅞c., which is now the nominal quotation. Baltimore has been selling at 14½c., while certain Arizona brands bring as much as 14⅝@14¾c. The situation of the metal is statistically a favorable one, and it needs apparently nothing but a revival in the demand and an improved tone of the markets abroad to strike higher values. The advices by cable from England are not, however, encouraging, Best Selected being quoted £65 and Chili Bars £59@£59 2s 6d.

Tin.—The market has been quiet and dull, with transactions at 19@19½c. for Straits, cash. Yesterday, 275 tons arrived. The feeling is one of ease. London cables £85 12s. 6d.@£85 17s. 6d.

Lead.—On Tuesday, 400 tons of Pueblo lead were sold at 3·60c. ; and since then second hands have been flooding the market with offers at that figure, the impression being created that the holders of other brands like Aurora and Horn-Silver are available at the same figure, while in reality they are understood to be held at 3·20c. However, the future may develop, and in spite of the fact that the elements of dullness continue, and that there is no anxiety to buy whatever, large lots could not be readily obtained at 3·60c. This should be stated because the opinion appears to have gained ground that all the producers had lost faith in the future of the metal, while, in fact, a number of them show a disposition to bide better times.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day :

Our market is dull, the demand being only moderate. Sales will not foot up to more than 90 tons of Common at 3·37½c. and 130 tons of Refined at 3·40c.

Messrs. Everett & Post telegraph from Chicago :

There has been an increased demand for spot lead during the past few days. Sales during the week foot up to 1000 tons at 3·32@3·35c.

Spelter.—The situation is unchanged. We quote 4⅝@4½c. for Common Domestic. England quotes by cable £15 7s. 6d.

Antimony.—There has been no change whatever.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 7

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has published the following returns :

Eighty-four furnaces, all kinds : 36 in blast, 48 out of blast.

	Stocks. Nov. 1.	Dec. 1.
All grades.		
Anthracite	16,295	11,568
Bituminous	16,687	16,371
Charcoal	11,495	11,801
Grand total	44,477	39,740
	Production. In Oct.	In Nov.
Anthracite	9,788	10,406
bituminous	20,993	33,386
Charcoal	2,227	2,260
Total	33,008	36,052

American Pig.—The market does not reveal any activity, but, on the other hand, shows no signs of weakness, holders having numerous inquiries for small lots, maintaining prices fairly well. With the close of the year at hand, there is, of course, no buying to cover any thing but immediate wants. We continue to quote $20@$20.50 for No. 1; $18.50@$19 50 for No. 2 ; and $17@$19 for Gray Forge at tide-water. Bessemer Pig is dull at $20 nominally, while Spiegel is lower, offers not going higher than $29 for 20 per cent.

At the Exchange, the following transactions were recorded during the week : Monday, 100 tons American Pig, No. 1, March, $20.12½ ; 200 do., $20.26 ; 100 do., April, $20.37½. Wednesday, 100 tons American Pig, No. 1, April, $20.50. Thursday, 100 tons, No. 1, April, $20.25.

Scotch Pig.—The market is very dull and quiet, transactions being limited to small lots.

We quote ex ship and to arrive : Coltness, $22.50@$23 ; Langloan, $2.75@$23 ; Summerlee, $22.50; Eglinton, $20@$21 ; Glengarnock, $21.75@$22 ; Dalmellington, $20@$21.

At the Exchange, the following cable quotations were received to-day : Coltness, 54s. 9d.; Langloan, 53s. 6d.; Summerlee, 53s.; Gartsherrie, 51s. 6d.; Glengarnock, at Ardrossan, 52s. 3d.; and Eglinton, at Ardrossan, 46s. Warrants at the Exchange to-day were 44s. 5d.

Steel Rails.—Is is said, though the statement is accepted with reserve, that the late unpleasantness at Chicago which led to the sale of rails at $32.25 at mill, as reported last week, is over. It is given out that the Pennsylvania Railroad has placed orders for 50,000 tons, with the understanding that the price be governed by the market price at time of delivery. Nominally, rails are now $35 at mill, and $35.50 for small lots.

Old Rails.—A few round lots of Tees have been placed. We quote $22@$22.50.

Philadelphia. *December 7*

Pig-Iron.—It is unsafe, at this time, to indulge in predictions as to the future of the market The

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Dec. 1. H.	Dec. 1. L.	Dec. 3. H.	Dec. 3. L.	Dec. 4. H.	Dec. 4. L.	Dec. 5. H.	Dec. 5. L.	Dec. 6. H.	Dec. 6. L.	Dec. 7. H.	Dec. 7. L.	SALES.
Alice, Mon.													
Amie Con., Co.	.11												1,400
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.	.30						.20						156
Bodie Cons., Ca.	.90				.70				.70				500
Breece, Co.													
Bulwer, Ca.	.45												50
California, Ne.	.20				.22						.12		1,400
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Castle Creek	1.00		1.00		1.00								2 200
Carysolite, Co.	1.35		1.35		1.35				1.30		1.40	1.35	3,500
Cons. Va., Ne.	.34	.33	.34	.32	.31		.33				.31	.29	6,240
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.	.25				.27						.25		300
Eureka Cons., Ne.			3.50		3.50						3.50		165
Excelsior, Ca.													
Father de Smet, Dk.	2.50	2.25											200
Findley, Ga.													
Gold Stripe, Ca.									.09				100
Gould & Curry, Ne.													
Grand Prize, Ne.							.30	.25					450
Great Eastern, Dk.													
Green Mountain, Ca.									1.20				200
Hale & Norcross, Ne.													
Hall-Anderson, N. S													
Hibernia, Co.													
Homestake, Dk.					10.88	10.50			10.50				1,100
Horn-Silver, Ut.	7.00	6.63	6.50	6.25	6.75								1,200
Hukill, Co.													
Independence, Ne.					.06				.04				110
Iron Silver, Co.	2.25		2.25	2.05	2.05	2.00	2.00		2.05	1.85	1.90	1.80	17,075
La Plata, Co.													
Leadville C., Co.											.47	.46	200
Little Chief, Co.	.54		.56	.54	.58		.59	.58	.58				3,600
Little Pittsburg, Co.									.51				100
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.													
Northern Belle, Ne.	1.75	1.60	1.45	1.35	1.30	1.20	1.15	1.00	1.00	.95	1.00	.95	1,430
North Belle Isle, Ne.													
Ontario, Ut.									20.25				100
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.					6.00								100
Rising Sun, Ca.							.02						1,000
Robinson Cons., Co.			.32						.30	.29	.29		3,500
Saint Joseph's Lead.													
Savage, Ne.			3.50								.85		500
Sierra Grande, N. M.			.70				.72		.67	.62	.64	.63	1,700
Sierra Nevada, Ne.	2.65										2.45		200
Silver King, Ar.					7.50								200
Spring Valley, Ca.													
Standard, Ca.			7.00	6.75	6.38	6.25	6.13	6.00			6.13	6.00	1,825
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Dec. 1. H.	Dec. 1. L.	Dec. 3. H.	Dec. 3. L.	Dec. 4. H.	Dec. 4. L.	Dec. 5. H.	Dec. 5. L.	Dec. 6. H.	Dec. 6. L.	Dec. 7 H.	Dec. 7 L.	SALES
Albion													
Alta-Montana											.03		3,500
Barcelona, G.	.27		.27		.26		.26	.25	.24		.24		4,600
Bear Creek													
Bechtel Con., G.													
Belvidere													
Bess & Belcher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.	.16				.15								400
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., G.													
Central Ariz'na, S.	.24	.23			.24	.22							1,700
Cherokee, G.													
Chollar													
Climax, Co.			.07				.06						1,200
Cons. Imp'r'l, G. S.													
Cons. Pacific													
Crowell, G.													
Dahlonega, G.													
Decatur										.04			100
Dunderberg													
Durango, G.													
Eastern Oregon	.45	.44	.46		.46		.46		.46	.45	.46	.45	15,700
Elko Cons.			.17				.18				.18		800
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.10	1.05	1.10		1.10		1.15	1.10	1.15		1.15		4,200
Hentzme, S.													
Imperial													
Lacrosse, G.										.08		.08	600
Lucerne													
Mariposa Pref., G													
" Com., G.													
Mexican, G. S.													
Miner Boy													
Mono													
North Mexican													
North Standard, G.													
N. Horn-Silv'r, S. L.													
Ori'nt'l & Miller, S.										.06			100
Parnell													
Rappahannock, G.	.09												5,200
Red Elephant, S.	.06												500
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.26	.25	.27	.26	.27	.26	.26	.25	.26	.25	.25		17,700
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.					.03								1,000
" Nos. 2 & 3, S.													
Sutro Tunnel	.16	.15	.15				.15						1,800
Taylor Plumas													
Unadilla, S													
Union Cons., G. S.							2.40	2.2	3.10		2.55		325

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 51,113. Non-dividend shares sold, 59,425.

BOSTON MINING STOCKS.

	Nov. 30. H.	Nov. 30. L.	Dec. 1. H.	Dec. 1. L.	Dec. 3. H.	Dec. 3. L.	Dec. 4. H.	Dec. 4. L.	Dec. 5. H.	Dec. 5. L.	Dec. 6. H.	Dec. 6. L.	Sales
Allouez													
Amie													
Atlantic			9.00										3
Aztec													
Bodie Con.													
Bonanza D					1.50								50
Bowman Sli	.16	.15	.14		.14		.14	.13	.15	.14	.14	.13	13,090
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	239		240	239½	239½		239½				239½		23
Catalpa											.35		200
Co. Virginia													
Contentm't.							.04	.03	.03		.04	.03	4,000
Copper F'lls													
Crescent													
"Cual"													
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin							.28		.28				500
Elko Con													
Empire	.25		.25		.26	.25	.26	.25	.25		.26	.25	11,350
Eureka Con.													
Franklin	12 00	11.88	11.75				11.50		11.75		12.00	11.75	377
Gila County													
Hancock G.													
Harshaw													
Horn-Silver													
Huron	.50						.75	.62½					235
Independ'ce													
Indian Queen													
Mammoth	.03	.02			.02		.02						8,500
Mass. & N.M.	.03		.04				.03						5,000
Milton													
Napa													
National													
Ontario													5
Osceola	18.50												
Penn-Breck.											3.00		125
Pewabic	3.50		3.50		3.50								
Pine Tree													200
Plymouth					.13						52.00		11
Quincy													
Ridge													200
Robinson	.33						.33				.15		100
San Pedro													
S'ta Grande													125
Silver Islet			3.00										
Silver King													300
Simpson Gd													
Sonora Con			.25						.27				
South Paci													
Standard													
Sullivan	.90		.91		.90		.95	.89	.90		.91	.87½	1,884
Sutro Tun.					.16				.16		.16		1,200
Sycamore													
Twin Lead.									.05				100
Vizina													

PHILADELPHIA MINING STOCKS.

	Nov. 30. H.	Nov. 30. L.	Dec. 1. H.	Dec. 1. L.	Dec. 3. H.	Dec. 3. L.	Dec. 4 H.	Dec. 4 L.	Dec. 5. H.	Dec. 5. L.	Dec. 6. H.	Dec. 6. L.	Sales.
Amer. Cons.													
Argent	.18	.17	.16		.17	.15	.16				.17		7,800
Arizona So.													
Battle Mt.	.01												1,000
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.10				.10								2,600
Comprom'e.	.35	.25	.23	.22	.21	.20							2,900
Contention													
Con. Virg.													
Dauntless													
Del Monte													
Denver City					.16	.13	.18	.16			.17	.16	25,500
Eureka													
Girard													
Governor	.02								.02				1,500
Grand Uni'n													
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Gulch			.04	.03	.04		.04		.05	.04	.05		49,800
Iron Silver													
King Bul'on													
Ledger Con													
Little Dia'd.													
Little Maud			.03								.03		3,200
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan											.02		2,000
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina							.11						500
Penn-Breck.	.05				.05		.05						1,100
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis	.10		.11				.07		.07		.11		1,000
Rara Avis E.	.07		.07								.07		6,000
Record													
Rico Pion'r.													
Sierra Apac.	.19										.17	.15	900
Sierra Bela.	.50		.48		.48	.47	.40				.39	.38	11,300
Sierra G'nde	.82½	.80	.82½	.75	.77½	.72½	.75	.72½			.70	.67½	39,200
Sierra Nev.													
Silver Cord.	.80				.80						.80	.75	2,900
Silver King.													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.													
Tombstone							.72½				.70		700
Victor													
Yale Mt.													

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regulation cant at present is, that the holiday season is approaching, and business is, for this reason, dropping off; but such is not the case. During the past few days, some large sales of pig iron have been made, and others are likely to be made before the close of the year; but transactions depend upon the acceptance of offers now in hand, which are for irons not regarded as strictly standard. The reason for this activity, if it be possible to assign one, is, that consumers look for an improving demand after the close this month, and if they can buy on their own terms at present, they are willing to do so. The reason for the preference for inferior irons is, that the standard makes are held a little higher than consumers are prepared to go, or rather, the difference between standard and inferior is such as to induce buyers to prefer the latter; nevertheless, the market may be characterized as quiet and steady, but it is in better shape than was expected a week or ten days ago. Some makers are selling quite freely, others are not. The absence of large stocks in consumers' hands is a favorable fact which will go to help the market now and next month. Average quotations this week for No. 1 Foundry, $20@$21, a few hundred tons have sold at $21½@$22, for special makes of iron not easy to get. Makers of special brands report their furnaces pretty well sold up, and those who are not are not rushing stocks upon the market. The increase in production is not such as to make any further decline in prices probable. On the whole, there is a better feeling in the market, and the probabilities are strongly in favor of a moderate improvement in demand. After the first of the year, it is probable that consumers will find it advisable to carry larger stocks. All kinds of iron show a slight increase in production in November over October. Stocks of unsold iron are slightly less, which is another favorable point. The supply of No. 2 is still in excess of demand, and is the weakest of the three kinds. Gray Forge is selling in small lots, as manufacturers are still afraid to buy largely. Some mills will close down next week, and it is impossible to say when they will resume production. Manufacturers will be guided by the market, but there is no disposition to rush stocks off at the present low prices.

Muck Bars.—A few hundred tons were asked for this week at $33, but actual transactions were small.

Blooms.—There has been a moderate movement of Charcoal at $57, and Anthracite at $47.

Merchant Iron.—The fact that prices for bar iron have declined to the lowest possible limits, associated with the fact that several mills will suspend production from three to four weeks, has had the effect of inducing consumers to make inquiries for large lots for early delivery. There is more disposition to buy just now than last week, because of these reasons, and also because of the possibility of a rush into market by a good many large buyers soon after the 1st of January. Still, the prices taken for large orders this week show no improving tendency, some being as low as 1·80c., and very few over 2c. Between these limits, almost all business is likely to be done. Sales of 1000 tons of Skelp iron have been reported, and there are inquiries for from 1000 to 1200 tons more, which will probably be placed within a short time.

Nails.—Since the ordering of the five-weeks' suspension in all Western nail mills, there has been a growing dissatisfaction among the manufacturers, one after the other refusing to carry out the agreement, believing it to be ill advised and not to the best interest of the trade. On the 5th of this month, an animated meeting of the Western Association was held in Pittsburg, and, after much discussion, the order was revoked, it being decided that, except for the usual holiday suspension, the mills would all work as usual. Jobbing demand is rather light; very few car-load lots are selling; ordinary quotations, $2.80@$2.90, but sales have been made at less.

Plate and Tank Iron.—Nothing outside of a few small orders can be reported this week, although makers claim that large sales are probable next month. To-day's quotations are: 2·35c. for Boat Plate; 2·40@2·50c. for Tank; 3@3·25c. for Shell; 4@$4·25c. for Flange; and 5@5·25c. for Fire-Box.

Structural Iron.—A feeling of hopefulness is shown among the brokers who place most of the business for structural iron, and it is known that there are several large orders likely to be placed for bridge iron in January; but for the past week or two, business has been of trifling dimensions. Quotations are given as usual, at 2·40c. for Angles, 2·75@3c. for Tees, and 3·50c. for Beams and Channels.

Wrought Pipes and Tubes.—Quotations for to-day, 70 and 10 to 75 per cent off for Gas and Steam Pipe, and 60@62½ off for Boiler Tubes.

Sheet-Irons.—Mills are doing a small business. Thin sheets are in the best demand. Galvanized is selling at 45@55 per cent off list.

Steel Rails.—The recent heavy sales of steel rails in the West have been followed by a quietness in Eastern mills which is not likely to be disturbed until after the opening of the year. The Edgar Thomson Works are completing facilities for production which will enable them to reduce the price of rails from $2 to $3 per ton. Other mills will not permit this mill to excel them, and the same improvements will probably be introduced in all other works as soon as practicable.

Pittsburg. December 7.

In the absence of any actual improvement in the iron trade, makers and brokers are manufacturing one, which is shown in the expression of increased confidence in an early improvement in demand and prices. A few large transactions took place this week. Bessemer pig sold in 1000-ton lots at $20.50; Gray Forge iron, $17.50@$18.50, according to quality. Very little Foundry is moving at any price. Mottled iron, $16.50@$16.75. Charcoal Foundry, $23@$25 Average price for good Gray Forge Iron, $18. Some little mill iron has sold at $17@$17.50. Muck Bar is extremely dull, and makers are offering stocks at $32; but no bids are received over $31.50, and a number have been made at $31. As to manufactured iron, some makers are selling large quantities and report business active, while others report business dull and sales limited. It is impossible to give an exact account, as manufacturers give such contradictory reports. Quotations 1·80@1·90c., but sales have been made at 1·70c. and, it is said, at less. Nails are quoted at $2.50@$2.65, with sales said to have taken place at $2.40@$2.45. Wrought Pipes and Tubes, 70@75 off for pipes and 65 for tubes. Old Rails are quoted at $23 50@$24.50. Large blocks are wanted next year, and buyers name $23@$23.50. Scrap-Iron, $21@$22.50 for No. 1 Wrought. Car-Axles, $30. Cast brings $19.

COAL TRADE REVIEW.

Anthracite.

NEW YORK, Friday Evening, Dec. 7.

To-day, the announcement was made that there would be a stoppage, if necessary, of anthracite on December 13th, 14th, 15th, 20th, 21st, 22d, 24th, 25th, and 26th. This is simply recognizing the fact that there is an excess of production, without meeting the evil. It will be noticed that, even during the holiday week, the days are so chosen that there will be a maximum of production, instead of simply stopping for the entire week. We echo the sentiments of the entire trade when we say that the action taken is not at all likely to produce the effect it ostensibly aims at creating. By the close of navigation, the market was confined to tide-water points, and it is beyond all doubt that, with production going on at the rate contemplated, it will be flooded. Prices can not stand such a strain, and must weaken, so that the coal companies are needlessly imposing upon themselves the great and thankless task, for the future, of carrying them upward. As it is now, good stove coal is obtainable at $4 per ton, and, should the present unfavorable state of the weather continue, may reach a lower level. Buyers naturally show no anxiety for the future.

Coal has endeavored, in collecting the following figures, to arrive at some indications:

	Week ended Jan. 13 (Full-time).	Jan. 20 (Half-time).	Feb. 3 (Half-time).	Feb. 10 (Full-time).
Del. & Hud	84,967	41,327	61,935	76,819
Del., L. & W	84,366	64,691	62,718	97,599
Penna. Coal Co.	27,387	15,013	17,694	29,406
Lehigh Valley	126,048	55,601	81,076	130,753
C. RR. of N. J	90,878	72,945	107,660	96,206
Phila. & Reading	148,334	80,343	132,463	196,510

	Week ended Feb. 17 (Half-time).	March 3 (Half-time).	March 24 (Full-time).	March 31 (Full-time).
Del. & Hud	42,395	64,398	100,846	111,738
Del., L. & W	71,814	71,372	100,528	109,160
Penna. Coal Co.	20,301	14,337	32,413	35,549
Lehigh Valley	63,977	75,039	156,229	160,483
C. RR. of N. J	84,966	126,416	103,890	147,399
Phila. & Reading	110,117	137,211	189,222	198,914

	Week ended April 7 (Half-time).	April 14 (Half-time).	April 21 (Full-time).	April 28 (Full-time).
Del. & Hud	38,989	49,706	96,576	94,231
Del., L. & W	68,497	72,634	112,370	126,472
Penna. Coal Co.	20,122	19,377	33,489	36,461
Lehigh Valley	59,303	82,967	176,303	132,483
C. RR. of N. J	70,256	78,592	118,532	177,642
Phila. & Reading	103,646	130,445	205,588	198,848

	Week ended May 5 (Half-time).	May 12 (Half-time).	May 19 (Full-time).	May 26 (Half-time).
Del. & Hud	50,142	51,296	101,767	49,201
Del. L. & W	63,731	71,814	108,665	89,147
Penna. Coal Co.	18,134	17,587	33,015	22,375
Lehigh Valley	81,816	79,126	177,795	72,585
C. RR. of N. J	36,146	71,129	104,975	99,527
Phila. & Reading	121,740	109,681	207,966	125,276

These figures do not, so far as we are able to discover it, reveal any law that might be used in guiding the trade to appreciate the effect of three-day stoppages. The figures for the Delaware & Hudson Company show some irregularity, but on the whole reveal a percentage little higher than one half product, though some weeks show that a little pressure will apparently run up the shipments. The Delaware, Lackawanna & Western appears to do, as a rule, considerably more than its share, its three-days' work footing up pretty closely to 5 per cent of its half-time shipments. This fully accords with its anxiety to see "restriction" carried out in this particular way. The Lehigh Valley is exceedingly irregular, and the same may be said of the Central Railroad of New Jersey, both appearing to be capable of forcing shipments. The Philadelphia & Reading Company sends but little more than one half of full-week product, in times of three-day stoppage.

Bituminous.

Harbor freights are easier, and freights from shipping points lower. Business is still dull, with the possible exception of the steamer trade, which takes a little more fuel. Prices are still low and irregular.

Buffalo.

The following statement shows the ruling rates of freight on coal per ton from Buffalo to Chicago and Milwaukee during the season of 1883, at the dates specified:

1883.	Per ton.
April 20	60 cents.
May 5	50 "
" 12	50 "
" 19	75 "
" 26	75 "
June 2	75 "
" 9	75 "
" 16	75 "
" 23	75 "
" 30	60 "
July 7	50 "
" 14	50 "
" 21	50 "
" 28	50 "
Aug. 4	70 "
" 11	70 "

1883.	Per ton.
Aug. 18	70 cents.
" 25	70 "
Sept. 1	70 "
" 8	60 "
" 15	60 "
" 22	60 "
" 29	60 "
Oct. 6	60 "
" 13	80 "
" 20	125 "
" 27	125 "
Nov. 3	100 "
" 10	100 "
" 17	125 "
" 24	150 "
" 30	150 "

The movement of coal Westward by lake, monthly, this year is thus shown:

	Tons.		Tons.
In April	11,405	In Sept	180,641
May	198,976	Oct.	210,856
June	227,231	Nov	148,204
July	113,289		
August	164,836	Total	1,253,538

These figures are from the Custom-House books. The aggregate differs only slightly from the statistics kept by your correspondent.

Notice has been given by the Buffalo, New York & Philadelphia, the Lake Shore, the Nickel Plate, the Grand Trunk, the Michigan Central, and the New York, Lake Erie & Western roads, that hereafter no reduction or concession of any kind in rates or classification will be made from the published West-bound tariff from Buffalo, Black Rock, Suspension Bridge, or Salamanca, N. Y. This notice cancels all special tariffs on cement, iron, plaster, fertilizers, salt, and all other special contracts *except anthracite coal.*

Horsford's Acid Phosphate.

In Impaired Nerve Function.

DR. C. A. FERNALD, Boston, Mass., says: "I have used it in cases of impaired nerve function, with beneficial results, especially in cases where the system is affected by the toxic action of tobacco."

OFFICE OF THE PLYMOUTH CONSOLI DATED GOLD MINING CO.,
23 Nassau St., December 3d 1883

DIVIDEND NO. 7.

The Board of Trustees of this Company have this day declared the regular monthly dividend of one per cent on the capital stock—equal to fifty thousand dollars payable immediately.

W. VAN NORDEN, President.

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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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NOT a day passes but what the announcement comes from several quarters that there has been a temporary suspension at rolling-mills or steel-works. This is followed, generally, within a week or less, by the statement that work has been resumed, after an agreement on the part of the workmen to accept a reduction of wages, ranging generally from 10 to 15 per cent. No one who has during the past year had occasion to buy or sell crude or manufactured iron will be at a loss to understand the reason. The decline in values has been continuous, and in the aggregate large. Manufacturers have seen their margins of profit shrink away, in spite of advantages which close buying of raw materials have given them. They have been forced to go before their workmen with the alternative of asking concurrence in a reduction of wages or of submitting to a closing down of the works. If only from selfish motives, manufacturers are loth to take such a step. It is satisfactory to note that there is not, so far as we know, a single instance or indication of a protracted struggle. The men understand how serious the situation is, and see the necessity of bearing their part of the burden of hard times. On the other hand, this general acceptance of the inevitable, the universal scaling-down of wages, means unfortunately that there is once more room for lower prices for the product of the works. In times of excessive competition like these, a reduction in the cost is a strong temptation to lower offerings. The eagerness to secure orders will too soon induce the producer to sacrifice a part of the ground he has gained by lower wages. Looking the facts squarely in the face, the very circumstance that we hear more of a scaling-down of wages than of shutting-down of works indicates that "bed-rock" has not been reached. When the men begin to feel that they would rather not work at all than work at the wages offered them, and when their employers are indifferent as to their decision, then, in times like these, the reaction is near.

WE are pleased to notice, from a perusal of the Colorado papers, that those who are prominently identified with the great lead interests of that State have taken steps to inquire into the means of seeking relief. A meeting has been held in Denver, at which the following gentlemen were present, so that the gathering was a fairly representative one: W. H. STEVENS, Chairman of the Executive Committee of the Iron Silver Mining Company; JACOB HOUGHTON, Secretary; COLONEL PIERCE, a director; WILLIAM AHRENS, General Manager of the same company; W. L. CHURCH, Manager of the Terrible Mining Company; W. S. WARD, of the Morning and Evening Star mines; TINGLEY S. WOOD, of the Silver Cord; EDWARD EDDY, of the Omaha & Grant Smelting and Refining Company; H. I. HIGGINS, of the American Mining and Smelting Company; HENRY COOM, of the La Plata smelter; CHARLES LIMBERG, of the Arkansas Valley smelter; A. S. HUGHES, of the Denver & Rio Grande Railroad; Mr. KEELER, of the Union Pacific; Mr. CROSBY, of the Burlington & Missouri; and Pool Commissioner DANIELS.

It was decided to form an organization, to be known as the Western Mining and Smelting Association, and a committee, consisting of Messrs. W. S. WARD and CHARLES LIMBERG, was appointed to draw up a constitution and by-laws, to report at a subsequent meeting, while Messrs. T. S. WOOD, JACOB HOUGHTON, EDWARD EDDY, and HENRY COOM were appointed a committee to gather statistics.

This is a movement in the right direction, which we trust will find the general support and co-operation which it deserves. How far it will be able to apply the only remedy which we believe will meet the situation, remains to be seen. There has evidently been some talk of a restriction of production, and it is stated that even now, with the stoppage of the Silver Cord, Henriett, and St. Bernard, with the reduced shipments of the Iron Silver, and the decline in the output from mines in other parts of the State, there has been a decline in the ore production equivalent to the make of 150 tons of bullion a day. We can hardly say, however, how any particular good to the Colorado miners and smelters would result from an agreement to run at half capacity. They will be hardly credited with the generosity of standing in the breach for others, even if more than one half of the producers would agree. It would simply be offering a premium to those who would be unkind enough not to agree with them as to the necessity of the measure. The Missouri, Utah, Nevada, Idaho, and New Mexico producers would give them all the encouragement they wanted, and would go on making and selling lead, the price of which would be maintained by their humane Colorado brethren. As reported, the gentlemen gathered at Denver were unanimous in saying that the last thing they would do would be to cut down the wages of their employés, who are now earning $3 and $4 per day. This sentiment does them credit, but is it business? If they agree upon a policy of restriction, do they put any more money into their workmen's pockets? We believe that their workmen would rather work at a reduction of wages of 30 per cent full-time, than lie idle half the time at present rates. Their argument that every other means of obtaining relief should be exhausted before steps are taken to lower wages is sound. They must, as they are preparing to do, have railroad freights reduced to a reasonable figure, and only those conversant with the facts can tell whether there is much margin or not. It is unjust to assume that the freights from Leadville should be as low proportionately as those from Utah. Shippers from Salt Lake City are said to be enjoying the poor satisfaction of being temporarily able to send base bullion from there to Omaha for $5 per ton, because the Union Pacific and the Denver & Rio Grande roads happen to be on the war-path. This will not last long, and after enough money has been wasted by the railroads, the Utah smelters will be happy in the conviction that they will be made to pay for the piper.

After an adjustment of the freight rates, the Western Miners and Smelters' Association will have to take up the wages question, because we do not believe that a general reduction of the output can or will be agreed upon. There are few mines so situated that, with a plethoric treasury, they can afford to shut down rather than exhaust their resources in putting on the market ore near in value to the present selling price. They are merely taking their chances that they will get something in the future which is now worth little. Their number, though it has been increased recently by an important producer, is limited.

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CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

A Correction.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The translator of Mr. Cumenge's report on the Rio Tinto, in the JOURNAL for November 24th, quotes Mr. Cumenge's analysis of rich matte produced from rich ores as containing tin, 26·74 per cent. It should be, iron, 26·74 per cent, as may be seen by referring to the original paper, "Pièces annexés," p. xi. Mr. Cumenge's report being in every sense of the word a typical one, he would, no doubt, be pleased to have this error corrected. Truly yours, A. WARTENWEILER.

BUTTE CITY, MONT., Dec. 2.

The Theory of the Action of the Circular Saw in Cutting Cold Iron.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: On several occasions, I have had discussions as to the theory of the action of the circular saw in cutting bar iron (cold), one party maintaining that the saw did not touch the iron; the other, that the iron was cut by the friction of the saw in contact with the iron. Believing that some of your readers will be able to give a decision that will settle the question, will you be kind enough to give this letter a place in your valuable paper? Respectfully, JOHN HENRY HARDEN.

PHŒNIXVILLE, CHESTER COUNTY, PA., Dec. 11.

Sampling Doré Bars.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: It has been asserted, in a letter from London, that if silver bars be sampled from dippings or granulations taken from the black lead crucible while the metal is in a molten condition, true results can never be verified by assays. In consequence, we shall be obliged if you will insert the following three questions in an early issue of your paper, and advise us upon the answers received. Of the three following methods of sampling doré bars of bullion, from which is the most reliable assay to be obtained? 1. By chipping corners of bar? 2. By borings taken from the ends of top and bottom of bar? 3. By dippings or granulations taken from the black lead crucible in which the bar is melted after a thorough stirring, and immediately before pouring the bar?

Yours truly, WILLIAM E. WALL,
Superintendent Alice Gold and Silver Mining Company.

WALKERVILLE, MONTANA, Dec. 7.

The Schwartzkopff Safety Apparatus vs. the Evans Safety-Guard.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. Joseph M. Locke, C.E., M.E., in giving five reasons why the Evans safety-guard, described by him in your issue of December 1st, is superior to the Schwartzkopff safety apparatus, seems to have entirely overlooked that the scales may also be turned the other way. I can give five good reasons why the Evans safety-guard is by far the inferior of the two inventions:

1. Its action depends upon a number of mechanical parts which may get out of order, and are more difficult to examine than the working condition of an electric alarm.

2. The indication of "low water" is very clumsy and not delicate. A considerable portion of the "boiler-tubes" must be exposed before the alloy will liquefy, as, in this case, it is cooled by the surrounding steam, and can only fuse if heated to the temperature corresponding to "undue pressure." Mr. Locke will agree with me that to allow the water in a boiler to sink below the tubes is not good steam-engineering.

3. If the boiler is fired dry, no alarm whatever is given, and should the fireman fail to "see" that the lever of the safety-valve has moved (which may easily occur at night), he will spoil the boiler by continued firing, or have an explosion, in spite of the safety-valve being open, as soon as he pumps water into the red-hot boiler.

4. Without an electric alarm, no notice of the abnormal condition of the boiler is conveyed to the office of the superintendent.

5. The alloy, remaining in contact with another metal—no matter what that metal is—must soon deteriorate, and change its point of fusion, which can not take place in Schwartzkopff's apparatus. This is one of the most serious objections.

No wonder the Evans safety-guard met with "vindictive opposition from large numbers of steamboat engineers." That Schwartzkopff's invention is of greater merit than Mr. Locke is disposed to accord to it, is apparent from its introduction in Europe. To show that some very eminent engineers are using and recommending it, I give the names of a few establishments only which have adopted Mr. Schwartkopff's safety apparatus: The Prussian Artillery-Works, Spandau; Siemens & Halske, Berlin; Siemen Brothers & Co., Limited, London; A. Borsig, Berlin; Bochum Cast-Steel Works, Bochum; Austrian Northwestern Steamship Company, Vienna; the Hamburg Gas-Works, Hamburg; Austrian Alpine Mining Company, Vienna; the Société Industrielle, Warschau.

WASHINGTON, Dec. 13. C. A. STETEFELDT.

The Mine Engineering Profession.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Probably there is no profession, and certainly none of the engineering professions, whose special field of work is so generally poorly defined in the public mind, and so much invaded by men who bear the same relation to the mining engineer that the quacks and the shysters do to the medical and the legal profession. This fact is not as apparent in the East as in the West. Here, we find many surveyors who make a business of surveying mineral claims, and whose education and experience have not extended beyond that class of work, who not only advertise themselves as "civil engineers," but also generally claim the profession of "mining engineers." They are men whose knowledge of mining engineering consists in the ability to distinguish between the different ores common to the immediate district in which they are located, and to map a mine. Any knowledge of geology, assaying, metallurgy, mine timbering, or of any but the simplest problems of underground engineering, is utterly foreign to them. In addition to this class, the mining engineer is obliged to compete with the "practical miner mining engineer," who, while possessing none of the engineering training of the surveyor, and lacking the education necessary to the solution of geological and metallurgical questions, still has the advantage generally of sound common sense and practical experience. He, however, generally fails to take a comprehensive view, owing to his one-sided education and limited acquaintance with different mining sections. In the course of my experience in the Western mining States and territories, I have met many men of both the above types, and believe they number two to every one mining engineer who has earned by education, training, and experience the right to belong to the profession. What has been the result? The public generally accept a man at his own estimate, until they learn to the contrary. Every one calling himself a mining engineer has been employed in some capacity or other, and naturally, in two thirds of the cases, satisfactory work has not been obtained. The public loses confidence, and the profession suffers. As a fact to-day, some Western papers of prominence openly denounce the mining engineer and "expert," whom they regard as one and the same, and warn the investor to steer clear of him. The term "expert" is used most promiscuously, has become of very doubtful and not very reputable significance, and should be abandoned as applied to engineers. While every mining engineer should be an expert in mining matters, very few "experts" are mining engineers.

We have arrived at an era in the mining industry when the services of the legitimate engineer should be in demand. Mining is conducted more nearly on business principles, and is demanding more economical and skillful management than ever before. Investors and owners must see that in mining, as in railroading or manufacturing, success requires the aid of men specially trained for that work, and of practical experience in it, and that the day of the Eastern clerk as mine superintendent, the investor as his own engineer, and of all unqualified engineers has passed. The engineer should receive a reasonable fee for his services, and be consulted not only in cases of the transfer of property, but in all questions of actual mine development, such as the location of shafts and tunnels, the erection of hoisting or milling plants, etc. It is in the wrong solution of such vital questions of daily occurrence that many valuable properties have in the past few years been wrecked or burdened with an expensive system of development.

What, then, are to-day the requirements of a competent mining engineer?

1. A constitution able to stand hard work and privation; good digestion, muscular development, and eye-sight.

2. A scientific training and education, such as is now provided in the mining course in the leading mining schools of this country, namely, the Massachusetts Institute of Technology, and the Columbia College School of Mines.

3. Not less than five years' practical mining experience in the leading mining sections of this country, including work as prospector, common miner, mine foreman or shift-boss, and superintendent. This should include experience in working both bedded and fissure-vein deposits.

4. A character prominent for honesty, self-control, pluck, and perseverance.

The mining engineer who lacks any one of these four requirements is not qualified to practice his profession. I regard the mining engineering profession as becoming more and more distinct from that of metallurgical engineering, and believe they should be separated by our mining schools. Concentration, or the dressing of ores, however, is a branch belonging more particularly to the mining engineer, and a knowledge of that subject, as well as of the principal metallurgical processes, is necessary to him; but his specialty is the mine, not the reduction-works. The metallurgical treatment of mineral products is a distinct industry, and requires special training and experience, differing largely from that of the mining engineer. While the two branches of engineering are closely allied, each is a large field by itself, and either industry will be better served if men are specially trained for its requirements.

DENVER, COLO., Dec. T. E. SCHWARZ, Mining Engineer.

MONUMENT TO THE INVENTOR OF THE HOT BLAST.—A monument in memory of Mr. James Beaumont Neilson, of Queenshill, inventor of the hot blast, has been erected on Barstobrick Hill, Queenshill estate, near Kirkcudbright, by his son, Colonel W. Montgomerie Neilson. The monument is shaped after the pyramid style, and is built of large blocks of whinstone, with granite corners. Occupying a commanding position, it rises to a hight of 55 feet, and at the base is 20 feet square. On the north side is the inscription: "1883. W. M. N. Fecit." On the south side: "Neilson Hot Blast, 1828."

A NEW CARTRIDGE.—Mr. C. W. Curtis, of the firm of Curtis & Harvey, well-known English manufacturers of blasting-powder, is about to bring out a new invention. It consists of an entirely closed cartridge, in which the powder is fired from the outside. This is accomplished by means of a separate "exploder" placed on the top of the charge. This exploder differs from the ordinary fulminate detonator in two important particulars: it is charged with common gunpowder, and it is itself entirely closed. The advantages of a cartridge that has not to be opened to insert a fuse are obvious. The powder can not be brought into direct contact with fire, and none of the grains can be spilled and exposed to sparks and blows, either during transport or while in the hands of the miner. It would seem that this arrangement must give the greatest attainable degree of safety in the use of an explosive. Another advantage of a closed cartridge is, that in wet holes it remains secure against the entrance of water, since nothing is left to the miner's care. The employment of gunpowder in such cartridges in collieries must certainly conduce to the safety of the men.

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CARBON DEPOSITS IN INCANDESCENT LAMPS.

In his inaugural address to the Newcastle-on-Tyne section of the Society of Chemical Industry, speaking of Dr. Fleming's experiments with Edison lamps and the copper deposit which takes place in them (*vide* the *Electrician*, vol. xi., p. 65), Mr. Barnard S. Proctor said: "In Swan lamps, the globe contains no material but the carbon filament, platinum wire conductors, and an infinitesimal residuum of air. Dr. Fleming says that when carbon is deposited on the inside of the Edison lamp, it is in a continuous coat, but when copper is so deposited, the molecules appear to be thrown off in straight lines from the point of heated metal, so that a shadow of the carbon filament is thrown upon the opposite side of the globe, the shadow consisting of a line of clear glass upon which no copper has been deposited. In Swan lamps which I have had the opportunity of observing, I have never seen such a shadow in either the carbon or the platinum deposit. My son, Mr. Charles Proctor, who is electrical engineer at the Swan Works at Benwell, informs me that these carbon deposits which occur when a lamp is overheated occur even more in lamps with the highest *vacua* than in those less perfectly exhausted. This would rather discourage the idea of the molecules being carried by currents in the residual air, and as yet we are wanting in evidence of the molecules being thrown off in radiations and equally wanting in any indication of the carbon having been in a truly gaseous condition. As the highest temperature to which the carbon can be raised fails to give any appearance of softening, I think we must give up any idea of the bending noted in 1878 being consequent upon an incipient plasticity; and if the smoky deposit is supposed to be the result of vaporized carbon, we may also suppose that it can not be melted except under the combined action of heat and pressure. Several lamps on the table illustrate the condition of the smoky deposit. There are four in which the deposit has accompanied the formation of an arc and four in which the arc has not been formed or the current has been stopped at the moment of its formation. In none of them can any symptom be observed which would indicate such a radial projection of molecules as to throw a shadow of the filament on the opposite side of the globe. There are also two broken globes, in one of which you may notice a patch of the deposit has been burned off by the heat of a spirit-lamp, showing that the deposit is almost entirely carbon. In the other fragments, the purple-black tint shows that an arc had formed by fracture close to the platinum wire, scattering platinum upon the glass almost free from carbon, as the film is little affected by heat and almost entirely removed by *aqua regia*. These deposits have all been formed intentionally by passing through the lamps stronger currents than they were intended to carry."

THE THEORY OF THE CRUCIBLE STEEL PROCESS.

Professor Ledebur, of the Freiberg School of Mines, is rapidly acquiring a high standing as an authority on matters pertaining particularly to the metallurgy of iron. In a recent issue of *Stahl und Eisen*, he has discussed a subject which will interest American steel-makers. We therefore reproduce a good translation of his paper from *Iron*.

There is not one of the more important metallurgical processes which has been more neglected by investigators than the manufacture of crucible steel. The reasons for the neglect are various. Many manufacturers suppose that the protection afforded by the crucible to the molten metal is sufficient to render any important chemical change impossible. Many smaller works also carry on their operations quite empirically, and do not trouble themselves either about the chemical composition of the charge or that of the finished cast-steel. Large establishments, however, which base their operations upon chemical examination, for reasons unknown to me, prefer to surround their manufacture of crucible steel with a kind of secrecy, even if they open their other departments most obligingly to the inspection of visitors and to scientific investigation. Even the smallest crucible steel-works often believe themselves bound to imitate the example of their larger competitors in this respect.

As is well known, MM. Troost and Hautefeuille have shown that silicon is reduced by carbon from crucibles containing silicic acid, and conveyed to the iron. It may be considered as proved that silicon reduces the property of liquid iron of secreting gases in solidifying, and thus acts beneficially in this respect. The process discovered by MM. Troost and Hautefeuille undoubtedly facilitates the obtaining of close castings in crucible melting; but few reliable data have as yet been published as to how far external conditions—especially the composition of the crucible and the composition of the charge—act upon the reduction of silicon in the crucible. A few experiments of Böker given in Wedding's *Darstellung des schmiedbaren Eisens* have reference only to the carbon contents of steel, and consequently do not permit of reliable conclusions as to the behavior of silicon. Two analyses made in Dr. Percy's laboratory on the influence of an addition of manganese, and which are reported in the above work (page 690), gave results the correctness of which must be strongly doubted (an aluminium contents of 0·12 per cent), and which possess little value because there are no data given of the composition and the quantity of the manganese alloy added.

As the reducing agent for silicon is in any case carbon, it may be assumed at once that this reduction will be greater if crucibles are employed containing large quantities of carbon (plumbago crucibles) than if crucibles are used containing little. The following information supplied by a friend confirms this theory. Equal charges, consisting of 30 per cent of crude steel and 70 per cent of wrought-iron, were melted in three crucibles of different carbon contents. The steel from bauxite crucibles with a carbon contents of 9 per cent contained 0·144 per cent of silicon; from fire-clay crucibles with 28 per cent of carbon, 0·274 per cent of silicon; and from fire-clay crucibles with 39½ per cent of carbon, 0·392 per cent. It is self-evident that the duration of the melting process and the melting temperature must also be of influence upon the reduction of silicon.

As regards the behavior of manganese in crucible melting, it has been proved by various recent examinations of other processes that the presence of manganese in iron may be an effective means of reducing silicon if opportunity is given for the protoxide of manganese formed to become saturated with silicic acid, and there is a high temperature. If spiegeleisen is melted at a high temperature in a cupola, with a lining holding silicic acid, it absorbs silicon, while manganese is eliminated, and may be changed into gray pig-iron. If gray iron containing manganese is melted repeatedly in the cupola, it remains gray all the longer—that is to say, it loses its silicon all the more slowly—the richer it was originally in manganese. It may therefore be assumed that in melting cast-steel in the crucible it would turn out all the richer in silicon the richer the charge was in manganese. In order to practically test this theory, at my request two charges of different percentages of manganese were melted under the same conditions in a large cast-steel manufactory. One charge consisted entirely of hearth steel, containing on analysis 1·29 per cent of carbon, 0·01 per cent of silicon (probably a constituent of the cinder), 0·12 per cent of manganese, and 98·50 per cent of iron. The second charge consisted of similar hearth steel, with the addition of 2 per cent of ferro-manganese, with 4·70 per cent of carbon, 2·07 per cent of silicon, 46·54 per cent of manganese, and 46·48 per cent of iron. Thus the second charge contained altogether 1·34 per cent of carbon, 0·05 per cent of silicon, 1·01 per cent of manganese, and 97·56 per cent of iron. The crucibles used contained in both cases about 39 per cent of carbon. The ingots received and analyzed by me contained:

	C. Per cent.	Si. Per cent.	Mn. Per cent
Without the addition of ferro-manganese	1·24	0·24	0·15
With the addition of ferro-manganese	1·36	0·49	0·75

The considerably larger increase in the percentage of silicon in melting the steel richer in manganese can not be mistaken. It follows, besides, from the analysis that the greater reduction of silicon was not only effected directly by the contents of manganese, but that the close affinity of the manganese remaining in the steel itself promoted the reduction of the silicon through the carbon of the crucible. If manganese serves as a means of reduction, the process taking place is evidently expressed by the formula: $2\,Mn + SiO_2 = MnO + Si$; that is, for 1 part in weight of silicon which is reduced, $\frac{110}{28} = 3{\cdot}93$ parts in weight of manganese must be oxidized. In the case before us, 0·49 — 0·24 = 0·25 per cent of silicon more is reduced in melting manganiferous steel than in melting steel poor in manganese. If this reduction were effected simply by manganese, it would only have required 3·93×0·25 = 0·98 per cent of manganese, which must have been eliminated from the steel, and the manganese contents of the latter could consequently have amounted to only 1·01 — 0·98 = 0·03 per cent, while the percentage was in reality 0·75. It follows from this that only a very small portion of the silicon has been reduced by manganese.

As is well known, a closer affinity exists also between carbon and manganese than between carbon and iron, and the effect of this circumstance may be plainly discerned from the analysis. While in melting steel poor in manganese a slight decrease of carbon is perceptible, manganiferous steel shows a large increase of it, caused by absorption from the crucible containing it.

THE ORIGIN OF GOLD IN CERTAIN VICTORIAN QUARTZ REEFS.

Mr. William Nicholas, geological lecturer at the Melbourne University and at the Sandhurst School of Mines, has read a paper before the Royal Society in Melbourne, entitled the Origin and Growth of Gold and Quartz Reefs or Veins in the Lower Silurian Rocks of Victoria. We quote from it as follows:

"Being deeply impressed with the idea that the 'laminated' quartz reefs are, for the most part, simply transmuted slate-beds, I looked for an explanation of the presence of gold in these reefs. In connection with this subject, I need hardly say that Mr. Newbery's researches, which have been published in your Transactions and the Progress Reports of the Geological Survey of Victoria, have thrown much light, and they may be looked on as standard investigations for reference. He has obtained gold from the incrustations of steam-boilers fed with mine-water, and he said that the late Mr. Daintree found gold in mine-water. It was therefore quite evident that mine-water was also the source of the gold in quartz reefs. Mr. Newbery remarked that organic matter has long been known as an agent for precipitating gold in the metallic state from its solutions, and the conclusion I came to was, that the organic matter in the soft black carbonaceous slate, when this slate was decomposing and changing into quartz, became both the precipitant and nucleus for the extraction of gold from the mineral waters that circulated in the tracks and reefs. I think the black slate, however, contained gold originally apart altogether from the mineral waters; for it is well known that 'casing' slate is frequently very rich in gold, and that too sometimes in very little altered or firm slate rock.

"'Casing' slate is now, as a rule, sent to the batteries to be crushed with the quartz from the reefs. I communicated my ideas on the origin of quartz reefs and gold to Mr. Mica Smith, B.Sc., of Sandhurst, who very kindly offered to make gold solutions for me with which to test the value of my ideas by experiments; and the following are the results of those experiments up to date: No. 1. (Strength of solution, 1½ grains of metallic gold to 1 ounce.) Quantity of solution, 2 ounces of distilled water. In this solution, I placed a cube of galena and some soft black carbonaceous slate which I obtained from the Garibaldi mine, New Chum Reef, Sandhurst. Within twenty-four hours, gold was precipitated on the top edge of the cube of galena, and most plentifully on the black slate, and the next day I observed the whole side of the cube was covered with gold. On the black slate also, gold particles were visible, and just beneath its surface a thin layer of gold had begun to accumulate. I noticed, too, that action had apparently been to a great extent transferred from the galena to the slate. This experiment was begun on May 19th, and I may mention that it was carried out in a glass stoppered bottle from which the stopper had not been removed. Further, so as to assimilate my experiment as closely as possible to nature's conditions, I placed the bottle in the dark. On June 11th, a white spot made its appearance, through its lifting up some of the slate and gold. On the 16th, no change was visible excepting the enlargement of the white substance which swelled upward and spread outward. The body of the mass of slate also appeared to be showing a disposition to become white. This white

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substance proved to be quartz. A doubt, however, existed whether this quartz was not enveloped in the slate put in the bottle; and must be verified by other experiments before this production of quartz can be announced. No. 2. This solution was identical with that of No. 1, with the exception that I added to it 2 ounces of mine-water, thus reducing its strength by one half. In this solution, I placed two bits of hard black slate taken from the same sample of slate as that used in No. 1. This experiment was begun on May 27th. It was then placed in the dark, and I found on my next looking at it on June 3d that both pieces of slate were covered with a bright gold. On June 10th, this gold coating became of a dull brown color, but bright gold was still visible. On this date, I placed two pieces of hard sandstone in the same solution. On the 24th, the condition of the slate remained unaltered, and the sandstone had deposited on them a few tiny brown spots and what appeared to be pin points of shining gold—doubtful. I also noticed two tiny white spots on one sandstone and one on the other.

"No. 3. Having ½ drachm of the solution of gold left, I placed this quantity in a bottle with two ounces of mine-water on May 27th, and added to it a little fine black slate, I did not observe any change in the experiment until June 24th, four weeks after, when the slate which was lying on one side of the bottle was swelling upward and gold was precipitated on its surface. No. 4 solution same as No. 1, excepting by addition of mine-water. Fine black slate was placed in the bottle sufficient to cover the whole of the bottom to the depth of a quarter of an inch. In a fortnight, a flocculent white substance had formed in the solution and settled around the sides of the bottle in white flakes; the whole of the surface of the slates was covered by a brown deposit in which gold can be seen. It is also visible in the overlying brownish white flaky deposit. In cavities formed by one or two bits of slate resting against the side of the bottle, gold can be seen attached to the black slate. No. 5 solution same as No. 4. In this, I placed sufficient large and small bits of calcite (carbonate of lime) to cover, or nearly so, the bottom of the bottle, which consisted of crystals of calcite got from Victoria Reef, Sandhurst; the mine-water used in Nos. 4 and 5 came from the City of Sandhurst mine, Hustler's Reef, Sandhurst. A disposition in the bits of calcite to turn purple is manifest. The solution still retains its bright yellow color, and a light brown deposit has settled on the calcite.

"No. 6. A cube of galena was placed in this, which has turned to a black-brown color, and to its edges are attached floating dark-brown dendritic forms. Solution, colorless. No. 7. In this, were placed three pieces of arsenical pyrites, got from Hustler's Reef, Sandhurst. Decomposition set in strongly; nearly all the yellow color had left the solution, and brown shadow-like deposits had formed, the specimens were coated with gold, and a few dark dendritic forms floated attached to their angles Gold adhered to the glass near the specimens, and the shadows continued to increase in a ray or star-like form. No. 8. In this was placed finely powdered black slate, carefully examined to prevent any bits of quartz being placed in the bottle. In three days, all the gold was precipitated, and the solution was colorless.

"'However little insight this paper may give as to the origin of laminated or banded lodes in other countries, I trust I have at least produced sufficient facts to warrant me in concluding that Victorian auriferous laminated quartz reefs are simply altered auriferous carbonaceous slates or clayey sandstones, and that through this transformation some of the gold in reefs was obtained by precipitation from the pervading mineral waters. Thus quartz and gold were formed by one operation in nature."

DREDGING AT OAKLAND HARBOR, CALIFORNIA.

At the last meeting of the American Society of Civil Engineers, a paper was read by Mr. L. J. Le Conte, Mem. American Society of Civil Engineers, describing the dredging operations at Oakland Harbor, Cal. The work described was the excavation of a tidal basin, and the deposit of the excavated material on the adjoining salt marshes. The machine used was a pump-dredge with a cutting apparatus consisting of a horizontal wheel with ordinary plows upon its lower face. The rotation of this wheel makes the excavation. Over this cutter and partly surrounding it is a hood, which allows water to enter only from beneath. Over the top of this hood a 20-inch pipe leads up to the large centrifugal pump of six feet in diameter. From this, a line of wrought-iron pipe, supported partly on pontoons and partly on the marsh, extends several hundred feet upon the tract to be reclaimed. The material, after leaving the cutter, is taken up by the water, passes through the pump and through the pipe to its place of deposit, without at any time during the transportation coming to a state of rest. The engines are two 16 by 20-inch engines, used exclusively for driving the centrifugal pump, and two 12 by 12-inch engines for driving the cutting apparatus, swinging the gear, etc. The steam is supplied by two 100 horse-power boilers, generally carrying from 90 to 95 pounds of steam. The amount of material transported with the water runs at times as high as 40 per cent by volume, but experience has shown that, in the material excavated at this point, which is a blue clay mud, it is not advisable to carry more than 15 per cent, particularly in order to secure a uniform distribution at the place of deposit. The total quantity moved by one dredge in eight months was 250,000 cubic yards. The best work in one month was somewhat over 60,000 cubic yards in 230 engine hours; the average distance of transportation being 1100 feet. The greatest distance transported was during October, when 45,000 yards were deposited in 190 engine hours, through from 1600 to 2000 feet of 20-inch pipe. The average daily expense account was stated as approximately $102; but this did not include the cost of the nine or ten men on shore, employed to secure a proper disposition of the material, particularly as the fill approaches completion, nor did it include the cost of retaining-embankments where required. The result of the work was stated to be, with this one pump-dredge, an average of 30,000 cubic yards, measured in the cut at a maximum cost of 10 cents per cubic yard, and in one particular month of 23 days' work, 60,000 cubic yards were deposited on shore at a distance of from 1600 to 2000 feet from the dredge, at a cost of 5 cents per cubic yard. The complete distribution of the material at the place of deposit has been very satisfactory, the result being a cluster of cones whose slopes are very flat—not more than 1½ per cent, and frequently so slight as to appear almost level.

THE LIABILITY OF A BOILER INSPECTION COMPANY.

Before the United States Circuit Court of the Eastern District of Pennsylvania, the case of Bradley and Wife *versus* the Hartford Steam-Boiler Inspection and Insurance Company involved the question of the liability of a boiler insurance company for damages for the loss of life occasioned by the explosion of a boiler inspected by it.

Defendant is a foreign corporation authorized to grant certificates of inspection and insure steam-boilers in the State of Pennsylvania. A certified boiler exploded and killed plaintiffs' child, and they brought suit to recover the value of its life (that is, the value of the child's service to them during his minority had he lived), alleging negligence in the inspection, the certificate granting an extent of pressure the boiler could not safely sustain. Defendant undertook to inspect Gaffney & Nolan's boilers at the corner of Mascher and Collins streets, and in accordance with the city ordinance. The *American Exchange and Review* has abstracted from the charge of Judge Butler to the jury as follows:

1. Did the certificate accord to the boiler a greater capacity of resistance than it would safely bear, thus authorizing its use under a dangerous degree of pressure? And if it did, then

2. Was this the result of negligent inspection?

The burden of proof respecting both questions is on the plaintiffs. You will first inquire whether the plaintiffs have shown that the boiler would *not* safely bear the certified pressure? They called before you several mechanical engineers as experts, some of whom testified, from investigations made after the explosion, that, in their judgment, the boiler-head would not safely sustain the pressure. Some of these witnesses, as the court understood them, did not unite fully in this judgment. This, as you observe, is the opinion simply of skilled and intelligent witnesses, who had no opportunity of examining and testing the head (the only part alleged to be defective) before the explosion. On the other hand, the defendants have called before you the manufacturers of the boiler, who testify, not only that the boiler was constructed of good material, and in the best manner as respects workmanship, but also that they subjected it to the hydrostatic test, and thus actually ascertained that it would safely bear a considerably higher degree of pressure than the certificate subsequently accorded it. The defendants' agents who inspected the boiler and granted the certificate testify that they also subjected it to this test, and ascertained it to be capable of bearing the pressure accorded with safety. The engineer who was first placed in charge testifies that, for the several weeks he ran the engine, the boiler sustained this pressure with safety. Several witnesses have testified that, with a view to ascertaining what pressure such a head would bear, a short boiler, with a head precisely like this, was manufactured after the accident, and subjected to the hydrostatic test, under the supervision of the city inspector; and that it actually bore between four and five hundred pounds to the square inch. The defendants also called experts, who, from the appearance of the boiler, expressed the judgment that it would safely bear the pressure certified.

The defendants were not insurers, as respects the plaintiffs. It was their duty to inspect and test the boiler, as has been explained to you. If the want or insufficiency of resisting capacity could be discovered by such inspection, they should have discovered it, and a failure to do so, under such circumstances, would be negligence. They were not required or authorized, however, to cut or chip the iron, and thus ascertain its quality, but to examine the boiler and its workmanship carefully and intelligently, and see whatever could thus be seen, and to subject it to the prescribed hydrostatic test. If they did this, and certified according to their best judgment thus formed, they are not responsible, no matter what latent defects may have existed.

Can you say that the boiler was subject to any defect discoverable by such an inspection? The head was of cast-iron, flat, with the flange turned inward. If such heads as you find this to have been were in common use, and thus approved by manufacturers and the trade, the defendants can not be held guilty of negligence in failing to condemn it, on this account. That such heads were in common use at the time, the testimony on both sides would seem to put beyond doubt. That other heads, of a different type, might be safer, or that experts differ in judgment on this subject, is unimportant. The defendants can not be found guilty of negligence in failing to condemn a head such as was in general use, and thus proved to be reasonably safe, or at least shown to be so esteemed.

The plaintiffs, however, contend, and have endeavored to prove, that this head, aside from its kind and material, was defective in manufacture—in that the man-hole plate, as they assert, was irregular, or uneven, on its surface, so that when bolted down upon the head, to make a close joint, it would strain the metal of the head; and in some other minor respects. While two, and possibly more, of the plaintiffs' experts testify to such defects of construction, others, and probably a larger number, of the plaintiffs' witnesses, who had an equal opportunity of examining the head, testify, either that they did not find these defects, or that they attached no importance to them. On the other hand, the defendants have exhibited the man-hole plate to you, and called witnesses, who, examining it in your presence, say it does not exhibit such uneven surface, and that it can not have been altered in this respect since the accident.

To the court, the exhibition of the plate, with this testimony, seems to be a complete and conclusive answer to the plaintiffs' allegation in this regard. You will say, however, whether it is so or not. Other experts called by the defendants tell you that there were no defects in the boiler-head, such as the plaintiffs ascribe to it, nor any other that a careful and competent inspector could have discovered. The City Inspector, Mr. Overn, called by the plaintiffs as well as the defendants, tells you distinctly and emphatically that no imperfection of any description could have been discovered in it before the explosion. He further tells you that he, as inspector, would certainly have passed it, and accorded the pressure certified; that the broken parts, examined by him after the accident, showed plainly that the explosion resulted from faultiness of the iron alone, which faultiness no previous inspection could have revealed. The defendants' agents, who inspected and tested the boiler, described to you how they did it; testify that they were careful in all respects; that they could discover no defect, and that it safely bore the prescribed test. The court sees nothing to justify the suggestion that these inspectors were wanting either in experience or intelligence.

Counsel for plaintiffs presented three specific exceptions to the charge of the court. Verdict for defendant.

A SUGGESTED CURE FOR BLAST-FURNACE CHILLS.*

By Henry M. Howe, A.M., M.E., Boston, Mass.

The object of the present paper is to suggest injecting into the hearths of iron blast-furnaces, whose temperature has become unduly lowered, some form of fuel whose calorific intensity under the peculiar conditions existing there is considerably higher than that of liquid petroleum, the use of this substance for melting out chills having grievously disappointed the high hopes which were at first entertained of it.

A chill being a fall of the temperature below that needed for the complete liquefaction of the slag, which requires, according to Plattner, about 1800 degrees C., one would suppose that the chief thing to be accomplished in curing it would be to raise the temperature in the crucible of the furnace. The most obvious ways of doing this seem to be to raise the temperature of the blast, and to increase the amount of fuel in the crucible itself. Simply increasing the rate at which the blast enters the furnace, if carried beyond a certain point, should lower the temperature in the crucible. The existence of a chill shows that the fuel is arriving too slowly at the tuyeres. If air be introduced so rapidly as to be in excess of that required for the combustion of the fuel, all that excess will simply lower the temperature around the tuyeres, carrying the region of intense heat upward, and weakening its intensity by increasing its size. Up to a certain point, increasing the rate of introducing the blast will increase practically *pari passu* the rate at which the fuel reaches the tuyeres. But when mechanical obstructions, which so often accompany chills, retard the descent of the fuel, there must be a point beyond which this does not hold good, and beyond which further increments in the rate of introducing the blast will not correspondingly increase the rate of descent of the fuel.

Up to a certain point, blowing on a match, a candle, or a fire will cause it to burn more intensely; beyond that point, the more you blow, the lower will be your temperature, till finally your fire, your candle, or your match is blown out.

Apparently somewhat the same thing is liable to take place in the crucible of a chilling blast-furnace. But one would expect that any chill could be melted out if you could considerably increase the rate at which both the fuel and the blast reach the tuyeres, provided that their combustion yields heat enough to raise its own products to a temperature well above the slag melting-point. This should be the more readily effected if the rate of arrival of the blast and fuel be increased in a higher ratio than the rate of arrival of the ore and flux.

FUEL AND CONDITIONS.	TEMPERATURE REACHED BY PRODUCTS OF COMBUSTION.	
	On complete combustion to CO_2 and H_2O.	On subsequent reduction to CO and H.
Pre-heated petroleum vapor, after Dulong's law, taking calorific power of C. at 11,214.....	3,950° C.	2,511° C.
Cold liquid petroleum.....	2,845	1,561
Pre-heated petroleum vapor, assuming its calorific power to exceed that of cold petroleum by its sensible heat above 100 degrees C., plus total heat of evaporation at 100 degrees C.....	3,050	1,737
Acetylene.....	3,840	2,474
Fine anthracite blown through tuyeres.....	3,389	2,114
Incandescent anthracite reaching the tuyeres in the normal way....	3,404	2,182
Ordinary producer-gas.....	2,379	1,265

Apparently the liquid petroleum has not in general yielded a temperature far enough above the slag melting-point to produce the desired effect, and I think that a little reflection explains clearly why it has not, and suggests the use of some other forms of fuel. I believe that much at least of the disappointment has been due to the kind of fuel injected, to its high percentage of hydrogen and low calorific intensity; and that a fuel of higher calorific intensity would in many cases have accomplished what the petroleum failed to effect.

In the first place, as the petroleum is injected cold and liquid, a great amount of heat is at once consumed in heating and subsequently in gasifying it. The amount of heat thus consumed is so great that the remainder of the heat generated by the combustion of the petroleum is not sufficient to raise the products of that combustion to the slag melting-point, except in the very small region where they remain unreduced from CO_2 and H_2O to CO and H.

Just how great the total heat of evaporation of ordinary petroleum is, I can not say, but there can be no doubt that it is very considerable. Mr. Joshua Merril, an authority in such matters, informs me that, from his prolonged experience, he considers it at least as great as the total heat of evaporation of water at 100 degrees C. Assuming it at this figure, pre-heated vapor of petroleum should raise the products of its own combustion in the blast-furnace to a temperature some 176 degrees C. (307 degrees F.) higher than cold liquid petroleum would.†

This seems to be about the lowest value we can assign to the difference between the temperature produced by the combustiou of cold liquid petroleum and that produced by pre-heated petroleum vapor.

Now, although the bituminous coals have calorific powers considerably in excess of those which Dulong's law‡ would assign them, that of petroleum is much lower than this law would imply.

This may be explained as follows: Dulong's law employs the calorific power of *solid* carbon, but of *gaseous* hydrogen. Now, if we regard the bituminous coals not as strictly solids, but as merely extremely viscid liquids, like the bitumens into which they shade, the calorific power of their carbon should be greater than that of solid carbon, while that of their hydrogen should be less than that of gaseous hydrogen, the differences corresponding roughly in the first case to the latent heat of liquefaction of solid carbon, and in the second to the latent heat of gasification of liquid hydrogen. On this view, the ratio of the actual to the theoretical calorific power should increase in the case of liquid and subliquid hydrocarbonaceous fuels with the percentage of carbon they contain; and this is the case, roughly speaking, the actual caloric power being much greater than that calculated in the case of the coals, and much less in that of the petroleums.

If, as I believe, this is the true explanation of the low actual calorific power of liquid petroleum, we may conceive that gasified petroleum might have a calorific power approximating that which Dulong's law would give it, using in that law the calorific power of gaseous carbon, 11,214, instead of 8080, that of solid carbon to which this law was intended to apply. On these suppositions, the vaporized petroleum should yield in the blast-furnace a temperature nearly 100 degrees C. (1800 degrees F.) higher than cold liquid petroleum would.

This supposition is undoubtedly extreme, and it seems probable that the temperature attained with our pre-heated petroleum vapor will be somewhere between that just given and that previously assigned it, on the supposition that the total heat of evaporation of petroleum equals that of water. The temperatures corresponding with these two sets of suppositions are given in lines 1 and 3 in the accompanying table.

The preceding statements suppose that the CO_2 and H_2O produced by the combustion of the petroleum are completely reduced to H and CO within a short distance of the tuyeres. The researches of Ebelman show that this reduction took place within 17 inches of the tuyeres in a furnace in normal working. But, as in our case, the chemical composition of the two fuels (and hence of their products of combustion) is identical, the less complete is this reduction, and the more CO_2 and H_2O remain unreduced, the more will the temperature produced by pre-heated petroleum vapor exceed that produced by cold liquid petroleum.

Thus, to repeat, if the products of combustion be completely reduced to CO and H, cold liquid petroleum can not of itself produce a temperature as high as the slag melting-point, even if no heat be lost by radiation and conduction; but pre-heated gaseous petroleum can raise the products of its partial combustion higher, perhaps only to the slag melting-point, but perhaps much beyond it, according to the calorific power which we assign to it.

Now this difference between the temperatures attainable with liquid and vaporized petroleum may well enable the latter to succeed where the former fails.

It may be objected that in distilling the petroleum we may materially lower the proportion of C to H which enters the furnace, since many of the hydrocarbons which arise from its distillation are split up by heat, yielding portions of solid C, which may remain in the retort. To minimize this separation of C, the petroleum should be very rapidly distilled, and as rapidly withdrawn from the retort. To understand this objection, it must be remembered that in burning the petroleum it is only the combustion of its C to CO that creates a net gain of heat in the crucible of the furnace. The H, though burned at the tuyeres to H_2O, is immediately reduced to H by the surrounding fuel, its reduction abstracting as much heat as was produced by its combustion, so that it really adds no more heat directly to the crucible taken as a whole than so much N would.* Furthermore, by its great specific heat, more than ten times greater than that of any of the other substances in the furnace, it has a powerful effect in dragging down the temperature. It seems clear, therefore, that, for the purpose we are considering, H is a far less desirable element than C, and that *cæteris paribus*, the smaller the proportion of H to C in the fuel, the better.

But the proportion of H to C in the vapor differs greatly during different stages of the distillation, and, by diverting the vapors which pass over during the early stages when they are richest in H, and blowing into the furnace only those richest in C, we may hope to bring the average proportion of H to C in our petroleum vapor considerably below that which exists in the original petroleum. This would produce a temperature still further in excess of that attainable with cold liquid petroleum than has been already indicated, and perhaps even approximating the excessively high point reached by the products of combustion of acetylene, given in the fourth line of our table.

The same thing would be accomplished by gasifying and injecting the heavy crude oils produced in refining petroleum, which are much richer in carbon than the original petroleum is. Indeed, even if these oils were introduced cold and liquid, they would produce higher temperatures than liquid petroleum would.

The calorific powers of three of the gaseous hydrocarbons, marsh-gas, olefiant gas, and acetylene, have been actually determined. The proportion of the actual to the theoretical calorific power, calculated by Dulong's law, is by far the greatest in acetylene (the richest in carbon), and much the lowest in marsh-gas (the richest in hydrogen). Analogy would lead us to expect correspondingly high actual calorific powers in the other hydrocarbons which are rich in C.

Another consideration points in the same direction. In addition to their needing higher temperatures, it is highly probable that these hydrocarbons, rich in C, require a greater amount of heat for their distillation than those rich in H. This means that their latent heat of gasification is greater, and hence that the excess of their calorific power in the gaseous state over that in the liquid state is also greater than in the more easily volatilized compounds rich in H.

The fact that the proportion of the real to the theoretical calorific power is greater in the hydrocarbons rich in C than in those rich in H would further reinforce the already very strong probability that, with the former class of fuels, a much higher temperature will be reached than with the latter, by the products both of complete combustion to CO_2 and H_2O, and of the subsequent reduction to CO and H; and it increases the difference we may expect to find between the temperatures attainable with these two classes of hydrocarbons.

* Read at the Boston Meeting of the American Institute of Mining Engineers, February, 1883.

† The assumptions on which this and the subsequent statements concerning the temperature produced by combustion are based are given in full in an appendix. The details of the calculations are given in a second appendix.

‡ Calorific power = $8080\ C + 34{,}462\ (H - \frac{O}{8})$.

* It, however, indirectly contributes to the heat in the crucible. For every portion of H, as well as of C, thus introduced, we have a corresponding portion of combustible gas added to the gases issuing from the throat, which, by its combustion in the hot-blast stoves, adds to the heat of the blast.

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Let us take the case of acetylene, whose behavior analogy leads us to expect that that of the hydrocarbons of similar composition would resemble. Not only is it very lean in H, having only 7·69 per cent, while crude petroleum has about 15 per cent, olefiant gas 14·3 per cent, and marsh-gas 25 per cent, but it is exceedingly stable, parting with its carbon slowly and only at a high heat. Moreover, it has an exceedingly high calorific power. While crude petroleum has actually 85 per cent of the calorific power which Dulong's law would assign to it, olefiant gas 81·8 per cent, and marsh-gas 76·8 per cent (for the latter two compounds substituting the calorific power of gaseous carbon 11,214 in place of that of solid carbon 8080), acetylene has 92 per cent and 118 per cent respectively, as we assign to the calorific power of C in Dulong's law 11,214 or 8080 units.*

So great is the calorific power of this gas that it would be capable of raising the products of its complete combustion by air to 3840 degrees C.; and even after being reduced to CO and H by the incandescent fuel in the blast-furnace, they should reach a temperature of 2474 degrees C., nearly 700 degrees above the slag melting-point, and nearly 900 degrees C. (1620° F.) above that attainable with cold liquid petroleum. Acetylene is readily produced from petroleum, which, indeed, seems to be its most economical source.

But we may obtain a still lower ratio of H to C by employing another class of fuel. If finely powdered anthracite, coke, or charcoal could be introduced into the crucible in large quantities, it would raise the products of its combustion to a temperature far above that attainable with pre-heated petroleum vapor of the composition of crude petroleum, and very nearly as high as that which is developed by the combustion of the incandescent fuel which is charged at the tunnel-head and reaches the tuyeres in the normal way. What this latter temperature actually is, we do not know. If all the heat were utilized in heating the products of combustion, and if the specific heats of the substance concerned were the same as at ordinary temperature, we should look for a temperature of about 3404 degrees C. on complete combustion to CO_2, and of 2182 degrees C. on the subsequent reduction to CO, were it not for dissociation.

The experiments of Bell show that the temperature of the slag, which roughly represents the average temperature of the crucible, is far above the melting-point of wrought-iron (say 1600 degrees C.), as a bar of that metal inserted in a slag as it ran from the furnace was rapidly melted, collecting in a basin farther on.†

Cailletet found that platinum, whose melting-point is estimated at about 2600 degrees C., melted rapidly at a point about seven inches in front of the tuyeres.‡

Of the three, anthracite, charcoal, and coke, the former should yield the highest temperature on account of its high calorific power, which is probably considerably above that which Dulong's law would assign it.

One can hardly believe that the mechanical difficulties in the way of introducing large quantities of finely-divided fuel are really insuperable. If they can be overcome, I can see no reason why this expedient should not enable the iron smelter to obtain a temperature in his crucible sufficient to melt out any chill or overhanging scaffold. One consideration inclines me to believe that such an introduction of extraneous fuel should be even more efficient in melting out chills and scaffolds than a partial breaking of a scaffold itself would be. If a scaffold is partially broken away, allowing the fuel, ore, and flux to fall into the crucible, as they were presumably charged several days before, and, indeed, before the chill occurred, they will simply arrive in the proportion needed for the regular working of the furnace. (Indeed, the very fact of chilling indicates that the fuel may not have been even in sufficiently large proportions for regular working.) That is, the fuel which is precipitated into the hearth will only be in sufficient proportion to heat and melt the ore which enters the hearth with it, and, by making up for the losses by radiation, conduction, and convection, to prevent the temperature from falling. But there will be no excess of fuel to perform the extraordinary work of raising the already lowered temperature, and of heating and melting large masses of chilled and solidified matter. Our extraneous fuel, however, injected directly into the crucible, not being accompanied by any other matter which absorbs heat in being heated and melted except the blast, generates an abundance of heat which is at liberty to raise the lowered temperature around it, and to heat and melt obstructions. All the heat it generates over and above that needed for raising the products of its own combustion above the slag melting-point is directly available for overcoming the chilled condition of the furnace.

Ordinary producer-gas, if made from anthracite, coke, or charcoal, consists almost wholly of N and CO, with a small amount of CO_2. This gas, introduced into the blast-furnace, could yield no net gain of heat from chemical action: although its CO would be oxidized to CO_2, it would be immediately reduced to CO again. Hence it is not suitable for introducing into our crucible. If the gas were made from bituminous coal, it would be but little better; it would then, indeed, contain a small amount of unoxidized C combined with H, whose combustion to CO would yield some heat, but far from enough to raise to the slag melting-point the immense quantities of inert CO,H and N accompanying it.

The most beautiful way of suddenly raising the temperature of the crucible would be to increase the proportion of O in the blast. The great amount of N in the blast has a most powerful effect in dragging down the temperature, forming, as it does, the great bulk of the products of combustion. Here, as in so many other operations of metallurgy and industrial chemistry, the discovery of an economical means of producing oxygen, or of even slightly increasing the proportion of oxygen in the air, will be an incalculable boon.

To sum up: cold liquid petroleum and ordinary producer-gas, far from having heat to spare, do not generate enough heat to raise the products of their combustion and subsequent reduction to CO and H even as high as the slag melting-point. A somewhat higher temperature should be reached by injecting the crude heavy oils produced at the refineries. Pre-heated petroleum vapor, on the other hand, especially if the proportion of H it contains be materially diminished in either of the ways indicated, is not open to this objection; and finely-divided anthracite, coke, and charcoal would yield a very great excess of heat over and above this requirement.

DISCUSSION.

Mr. W. F. Mattes, Scranton, Pennsylvania: There is one point that I would like to call attention to: chills of this character are usually caused by scaffolding. The scaffold prevents a regular descent of fuel to the place in the crucible where it should do its work, and during the prevalence of the scaffold the supply of carbon in the hearth is much diminished, with the result that the proper reducing atmosphere is not maintained. Now it seems to me that the injection of vapor of petroleum into the hearth, in the manner proposed, will fail to supply the one condition that is absolutely essential, namely, an active reducing atmosphere at that point. It might answer to call upon the fuel to carburize the products of the vapor combustion, provided there is sufficient carbon before the tuyeres. But usually that carbon is lacking, and then the carburization will probably occur higher in the furnace, perhaps at the expense of the fuel at the critical point whence the mischief originated, and any good effects are likely to be merely local and not at the right place. If the obstructions at the boshes can be broken, chills in the hearth will rapidly melt away.

Mr. Howe: The notion that the introduction of carbon and hydrogen—be they gaseous, liquid, or solid—into the crucible will weaken the reducing action there, and so increase the tendency to rob the parts above of their carbon, is utterly untenable. It is an increase in the proportion of oxygen introduced, not of such powerful reducing agents as carbon and hydrogen that would weaken the reducing conditions.

Doubtless you should have a reducing atmosphere with your high temperature, but a little reflection shows that we may hope for both. As the gentleman says, if you keep your petroleum as petroleum, you get no heat from it; if you oxidize it to CO_2 and H_2O, it will not help your reducing conditions; but if you oxidize it to CO, you will increase both your heat and the strength of your reducing conditions. You will not increase the proportion of CO_2 in the crucible unless you increase your blast by an amount which is more than the equivalent of the petroleum injected.

The gentleman seems to agree with me that chill is due to the lack of fuel at the tuyeres, and he rightly says that, if the obstructions at the boshes can be broken, chills in the hearth will rapidly melt away. This is because fresh fuel will arrive there. Now I simply propose that, when you can not get fuel from above, you should force it in from below, and that you should use a fuel of high calorific intensity.

Perhaps he is confused by the idea that it is necessary to have solid carbon at the tuyeres in order to obtain an atmosphere of CO. The gaseous C and H of the petroleum also reduce CO_2 to CO. It is not necessary, as he fears, to call on the solid fuel to perform this reduction. If there should not be enough solid fuel in the hearth to accomplish this, which I consider most unlikely, then the unoxidized portions of the petroleum will reduce the CO_2 and H_2O produced by the complete combustion of the remainder. H and CO_2 can not coexist at these temperatures.

The obscurity and confusion disappear if we remember that the calorific effect and the effect on the chemical compositions of the atmosphere of the furnace caused by introducing petroleum vapor should be parallel with that of introducing incandescent fuel. Indeed, we may here regard petroleum vapor simply as a manageable form of carbon, diluted indeed with a little H, whose presence yields no net gain of heat, but serves to intensify the reducing conditions.

Mr. Mattes: With reference to reducing the products of combustion by unconsumed vapor, it may be noted, first, that as the oxygen supply is continuous with that of the petrolum gas when the latter is in excess, its combustion will yield carbonic oxide and probably steam, but not carbonic acid; and secondly, that the decomposition of the steam by unconsumed petroleum gas does not produce the same effect as if accomplished by incandescent fuel, because the gas does not carry the surplus temperature of the latter. After the reduction of the steam, we shall have a mixture of nitrogen, carbonic oxide, and free hydrogen, which is certainly a very desirable atmosphere if obtained in connection with high temperature.

When, as sometimes happens, a scaffold or a fragment slips into the hearth with plugging effect, the obstruction must be directly attacked by the most available means. Under such conditions, a powerful blow-pipe jet will be a valuable agent, regardless of the composition of the products of combustion. But this treatment should cease when the immediate object is attained; otherwise, the trouble at the boshes may be aggravated and the second stage be worse than the first. When once the obstructions are sufficiently broken to bring within reach a body of incandescent fuel, no reagent is so safe and effective as the heated blast.

I had understood Mr. Howe's proposition to be the introduction of a mere jet of petroleum vapor to be oxidized by the blast of the tuyeres. Its introduction in excess is a different matter, and, if the heat calculations are correct, removes the chemical objection, while increasing the practical difficulties of its application. One of these difficulties is, to gauge correctly the relative percentages of gas and blast; and this will not be met by rapid analyses at the top, because they can not locate the reactions.

It may be interesting to note in this connection the frequent success that has attended an introduction of steam into the hearth for the purpose of breaking a scaffold. The usual method has been to introduce the steam into the blast-pipe before entering the ovens; but in a recent and very successful case, the steam-pipe (1 inch diameter, with ¾-inch nozzle) was carried to the nose of a tuyere and opened full to a boiler close at hand, with 115 pounds pressure, for two or three hours at a time. There is reason, however, to believe that, in every case where steam has proved efficacious, the scaffold-ring had closed rapidly, imprisoning a body of incandescent fuel below sufficient to decompose the steam without undue cooling; thus yielding, still at high temperature, a mixture strongly reducing and very penetrating.

Mr. Howe: I do not know on what ground the gentleman says that petroleum vapor in excess will not produce CO_2 to be immediately reduced to CO: we know that solid fuel, no matter in how great excess, does yield CO_2, which is reduced by that excess.

The difference between the effect of the decomposition of steam by

* Based on Thomsen's determinations, Deut. Chem. Ges. Ber., vi., 1533.

† *Journal Iron and Steel Institute*, 1871, p. 298.

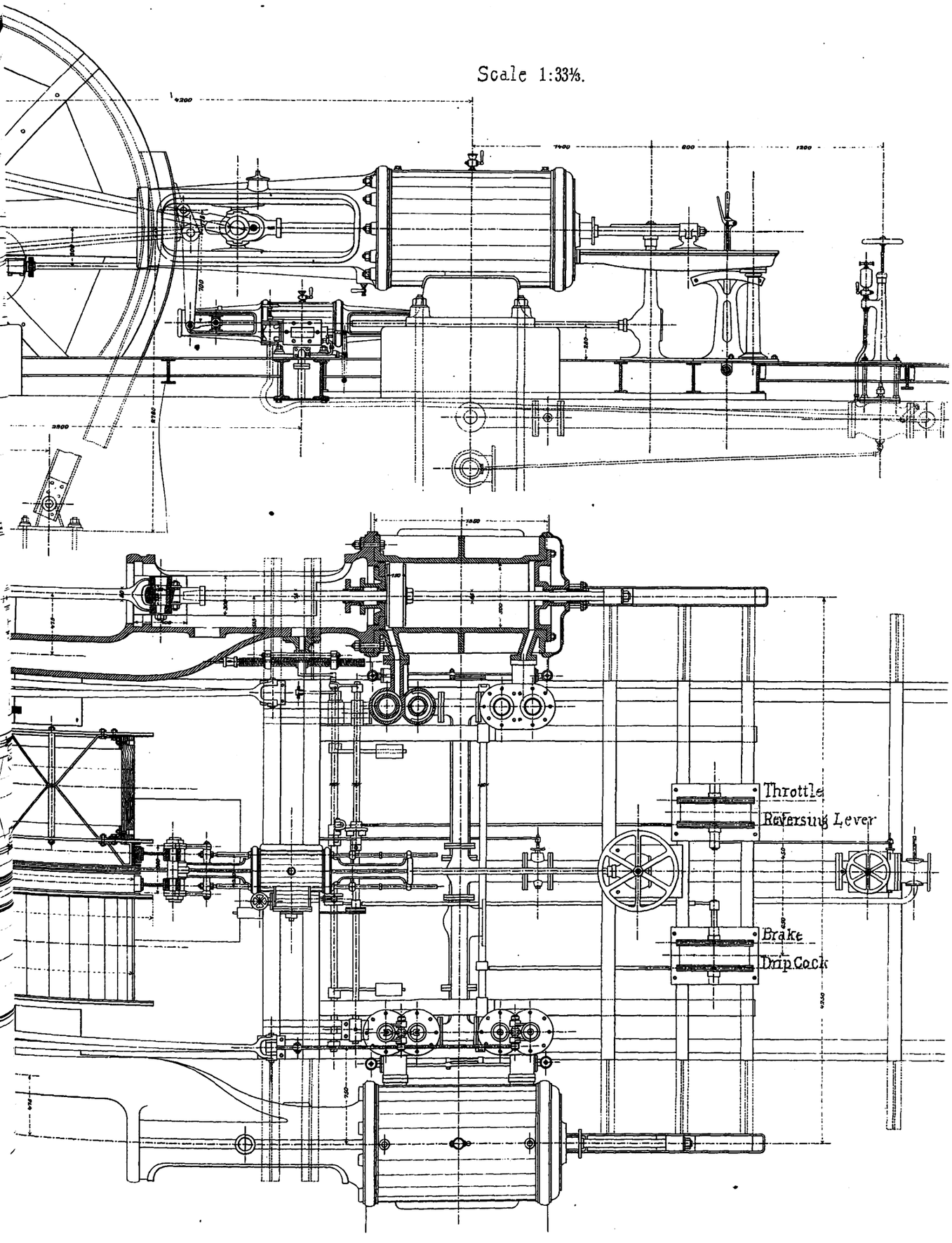
‡ *Traité de Metallurgie*, Gruner, p. 466.

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BINDWEIDE MINE, GERMANY.

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incandescent fuel and by red-hot petroleum vapor is much less than might be supposed. If we admit a difference of 500 degrees C. in the temperature of the solid and the gaseous reducing-carbon, that 500 degrees would produce only a difference of some 40 degrees C. in the temperature of the resulting products of combustion, so small a proportion does the weight of the reducing C bear to that of the whole of the products of combustion.

While I do not pretend to say that plenty of practical difficulties would not arise on attempting to carry out such a scheme as I suggest, yet I do not think that one of them will be that which Mr. Mattes has specified—gauging correctly the proportions of gas and blast. While, as I have said, you can have an excess of blast, you can not have, in the ordinary working of a furnace, an excess of fuel, because the fuel will only descend to the tuyeres as fast as it is burnt there; you can not make it descend faster. So injecting our petroleum will retard the descent of the solid fuel by consuming a portion of the blast and leaving so much less for the solid fuel. But you can not get an excess of petroleum over blast into your crucible until the petroleum is in such enormous quantity that it consumes all the blast that enters, leaving none whatever for the solid fuel. To do this would require an amount of petroleum which no one in his senses would dream of injecting.

I can see no difficulty in the way of controlling operations by means of rapid analyses of the atmosphere in the crucible, drawing off samples through holes pierced in its sides.

Mr. R. P. Rothwell, New York: I would ask whether Mr. Howe has considered the use of the mixture of carbonic oxide, known as water-gas, for this purpose. The temperature of combustion is higher, if I remember the figures, than the temperature of combustion of vapor of petroleum, and it may be available here. We find it in similar uses in some other processes requiring high temperature. It is a cheap, economical fuel to procure or manufacture. I have nothing more definite than this mere suggestion to make, as I have not the figures at my command, but I believe its temperature of combustion is very considerably higher than that of petroleum or coal-gas.

In some recent experiments that have been made in Germany with this water-gas, they have injected the gas along with the air mixture, either combining it before injection or while it is being injected, and in that way they obtain an extremely high temperature. Whether it would be applicable to the case under consideration I can not say positively.

Mr. Howe: Water-gas consists mainly of CO and H, with small portions of N and CO_2. On account of its freedom from N, its complete combustion of air causes a higher temperature than either C or H. But its introduction into the blast-furnace can cause no net gain of heat there, since, though burnt at the tuyeres, it will be again resolved into its original condition by the solid fuel surrounding it, and the decomposition of the products of its combustion will consume exactly as much heat as was given out on its combustion. The oxidation and subsequent reduction, the generation and absorption of heat, would take place within such a short distance of the tuyeres that probably no useful effect is to be expected from its use. Indeed, as its initial temperature would be lower than that of the crucible itself, it would, in being raised to that temperature, absorb a certain amount of heat, and thereby lower the temperature of the crucible taken as a whole.

Mr. C. Constable, New York: I would suggest that when we speak of a furnace chilling we give the impression that the furnace is likely to go out. It seems to me that "chilling" is commonly, at the outset, the result of driving the point of combustion up into the furnace, and the word is perhaps a misnomer, since the combustion is still going on. Furnaces have been, of course, banked up for six months at a time, and have started off well again, making foundry iron. So that it is not very easy to put out a furnace, to chill it, provided air is excluded. The chilling is rather the apparent cooling of the hearth only, and because the burning-point has been merely driven higher up by an excess of air, as I believe. The hearth, like that of any furnace, is only capable of burning so much fuel per hour; and if an excess of air is blown in, it will burn the fuel that is higher up in the furnace, raising the heat on the boshes and rendering the stock sticky. The danger, then, is, that the stock may scaffold. If the original causes are not removed, the tendency at first to "hang" and "slip" becomes aggravated, and a permanent scaffold is formed, which, if bad enough, may put the furnace out, it is true. At this stage, Mr. Howe's plan may come in play. But when the first indications of the chilling of the hearth are met by a reduction of the revolutions of the engine (to suit the condition that less fuel is reaching it), and, where possible, by an increase in the heat of the blast, I think many of us have not only found relief, but have reduced the tendency to scaffold and chill. What I would call attention to is that, if taken in the first stages, as suggested, serious scaffolds, such as Mr. Howe is treating of, would seldom occur.

Mr. Howe: Doubtless some scaffolds and chills can be remedied in the way the gentleman advises, but many others can not. If you are scaffolded so that coal can not fall to the tuyeres, merely slacking your blast will not bring your coal down to the tuyeres, nor will it raise the local temperature.

If the amount of fuel arriving at the tuyeres in the unit of time is so small that its combustion (even when no excess of air is injected) does not generate enough heat to raise to the slag melting-point the amount of burden which arrives at the tuyeres in the same unit of time and to restore the heat lost by radiation, conduction, and convection during that time, then your furnace must chill and eventually go out unless you increase the rate at which the fuel arrives at the tuyeres, or raise the temperature of the blast, or otherwise increase the amount of heat in the crucible. If you can not bring more fuel in from above, bring it in from below, but gasify it outside your furnace, and do not lower the temperature of your furnace by gasifying your fuel inside it.

WITH the growth of the Western anthracite business, a matter is assuming greater importance to which some of our ingenious inventors should direct their attention. What is wanted is some machinery that will automatically load any kind of a railroad car that may come to the breakers, so that there will be no trouble in loading with hard coal grain cars returning Westward. There is a rich harvest in store for those who succeed in devising a really meritorious machine.

THE HOISTING-ENGINE OF THE BINDWEIDE MINE, GERMANY.

(WITH SUPPLEMENT.)

The engine of the Bindweide mine was designed to afford the means of hoisting the ore for an estimated period of working of twenty years from a maximum total depth of 286 meters, or 200 meters below the tunnel level, the capacity being 40 cars holding 13 tons of iron ore each, per hour. The work of the engine was to include also the hoisting of the coal for the boilers from the tunnel level to surface, and hoisting rock to surface to be delivered to the dump. The specifications called for direct-acting engine, with valve-gear. Cylindrical drums, 3·4 meters in diameter, were chosen. The steam pressure available was from 6 to 7 atmospheres. Taking the weight of the empty cars at 300 kilograms, the maximum load of ore or rock at 1300 kilograms, and the weight of the cage at 500 kilograms, then the maximum load on the wire rope at a point immediately above the cage would be 2·1 tons. In order to have a factor of safety of 10, a 25-millimeter round crucible-steel wire rope was chosen, the manufacturers claiming for it a tensile strength of 27,000 kilograms. Its weight was 1·8 kilograms per running meter, so that, at a maximum depth of 286 meters, the greatest load on the rope, including its own weight, will be 2·615 metric tons. The width of the drums was made 0·8 meter, and the dimensions of the steam-cylinders were made 0·5 meter diameter and one meter stroke. Assuming the useful effect of the engine to be 60 per cent when starting with only one cylinder at work, the other being on its dead-center, and taking the useful effect to be 75 per cent while hoisting, both cylinders doing their work, then the engine will be found powerful enough to start the work with one cylinder, and to hoist it with both cylinders, cutting off the steam at one quarter of the stroke. This is irrespective of any effort to counterbalance the weight of the rope. With a back rope, a pressure of five atmospheres would suffice to do the work. The Gooch valve-gear was adopted, and permits of cutting off at a range between 0 and 85 per cent of the stroke. The cut-off gear is not automatic, the engineer gradually varying it by means of a lever during the stroke. Indicator diagrams taken show that the engine is well designed. There is a slight defect in the admission of the steam, when the cut-off takes place at an earlier part of the stroke, which is due to the use of the Gooch gear.

THE TRANSMISSION OF ENERGY.—It is well known that the town of Geneva is about to erect large works on the banks of the Rhone, the waters of which they intend to utilize for distributing and supplying motive-power throughout the town. Before finally settling the method of utilizing the water-power, they appointed a committee to consider the matter. This committee was composed of MM. Legler, Achard, Pictet, and Turrettini. These gentlemen drew up a report in which they considered the various methods that might be adopted, and, among others, that based on the generation and distribution of electrical energy. One great obstacle to this method was, however, in their opinion, the loss that occurs in the distribution of electricity. "This loss," the report says, "is due to three prime causes: the heating produced by the resistance of the generator, the heating produced by the resistance of the cable, and the heating produced by the resistance of the receiver. These three factors, to which must be added the relatively small amount of friction in the two machines, are the principal cause of the loss of power, which must not be overlooked; for in the celebrated experiments of M. Marcel Deprez at Munich, and at the Gare du Nord, at Paris, they amounted together to about 70 per cent, thus leaving a useful return of 30 per cent only. It is but just to mention that M. Deprez had been pleased to exaggerate the difficulties in his experiments by employing iron cables and by trying to generate a difference of potential of several thousand volts in one machine alone, which rendered it very delicate, and reduced to a great extent the power obtained, owing to the insufficiency of the insulation of the wires of his machine in the presence of such colossal differences of potential. The distance to which M. Deprez transmitted energy was 8·5 kilometers. It is unlikely that in Geneva we should have to transmit so far from the generating station; therefore the problem is to a certain extent simplified." The report further considers that it would not be good to have a higher electro-motive force than 500 volts, in view of possible accidents to persons. For the present, therefore, there does not appear to be any chance of Geneva utilizing its water-power to generate electricity and distributing the latter. The report is in favor of the adoption of a system of transmitting water under pressure, to be utilized as required.

FURNACE, MILL, AND FACTORY.

The Colliau Furnace Company, of Detroit, Mich., has now in course of construction two of its largest size cupolas for the Frankfort shops of the New York, West Shore & Buffalo Railroad.

The converting works of the Scranton Steel Company averaged fifty-two heats per turn last week, a record which, so far as known, has not yet been beaten except by themselves.

The Norway Iron-Works, South Boston, will close its operations under the name of Naylor & Co. the 1st of January. The works were built in 1854 and completed in 1855 by Henry S. Washburn & Co., and shortly after passed into the hands of Naylor & Co., an English firm with agencies in several cities besides Boston. The place was built under the supervision of Hon. Thomas Gogin, and the extensive improvements carried on since that period have still been under his direction. He has been superintendent from the opening of the works up to the present time. The great specialties of the works are making steel boiler-plate, carriage-spring steel, and a general variety for cutlery. The open-hearth steel manufactured there is largly used at the South Boston Rolling-Mills to make boiler-plates. There has been an increased demand for wire the past few years, on account of the new inventions in electricity. A project is on foot to establish a joint-stock company. The Norway Iron-Works have always been a paying concern, and it is not on account of any suspension the proprietors retire. The money volume of the business at the works has amounted to at least a million and a half of dollars yearly, and for labor alone seven thousand dollars have been paid out weekly. Six hundred men are at work, representing three thousand persons, and the suspension of the business at the present time would prove a very serious matter. There are great inducements to capitalists and men of enterprise to continue the business, considering the easy facilities for delivering the raw material to the wharves and the remov-

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ing of the same when manufactured. For the last year, experiments have been going on to substitute petroleum instead of coal. Some furnaces have been reconstructed for the use of this material with every success.

The Centralia Mining and Manufacturing Company, Centralia, Ill., has placed its order with the Lechner Manufacturing Company, Columbus, Ohio, for roller chain belting. This company has also made shipments of steel roller chain to the Montgomery Iron-Works, Montgomery, Ala., for traction engines; D. Giles & Co., Chattanooga, Tenn.; and the Ohio Pipe Company, Columbus, Ohio, for racking carriage on lifting cranes.

The Brier Hill Iron and Coal Company is making preparations to engage in the manufacture of dephosphorized metal. The spiegeleisen furnace built by this company is rebuilding under plans prepared by Edward L. Ford, of Youngstown, Ohio. The metal while heated to a liquid state in the blast-furnace is carried to the new furnace in ladles, and subjected to a certain process that removes the phosphorus, leaving only the pure metal, which is a very valuable product. Work is pushed on the furnace, and, if the weather continues fair, it will be ready for operation in a few weeks.

The Martel furnace, Mich., has blown out for the winter. The cause is said to be the depressed state of the iron market.

The Penn Iron Company, of Lancaster, Pa., has given notice to its puddlers of a 10 per cent reduction to take effect December 15th. It is probable that the works will shut down, as the workmen refuse to accept the reduction.

The Union Rolling-Mill at Cleveland, O., was almost destroyed by fire December 9th. The loss on the building is $20,000, and on the machinery probably between $50,000 and $60,000. The insurance can not be estimated.

The Mount Hickory Rolling-Mills were destroyed by fire December 9th. The loss is estimated at $200,000; insurance, $90,000.

At a meeting of the Toronto City Council, it was decided to grant a lease of a portion of the marsh lands for the purpose of aiding in the establishment of iron and smelting-works, for the term of forty-two years, at a rental of $1 per acre per annum, and that the real estate, plant and machinery be exempt from taxation for ten years.

The Scranton Steel Company has given notice of an increase of capital stock from $600,000 to $1,500,000. It is said that it has received a big contract, and the increase was necessitated thereby.

The large rolling-mills of Coates & Brothers, George, W. P., and Charles E. Coates, at Locust Point, near Baltimore, Md., have suspended operations. The suspension is attributed to the recent heavy failures in other cities and to the great depression in the iron trade during the past two years. Their liabilities are $175,000; assets, from $40,000 to $100,000. The firm promises to pay every dollar of its indebtedness. Two hundred employés are thrown out of work. The mills were built in 1882.

The Dickon Manufacturing Company, of Scranton, Pa., has reduced wages 10 per cent.

The Coosa furnace, at Gadsden, Ala., was burned December 9th. The fire was caused by one of the gas-blowers exploding near the furnace-shield. The latter is a total wreck. The engine, boilers, and 400 car-loads of coke were also destroyed. The loss is nearly $150,000, with no insurance.

About seventy mechanics, who have been discharged on account of slackness in the work from locomotive-shops in Paterson, will sail for Europe, to go to work at iron steamship building on the Clyde.

The Phillipsburg sheet-iron mill, which is considered the largest manufactory of the kind in New Jersey, after one week's idleness, started up again with a reduction of 10 per cent in wages, making a total reduction in wages within a month of 15 per cent. Nearly all of the iron mills through the Delaware Valley are making a like reduction. An overstocked market is given as a cause. The owners of mills say there will be little work done this winter.

The contracts for the supply of metallic label cases and printed wooden tags for the use of the Post-Office Department have been awarded to Charles R. Penfield, of Lockport, N. Y., and Smith, Egge & Co., of Bridgeport, Conn.

Nineteen creditors of Brown, Bonnell & Co., by their attorney and by consent of Brown, Bonnell & Co., entered judgments in the Common Pleas Court December 10th to the amount of $142,000. Executions were issued, but nothing further will be done until after a hearing before Judges Welker and Baxter, at Toledo, on December 17th, on a motion to discharge Receiver Gayette Brown, of Cleveland.

The rail-mills of the Albany & Rensselaer Iron and Steel-Works at Troy, which employ 400 men when busy, have shut down. General Marvin says the condition of the labor market does not admit of the running of the mills at present. The iron and merchant steel-works were running, though not at full capacity. The combined works employ, at full capacity, 3000 hands. Less than half this number are now at work.

From Pittsburg, it is reported that the rail department of the Pittsburg Bessemer Steel-Works at Homestead have been shut down, throwing 800 men out of employment. Andrew Carnegie stated that the Edgar Thomson Works, at Braddock's, which employ 3000 men, would probably follow suit in a week. McKee, Anderson & Co.'s mill, at Beaver, Pa., has also been closed, and will remain closed until after the holidays. The Manchester Iron and Steel-Works will suspend operations on account of scarcity of stock, and 150 men will be thrown out of employment. The puddling department of Kloman's Superior Mill, which suspended four weeks ago, will resume.

The Electro Metal Refining Company of this city, says the Rome, N. Y., *Sentinel*, has been engaged since last May in putting in a plant at the malleable iron-works, for the purpose of treating base bullion by electricity, and separating the lead in the bullion from the impurities. Mr. N. S. Keith, of New York, after years of study, has discovered a new mode of doing this work by electricity. It has been tried on a small scale and has been found to work successfully.

A part of the malleable iron-works building which has heretofore been used as a molding-room has been partitioned off for the purpose of constructing this plant. In this room, have been built 30 circular vats or tanks. These vats are made of a composition as hard as rock and rest on a floor of the same substance. Each vat is six feet in diameter on the inside and 40 inches deep. There is a core two feet in diameter in the center of each vat, extending from the bottom to the top. In the center of each core is a copper conductor for carrying the electric current from one vat to the next one, and so on through the entire series of 30. There are but a few inches of space between the vats. Within each vat, are 13 cylinders of thin sheet-brass extending from the top of the vat down two feet. These brass cylinders are in a nest, two inches apart, and range from two to six feet in diameter. These cylinders are termed the cathodes. The bottoms of the cathodes rest on a copper conductor through which the electric current passes. This conductor passes under the bottom of the next vat and up through the center core to the top. The cathodes can be taken out of the vat, and put back again whenever it is necessary. A clear space of about a foot is left in the bottom of the vat.

Each vat is provided with what is called an anode frame, similar in construction to the cathodes, being a nest of brass bands two inches apart. These bands are, however, but two inches in width. In the center, is a copper hub, from which arms or spokes extend, like the spokes of a wagon-wheel. Into three of these spokes, are set copper conductors, and to the conductors are riveted the brass bands which form the frame. In the copper hub, is a socket which sets on to the copper conductor that comes up through the core in the center of the vat. To each of the brass bands are attached small brass hooks which look like the heads of large pins. The vats stand between three and four feet high on the floor, and each one is covered with a heavy movable wooden cover. When these covers are all down, they form a large platform or stage over the entire series of vats. The covers are taken off and the cathodes and anodes lifted out of the vats by means of a traveling crane.

The base bullion is melted in a reverberatory furnace. On a circular revolving pedestal, are twelve molds. The bullion is run into these molds and forms plates two feet long by six inches wide and one eighth of an inch in thickness, and provided with two ears or loops. By the time a casting makes one half the circuit after being poured, it is cool enough to be taken out. With one man to pour and another to remove the plates, the casting can be done very rapidly. After the plates are removed from the molds, they are inclosed in muslin bags and hung by the ears or loops on the pins with which the brass hoops of the anode frame is provided. These plates weigh about eight pounds each. After the frame is full or loaded with plates, it is lifted by the traveling crane and carried to any vat required and lowered so that the plates hang between the cylinders of brass in the vat, and the copper hub of the anode rests on the copper conductor in the core of the vat. After all is in readiness, a solution is let into the vats, and the electrical current is started by means of an Edison dynamo that is in the building. By means of the copper conductors, the current is conveyed from one vat to another; that is, the copper conductor in the core transfers it to the anode frame by means of the copper conductors in the arms. It passes through the solution, acts on the plates, and passes off on the copper conductor to the next vat, and so on around the whole thirty and back to the dynamo, forming a complete electrical circuit. It is intended to start three vats a day for ten days. At the end of that time, the whole thirty will be in operation, and the first three will be ready to clean up. If every thing works as is expected, three tons of pure lead will be taken out each day.

By means of a system of wooden pump-logs underlying the vats and communicating with each of them, the solution is forced into the vats from the bottom, overflows at the top, and is carried by conductors to a large cistern. Thence it is pumped up into an overhead tank situated higher than the vats, and from which the original supply comes. This tank is supplied with a copper steam coil, by means of which the solution is heated to about 100 degrees, when it overflows into pump logs by its own gravity and escapes into the vats to be used over again. This process proceeds uninterruptedly. By this means, a constant circulation of the solution and a uniform temperature are maintained. The solution is made of acetate of soda, sulphate of lead and water, and is kept at a density of about 10 degrees Baumé.

Power will be furnished by the malleable works engine, and the dynamo will make 1500 revolutions a minute.

The lead thus produced is pure, and can be used for purposes for which the article is in demand, such as white lead, paints, sugar of lead, and is especially adapted for the new system of storing electricity. This company has contracted all the lead it can manufacture to the American Storage Battery Company, at about $60 per ton above the quoted price of lead. The Electro Metal Refining Company has a capital of $100,000. The officers are as follows: President, N. S. Keith; Vice-President, Samuel Wardwell; Secretary and Treasurer, J. S. Wardwell. Among the directors are A. Ethridge, Edward Comstock, M. D. Barnett, C. O. Yale, and others.

GENERAL MINING NEWS.

ARIZONA.

PIMA COUNTY.

QUIJATOA.—J. W. Mackey and J. W. Flood, of San Francisco, have, it is rumored, purchased these mines. The sale was negotiated by W. Lytle, of the same place, who takes an interest with them. The price paid was $450,000. The mines are located eighty miles southwest of Tucson, and were discovered last May. The purchase was made on the report of J. N. Low, W. S. Patten, and Hank Smith, acknowledged to be the best authority on the coast. The purchasers will begin operations at once on an extensive scale, putting up the most approved machinery for developing and working the ore.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended December 1st shows: Ore crushed, 120 tons; average pay value of pulp, $15.80 per ton; of tailings, $3.05. Bullion shipped, $6377.83.

STANDARD CONSOLIDATED.—For the same week, the report from this mine shows: Ore extracted and shipped to mills, 1419 tons; crude bullion received, 2346 ounces; bullion shipped, $16,324.50.

COLORADO.

BOULDER COUNTY.

Mr. J. R. Wood, of Boulder, sends us the following notes under date of the 5th: Owing to the continuance of the mild weather, mining in this county has not yet lost its summer impetus. Prospecting is still carried on upon the surface, as there is no frost in the ground where exposed for one or two hours during the day to the sun. The miners in the gulches upon Four Mile Creek are still doing some work, but expect to be closed down by cold any day. This gulch has been worked steadily for the past fourteen years, and a number of claims have paid handsomely. The work is necessarily slow, as, owing to the large amount of heavy boulders and lack of dump-room, a hydraulic can not be used. During the last two years, most of the work has been done by Chinamen under lease. As the cañon is narrow and is now occupied by the Greeley, Salt Lake & Pacific Railroad, a large amount of good ground can not be worked. Six miles from Boulder and one mile from the station at Crisman, are located the Yellow Pine mines, owned by Mr. George Williamson, by whose courtesy we were enabled to make a thorough examination, and were agreeably surprised at the showing of ore and the amount of development-work done. With the main working level at an altitude of only 7000 feet above the sea, the various tunnel-mouths one hundred feet above one another open into the hill-side, until, at the discovery-shaft, we are 800 feet above the lowest working, while the mountain still ascends at an angle of 45 degrees 300 feet higher, admitting all the work to be done through tunnels, shafting being only necessary for ventilation, and nowhere need more than 100 feet be sunk or raised to connect any two succeeding levels, thus doing away with all expensive machinery in handling rock or water. The property consists of the Yellow Pine, Volcleuse, Duroc, Gray Copper, and Mitchner lodes, and has been opened by 4955 feet of tunnels, connected by 912 feet of shafts. No stoping has been done to speak of, the owner's working plan being, "as long as the work of exploration pays for itself, no stoping will be done." In every tunnel, we found large blocks of ground from 100 to 200 feet long by 100 feet in hight, carrying a mineral streak of from one inch to five feet of ore, averaging 300 ounces of silver per ton, while the sorters were saving one grade as high as 800 ounces. The pay-streak in the Yellow Pine vein is from two to five feet in width. An average sample from the widest part gave 275 ounces. The ore apparently lies in a chimney whose dip is to the northwest, and as each succeeding tunnel has reached it, the ore-body maintains its quality and strength. The east wall, upon which the ore lies, is perpendicular, and wherever opened carries a regular northeast and southwest course, and as yet has shown no break. English, Welsh, and American miners with whom I have talked say they never before saw so fine a wall. Some cross-cutting has been done; but as yet the other wall has not been found, although bunches of ore and small feeders are encountered for thirty feet. Thirty men are steadily employed, and as the vein-matter is soft, a large amount of development is accomplished monthly. In the immediate neighborhood of the above mines, is the Five Brothers, a tellurium-bearing vein, which is worked by five men under the direction of Mr. E. McCormack. Not much ground has been opened yet, but the work has paid well as far as prese-

cuted. The Rob Roy, an extension claim upon the Yellow Pine vein, is worked through a cross-cut tunnel now in 100 feet. Another vein carrying a paying body of silver-bearing ore was cut at 80 feet, and is now opened by two headings from the tunnel, while the tunnel-breast is pushed by two shifts of men. The Neikirk concentration mill, at Crisman, after four years of continuous work, is undergoing preparations for putting in a new concentrator, the invention of a Boulder man. Although this machine has been at work in the county for about two months, and when seen by us appeared to be making a close saving of the mineral, still the operators could not be got to make a thorough test so as to ascertain the actual saving, appearing to be satisfied with what they could see. We hope that this may now be arrived at, as the cost of the machine is not more than $500, and the power used only one half horse, with a capacity of 15 tons daily. As the greatest want of the miners of Colorado is a concentrator having the requisites of economy in construction and power used with large capacity, we watch with deep interest any machine that promises to meet the conditions.

Work is steadily prosecuted on the Melvina lode by a force of 15 men. So far, it has been found necessary to employ the full force in replacing timber and putting the mine into shape for safe working, as the action of the water while standing idle had done a large amount of damage, the walls being soft. Enough ore was found in the old workings to nearly cover the expense, and new ground is now opening.

The concentration-works of the Century Company, at the mouth of Gold Run, continue steadily at work, treating 15 tons a day. The company is putting in tables to amalgamate the ore before it goes to the concentrators. The record shows a saving of 97 per cent upon some ores, with an average of 85 per cent. Work is about to be resumed on the Hoosier Tunnel. As this is a strong vein, some 60 feet wide, which has paid at times, it is expected that further explorations will open another ore-body.

The Victoria lessees are about purchasing a No. 8 Cameron pump, and on its arrival will sink the main shaft 200 feet deeper. In doing the annual work upon the Valley Forge, a body of ore giving mill-runs of 2000, 3000, and 4000 ounces was encountered. But for some reason, the mine immediately closed down. As this was done before the extent of the ore had been determined, the trouble is not in the vein.

CLEAR CREEK COUNTY.

PAY ROCK.—During the past two weeks, the superintendent has put 65 new lessees at work on the Pay Rock, in addition to the large force previously employed. The pumping out of the shaft below the tunnel level has opened up again for mining 1000 feet of levels, which will be rapidly extended. Two pumps, a sinking and a No. 5 Knowles, were used in cleaning out this shaft. The old stull timbers kept their place well. In No. 3 level, a scale caved off one side, disclosing about four inches of 600 or 700-ounce stuff and 15 inches of ore running from 70 to 80 ounces. Larger masses of ore are now to be seen in the mine. Its output this winter promises to be much increased.

DOLORES COUNTY.

PHŒNIX.—Some more fine ore has been found. It is not a new body of ore, but is merely a continuation of the mineral on which they have been working. It is bromide in character, and it is thought the whole body will run high. Tests made have run very high.

GUNNISON COUNTY.

Gunnison City is enthusiastic over the prospect of several new smelting establishments to be built in that vicinity early next year. Mr. S. D. Patrick left Denver for Alma to superintend the removal of the Stevens furnace from that section to Gunnison City. The Stevens process has not had success in Colorado thus far, although it is claimed to have worked in a satisfactory manner in Utah and Omaha under thorough test.

The mines at Spring Creek are fully meeting all expectations, and a number of good producing properties have been opened during the past year.

The Von Cota lode, located only last June, by a limited amount of exploration-work disclosed three and a half feet of lead carbonate ore, containing fifty-two per cent of lead and twenty-two and a half ounces of silver to the ton.

The James lode shows a fair body of ore, carrying sixteen ounces in silver and from forty to fifty per cent in lead. The mine is located on the south end of Bald Mountain.

The Boston lode, on Ute Mountain, is owned by a number of Leadville gentlemen. The workings expose quite an ore-body running seven ounces in silver and seventy per cent in lead.

Excellent ore-bodies have also been opened along Ohio Creek and the White Pine District, the mines of which are owned principally by Leadville gentlemen.

The Doctor mine is shipping regularly to the smelting-works near Salt Lake City, a distance of 460 miles.

HINSDALE COUNTY.

HOTCHKISS.—The tellurium streak in the formerly famous Hotchkiss mine, the riches of which led to the establishing of Lake City, has been struck again, after years of idleness and litigation. The mine was re-located as the Golden Fleece, and is owned and patented by Samuel Wendel and George Wilson. A contract had been let to extend the lower drift, and work had just been commenced when at 240 feet the ore-body was struck. It extends from top to bottom in the face of a drift, and is improving at every shot. The ore-body is a foot in width, with tellurium and petzite freely interspersed.

LAKE COUNTY.

ÆTNA.—The lessees of this mine on Carbonate Hill have begun hoisting mineral. They have between $9000 and $10,000 worth of ore broken and ready to fill into the bucket, with assays from the different stopes ranging from 37 to 400 ounces per ton.

CHRYSOLITE.—Drifting to the south and east from the All Right No. 2 shaft is advancing at a satisfactory pace. The south drift will soon be connected with the Kit Carson No. 2 shaft, and thence will be continued to the Eva No. 5, which is already connected with the principal workings of the mine. The driving of the Iron incline is also making good progress. Work on the Chrysolite No. 6 shaft will begin soon. It is situated back of the office buildings. This shaft was begun by W. S. Keyes, while manager of the property, several years ago. The shaft has a depth of 152 feet.

CROWN POINT.—Exploration and development-work at this mine, on Rock Hill, has been advancing very satisfactorily. The extension of the underground workings of the mine broke into the drift of the La Plata mine, on the territory of the Pinnacle lode. In driving this work, a large body of ore was opened, running twenty-five ounces in silver and thirty-five per cent in lead. The extraction of ore and shipments in large quantities will begin at once. The hoisting-plant that is being placed on the Crown Point shaft, a new shaft-house, ore-bins, and other surface improvements are also under way.

FREYER HILL.—Only three furnaces are in blast at these smelting-works. Several of the old furnaces at this establishment have been torn down, and will not be rebuilt until next spring.

GRIFFIN.—This property is in the new mining district on the west side of Tennessee Park, about six miles from Leadville. A shaft has been sunk about sixty feet. It is entirely in mineral, and is daily yielding a considerable amount of ore, which is shipped to the Arkansas Valley smelter. The ore consists of quartz, galena, zinc-blende, and possibly some antimony. The silver occurs as sulphurets, and pieces of ore are frequently met very rich in the latter mineral.

IRON SILVER.—A small force of men is again at work on the plant at the Moyer shaft, preparing for the resumption of work on the shaft.

LA PLATA.—All five of the furnaces are in blast.

LITTLE CHIEF.—This mine, although closed down during the first ten days of November, made shipments during the month of 150 tons of ore. Owing to repairs to machinery and the performance of considerable unproductive exploration-work, the operations of the month have resulted in yielding barely enough to pay the unusual expenses, and no profit was derived for November's work.

MORNING STAR.—A four-foot body of ore is exposed in the Kitchen shaft of this mine, which it is calculated will run from $200 to $300 a ton.

ROBERT E. LEE.—This company has recently taken over ten thousand dollars from supposed barren ground in the vicinity of the south shaft.

ST. LOUIS.—The output of this mine, formerly the Miner Boy and Colorado Prince mines, during November amounted to 500 tons of ore. The average value of the ore is about one and a half ounces in gold to the ton, and fifteen ounces in silver. The ore is extracted from a strong vein opened on the line of the Colorado Prince tunnel, about 500 feet from its entrance. During the past week, a seam of ore eighteen inches in width has been discovered that will run ten ounces in gold to the ton and seventy-five ounces in silver. During the past few days, boilers, steam-pumps, and hoisting machinery have been purchased by the lessees, and preparations are making to develop the vein below the tunnel level.

PITKIN COUNTY.

The smelter at Aspen has shut down, and will not start up again until there is a certainty of buying ore in quantities to warrant the expense of running.

SUMMIT COUNTY.

ROBINSON.—Mr. Greer, the lessee, reports shipping ore at the rate of about one hundred cars a month. The ore-body in the lower levels is stated to show a marked improvement.

DAKOTA.

FATHER DE SMET.—The superintendent's report for nine days ended November 30th shows: Ore extracted from first level, 1500 tons; second level, 800 tons; third level, 400 tons. Ore milled, 2700 tons. Golden Gate south header, third level, advanced 13 feet.

STAND BY.—The twenty-stamp mill, recently started up, works smoothly, and the mine is showing up well.

IDAHO.

BALTIMORE & VICTORIA.—The Baltimore, Victoria, Minnie May, Cumberland, and Ida Harland lodes and the Baltimore mill site—all situated in Warm Springs Creek Mining District, Alturas County—are to be worked by this company, recently organized at Salt Lake City with a capital stock of $1,500,000.

KENTUCK.—For the purpose of carrying on a "great mining business," this company has been organized with a capital stock of one million dollars. The property proposed to be operated is situated in Mineral Hill Mining District in the county of Lemhi, and consists of the Kentuck and the Lost Miner lodes.

MICHIGAN.

The product of the mines mentioned for the month of November is reported in tons as follows:

Calumet & Hecla	1757	Copper Falls	59
Quincy	452	Pewabic	45
Franklin	201	Portage	40
Atlantic	168	Wolverine	40
Allouez	100	Hancock	34
Huron	73		

CONGLOMERATE.—One head of Ball's stamps in the new mill of this mine, at Lac la Belle, started up some three weeks ago and is working very satisfactorily.

HURON.—The directors have levied an assessment of one dollar per share. The Houghton *Mining Gazette* says: The decided improvement in the lode in various parts of the mine, which the last two monthly products, 70 and 73 tons respectively, corroborate, fully warrants the management in erecting another head of Ball's stamps, which will admit of the mine doubling its present handsome product and assuming a position to earn something for its stockholders. To make this much needed addition to the mineral crushing plant, this last assessment is called, which will be ample, we are informed, to pay for the new machinery and the other expenses on the mine incident to its dressing-works' enlargement.

IRON STAR.—This new corporation has been recently organized by Detroit and Lansing parties, principal among which are James M. Turner and John S. Newberry. Capital stock, $500,000, with $5000 actually paid in. It is not stated exactly where the new company proposes to operate, but presumably the Agogebic District will be its field.

ROPES.—The official report shows that a clean-up of all the rock treated—272 tons—had just been finished. The following facts are given:

Gold from mill	$1,323.02	
Gold from concentrates	328.14	$1,651.16
Silver (native) from mill	166.01	
Silver from concentrates	192.80	358.81
Total gold and silver		$2,009.97

The records kept at the mill show that the ore fluctuated considerably in value. The first lot milled was from a shaft sunk to a depth of 25 feet, the upper portion giving a mill result of $6 or $7 per ton, the lower portion, from $14 to $15. The third test of ore treated was 150 tons from drifts run at a depth of 25 feet and a continuation of the shaft downward, which yielded about $6 per ton. At a depth of 30 feet, a dike of greenstone was encountered, both in the drift and the shaft, breaking up the lode and forming fully 50 per cent of it. The 150 tons was composed of this mixed matrix. It was subsequently found that the drift and shaft were entirely off the lode, a cross-cut to the south of a few feet from the bottom of the shaft, which was down 45 feet, revealing it in its full width and richness, and a like cross-cut in the same direction from the end of the drift, 20 feet from the shaft, also found in all its former richness and strength. This fact shows plainly why the yield of gold and silver was not greater. The fourth lot milled was 22 tons of siliceous talcose slate from an opening 100 feet east of the Curry shaft, where a belt of this slate 8 feet thick lies between two quartz lodes each 4 feet thick on the north and south of it. A shaft was sunk 14 feet and the belt cut across, as well as the two quartz-veins. From this run, per ton of rock, $3 at the mill and $2.50 from the concentrates were obtained. It was the purpose of the management to have milled a quantity of ore from the north lode, as it runs much higher in gold than the other openings, with but little silver, but the arrival of cold weather prevented. Examination of the tailings taken from the plates and concentrator give from $6 to $9 in gold and from $2 to $3 in silver, per ton. Two assays of 50 pounds of the tailings, after the run, showed, respectively, gold, $18; silver, $2.24; and gold, $15; and silver, $19 per ton. This great discrepancy shows that amalgam has gone over from the mill and is the cause of it. The results as shown give a value of over $20 per ton on the ore as it was run, and it is expected on the resumption of mill work that certain appliances will be brought into requisition which will reclaim that portion which has heretofore been lost. Fraser & Chalmers, the mill builders, have the matter now in hand, and are confident they can quickly remedy the difficulty.

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During the last ten days of work, the developments made did more in proving the width and richness of the lode than all that had been performed previous to that time. The trial, even with its numerous drawbacks, can not be looked upon as other than a most favorable one, and the management, together with those familiar with the mine's showing, are confident that the success of the enterprise is already well assured, and that a renewal of operations will be met with results fully up to the standard as set by the most sanguine friends of the enterprise.

TAMARACK.—The sinking of the big combination shaft continues. At present, a depth of 1100 feet has been attained.

MONTANA.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED.—Another furnace is to be added to the smelting-plant of this company at Glendale, increasing the capacity of the works to 150 tons a day. The Hecla Company, it is reported, is turning out more and better ore from its mines on Lion Mountain than it has done before since its organization.

SILVER BOW COUNTY.

GAMBLER.—It is stated by the Butte *Inter-Mountain* that this claim was lately bought for $1500, and sold to the Montana Copper Company for $8500.

NEPTUNE.—This mine, owned by Mr. Clark, is opening and is producing six tons of ore daily, which is worked in the Moulton mill, and pulps an average of $76.

POLLOCK.—This mine, located east of the Poser and also owned by Mr. Clark, is producing eight tons of ore daily. The last shipment of ore made to the Moulton mill returned $101 per ton.

NEVADA.

EUREKA COUNTY.

EUREKA TUNNEL.—The ore on the Eureka Tunnel dump at the time of attach ment has been sampled and settled for at the Eureka Consolidated furnace with the following results: The sacked ore assayed $574 per ton, silver; No. 1 hard ore, $97, the screenings from which went $46, and the carbonate ore, $59; this last carrying $20 in gold. We are informed that after payment of the Hansen claim and costs, amounting to $476, the yield of this ore, thirteen and a half tons, will be paid on the company's indebtedness. Including this lot, which was taken out of the mine in September, the yield for that month was $6594.23 net to the company.

LINCOLN COUNTY.

. DAY.—Work in the mines of this company is steadily pushed ahead. Ore is extracted and shipped to the furnace daily. The mines are at present working a larger force of men than they have for months. The furnace is getting into the best of order at Bristol. The indications are, that it will make a steady run of several months when it starts, which will be about the first of the year.

STOREY COUNTY—COMSTOCK LODE.

At the middle mines, prospecting is pretty much at a stand. In the Chollar and Potosi, no attempt has been made to prospect in a long time. At the Savage they tried it for a long time on the 2700 level, but found themselves headed off in every direction by water, so were obliged to return to the main incline and put in the time at sinking that, until the new hydraulic pump shall make it safe for them to cross-cut in the wet ground above.

At Gold Hill, the Yellow Jacket, Crown Point, and Belcher companies are taking out all the ore that mills on the Carson River can reduce with the present stage of water.

The Alta folks have drained their mine nearly to the 2150 level.

John W. Mackey, who has just returned from a thorough examination of the Comstock mines, while declining a newspaper interview, according to San Francisco papers, apparently wishes it to be understood that his faith in the productiveness of the mines is undiminished. He says that, just as soon as the water can be got out of the lower levels, the public will be astonished at the richness of the remaining deposits. He has ventured no opinion when the water will be exhausted.

MEXICAN.—At the recent stockholders' meeting, held in San Francisco, the following report of work done in the mine for the fiscal year ended November 30th, 1883, was submitted: There have been extracted during the year 94 tons of ore; there have been milled 308 1340-2000 tons, yielding $3929.23, or at the rate of $12.72 per ton, this being the yield of the ore-streak found on the 2700 level near our north line. There have also been extracted from the mine in the work of exploration 4019 tons of waste rock. No work has been done during the past year on the 1600, 2000, 2360, 2500 and 2700 levels, except the necessary repairs to the various drifts and winzes used for drainage and ventilation. At the 2000 and 3100 levels, work was continued. The Sierra Nevada, Mexican, and Union shaft has not been sunk to any great depth during the past year, the work being confined to necessary repairs. In January last, the 14-inch pumps that had been used in the shaft were taken out and 17-inch pumps substituted therefor, thereby increasing the pumping capacity about 50 per cent and enabling the shaft to handle all the water from the Sierra Nevada, Mexican, and Union Consolidated mines without any trouble. By the use of the diamond drill, I have avoided or controlled the influx of large bodies of water, the amount of water in the aggregate being less at this date than twelve months ago. As some increase of water is always found in opening up new levels in depth, this fact proves a material decrease of water in the levels above the 2700, and indicates a further decrease during the next year. Although the ore discovered on the 2700 level, near our north line, proved of no great extent or value, the development of the low-grade ore in the 3100 west cross-cut, as before described, which is probably the same vein in which the joint Ophir-Mexican winze from the 2900 to the 3100 was sunk, gives renewed hope that further explorations may find something of value.

The financial statement shows:

Balance from last year	$69.92
From other mines	514.50
From San Francisco office, sundry drafts on president	289,869.36
Total	$290,453.78

DISBURSEMENTS.

Salaries and wages	$89,981.68
Supplies and miscellaneous expenses	109,349.34
Sierra Nevada, Mexican & Union Shaft Company	86,558.13
Legal expense	416 66
Exchange	1,437.00
Milling	2,469.36
Royalty on ore	154.37
Gross expense	$290,366.51
Balance cash on hand	87.27
	$290.453.78

NEW MEXICO.

SAN PEDRO.—A dispatch from Boston says that the bondholders of this company have voted to foreclose its mortgage and reorganize by issuing new stock to its holders. Fifty per cent of its mortgage is to be canceled, and for the remainder preferred stock at $10 per share is to be given. Each bond is to contribute $25 in cash. The claim of G. W. Ballou & Co. against the company, amounting to $240,000, is to be reduced to $200,000, and payment made in preferred stock.

PENNSYLVANIA.

Mr. John Eyerman, of Easton, Pa., sends us the following:

THE FRIEDENSVILLE ZINC MINES.—After a number of years of idleness, work has again begun at the old Ueberroth mine, formerly owned by the Lehigh Zinc Company, but now owned by Messrs. Osgood & Co., of New York City. Four boilers (out of sixteen, which were used to run the large West engine) are in operation. They supply steam for two donkey-pumps that are used in attempting to empty the mine of a great body of water. They have been working three weeks, and about ten feet of water have been pumped out in this time. No doubt the large engine will be used, as it will take months to pump the mine dry with the two donkeys. The surface opening of the mine is 465 feet in length by 435 feet in width. It is said that the mine is 250 feet deep. The water is now about 49 feet from the surface, making about 200 feet of the mine still under water. The bottom was reached by an inclined plane, besides several shafts. The engine-shaft at the West engine is 35 feet by 24 feet. The diameter of each of the two pipes is 36 inches. Each walking-beam of the engine weighs 48,000 pounds, and it is stated that it required 40 head of horses to convey it from Bethlehem, three miles distant. The cylinder is 110 inches in diameter, and has a ten-foot stroke. The engine can raise 12,000 gallons of water 300 feet in one minute. Besides this large engine, there is a smaller one, just opposite, on the other side of the mine opening. The shaft is 18 by 15 feet. When these two engines were working, all the wells, for miles around the country, were dry, and the Saucon Creek a large river.

As the ore (calamine, smithsonite, and sphalerite) in this mine is near the surface, it is not, at present, difficult to work. The calamine is found in large quantities disseminated through the limestone. It is found mostly on the north side of the mine, where it is worked by a small force of men.

This mine has furnished, and will continue to furnish, the finest specimens of calamine (or silicate of zinc) known to the world. It is very often found in botryoidal and stalactical forms. It is not seldom that sheets or plates of calamine from two to three feet square and from one eighth to one fourth of an inch thick, and containing thousands of little crystals on the surface, are found between the crevices of the limestone. Again, it is found as a thin coating to the inside of a quartz geode. This ore is quite scarce at the Endy mine. It seems to have been replaced by the blende. The smithsonite or carbonate of zinc is found in white scales and in granular masses, coating calamine and blende. It is also more commonly found as a brownish earth, which hardens when dry. It is found near the center and along the west side of the mine. It has often been mistaken for clay. This is also mined at present by a small number of men. The sphalerite or zinc-blende is not mined. It is found throughout the mine, with pyrite disseminated through it. It is not met with in as large quantities here as at the Endy mine. Greenockite (sulphide of cadmium), hydrozincite, and goslarite (sulphate of zinc) are met with in smaller quantities. The sulphate of zinc is scarcely ever found. A considerable quantity of greenockite has been mined. It is found as a yellowish powder coating blende and limestone. It was formerly separated at the Bethlehem works.

The ore is conveyed in wagons from the mines to a wharf on the Saucon Iron Company's siding, about two miles from Bingen, on the Philadelphia & Reading Railroad. From this point it is forwarded to Bergen Point, N. J.

Zinc is reported to have been discovered in Lehigh County, at Coplay, and on a farm near Shinersville.

The Ueberroth mine was opened about 1850. The first person to announce the mineral was the well-known mineralogist, the late Prof. William Th. Roepper, of Bethlehem. He had strolled, one Sunday, through the farm of Jacob Ueberroth, and, finding several specimens of a crystallized substance, took them home, and afterward pronounced them to be calamine. His discovery led to the opening of the great zinc mines. Until the company failed, the ore was conveyed to the Bethlehem works. This company now obtains its ore (zincite and willemite) from Franklin Furnace, Sussex County, N. J. Works for the production of zinc oxide were built at Bethlehem about 1853. The Lehigh Zinc Company now owns a mine (producing zinc and lead) near Landisville, on the Pennsylvania Railroad, in Lancaster County, Pa. It is known as the Bamford zinc mine.

UTAH.

The bullion shipments made to Salt Lake City during the eleven months of this year amounted to $6,326,780. This assures a yield considerably in excess of that of any previous year, inasmuch as several steady producers are not reported in these weekly statements. The values, too, are fixed at local rates.

JUAB COUNTY.

WAR EAGLE.—A contract has been let to run a 186-foot tunnel on this mine. There is a tunnel of 130 feet in length already on the claim, and, with the 186 feet additional, the owners hope to tap the vein.

SALT LAKE COUNTY.

GERMANIA.—The Germania Lead-Works are now building a large structure, which will be completed in about a month, says the Salt Lake *Tribune*, for the purpose of increasing the manufacturing facilities. The company purposes manufacturing all of the products from the smelters into every conceivable article that can be made from lead. The company will begin refining bullion immediately, no work of that kind having been done at the works for at least a year past. Hereafter, but little if any bullion will be shipped East, as the company in doing its own refining and utilizing its lead can dispense with these shipments. The gold and silver will be sent to New York. The works now produce about fifteen or twenty tons of bullion daily, aggregating about $2000 in silver and gold and about $1000 in refined lead. Out of this lead, there will be manufactured, when the works are completed, lead pipes, white lead, red lead, granulated lead, test lead, litharge, solder, Babbitt metal, and also all colors that are used in paints. The company has recently erected a fine sampling-mill, where all of the sampling of ores bought from the different mines is done. There are no such works nearer than Omaha and San Francisco. The Germania works will be so perfect that the company will be able to take the ore from the mines, sample it, smelt it, refine it, and manufacture the lead into almost any article for which that metal is used. The company is shipping constantly large consignments of white lead, in the shape of pipe, and is supplying a greater part of the territory. About 100 men are employed, and when the additions are completed and the machinery erected, there will be work enough for 150 men. Three assessments have recently been levied, aggregating $40 per share. This will make the capital stock $500,000, full-paid. With the present increase in the business, there is no doubt but that the capital stock will be increased to $1,000,000.

SUMMIT COUNTY.

BALTIMORE.—The company is running a drift at its mine on Connor Hill. It is driving through solid rock. The tunnel is now 450 feet long, with very good indications.

TOOELE COUNTY.

COLUMBIA.—This company has recently been organized with a capital stock of $500,000 for the purpose of carrying on mining and tunneling, and business operations on the General Hancock, the Grampian, the Hughes, the King Philip, and the Powell lodes, in the Columbia Mining District.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Dec. 14.

The mining market this week presents but few items of interest. While the aggregate number of dealings exceeds that of last week, they were not characteristic of any new or important features. Northern Belle continues to decline, and to-day was quoted at its lowest price on this market. Iron Silver was in great demand, and regained its former strength, being held firmly throughout. Sonora was very actively dealt in and was a little weak. Amie was actively sold and was also weak. Eastern Oregon suffered a strong decline, and was not so largely dealt in as usual. A complete summary of the market is given below. The total number of shares sold aggregates 120,260, as against 110,538 last week.

The Comstock shares were quiet and were generally weak. California sold from 28@21c., with a small business. Consolidated Virginia was fairly dealt in at irregular prices; it sold from 40@31@34c. Sierra Nevada was weak, under a small business, selling from $3.70@$3.05@$3.40. Union Consolidated was also weak, selling from $3.45@$3@$3.05. Mexican sold from $2.60@$2.10. Ophir was strong under a small business, selling at $7. Hale & Norcross sold at $1.75. Sutro Tunnel was quiet and steady, selling from 15@16c.

The Leadville stocks were actively dealt in at about steady prices. Amie was irregular, with a very active business, selling from 12@9@10c. Chrysolite was quiet and a little weak; it sold from $1.35@$1.25@$1.30. Dunkin was steady, with a small business, selling from 26@28@27c. Breece sold at 16c. Iron Silver was strong, under a very active business; it sold from $1.85@$2 10, the transactions aggregating 14,350 shares. Leadville was strong, with a fair business, selling from 40@50@49c. Little Chief was quiet and steady, selling at 56c. Climax sold at 7c.

The Bodie stocks were quiet and steady. Bodie Consolidated sold at 70c. Standard was quiet and irregular, selling from $6@$5.75@$5.88. Bulwer was moderately dealt in at steady prices, selling from 40@45c. Goodshaw sold at 16c.

The Tuscarora stocks were very quiet and were steady. Grand Prize sold at 28c. to-day. Argenta was quiet at 10c. Belle Isle sold at 20c. Navajo was quiet and steady from $3.20@$3.25. Independente sold at 10c., under a small business. Elko Consolidated was quiet and steady, selling at 19@18c.

In the miscellaneous list, Alice was strong, under a small business, selling from $2.50@$2.80@$2.70. Green Mountain was moderately dealt in at irregular prices; it sold from $1.20@$1.10@$1.15. Horn-Silver was a little weak under moderate transactions, selling from $6.50@$6. Northern Belle continues to decline; it sold from 45@20@22c. under moderate dealings. Robinson Consolidated was quiet and irregular, selling from 30@34@32c. Sierra Grande was steady at 66@64@65c., with a small business. Silver King was strong, selling at $7.25.

Barcelona was quiet and a little weak, selling from 23@20c. Central Arizona sold from 24@20c., under a small business. Decatur was moderately dealt in at steady prices, selling at 4c. Durango sold at 8c. Eastern Oregon was quite weak under a small business; it sold from 44@14@16c. Harlem was moderately dealt in at irregular prices; it sold from $1.20@$1.10@$1.15. Sonora Consolidated was very active at irregular prices; it sold from 26@22@23c. North Mexican was quiet and strong, selling from 51@65c. Colorado Central sold from 40@35@39c., under a small business.

MEETINGS.

The Alice Gold and Silver Mining Company, Walker Brothers' Bank, Salt Lake City, Utah. Annual meeting of stockholders and election of trustees, January 14th, between ten o'clock A.M. and five o'clock P.M.

The Colorado Central Consolidated Mining Company, No. 25 William street, New York City. At the recent meeting of the Board of Trustees, the following trustees were elected officers of the company for the ensuing year: President, Paul Lichtenstein; Vice-President, Herm. R. Baltzer; Secretary, Paul O. d'Esterhazy; Treasurer, R. V. Martinsen; Superintendent, at Georgetown, Colorado, George W. Hall.

The Gold Cliff Gold Mining Company, No. 46 Cliff street, New York City. Annual meeting of stockholders and election of trustees, December 22d, at one o'clock P.M.

The Grand Central Mining Company, Youngstown, Ohio. Annual meeting of stockholders and election of trustees, January 15th, at eleven o'clock A.M.

The Lake Huron Silver and Copper Mining Company, North British and Mercantile Insurance Buildings, St. François Xavier street, Montreal, Canada. Annual meeting of stockholders and election of trustees, third Wednesday in January next, at one o'clock P.M.

The San Juan & New York Mining and Smelting Company, No. 70 Broadway, office of Spencer, Trask & Co., New York City. Annual meeting of stockholders and election of trustees, January 22d, at three o'clock P.M.

DIVIDENDS.

The Homestake Gold Mining Company, of Dakota, has declared its sixty-fourth dividend of $25,000, payable at the office of the transfer-agents, Lounsbery & Haggin, Mills Building, No. 19 Broad street, on the 26th. Transfers close on the 20th. Total dividends to date, $2,287,500.

The Mount Pleasant Mining Company, of California, has declared a dividend (No. 4) of twenty cents per share, or $30,000, payable December 15th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows:

The week has been a dull one. Friday morning last, the market touched $1.18, but was rapidly advanced to $1.17⅝, Saturday afternoon. Monday, it opened at $1.16½; and during the present week, it has gravitated between $1.18⅝ and $1.16. Meantime, the price of refined oil has advanced from 9@9¼c., and is now 9½c. bid. From the best information we get from refined oil men, the export trade for the past three months has been the dullest for any similar period for years. The visible supply in seven European ports is about the same, perhaps a little more, than this time last year; but there has been no year since 1875 when there has been so little refined oil contracted for, for future delivery, as now. Last year, there were about one million barrels more of contracts held by the foreign trade than at present. Low prices have prevailed in Europe this fall; but when their present supply is exhausted, they will become buyers, and as the refined interests, Standard, Tidewater, and others, are now united in action and interest, they can fix the price of refined at a figure that will be remunerative, and higher prices for refined may be expected.

There has been a great deal of discussion during the week in both the New York Mining Stock and National Petroleum Exchange and the New York Petroleum Exchange on the proposed consolidation of the two. In each, there is opposition on the part of a minority; but the prevailing sentiment seems to favor a union of forces, and the establishment of one strong institution. It is believed that the question of consolidation on each Exchange will be voted upon, on the 22d inst.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Dec. 8	$1.16¼	$1.17⅛	$1.16⅛	$1.16⅛	5,223,000
10	1.16⅝	1.16⅝	1.15⅝	1.15¾	7,379,000
11	1.16	1.16	1.14	1.14⅛	7,158,000
12	1.14¼	1.15	1.13⅝	1.14⅞	7,238,000
13	1.15⅛	1.15¼	1.13⅞	1.14	5,199,000
14	1.13⅝	1.14⅝	1.13½	1.14⅛	4,698,000
Total sales					36,895,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, December 13.

There is no improvement in the market the past week, and prices drag along with only slight variations, except for Quincy Mining Company, which shows a decline from $52@$49¾. Calumet & Hecla was quite firm during the week at $239½, until to-day, when it touched $239. Franklin, after selling at $12 last week, declined on small lots to $11¾, a round hundred being taken at $11⅞. There were no dealings in the other stocks on the list, there being not the slightest disposition to buy or sell for speculative account. The condition of the ingot copper market does not warrant any expectation of a rise in that direction, and consequently we may look for a dull market for some time to come.

There was a little more activity in the silver stocks but not enough to indicate a boom in this class, for the present, at least. Bonanza sold at $1 7/16, a decline of $\frac{1}{16}$. Harshaw, 50c. Crescent, 15c. San Pedro awoke from a long sleep, and sold at 12½@15c. Sullivan sold at 89@90c. at the regular Board, and as high as 94c. at the Mining Exchange. Silver Islet declined from $8, sales, last week, to $2½, and rallied again to $3.

At the Mining Exchange, some considerable activity has developed in Empire, and all the lots for sale at 25c. have been readily taken. This stock has always been rather a Boston favorite, and we should not be surprised to see it resume its old-time activity. Bowman was quite steady at about 14c. until to-day, when it declined again to 12c. Dunkin is in fair demand at 27@29c.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Dec. 7.	Dec. 8.	Dec. 10.	Dec. 11.	Dec. 12.	Dec. 13.
Albion	..	..	..	..	1	..
Alpha	1	..	..	..	1	1
Alta	1⅛	1	1⅛	1⅛	1¼	1⅛
Argenta	.05	..	..	..	.05	.05
Bechtel	..	..	..	..	..	..
Belcher	1	..	1	1	..	.90
Belle Isle	..	..	..	.30	.20	..
Best & Belcher	2⅛	2¾	3	2¾	2¾	2¾
Bodie	.75	80	.80	.80	.73	.75
Bullion	..	..	..	..	..	..
Bulwer	..	..	..	..	..	..
California	.20	.25	.25	..	.15	..
Challar	2	2	2¼	2⅛	2⅛	2¼
Con. Virginia	.35	.30	.40	.30	.30	.35
Crown Point	1	..	1	.95	..	..
Elko Cons	.20	.20	.20	.10	..	.05
Eureka Cons	..	2¾	..	3⅛	3¼	3¼
Exchequer	..	..	..	..	..	..
Gould & Curry	1⅛	1⅛	1¼	1⅛	1⅛	2¼
Grand Prize	.25	..	.30	.25	.25	.25
Hale & Norcross	1¼	1⅛	1¼	1⅛	1⅛	1⅛
Independence	..	..	.10	..	.10	..
Martin White	..	..	..	..	..	..
Mexican	2¼	2¼	2⅜	2⅛	2⅛	2⅛
Mono	..	..	..	..	..	..
Mount Diablo	..	2¾	..	2¾	3⅜	..
Navajo	3⅜	3¼	3¼	3⅛	3½	3⅜
Northern Belle	.10	.25	.15	.15	.15	.20
North Belle Isle	..	..	..	..	..	..
Ophir	9	8½	7¾	7	7¾	10
Overman	..	..	..	..	..	..
Potosi	.85	.80	1	.80	.80	.90
Savage	95	.80	1	.90	.90	..
Scorpion	..	..	..	..	..	..
Sierra Nevada	3⅛	3¼	3¼	3	3	3¼
Silver King	..	..	..	..	..	..
Tip Top	..	..	..	..	..	..
Union Cons	2⅛	2⅛	3⅛	3	2⅛	3
Utah	1¾	1¾	1¾	1⅛	1⅛	1⅛
Wales Cons	..	..	..	..	..	..
Yellow Jacket	1⅛	2⅛	2⅛	2	2	2

BULLION MARKET.

NEW YORK, Friday Evening, Dec. 14.

The silver market abroad has been weaker, under a diminished demand for India exchange; and here, it has been affected in addition by a lower rate for sterling exchange.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Dec. 8	50 13-16	110⅜	Dec. 12	50 13-16	110⅜
10	50 13-16	110⅜	13	50⅝	110⅛
11	50 13-16	110⅜	14	50 13-16	110⅛

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended December 14th, as compiled from various sources, amounted to $207,878, as against $288,000 reported for the previous week. The receipts from January 1st, 1883, to date are $11,026,321.

Foreign Bank Statement.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank gained £193,000 bullion, and the proportion of its reserve to its liabilities was raised from 42¼ to 43⅞ per cent, against 41⅝ per cent at this date last year. The weekly statement of the Bank of France shows a decrease of 2,308,000 francs gold and a loss of 4,480,000 francs silver.

Ten-Cent Coin for Hawaii.—The superintendent of the Mint at Philadelphia has been notified that the Hawaiian government desires to substitute a ten-cent silver coin for the twelve and a half cent piece origi-

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nally ordered, and has been granted authority to prepare a die in accordance.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of November.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.		$885,934
*Alta-Montana, G. L. S.	"		$10,625
*Belmont.	"	——	12,604
Bodie, G. S.	Cal.		199,859
Bodie Tunnel, G.	"		52,742
*Bonanza King, G.	"		426,967
*Boston & Montana, G.	Mont.		140,323
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah.		219,459
*Chrysolite, S. L.	Colo.	17,624	345,403
*Consolidated Bobtail, G.	Colo.		62,743
*Contention, S.	Ariz.		791,389
*Crescent, G. S. L.	Utah.		266,498
*Custer, G. S.	Idaho.		43,572
*Deadwood-Terra, G.	Dak.		388,562
*Derbec Blue Gravel, G. S.	Cal.		115,043
Dunkin, S. L.	Colo.		49,250
Evening Star, S. L.	Colo.		47,061
*Father de Smet, G.	Dak.	11,813	312,494
*Frisco M. and S. Co., G. S. L.	Utah.		$77,084
*Granite Mountain, S.	Mont.		323,523
Gunnell, S.	Colo.		58,828
*Halle, G.	S. C.		34,625
*Head Center Consolidated.	Ariz.		45,340
*Head Center and Tranquillity	Ariz.		89,108
*Hecla Consolidated, G. S. L.	Mont.	**	633,979
*Homestake, G.	Dak.		866,709
*Hope, S.	Mont.		82,060
Horn-Silver, S. L.	Utah.		2,737,200
*Howell S. and Mg. Co., G. S. L.	Ariz.	49,075	193,952
Idaho, G.	Cal.		150,642
*Independence, G. S.	Nev.		32,991
*Iron Silver, S. L.	Colo.		1,031,952
*Joculstita, S.	Mex.		‡258,959
*Kentuck, G. S.	Nev.		20,550
*Lexington, S.	Mont.	119,134	1,173,685
*Little Pittsburg, S. L.	Colo.	15,441	87,552
*Marguerite, G.	Cal.		74,622
*Martin White, G. S.	Nev.		136,317
Morning Star, S. D.	Colo.		84,428
Mount Diablo.	Nev.		428,250
*Navajo, G. S.	"		411,642
*North Belle Isle.	"		2,153
Northern Belle, S.	"		539,105
*Ontario, S. L.	Utah.		1,807,178
*Oxford, G.	N. S.		54,055
*Phœnix, G.	N. C.		21,009
*Pinal Consolidated, S. L.	Ariz.		181,485
*Plymouth Consolidated, G.	Cal.	77,366	450,456
*Satemo. G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		203,947
*Silver Cord, G. S. L.	Colo.		941,305
Silver King, S.	Ariz.		367,802
*South Yuba, G.	Cal.		37,272
Standard, G.	Cal.		963,619
Star, S.	Nev.		27,095
*Stormont, S.	Utah.		215,552
Syndicate, G.	Cal.		56,008
Tintic M. and M. Co.	Utah.		34,670
*Tip Top, S.	Ariz.		37,868
*Tombstone, G. S. L.	"		664,618
Wyoming Consolidated.	Cal.		31,541
Yellow Jacket, S.	Nev.		265,885
Total amount of shipments to date			$20,343,485

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Dec. 14.

Copper.—Business is very quiet, transactions being on a limited scale, with Lake at 14⅛@15c., Common outside brands, 14@14¼c., and the best of this class 14⅛@14¾c. Consumption appears to be fairly good, but we are approaching the end of the year, a time when manufacturers do not care to increase supplies of raw material. London is again lower, Chili Bars being cabled £57 10s., and Best Selected, £65. In spite of this decline, there are some inquiries at hand from abroad.

Tin.—There has been a bad break in this metal in London and here, due, it is said, largely to the increase in the production in the Straits settlements. According to dispatches to the Metal Exchange, London dropped from £84 on Wednesday to £83 on Thursday, and fell to-day to £82 10s. Here, spot Straits is 18⅝@18½c., with futures as low as 18¼c.

Lead.—Except a retail business in car-load lots, absolutely nothing has been done. Nominally, quotations are 3·60c., that figure being the one that it might be possible to get lead for, though for the time being there is little of it in the market. There is, however, no confidence in the metal, and there are few who would venture to advance any arguments in favor of an improvement.

Messrs. John Wahl & Co., of St. Louis, wire us as follows:

Our market is a little easier. Sales during the week aggregate 250 tons of Refined at 3·30c. Common lead is nominally the same as Soft lead.

Messrs. Everett & Post wire us as follows from Chicago:

Common and Refined lead are salable at 3·35c. Offerings are only moderate.

Spelter.—The dullness still continues at unchanged quotations, which are 4⅝@4½c. for Common Domestic.

Antimony.—Unchanged at 10½c. for Hallett's and 11½c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 14.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has published the following returns from 137 furnaces, of which 61 are in blast and 76 out of blast:

All grades.	Unsold stocks. Nov. 1.	Dec. 1.
Anthracite	24,599	16,063
Bituminous	38,078	39,976
Charcoal	38,520	39,787
Grand total	101,197	95,826

	Production. In Oct.	In Nov.
Anthracite	12,786	13,442
bituminous	36,829	37,883
Charcoal	6,319	6,102
Grand total	55,934	57,427

American Pig.—The market is quiet, transactions being limited to small lots to cover urgent necessities. There are frequent reports of sales at low figures; but they are so generally accompanied by exceptional circumstances that they can not be looked upon as representing average quotations. We hear of a sale of 5000 tons of Colebrook forge iron reported as having been sold at $17, delivered at works near the furnace. We quote Foundry No. 1, $20@$22.50, ordinary to choice; No. 2, $18.50@$19.50; and Gray Forge, $17@$19, all at tide-water. There have been some transactions in Bessemer pig at private terms. It has been a mystery how steel-makers could afford to pay the nominal figures hitherto current. Spiegel is dull, so far as actual transactions in the higher grade are concerned. We quote, nominally, $29@$29.50, with the market in buyers' favor.

At the Exchange, not a single transaction was reported during the week.

Scotch Pig.—The market is very dull and quiet, transactions being limited to small lots.

We quote ex ship and to arrive: Coltness, $22@$23; Langloan, $22.75@$23; Summerlee, $22.50; Eglinton, $20@$20.50; Glengarnock, $21.50@$22; Dalmellington, $20@$21.

Warrants at the Exchange to-day were 44s. 2d.

Steel Rails.—From four different quarters come reports that indicate a further weakening of the market. In Chicago, rails have been offered shading $35, delivered there by a mill which besides is unfavorably located in reference to that market. Here, there are rumors that contracts lower than $35 at mill have been accepted, and similar indications reach us from Philadelphia.

Old Rails.—We quote nominally $22@$22.50 for Ts.

Philadelphia. December 14.

Pig-Iron.—The only changes which have taken place in crude iron this week related to prices for some kinds of forge and foundry. A few days ago, several large transactions took place in inferior forge iron, and in consequence of this, some makers of brands which are called standard have been holding prices a little more firmly; but it is useless to try to advance prices at present; too many furnaces have heavy stocks on hand, and too many lots are offered on the market at buyers' terms. A few large consumers bought freely, but that demand seems to have been met, and at present there is no disposition to buy largely. Best grades of Foundry have sold this week at $21.50; some 25 to 50-ton lots sold at $20@$20.50. Numerous speculative inquiries are made, but the prices offered are too low to be accepted. Some authorities think that, on account of the smallness of stocks in second hands, an improving activity will take place in January, and they are willing to buy now, provided their offers are accepted. The strong companies are satisfied that nothing can prevent a strong movement, and are content with the present condition of things. Ordinary No. 2 Foundry sells at $19@$19.50. A little inferior is to be had at $18.50. Gray Forge, $18@$19 delivered. Nothing of desirable quality can be bought under $18.50. Two or three thousand tons have been offered on the market, and negotiations are pending, but prices asked are a little too high. In fact, if makers want to sell now for future delivery, they find it very difficult to move stocks above cost.

Foreign Irons.—Very little business has been reported this week. Some inquiries from Western parties are made; but it is doubtful whether more than $19.50 would be paid, and the nominal price is $20.50. A little Spiegeleisen has sold, and there are inquiries for large lots, but the best price to be had is under $29. Scotch Iron is selling very slowly, and buyers decline offers made from New York of lots of from 100 tons up.

Muck Bars.—From 600 to 700 tons of Muck Bars have sold from $32.75@$33.25.

Merchant Bar.—Considering the season, the demand for the past week may be called fair, but prices named are so low as to make it a matter of indifference whether mill-owners continue or not. Two or three mills will shut down this week; three or four country mills will certainly shut down; and it is said that others will follow next week. A very unsatisfactory trade is reported at country mills. The only good sales were of common iron, but prices are as low as 1·70c.

Sheet-Iron.—Local manufacturers of sheet-iron are reducing output, and are declining to make further concessions. Some large lots were refused, offers being too low, and nothing better can be done for buyers at present. The only demand is for thin sheets.

Nails.—Makers here report a rather slack movement, and jobbers backward as to next quarter's requirements. The action of the Western people has put a wet blanket upon this market. Nominal quotations, $2.80@$2.90; but buyers can make better terms. Offers are made at $2.60.

Plate and Tank Iron.—Several small sales were made this week at one tenth below usual quotations. Some manufacturers have inquiries in hand for next quarter's delivery, but can not secure business this month. There are offers for Plate at 2¼c. Shell sells in small lots at 2¾@3c. Flange, 3·80@4c. Fire Box, 5c.

Steel Rails.—There are rumors of inquiries for from 20,000 to 30,000 tons, but at present writing the orders have not been given out. Whether they will be placed before January is doubtful. Makers say that the restriction of output consequent upon the closing down of mills will prevent any further weakening tendency, and buyers who are offering $33 and $34 will be compelled to order at $35.

Wrought Pipes and Tubes.—A number of large orders have been placed within a day or two, and discounts are less.

Old Rails.—There are numerous inquiries from parties in the interior. Ordinary quotations, $22@$23.50 for Tees. Double-Heads, nominal at $25.

Pittsburg. December 12.

Rumors of the shutting down of mills, and the further restriction of the output of iron and steel, prevail throughout this section. Prices are weak and demand irregular. Standard brands of Forge are held at $17.50@$18. Sales of the Marshall iron have been made at about $16, and it is reported that some large lots will be quietly disposed of, and this has had an unsettling effect on prices. Cold-Blast Charcoal has sold at from $29@$32. Native ore coke iron, $18 for Foundry, and $17.50 for Forge. Muck Bar is offered at $32, with but little selling. Manufactured

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Dec. 8.		Dec. 10.		Dec. 11.		Dec. 12.		Dec. 13.		Dec. 14.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.50	.....	2.75	.....	.....	.....	.....	.....	2.80	.....	2.70	.....	1,100
Anie Con., Co.	.....	.....	.12	.....	.11	.10	.10	.09	.10	.....	.10	.....	13,500
Argenta, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	100
Bar. & Walker, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6 50	.....	100
Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.20	.....	.....	.....	300
Bodie Cons., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.70	.....	.....	.....	10
Breece, Co.	.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	800
Bulwer, Ca.	.....	.....	.....	.....	.40	.....	.....	.....	.45	.....	.....	.....	400
California, Ne.	.25	.....	.28	.....	.21	.....	.....	.....	.....	.....	.....	.....	1,200
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caribou Con., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Castle Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Co.	1.35	.....	.....	.....	1.30	1.25	1 25	.....	1.25	.....	1.30	.....	1,350
Cons. Va., Ne.	.39	.34	.40	.39	.38	.35	.33	.32	.33	.31	.34	.32	9,400
Crown Point	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deadwood-Terra, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.27	.....	.....	.....	.....	.....	.....	.....	.26	.....	.28	.27	2,950
Eureka Cons., Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.50	.....	250
Excelsior, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.06	.....	2,000
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.28	.....	100
Great Eastern, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.01	.....	1,000
Green Mountain, Ca.	1.15	1.10	1.20	1.10	1.20	1.10	1.15	.....	1.15	.....	.....	.....	2,500
Hale & Norcross, Ne.	.....	.....	.....	.....	.....	.....	1.75	.....	.....	.....	.....	.....	100
Hall-Anderson, N. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hibernia, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.00	.....	100
Horn-Silver, Ut.	6.50	.....	.....	.....	6 25	6.00	6.00	.....	.....	.....	.....	.....	1,150
Hukill, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independence, Ne.	.....	.....	.....	.....	10	.....	.....	.....	.....	.....	.....	.....	200
Iron Silver, Co.	2.05	1.85	2.00	.....	2.05	2.00	2.10	2.05	2.10	.....	2.10	.....	14,350
La Plata, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co.	.45	.40	.47	.....	.....	.....	.....	.....	.50	.....	.50	.48	1,275
Little Chief, Co.	.56	.....	.56	.....	.....	.....	.....	.....	.56	.....	.....	.....	500
Little Pittsburg, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moose, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	3.25	.....	.....	.....	.....	.....	3 20	.....	.....	.....	3.25	.....	610
Northern Belle, Ne.	.45	.....	.35	.....	.35	.30	.25	.....	.....	.....	.22	.20	1,910
North Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ophir, Ne.	7.00	.....	7.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	290
Plumas, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca.	.....	.....	.....	.....	6.00	.....	.....	.....	.....	.....	6.00	.....	310
Rising Sun, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson Cons., Co.	.30	.....	.34	.33	.34	.33	.32	.31	.33	.32	.....	.....	6,900
Saint Joseph's Lead.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sierra Grande, N. M.	.....	.....	.....	.....	.....	.....	.65	.64	.66	.64	.65	.....	700
Sierra Nevada, Ne.	.....	.....	3.70	3.15	.....	.....	3.05	.....	3.05	.....	3.40	3.05	1,450
Silver King, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	7.25	.....	.....	.....	100
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	6.00	.....	6.00	.....	6.00	.....	6.00	.....	5.75	.....	5.88	.....	565
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Dec. 8.		Dec. 10.		Dec. 11.		Dec. 12.		Dec. 13.		Dec. 14		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta-Montana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
American Flag	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500
Barcelona, G.	.28	.....	.....	.....	.28	.....	.23	.....	.22	.....	.20	.....	2,700
Bear Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'licher, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Big Pittsburg, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradshaw, S.	.....	.....	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Buckeye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, S.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bye and Bye	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calaveras, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
C'lav'r's W. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz'na, S.	.....	.....	.24	.....	.....	.....	.....	.....	.....	.....	.20	.....	600
Cherokee, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chollar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Climax, Co.	.....	.....	.....	.....	.....	.....	.07	.....	.....	.....	.....	.....	200
Colorado Central	.....	.....	.....	.....	.....	.....	.40	.....	.35	.....	.39	.38	450
Cons. Pacific.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crowell, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dahlonega, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.04	.....	.....	.....	.....	.....	.04	.....	.....	.....	7,500
Dunderberg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, G.	.....	.....	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Eastern Oregon	.44	.....	.34	.....	.....	.....	.....	.....	.20	.14	.16	.....	5,700
Elko Cons.	.18	.....	.19	.18	.....	.....	.18	.....	.....	.....	.....	.....	1,700
Enterprise	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fannie Barret	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Globe Copper	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Placer, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G	.....	.....	.....	.....	.....	.....	.....	.....	.16	.....	.....	.....	500
Granville, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	1.15	.....	1.15	.....	1.15	.....	1.15	.....	1.20	1.15	1.15	1.10	4,800
Hortense, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Imperial	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G.	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Lucerne	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	.....	.....	2 60	.....	.....	.....	.....	.....	.....	.....	2.10	.....	250
Miner Boy	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Mexican	.....	.....	.....	.....	.....	.....	.51	.....	.60	.....	.65	.....	1,100
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Parnell	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, G.	.....	.....	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Red Elephant, S.	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Ruby, of Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, S.	.....	.....	.....	.....	.12	.....	.....	.....	.....	.....	.....	.....	500
Sonora Con.	.25	.....	.25	.....	.26	.25	.25	.....	.25	.24	.24	.22	15,900
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel	.....	.....	.16	.15	.16	.....	.15	.....	.16	.15	.18	.....	4,200
Taylor Plumas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cons., G. S.	.....	.....	3.45	.....	.....	.....	.....	.....	.....	.....	3.05	3.00	1,100

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 67,660. Non-dividend shares sold, 52,600.

BOSTON MINING STOCKS.

	Dec. 7.		Dec. 8.		Dec. 10.		Dec. 11.		Dec. 12.		Dec. 13.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza D	.....	.....	1.60	.....	.....	.....	.....	.....	.....	.....	17 16	.....	100
Bowman Sil	.16	.14	.....	.....	.16	.15	.....	.....	.....	.....	.13	.11	6,944
Bruns. Ant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hec.	.....	.....	239½	.....	239½	.....	239½	.....	239¼	239¼	239	.....	32
Catalpa	.35	.....	.35	.....	.35	.....	.....	.....	.....	.....	.35	.....	600
Co. Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Contentm't.	.03	.....	.....	.....	.04	.03	.....	.....	.....	.....	.....	.....	2,000
Copper F'lls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,200
"Cusi"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deer Isle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Duncan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin	.30	.28	.....	.....	.29	.....	.....	.....	.....	.....	.29	.....	1,200
Elko Con	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Empire	.26	.24	.27	.23	.25	.....	.....	.....	.....	.....	.26	.25	11,000
Eureka Con.	.....	.....	3.63	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
Franklin	12 00	.....	11.75	.....	12.00	.....	11.75	.....	11.88	.....	.....	.....	150
Gila County	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hancock G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harshaw	.....	.....	.....	.....	.....	.....	.....	.....	.50	.....	.....	.....	50
Horn-Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Independ'ce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Qeen	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth	.....	.....	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Mass. & N.M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	300
Milton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn-Breck.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewabic	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pine Tree	.....	.....	.08	.....	.09	.....	.....	.....	.....	.....	.....	.....	2,000
Plymouth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy	50.00	.....	.....	.....	.....	.....	50.00	.....	.....	.....	49.75	49.50	43
Ridge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson	.30	.....	.....	.....	.31	.....	.....	.....	.....	.....	.....	.....	200
San Pedro	.15	.....	.15	.12½	.....	.....	.15	.....	.....	.....	.12½	.....	800
S'ra Grande	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Islet	.....	.....	.....	.....	.....	.....	.....	.....	3.00	2.50	4.00	.....	227
Silver King	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simpson Gd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pact.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan	.90	.89	.92	.90	.91	.....	.90	.....	.....	.....	.95	.....	2,000
Sutro Tun.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	100
Sycamore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	Dec. 7.		Dec. 8.		Dec. 10.		Dec. 11.		Dec. 12.		Dec. 13.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Argent	.18	.17	.19	.18	.19	.17	.19	.18	.19	.18	.17	.....	16,700
Arizona So.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Battle Mt.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buena	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calista	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati	.08	.....	.....	.....	.....	.....	.....	.....	.09	.....	.07	.....	2,750
Comprom'e.	.....	.....	.25	.....	.....	.....	.27	.....	.35	.20	.36	.35	4,194
Contention	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virg.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dauntless	.....	.....	.....	.....	.....	.....	.02	.....	.02	.....	.01	.....	4,700
Del Monte	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.16	.....	1,100
Eureka	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Girard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Governor	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	.....	.....	500
Grand Uni'n	.....	.....	.03	.....	.....	.....	.....	.....	.....	.....	.02	.....	6,100
Green Mt.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gunnison	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horn Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch	.04	.....	.05	.....	.05	.....	.05	.....	.05	.....	.04	.....	39,100
Iron Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Maud	.02	.....	.03	.....	.03	.....	.03	.02	.03	.....	.04	.02	15,100
Little Pitts.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L'g & D'y H	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Sheridan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North'n B'l.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Orion Pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palmetto E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn-Breck.	.04	.....	.05	.....	.04	.....	.....	.....	.....	.....	.....	.....	3,000
Permanent	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro Ex.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.02	.01	7,500
Potosi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rara Avis	.11	.....	.12	.....	.11	.....	.12	.11	.12	.....	.10	.....	5,600
Rara Avis E.	.07	.....

Iron 1·70@1·80c. Business is unsatisfactory, and large consumers refuse to place orders until after January 1st. The rescinding of the resolution of the nail-makers to suspend production has checked business, and given prices a downward tendency. Quotations are $2.40@$2.50, with offers at $2.30@$2.35. Wrought Pipes are quoted at 7 per cent off, and Tubes at 60 per cent off. A sale of Old Rails is reported at $24.50. Several offers are in hand at $23.50@$24. Steel Rails sell in small lots at $36. There are offers at $35, shaded. Scrap is dull. There have been no sales of crop-ends. The Homestead Bessemer Steel-Works closed down last Saturday, and the Edgar Thomson Works will probably close this week. A good many mills are working half-time. A change in the situation of the glass trade is expected in a few days. The coke pool is not yet settled.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 14.

Anthracite.

Under the pressure of very unfavorable weather, the market continues exceedingly dull, and there is a general uneasiness among sellers as to the near future. It is well known that there is not cordial co-operation among the companies, and there are disquieting rumors which are not calculated to inspire confidence among buyers or sellers. So far as the former are concerned, the companies could not more successfully have destroyed confidence had they gone to work deliberately to do it. The mismanagement of the trade during the summer and early fall is now bringing its fruit, though it is only just to say that the state of the weather has aggravated the evil beyond the fears of those who have most disapproved of the hesitating and illogical policy pursued. There may be some comfort in the fact that the companies are even now beginning to discuss January, although, so far as we can learn, no decision has been reached concerning the action to be taken. If negotiations drag as they did in reference to December, work has been begun none too early. We trust that the present condition of affairs may prove a warning that will be heeded—a hope that will probably be regarded by many as strongly optimistic.

Buyers, encouraged by past concessions, are expecting all sorts of low figures, and it is difficult to move them from a position which unbiased observers are quite ready to admit is warranted by the facts.

Pittsburg.

Railroad trade is flat on its back for at least three good causes: Railroads themselves are not large consumers; for their engines are not as busily employed as a month ago. Then the rail trade, giving employment at this point to the largest class of mills, is dead, and shutting down is the order of the day. Pan-Handle pits are working less than one third time on an average. Some work quarter-time and some large railroad pits are shut down altogether. Among the latter are the Duquesne Works of the New York & Cleveland Gas-Coal Company, near this city, on the Pennsylvania Railroad. They employ over 200 miners. The Mansfield Coal and Coke Company, Pan-Handle region, closed two of its works, and smaller concerns are following suit. Quoit-pitching along the Pan-Handle is pursued to an extent that clearly shows how many idle miners there are at present. Prices are nominally 6¼@6½ cents on the wall, but actually are whatever the necessities of the seller make them. Sales at 5½c., and even less, are reported. Another reason for this dullness is the warm weather. No domestic consumer is in a hurry for coal, and the yard dealers are disgusted. Still another reason lies in the fact that this is the "off" season of the year in other respects. New contracts on account of lake and gas and other orders do not come in until early next year. The present is the hibernating season of the coal trade here, and this restfulness is only intensified by the extreme dullness of demand from iron and steel concerns and glass-houses. In fact, the trade has not been in its present shape for years, and I trust will not pass through another such period for years to come.

River operators join their growl with that of the railroad trade. With second pool coal selling at 7c. and less at Cincinnati and Louisville, the cloud over this trade here has not even a silver lining. Work is fairly brisk at the pits, for the reasons outlined in my last, but stocks below and the mild winter, added to causes already enumerated, conspire to make December, 1883, a dismal epoch in the history of the river trade in this city.

Buffalo.

One of the great improvements of the Lehigh Valley Railroad on the Tifft farm was completed Saturday, and operated for the first time. The work referred to is the mammoth double coal-stocking trestle, which is 2100 feet long, and the largest of its kind probably in the United States. Cars are to be run upon the trestles, and their contents dumped on to an elevated platform, under which is a tunnel 1385 feet long. There are 275 gates in the platform; and when these are operated, the coal is to be spouted into cars running through the tunnel. There is room for 96 coal-dumps in the tunnel, and it is estimated that one car can be loaded every five minutes. The platform has a capacity for holding 150,000 tons of coal at one time, and the company will thus be able to keep a large supply on hand to meet any emergency.

Three large Clyde-built steel propellers lately arrived here from Scotland—in sections—via the St. Lawrence River and canals, Lake Ontario, the Welland Canal, and Lake Erie. At Montreal, on their arrival from sea, it became necessary to cut the hulls in two, and the sections were placed on pontoons, thus enabling them to be taken through the shallow canals on the St. Lawrence route. These vessels are to run in connection with the Canada Pacific Railroad from Algoma Mills, Georgian Bay, to Port Arthur, Lake Superior, a distance of 350 miles, and will be fitted up for passengers as well as for freight. They can not leave here now, of course, until next spring, although the work of reconstruction is nearly completed. They will receive their upper cabins and other appointments at some place in Canada. The two other boats of the line will be sent from Scotland at the opening of navigation in 1884. The names of the vessels are the Algoma, Alberta, and Athabaska.

Horsford's Acid Phosphate.

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DR. J. J. RYAN, St. Louis, Mo., says: "I invariably prescribe it in fevers; also in convalescence from wasting and debilitating diseases, with admirable results. I also find it a tonic to an enfeebled condition of the genital organs."

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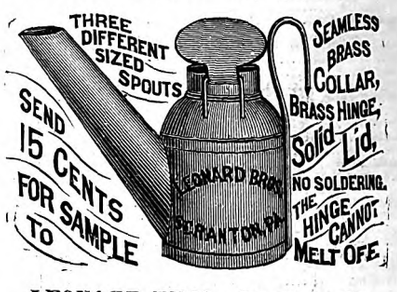
Iron and steel manufacturers, manufacturers using steam-boilers, smelters of ores, and others, are invited to examine the Process and inform themselves by seeing it at work upon a commercial scale. S. S. HENKLE, Pres.

TO INVESTORS.

The Keith Electric Company, having secured and paid for valuable patents covering a complete system of electric lighting, and having demonstrated the economy and reliability of their light, are now prepared to push its introduction with the utmost energy. For this purpose a limited amount of the stock is offered at $20 per share.

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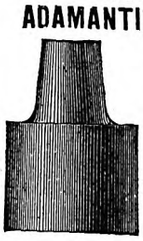


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HOMESTAKE MINING COMPANY, MILLS BUILDING, 15 BROAD STREET,
NEW YORK, Dec. 13, 1883.

DIVIDEND NO. 64.

The regular monthly dividend, TWENTY CENTS per share, has been declared for November, payable at the office of the transfer-agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on the 26th inst.

Transfer-books close on the 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

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CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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AUSTRIAN engineers are elated over the early completion of the Arlberg tunnel, in which the headings met on the 19th of last month. As compared with work at the Mont Cenis and St. Gothard tunnels, the Arlberg tunnel well illustrates the progress made in rock excavation through the introduction of power-drills and high explosives. Compared with the first-named enterprise, the advance of the heading was 2·6 times as rapid, and contrasted with the latter it was twice as fast. The original estimates of the engineers, as regards time of completion, were reduced in actual work by twenty-five per cent. The total length of the bottom heading is 10,259·4 meters, or 33,660 feet; in exactly three years, 9830 meters, or 32,251 feet, were driven, or an average of 9 meters, or 29·5 feet, per day.

A REPORT prepared by the Directors of the Richmond Consolidated Mining Company, for presentation at the meeting, shows that that company now holds upward of 10,000 tons of lead. Since the sale of 5000 tons in the summer of 1882, the company has not put any lead on the market. During the current summer, negotiations were repeatedly entered into, but the price then was not satisfactory. It has never fallen far below the figures which were then refused. Though not more than half of the stock is available here, it constitutes a standing menace to values which those in the trade should not lose sight of. One opportunity was missed this year, and it is not likely, therefore, that the chance of placing the metal as soon as there are signs of improvement will be allowed to go by.

THURSDAY last was one of the red-letter days in the history of American engineering, the occasion being the formal opening of the great cantilever bridge spanning the Niagara. Though as yet the official report of the experts—Messrs. GEORGE S. MORRISON, CHARLES MACDONALD, THEODORE COOPER, CHARLES LILIENTHAL, and THOMAS RIDEOUT—has not been made, it is understood that the tests made by them have been of the most satisfactory nature. Ten locomotives and eleven loaded gravel cars on each of the tracks started over the bridge stopping on each arm of the cantilevers and on the center truss. The maximum deflection when the trains reached the middle of the bridge was 6·75 inches. Apart from the principles of which the bridge is practically the first embodiment, the remarkable feature connected with it is the rapidity of its erection. Work was begun on the 19th of April, and in less than seven months and a half it was completed, the work being finished on the first of this month. The credit to be awarded is due mainly to the genius of C. C. SCHNEIDER, the engineer.

THE protracted sharp competition in the Connellsville coke trade, with its attendant evil of very low prices, has at last brought about the partial realization of a plan designed to remedy existing evils. For months, coke has been selling f. o. b. cars at oven at from 90 cents to $1 per ton. When it is considered that it takes fully 15 tons of coal to make a ton of coke, and that the cost of coking must be taken into account, it will be understood that the coal brought to surface is paid for at a rate less than 50 cents per ton. Such figures are well calculated to make the weaker producers uncomfortable, and there is some reason to believe that the strain put on them by hard times is purposely made greater. There has been a gradual but, it would appear, almost irresistible tendency in the Connellsville region toward centralization of interests, which low prices like those ruling are very apt to assist. But even at bed-rock prices, there has been a constantly shrinking demand, a state of affairs due principally to the stagnation in the iron trade. As a last alternative, the coke-makers have decided to restrict, stopping one day in the week, and making 72-hour instead of 48-hour coke. This amounts to a reduction of the output of 3600 cars per week, or approximately 15 per cent. More than two thirds of the 8400 ovens now in blast are included in this agreement.

THE labor question is one that may cause some agitation during the ensuing year, notably in Colorado. During the past few months, there have been local contests which may possibly be regarded as the forerunners of a more general discussion of the relations of employés to employers. The most intelligent of the latter shrink from the idea of any readjustment of wages, and many reject the possibility of seeking a reduction of cost of production in that quarter. It has been urged that the conditions in the West are wholly unlike those in the more thickly settled parts of the East, where there are many diversified industries and where there is a steady demand for labor in agricultural pursuits. In Western mining camps, it is pleaded, there is nothing but mining; the cost of the bare necessities of life are high, and there is no margin whatever for any reduction. The labor is such that it demands the highest physical development, the miners must be a picked body of men in that respect, and can and do claim wages higher than those of ordinary labor. There is, of course, much that is forcible in such an argument; but it does not weaken the power of hard facts. When any enterprise has reached the point where it becomes a question whether, in the interest of those who have embarked in it, it is better to suspend or to ask the employés to bear their share of the common burden, we believe that common sense will dictate the taking of the latter alternative. Under the circumstances, knowing the temper of their men, the majority of the mine owners of the West will be forced, however, to bring their miners to a realizing sense of the gravity of the situation by closing down, whenever they can do so.

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CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Morey & Sperry Pulverizer at the Welcome Mine, Deadwood, Dakota.

EDITOR ENGINEERING AND MINING JOURNAL :

SIR: The Deadwood *Times* of December 12th contained an article headed "The Welcome Mine," part of which was so utterly devoid of truth that we would thank you if you would allow us to make a correction of the same through your paper.

The Morey & Sperry Mining Machinery Company did make and furnish the Welcome Mining Company with splendid engines, boilers, and first-class machinery, including two 5-foot size Morey improved pulverizers, and a complete gold and concentrating plant.

When ready, all was started up, every thing working splendidly, as stated in the *Times;* but they then state, further, that in a short time they had broken the pulverizers all to pieces, and proved them to be worthless, which is utterly false.

We have seen a letter over the signature of the president of the Welcome Company, referring only to the breakage of a cage or carrier, and the second die, or wearing part, and stating that then the mill shut down, and the men were discharged; that the gold was showing well on the plates; and that concentrates assayed $100 per ton, or words to that effect.

There is not a stamp-mill in Deadwood that has not broken shoes and dies and cams lying around its mills. They do not, however, when their mine is paying, shut down their mills because a couple of wearing parts are broken: they put in others, and push the crushing.

We shipped with that plant several extra wearing parts. Why did not the Welcome Company put in others "that it had on hand," and continue to work if its mine was paying and if it had plenty of water; then order more wearing parts of steel, which can not be broken; as we offered it steel parts at twice the price of cast-iron, and it ordered the iron. No one can guarantee that cast-iron will not break.

Mine managers do not usually shut down their mine if they can make from $300 to $400 per day, if it does cost them a few dollars a day for wearing parts.

We have the further statement of the company's master-mechanic, who erected its mill, and to whom the Atlantic Steam-Engine Company gives a good name and reputation, as he was its foreman a number of years.

This gentleman states that he ran the mill about a week after erection to get it into running order, and that the pulverizers each crushed over thirty tons per day. Yours very respectfully,

JAMES D. SIPP,
Sec'y Morey & Sperry Mill Co.

THE MINES OF FRESNILLO.—I.*

Special Correspondence of the Engineering and Mining Journal.

An important memoir on the silver mines of Fresnillo has been recently prepared by Professor Silliman, for the owners, and printed for private circulation. It embodies a history of these famous mines; it reprints the references made to them by Duport, Burkart, and others, and contains summaries of the accounts taken from the official records of the companies which have worked them since 1841. This latter section is of peculiar value to the metallurgist, as it gives precisely the cost of treatment and the percentage of loss by the patio process at the Hacienda Nueva of Fresnillo; and it shows authoritatively what has been the actual yield of the ore of one of the large productive mines of Mexico. The document was evidently prepared for the purpose of affording capitalists the means of forming an opinion as to the advisability of reopening the deep workings. This being the motive for its publication, we are struck by the palpable honesty with which facts are stated and arguments and apologies withheld. If all mining enterprises seeking for public support at home or abroad were presented with the same candor, mining would soon be relegated from the domain of speculation to that of business reality.

We gather from the memoir that the Fresnillo mine is on a net-work or *Stockwerk* of silver-bearing veins which intersect the Cerro de Proaño, a hill with a circumference of only 3000 meters, and rising isolated from the plain to a hight of 350 feet. On this low hill, some twenty-one shafts are sunk, varying in depth from 30 to 420 meters, through which, in the palmy days of the mine, 900 tons of selected ore were raised weekly.

The mines were, according to tradition, discovered and superficially worked soon after the Spanish conquest—a fact likely enough, as it is certain that most of the large mines of Mexico, from south to north were known to the conquerors, and robbed by them of their most accessible mineral. It was either by dint of that keen instinctive scent for gold and silver which the Spaniard has always exhibited, sharpened by the cupidity which was the ruling motive of the followers of Cortez, or, more probably, owing to the mines having been already worked for native and easily reducible ores of silver by the Indians before the conquest; but certain it is that, within a generation, that little band of Spaniards had ferreted out all the great deposits of precious metals more effectually than our large army of prospectors has unearthed those of the Rocky Mountains within the same period of time. But the active exploitation of the Cerro de Proaño dates from 1750, when, for a few years, its principal veins were worked down to water-level. How to cope with the water was then, as it is to-day, the puzzling problem and the hinge on which profit or loss turns.

After the revolution in 1830, the mines were appropriated and worked by the State of Zacatecas, which in 1832 made them over, in return for a division of profits, to the Zacatecas-Mexican Company. As depth was attained, the water increased. The *malecates*, or horse-whims, though worked by 1500 horses, could not master it. In 1836, a 60-inch cylinder Cornish pumping-engine supplanted 35 horse-whims. Shortly after, another of equal power was added. But their combined capacity was insufficient in 1842 to unwater the lower workings, and they were replaced in 1844 by two new 80-inch cylinder engines, the old engines being removed to the reduction-works. The new engines permitted work to be prosecuted (in the Balena mine) to a depth of 400 meters. Matters prospered for many years thereafter under the management of Don José Gonzales Echeverria; but progress was interrupted by the political troubles of 1857–67. The accounts show a decline in yield. Echeverria was exiled. Politics occupied the attention of the rich, and the poor were drafted into the army, to fight their masters' battles. Meanwhile, the water obeyed its laws implicitly and filled the mines. Since then, the deeper workings have been flooded to a depth of 1072 feet; and as it is estimated that the cost of pumping will be $1000 per yard, the item of unwatering alone will amount to about $400,000. However rich, therefore, may have been the mineral in the bottom of the Balena and San Francisco shafts, it is easy to understand that no native organization would undertake to corroborate the old reports; and, reckless as is foreign capital, even during periods of speculative mania, it would hardly risk so large a sum on such a venture. But as much more shallow workings of reputed value were submerged, it would not be necessary to stake the whole amount in determining the character or the condition of the deepest workings. It may happen, and is not unlikely, considering the methods of Mexican timbering, as the workings are on an intricate net-work of veins in a decomposable porphyritic gangue, and have been under water since 1860, that they have caved in, and that therefore it may be cheaper to reach the ore in depth by a new shaft than to unwater the old one. The hopeful feature of the enterprise is, that as much as 300 tons weekly are still extracted from the hill, chiefly through the Amarilla shaft, from the fifth level, and that into the harder ground beyond the Cerro de Proaño the veins are known to extend and to be productive, but have not been exploited, owing to the greater cost of mining and crushing. The advent of the railroad with cheaper fuel and supplies will undoubtedly reduce these items of expense. Oxidized ores were found to a depth of about 200 feet; but they are now scarce. Beneath this decomposed layer, the ore carries sulphureted compounds of silver, with some native silver and more or less of the sulphides of the common metals. A peculiarity, however, which this region possesses with some others, as pointed out by Professor Silliman, and one which compensates for the extreme narrowness of many of the veins, is, that for from half a foot to 2½ feet from the veins the country-rock is enriched by impregnation with silver minerals to a grade equal to that of the vein-matter itself.

In the early days of the resuscitated work, 1830–33, Auld and Buchan put the value of the ore of all kinds at 8 marks 7½ ounces per ton—about 60 ounces. But the tabulated return given on page 66, from 1853 to 1862, shows that there were treated during that period 452,264 tons, and that the silver produced was 1,096,281 marks, or 2·42 marks per ton, equal to 17¼ ounces. During the same period, the cost of mining, including pumping, was $1.632 per carga of 300 pounds = $10.88 per ton, while the cost of metallurgical treatment was $11,169, giving a total of $22.04 per ton. The value of the silver produced was $9,825,595.68, or $21.72 per ton treated. This exhibits, therefore, a slight loss on working expenses; a loss accounted for by M. Ramosa, but still honestly published. The cost of mining and treatment shows, from year to year, considerable variation. The rise or fall in the column of mining, generally corresponding to a similar oscillation in the column of treatment, is probably due to the region of the mine whence the year's supply was drawn, the oxidized surface ore costing less for extraction as well as for reduction than the deeper more rebellious ores. The annual yield per ton also departs often from the average. Thus, while the average of the ten years shows a loss of $0.32 per ton, the result for 1856 shows the cost per ton has been $21.45, and the yield per ton, $23.44, or a gain of $1.99 per ton.

From Duport's notice of Fresnillo, reproduced in full in this memoir, we find that, from January, 1840, to October, 1842, the yield of silver was $49.18 per ton; but he incidentally remarks that, owing to better administration and reduced cost in all departments, ores too poor to be handled in times past were then beneficiated; and it may be that, in a still later period, the attempt to work up quantity may have been carried beyond the limits of economy; but nevertheless, the figures furnished leave no doubt that Fresnillo is not exempt from the law of depreciation in depth which seems to prevail so universally; for, according to Auld and Buchan, the yield in 1833 was 8 marks 7¼ ounces, say $60. According to Duport, it was, in 1840–42, $49.18. According to official account for 1853–62, $21.72. A sliding-scale unfortunately downward, which it would behoove all contemplating the reopening of deep mines to ponder over.

It is interesting to note the great reduction in cost through the introduction of steam. Even in 1832, when the mines were comparatively shallow, the lowest depth being but 40 fathoms, according to Auld and Buchan, the cost of unwatering amounted to $300,300 per annum, 300 men and 1500 animals being constantly employed at the *malecates*. They add, in advocating the application of steam, certain facts ascertained by comparing the work of horses on the Veta Grande with that of the steam at Bolaños, namely, that by the combustion of 832 pounds of wood, the same quantity of water was raised as by the labor of 48 horses for twenty-four hours at the *malecates*, or that the effect equal to that of a whole day's work of a horse at the *malecates* was obtained by the consumption of 17 pounds of wood; that is, by a less weight of fuel than the weight of the forage which the animal would eat in the same time. In those early days, in addition to the animals at the whims, 200 were employed in hauling ore and 500 in the reduction-works, or 2200 in all.

According to Duport, who wrote in 1842, when the building of larger engines was in contemplation, and the deeper workings were 800 feet from the surface, the cost of unwatering was $2934 a week, as against $5775 a week for unwatering in 1833, to a depth of 240 feet. In 1844, the cost of pumping with No. 2 engine had risen to $3250 a week. But from 1853 to 1862, when the two larger engines were in operation, the total cost of unwatering was only $1,100,301 per annum, or $2116 per week.

The price at which the railroad will be able to deliver coal on the Central Plateau is uncertain. If a brisk export trade should spring up

* *Sketch of the Great Historic Mines of the Cerro de Proaño, at Fresnillo, State of Zacatecas, Mexico.* 1883.

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between Tampico and England, coal should be delivered at that port for from $5 to $6. Tampico will be about 400 miles from Fresnillo. At two cents a ton per mile, the freight would be $8, and the total cost from $13 to $14. As wood now costs $7.50 per ton, there will not be much advantage in using English coal. But the coal-fields of Sonora will sooner or later be brought within reach of the great mines of Zacatecas, Durango, Guadalajara, and Guanajuato, and probably other and nearer sources of fuel discovered. Then, with cheaper fuel and cheaper supplies, it will not be necessary to alter present methods in order to render remunerative many a mine now bankrupt; for this important memoir, with its exact data, adds ample testimony to existing proof of the efficiency and economy of the patio process, when worked skillfully under proper conditions of climate and ore. J. D., JR.

NEW PUBLICATIONS.

SECOND GEOLOGICAL SURVEY OF PENNSYLVANIA. Vol. I 4. *Geological Report on Warren County and the Neighboring Oil Regions, with Additional Oil-Well Records.* By JOHN F. CARLL. With a Colored Geological Map of Warren County; Two Sheets of Oil-Well Sections; and a Map of the Warren County Oil Region. Harrisburg. 1883. Octavo, 439 pages. Price, including postage, $1.37.

The great interest and value of Mr. Carll's reports on the oil regions have long been acknowledged. His work has combined in a striking manner the patient accumulation of facts and the deduction of laws useful to practical operators, with the development of theories in geological history most suggestive and instructive to scientific geologists. The latter class is likely to receive the greater benefit; but that is not the fault of Mr. Carll. He has been, in fact, more earnest and active in the compilation of records, and the utterance of advice and warning to oil operators, than in his brilliant demonstration of the dynamics of the ice period and the reversal of the drainage of the country. But it almost seems as if the attitude of the "practical operators" were less favorable to his work now than when he began. The gambling spirit (which hates the precise truth, since it lives by uncertainties) was always rife in the petroleum business; but gambling in petroleum appears to have reached a hight, in the last two years, which it never before attained. One of its results is the desire on the part of those who bore wells not to furnish, but to hide or to misrepresent, the facts of their experience. Another result is the habit, bred by gambling, of looking at immediate consequences, short turns, artificial changes—any thing, in short, rather than the true condition of the oil business considered as a drain upon natural resources which can never be renewed. We have already commented upon the strange spectacle presented by this industry—reckless overproduction; ruinously low prices; hundreds of eager adventurers running a mad race of waste, as though it were a virtue to be first in throwing away for almost nothing the wealth that nothing would bring back. The approaching exhaustion of the oil-fields causes nobody to pause. "The trade" hoots at the warnings of the calm outside observer, who draws from the facts their inevitable conclusion; and, lest more facts should strengthen the force of the demonstration, the gamblers *hide* them at the time when they would be most valuable for public guidance. The facts are but cards in their little game; and they are not fools enough to show their hands! Well says Professor Lesley, in the introduction to the volume before us, "The next generation will gather from our oil history, with angry astonishment, a lesson of warning in political economy, only useless because it comes too late."

If any spectacle could illustrate the fallacy of the *laissez faire* policy in industrial matters, it would be, one would think, this amazing waste of wealth, without the raising of a finger of interference on the part of the government. If Pennsylvania were infected with the theories of free trade, one might understand this phenomenon. It could be plausibly explained as a consequence of the belief that every industry should be let alone. But that is not the heresy of Pennsylvania.

When Mr. Carll gave to the world his reasons for apprehending relatively early exhaustion of the oil regions—every one of which reasons remains in force to day—there were many sneers at scientific theorists; and when, not long after, some immensely productive wells were opened in Cherry Grove, there was a general outcry of triumph, as though this discovery had overthrown all Mr. Carll's conclusions. But the new bonanza was speedily exhausted. The Jamestown well began at the rate of 200 barrels on May 17th, 1882; by the 28d, it had reached a daily yield of more than 1000 barrels; and its maximum of 2000 barrels was attained about the middle of June. By the latter part of August, the product of the district was probably 40,000 barrels daily. In September, it began to decline rapidly; in December, it was between 2500 and 3000 barrels a day; of the 405 wells which had been bored, 22 had always been dry, and of the 383 productive ones, fully two thirds had ceased to yield oil; and the product of the original Jamestown or "Mystery" well had sunk to less than one barrel per day. Professor Lesley says:

"The recent discovery of an abundance of oil stored away in a small area south of Warren, which produced so disastrous an excitement, and added such a pile of fuel to the gambling fire of the oil exchanges, seemed at first to overthrow the scientific conclusions of the survey. But the small extent and rapid exhaustion of this pool of oil have shown the soundness of our acquired knowledge; for it is merely a repetition of what has happened before and what may happen again. It is not from such local pools that the vast demands of trade are to be supplied. Spurting and flowing wells are no longer marvels of nature calculated to upset the principles of geology, and therefore to let loose the demon of unreflecting speculation upon the community. The figures given in this report will satisfy reasonable people that such events are mere ripples in the stream of oil production, and, if they affect the market, are made to do so by shrewd and heartless monopolists for their own purposes. It is equally manifest that violent fluctuations of the market would be impossible but for a still prevalent ignorance of the geology of petroleum, and an equally prevalent epidemic of the gambling spirit."

The account given by Mr. Carll, on page 366, of the proceedings connected with the "Mystery" well, affords a graphic illustration of this spirit. The drillers, oath-bound to secrecy; the picket-lines and patrols guarding the premises night and day; the plugging of the well after oil had been found in it; on the other hand, the scouts who filled the neighborhood, "scanning the derrick and tools with field-glasses, examining the stream below for indications of oil, listening to hear if any flows occurred, and hoping for an opportunity to steal in unobserved or to bribe some one of the guards"—these are dramatic elements. After Pennsylvania shall have fooled away her oil, such scenes will at least be material for the novelist as well as the moralist.

Mr. Carll's report is accompanied with maps, and a statistical chart of great interest, showing the annual product of oil, by districts, in Pennsylvania and New York, the average price per barrel of crude oil at the well for each year, and other data, from 1859 to the close of 1882. Not only the decrease in price from $9.87½ in 1864 or (not to regard these war prices) $3.64 in 1872 to $0.78¾ in 1882, but also the rise and fall of each district, may here be read at a glance. It is pathetic to note on the chart the appearance, increase, and diminution of one color after another, symbolizing the rapid development and premature exhaustion of a new territory. Oil Creek, Pithole, Tidioute, Butler and Armstrong, Clarion, have waxed and waned. Even the marvelous product of Bradford, 22,300,000 barrels in 1880, and 23,000,000 barrels in 1881, had fallen in 1882 to 18,000,000 barrels; and the grand total of 1882 was swelled to 30,460,000 barrels, as against 27,238,000 in 1881, only by the short-lived spurt of Cherry Grove (increasing the yield of Warren and Forest from 440,000 to 3,300,000 barrels), and the large contribution of Allegany, New York, which rose from 600,000 to 6,450,000 barrels in the latter year. Meanwhile, the ever-increasing stock on hand—amounting at the end of 1880 to 18,928,430; a year later to 26,019,704; and at the end of last year to 34,596,612—gives solemn proof of the uselessness of this reckless production. This chart, pasted on the wall, should be intelligible to President Belshazzar of the Standard Oil Company, even without the aid of a second Daniel come to judgment for its interpretation.

DANGER FROM SIGILLARIA IN COAL-SEAMS.

In an interesting paper read before the Manchester Geological Society by Mr. George Wild, it was stated that there was much doubt in the minds of many persons whether the casts of the trunks found in the roofs of many of our coal mines, and known to the miners as "pot-holes," were really organic casts of plants, or were due to gases escaping from the decomposing and probably liquid mass of matter forming the coal, in the form of bubbles, which, bursting, would let in the soft covering of muddy sediment or roof, forming a cast surrounded by a film of carbonaceous matter. That hypothesis might be very sparingly allowed to account for some of the irregular casts that were sometimes met with; but there was no doubt that other causes were in operation, playing an important part in determining the shape of the bastard "pot-holes." He did not, however, intend to advance any definite opinion as to short crumpled-topped holes from which the cast had dropped, but he would briefly allude to the more perfect ones. It had been his duty for a long time, as it was of all colliery managers, on scientific grounds.

That the growth or presence of roots and rootlets in the seat of a seam of coal had unstratified the shale, most old sinkers will admit, especially in strong ground, where planes of stratification or floor-partings were eagerly sought for to assist in making way for the measuring tapes. He thought no colliery manager could with advantage ignore geological phenomena indicative of a danger the creation of which was in no way due to either unskillful planning or negligence on the part of any one connected with colliery operations. By the observation of these phenomena, accidents were more likely to be avoided in the many contingencies that had to be guarded against underground. It behoved them, therefore, to take advantage of every means that presented itself for detecting so treacherous a foe as the hidden "pot-hole," or the silently yet suddenly falling slickensides in the roof of a coal mine. The basis of these stool-bearing trunks could be recognized, not only by the roots themselves, but the crucial and quaternary divisions which were seen directly under the base of the pot-hole, where the stigmarian punctures were almost obliterated. Had it been only possible to detect these objects by the features simply of the upper surface, then no economic value would attach to a knowledge of their form further than they already possessed—that their separation from the surrounding strata by a film of coal, and their upward taper, rendered them dangerous to work under.

The conclusion that these short portions of trunk had in most cases been hollow to the level of the seam of coal with which they had become incorporated, was borne out by the fact that often the deposit of fishes' scales, teeth, spines, etc., and bituminous shale on the top of the seam, had been continuous almost evenly with the roof through the hollowed trunk—a circumstance easily accounted for when under the same depth of water as the surface of the seam, and sufficiently decomposed to have become hollow. Many objects of interest were to be met with in the roof, as well as its being that part of the underground workings requiring the most attention from both workmen and officials, and assuredly it would not be beyond the duty of the highest official to examine the various features which presented themselves. The aim of the paper was not only a small contribution to science, but also to the mining interest generally, in the avoidance, however slight, of one or more of the greatest sources of danger attaching to coal mining, a matter of no little importance to both employers and employed.

A NEW SAFETY-CAGE.—The tests with a new safety-cage, recently made at Falkenau's iron-works, Leadville, Colo., were witnessed by a large number of mining men. The results were entirely satisfactory to every one present. Mr. Falkenau has also devised a safety-hook, which will automatically detach the cage from the cable if drawn up into the sheave. The device was pronounced excellent.

THE Pittsburg & West Virginia Railroad has purchased one of Hasenzahl's diamond-bit rock-drills for prospecting purposes. Mr. Hasenzahl has also recently furnished the McNabb Coal and Coke Company, of Chattanooga, Tenn., with a special size of his drill. The machine is adapted to boring two sizes of holes, 1¼-inch and 3¼-inch, and is furnished with two diamond bits and boring tools, hose, force-pump, and tool-rods all complete, for going to a depth of 500 feet. The McNabb Coal and Coke Company will use it in prospecting on its lands on Walden Ridge, Tenn.

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SKETCH OF THE METALLIFEROUS DEPOSITS OF FLINTSHIRE AND DENBIGHSHIRE, WALES.*

The counties of Flint and Denbigh form the northeastern portion of the principality of Wales. They are largely productive of lead and zinc, in the mining and smelting of which a considerable proportion of the working population is employed. Mr. Davies, a well-known writer on metalliferous deposits, has added a contribution to our literature of the subject, which is of particular interest to American miners, who, during the past few years, have had so much to do with deposits in limestone formation.

The oldest known strata of the two counties are the lower Llandeilo or Arenig beds, followed by a succession of strata which, by our school of geologists, is looked upon as the Llandeilo series proper. They are capped by a dark fossiliferous limestone. This series of strata forms the great mineral horizon of the Silurian strata of Wales and the borders. It is in these strata that the lead mines of Carnarvon, Merioneth, Montgomery, Cardigan, Carmarthen, Pembroke, and Shropshire are worked, though in Denbighshire no lead mines have as yet been successfully developed in the group. Then follows a series of strata known in North Wales as the "Bala," and in Shropshire as the "Caradoc" group. Above, come the Llandovery beds, very fossiliferous strata, which are capped by a series of pale shales and slabs known as the Tarannon shales. These are followed by the Wenlock shales, forming the lowest, and the Denbighshire grits, forming the upper portion of a series of rocks of vast thickness in the aggregate. Above the latter, comes a deposit which in Denbighshire seems to represent some portion of the Devonian strata, and then the most important member of the stratigraphical series is reached. It is the "Mountain" or Carboniferous limestone of North Wales. This limestone is covered by a series of sandstones, chert, and pebble beds, thin limestones and shales, which collectively are taken to represent the millstone grit capped by the Coal Measures.

The lowest division of the Carboniferous limestone is a series of white-colored limestones, ranging in thickness from 70 to 130 yards. They contain metallic ores to the extent and in the manner to be described. The second division consists of a thick series of pale cream, pink, and gray-colored limestones, from 100 to 170 yards thick, which form the most usually productive ore-bearing group of any of the limestones. As a rule, these two lower divisions thicken in their progress northward. The third division is exceedingly rich in the remains of former sea life, but, save for the "flats" that are formed on their uppermost surfaces, they are barren of metallic ores. Above the dark fossiliferous limestones and shales, a series of calcareous sandstones in the lower part lead up through a succession of red, yellow, and white sandstone beds to massive white grits over twenty-five yards thick. The latter, in their turn, are overlain by a limestone bed, seven yards thick, and cherty rocks capped by shales and sandstone. Both the limestones and the overlying sandstones are traversed along their whole course by numerous fissures or cracks. No less than 170 are laid down on the maps of the Geological Survey, though this number does not probably nearly represent the entire quantity. About 160 of those already observed have a general east and west direction, ranging, however, from N. E. to S. W., and from N. to S. E.

These fissures are of two principal kinds. First, there are simple cracks of greater or less width, which seem to have been formed by the contraction of the rocks as they dried and hardened. The greater part of the fissures ranging on either side of E. and W. are of this description. Secondly, there are fissures that follow lines of displacement of the strata. These have two principal directions: first, north and south; and secondly, east and west, or rather from northwest to southeast. Those running north and south are known as the great "cross-courses;" and the strata are generally thrown up by these to the east, although there are a few exceptions to this rule. In the east and west lines of displacement, the upthrow is usually to the south.

The north and south fissures travel long distances. One extends from near the great east and west Minera fault, south of Llanarmon in Yale, to the sea, a distance of fifteen miles, and is known among the miners as the "hell-gallop" cross-course. As this fissure passes along Halkyn Mountain, it has a width of from ten to fifteen feet.

There are one or two other roughly parallel faults, but these do not extend to so great a distance. The east and west fissures of the first class traverse short distances; but those on lines of displacement—as the great Minera fault—may be followed for many miles.

In point of age, the simple cracks or fissures seem to be the oldest, because they do not often pass upward through the shale. The north and south cross-courses come next. They pass up to the surface. Then come the great east and west lines of displacement, which appear to be the latest in time, inasmuch as, taking all the faults of the region into consideration, they displace whole groups of north and south faults.

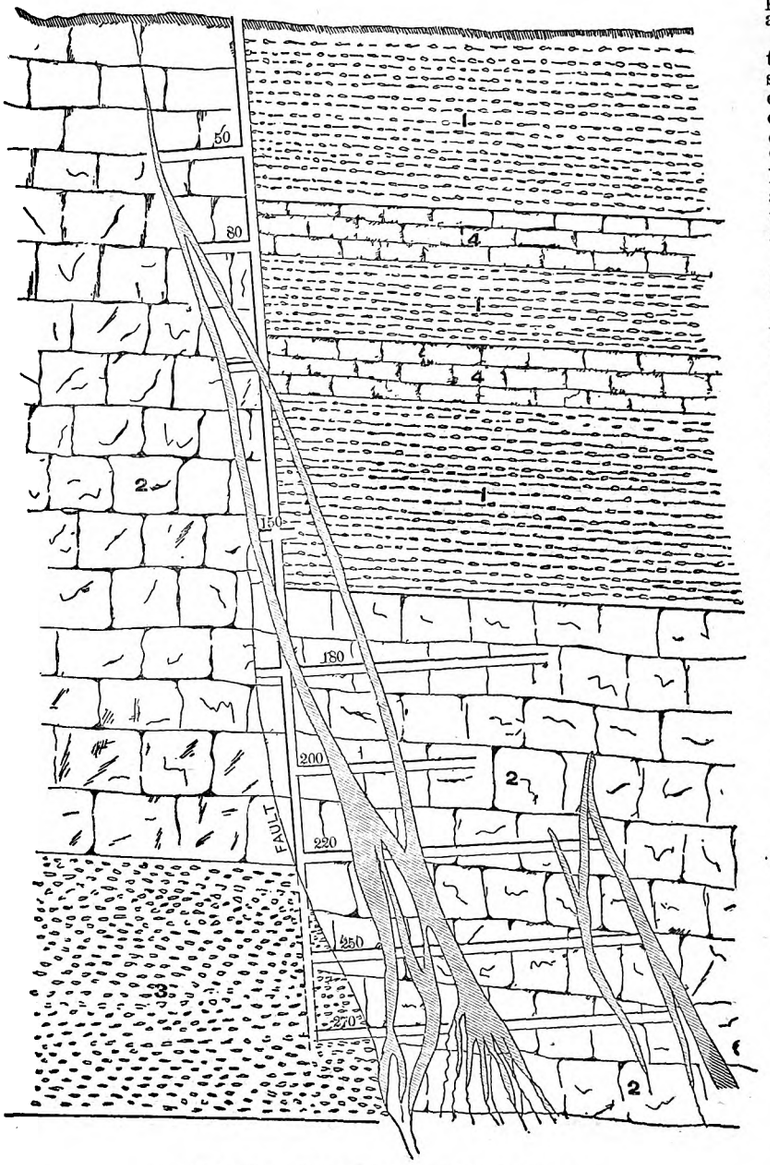


FIG. 8.—MINERA LEAD MINE.

1. Millstone Grit. 2. Carboniferous Limestone. 3. Shale Beds. 4 Limestone in Millstone Grit.

From the fact, probably, that these cracks and fissures in strata generally have "led" explorers in past times to hidden deposits of wealth, has come the name "lead" or "lode," by which they are known in mining language, and by which they may now through the remainder of this article be named.

The east and west lodes, comprising the whole group having this general direction, vary in width from six inches to as many feet. They are, as a rule, narrowest as they pass through the lowest compact limestones, and as they traverse similar beds in the overlying group. They open out where a bed of softer rock or a succession of thin beds comes in, especially where the calcareous matter is partly absent, and the rock is made up of sandy material. They are wide, but disordered as they pass through shaly or clayey beds. They open out into "flats," as we shall see, at the junction of sandstone with limestone beds. They are disordered, or lost downward, when the underlying old red sandstones and shales, or the Silurian strata, are reached; and for the most part, they are lost upward when they reach the shale. They generally dip or hade toward the north, but their inclination varies as they pass through different strata, and they are sometimes deflected from a straight course as they pass through beds of shale and marl.

Branching out from the main lodes are "fliers," or subsidiary cracks. These sometimes die out and are lost as they are followed into the adjoining strata. Sometimes they meet with other cracks that start from a distant part of the lode, and sometimes, making a little bend, run roughly parallel to the main lode, and in a short distance rejoin it.

The cracks that diverge at the greatest angle from a main lode are probably of the same age as the latter, while those that are more or less parallel to or curve round to meet the main lode are of a later date. More especially is this the case with those that occur on the upper or "hanging" side of a lode. These latter are due, probably, to the falling away of the strata by its own weight from the superincumbent rock into part of the space formed by the main fissure.

Besides these true fissures or lodes, there are other two varieties of depositories of metallic ores which we have to consider. These are, first, "flats;" and secondly, "pockets," "vuggs," or "ore-chambers."

The "flats" are of two principal kinds. The first class consists of those that occur at the junction of two dissimilar beds of rock. There are two distinct horizons at which "flats" of this kind occur. The lowest is found at the base of the grits, lying upon the dark uppermost beds of the main limestone *E*, and the uppermost in the chert, overlying the limestone band of Fig. 1.

In both cases, between the limestone and the overlying sandstone, there is a thin parting of shale or clay, which is softer than either the limestone or the sandstone. On both sides of the more or less vertical fissures or lodes, and to a distance varying from two or three to thirty and even forty yards, the sandstone has been decomposed to a hight of two or three feet. This decomposition may have taken place in the following manner:

* Abstract of a paper from the January, 1883, number of *Y Cymmrodor*. By D. C. Davies, F.G.S., author of *Metalliferous Minerals and Mining; Slate and Slate Quarrying*, etc.

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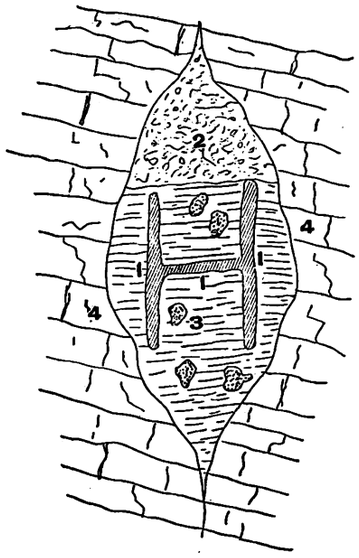


Fig. 4.—"Swallow" in Prince Patrick Mine.

1, 1. Galena. 2. Lime. 3. Clay. 4. Middle Limestone.

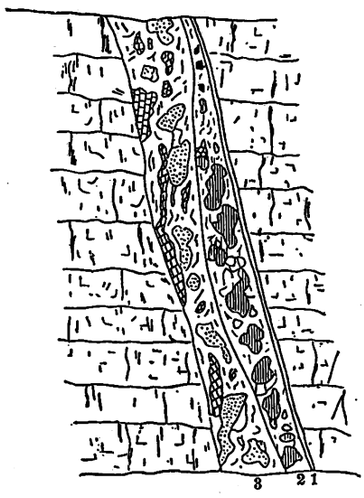


Fig. 7.—Talargoch Lode.

1. Thin Shale. Blende with Lime and Spots of Lead. 3. Fragments of Lime and Chert in Carbonate of Lime with Bunches of Lead Ore.

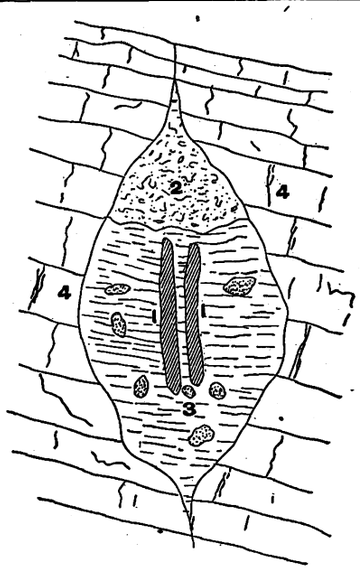


Fig. 3.—"Swallow" or Long Flat in Prince Patrick Mine.

1, 1. Galena. 2. Lime. 3. Clay with Lime. 4. Middle Limestone.

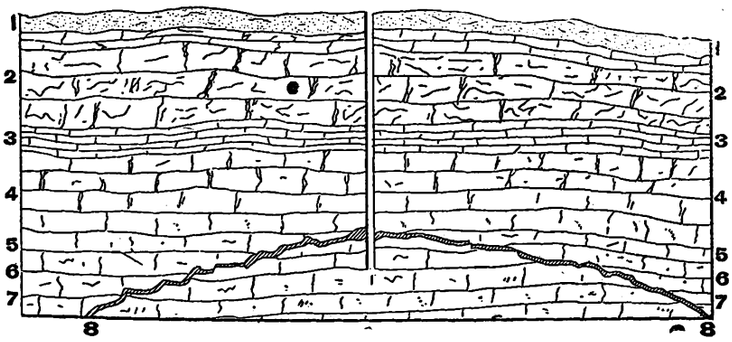


Fig. 2.—Flat Lode at North Hendre Mine.

1. Drift. 2. White Limestone. 3. Bluish-Black Limestone. 4. Black Limestone. 5, 6, 7. Lead-Bearing Limestones. 8. Flat Lode.



Fig. 6.—Carbonate of Lead Deposit at Queen of Mountain Mine.

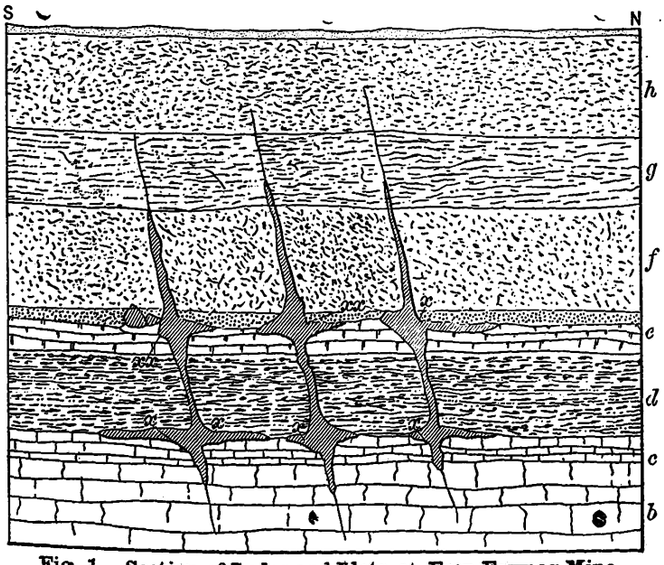


Fig. 1.—Section of Lodes and Flats at Fron Fawnog Mine.

b. Middle Limestone. *c.* Upper Dark Limestone. *d.* Grit Beds. *e.* Thin Limestone. *f.* Chert beds. *g.* Shales and Sandstones. *xx.* Upper Flat. *x.* Lower Flat.

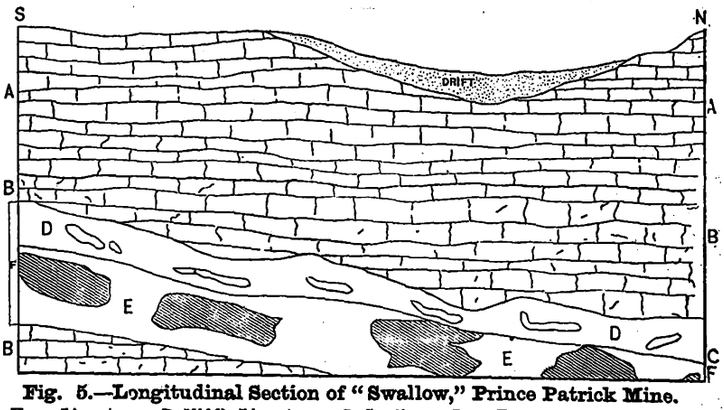


Fig. 5.—Longitudinal Section of "Swallow," Prince Patrick Mine.

A. Upper Limestone. *B.* Middle Limestone. *C.* Swallow or Long Flat. *D.* Carbonate of Lime with Pockets of Clay. *E.* Clay. *F.* Runs of Lead Ore Shaded.

The cracks are more restricted in passing through the limestone than they are as they traverse the sandstone. Therefore, a column of water passing through the overlying sandstone would be partially arrested when it reached the limestone; and, assisted by pressure from above, would gradually soak along the line of soft parting, softening it and the the overlying sandstone immediately adjacent; and in process of time, either washing it away or reducing it to the consistency of mud, would prepare it to receive the deposition of any heavy substances the water might bring with it.

Flats of this description resemble most nearly those occurring in the carboniferous limestone of the North of England, with this difference—there, it is the limestones themselves that are eaten away, while in Flint

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and Denbigh the limestones are intact, and the overlying sandstone has been removed. Thus, the three "flats" that are found in the great limestone of the North occur in beds of limestone that are parted by thin layers of shale. This difference is accounted for by the fact that in the North the limestone is overlain by "sill," or hard shale, but in Wales by sandstone, more easily acted upon by water.

The "flats" of both districts have, however, this fact in common—they occur only in connection with fissures or lodes traversing the strata in which they occur, and they are not found except in this connection.

The second kind of "flat" occurring in the district we are considering partakes more properly of the character of a flat crack or lode. An example of this kind is seen in the North Hendre flat, Fig. 2. It would seem as if the beds below had either shrunk by contraction, or sunk through the giving way of some lower bed, thus causing a crack like that we often see in a wall built on a poor foundation. The crack has been enlarged in the course of time, and subsequently filled with its present contents. It will be seen that this flat occurs at a much lower horizon than those we have just noticed.

A third form of "flat" is conceivable where a crack coming down on a shale-bed runs some distance down it, and then strikes downward at some weak point of resistance. In such a case, the shale-bed is gradually removed, and the space subsequently filled with metallic and other minerals.

We now come to notice the class of ore-deposits known as pockets, vuggs, cavities, or ore-chambers.

Any reader who is familiar with the limestone beds we are considering, as they are worked in quarries along the course of the belt, will have noticed that there are, in the middle and lower divisions, irregularly shaped masses of rock of a different character and composition from the rest of the beds. They are marked by a comparative absence of lime and a preponderance of sand in their composition. They occur in all stages of decomposition, and are mostly of a brownish color, from the presence of iron. In places, this loose sandstone is full of small cavities. Again, it is partly washed away, especially where cracks come down upon it and lead away from it. The result is caverns in the incipient stages of their formation.

Where water has had free ingress and egress to these deposits, the result is a cavern. Where, at some period, the egress has been closed, or partly so, the result is a pocket more or less filled with clay, carbonate of lime, and brecciated or conglomeritic fragments of limestone, in which metallic ores may also be found.

Such cavities also occur along the north and south lines of fracture, where the rock on both sides of the main crack is shattered. A succession of these is seen along the cross-course west of the Park mines, Minera, and from Halkyn to Holywell.

It will be borne in mind, however, that, in order to transform a cavity into a pocket which may contain metallic ore, the outflow of water must, if not altogether stopped, be checked and rendered very slow.

Locally, the name of "flat" is also given to these pockets when they contain lead ores, as in the case of the extensive one at the Prince Patrick mine, Halkyn.

The whole of the fissures, cracks, flats, and most of the cavities, just described, have during the course of time become filled with substances which may be broadly classed into two kinds—earthy and metallic.

Strictly, speaking scientifically, some of the earthy materials have a metallic base, and are known in mineralogy as belonging to the metallic elements; but the word earthy is used here in a practical sense, to distinguish the ordinary matrices of the metallic ores from these ores themselves.

The earthy filling of the fissures and cavities is almost made up of the materials forming the strata the fissures pass through, or in which the cavities occur. They appear in two principal forms. First, as fragments of the adjacent rocks cemented together in a conglomeritic or brecciated form, and secondly, in an altered and redeposited form. Thus, the calcium of the limestones occurs in crystals and masses of carbonate of lime. The silica of the sandstones occurs occasionally as quartz, and commonly as re-formed masses of fine sandstone. The argillaceous matter of the shales and limestones takes the form of stiff glutinous clay; while the rarer constituents of these strata, as fluorine, baryta, give the coloring to the commoner substances, or are attached to them. The earthy filling is also affected in character by the particular strata in which the openings occur. The materials have, more or less, a banded or stratified appearance, running roughly parallel to the walls of the lode. This description applies principally to the lodes having a general direction east and west. The great north and south fissures have a different filling. Thus, the "hell-gallop" vein—the long cross-course that extends from Llanarmon in Yale to Holywell—is filled chiefly with a calcareous clay, which in places becomes a true clay, and in others presents the appearance of great masses of carbonate of lime; and in these substances there are imbedded boulders and splinters of the adjacent rocks. The "pockets," or great cavities, are also similarly filled with clay and carbonate of lime. A good example of the way in which this earthy filling occurs is seen in the workings at the Prince Patrick mine as shown in Figs. 3, 4, and 5. As a rule, the clay occupies the lower part of the cavity and the carbonate of lime the upper part, but there are also inter-stratifications and interlacings. The clay in these cases is of a bluish-brown color, generally less brown than blue in the vicinity of lead ore; and the carbonate of lime is found, first, as pure white crystalline masses containing over 99 per cent of carbonate of lime, and, secondly, as gray compact masses of the same, and less pure.

Throughout portions of these earth materials, are distributed the ores of several useful metals. It is with the ores of lead and zinc, and the contained silver, that we have now principally to do; and these I now proceed to describe.

The common ores of lead, as found in the carboniferous strata of the two counties, are the sulphide and carbonate.

Many examples of the combination of lead with other substances also occur in the district, but more rarely, and not in quantity. These are therefore more of interest to the mineralogical student, or for museum purposes, than important commercially, or for the practical purposes of this paper. I therefore proceed to notice the conditions under which the two common ores just described occur, beginning with galena or blue ore. The east and west lodes, including in this term the lodes ranging N. E. and S. W., and those ranging N. W. and S. E., are much more strongly charged with the ore than are the true lodes running N. and S., or nearly so. In the neighborhood of Holywell, there would seem to be an exception to this rule, but there the N. and S. short lodes are frequently intersected by those running E. and W. Apart from this connection, and away from the points of intersection, the north and south fissures have not supported paying mines.

As the lodes pass upward into the dark fossiliferous limestones, they are usually unproductive of lead ores, but the latter reappear in the grit beds; and they are often accumulated in the flats described as lying at their base and upon the surface of the limestone. This horizon of ore is known as the "lower flat."

The thin dark limestone is also unproductive; but the altered sandstones and cherty beds overlying it are known to be good ore-bearing ground. The ore is also accumulated here in "flats" on the surface of this limestone, as already described—the horizon being known as the "upper flat." This brings us to the summit of the lead-bearing strata of the district.

An apparent exception to the arrangement just described occurs in the case of the Minera lead mine, where ore occurs, more or less, all the way down for a depth of 300 yards or so. This lode, however, is on a line of displacement of the strata, the beds on the south being thrown up about 100 yards higher than those on the north. Thus, productive beds have been thrown up against unproductive beds, the result being that, stratigraphically, there is little ground quite unproductive of ore vertically; only, as in similar cases in Yorkshire, there are different degrees of productiveness, according to the kind of strata thus thrown opposite to each other. Then, in the vicinity of a great line of displacement like this, the strata have been much broken, the result being many side-cracks and tributary lodes.

On a lesser scale than Minera, all the great mines that have been worked on east and west lodes have been on lines of displacement. The displacement has usually been an upthrow to the south; consequently the lodes hade or incline to the north, and, on the surface, the limestone beds are seen extending farther to the east, to the south of such lines, as a glance at the geological survey maps of the district will show. It is along these lines, which are usually marked on the surface by hollows or depressions in the limestone belt, that the great mines have been worked. It is seldom that a simple fracture of shrinkage has contained sufficient ore to pay for working for long together.

In these east and west lodes, the ore is arranged roughly in layers, alternately with the carbonate of lime; which layers are more productive, generally speaking, as they approach the heading or lower side of the lode. The layers of ore are not always continuous, and then the ore has a bunchy and nuggety appearance. Many of the minor lodes have a tendency to become pinched and poor in metallic ores as they are followed eastward—a fact that has helped to form the current idea that the farther the lodes run from the great north and south cross-course the poorer they are. The branch lodes that run down from the heading side of the lodes also die out, and become unproductive in depth, except in cases where they are continuous to a parallel lode of any considerable size. The branch lodes or fliers that come down on the hanging side are often productive in the usual productive beds.

There are accumulations of galena in flats that have been formed at the junction of two dissimilar rocks, as at the Fron Fawnog mines, Fig. 1. But productive ore "flats" of this kind only occur where a lode, more or less productive, comes down upon the point from productive ground.

The same remark is true where cavities or pockets, locally known as flats, like those in Fig. 5, contain ore. Such cavities occur along the line of cracks, and one or more may generally be found leading down to them, as shown in the Figs. 3 and 4. This is a fact that is taken advantage of by the miners, who generally contrive to sink their shafts along the line of a crack, which accounts for the tortuous course of many of the shafts in Flintshire. The ore, when it occurs in these flats, is found in rounded masses, from a very small size to lumps of several hundredweights. It is generally of a darker color, coarser grained, and more flaky than the ore obtained from the east and west lodes, and the surface of the lumps is generally a carbonate of lead for a little distance in. It occurs in "runs," or accumulations of such lumps as shown in Fig. 5, such runs being sometimes single separate courses of ore, as in Fig. 3, and sometimes connected by cross or horizontal runs, as in Fig. 4. These runs occur usually in the clay, sometimes in clay and the compact impure carbonate of lime combined, but never in the masses of pure white crystalline carbonate.

In the North Hendre flat lode, Fig. 2, such runs also are found imbedded in the clay, and separated by patches of barren ground.

Carbonate of Lead.—Carbonate of lead, or gray ore, has been raised extensively in Flintshire as far back as our records of mining extend. It is found in the clay that fills the pockets and flats, and, to a lesser extent, in true lodes with a partial clay filling. It varies in color from white to gray and black; and it occurs in concretions and nests in the midst of the clay; for the most part in the lower part of a pocket. It follows the course of the underlying limestone, and is found accumulated in the hollows of its surface, and nestling behind great boulders of limestone.

A pocket now worked at the Queen of the Mountain mine, Halkyn, as represented in Fig. 6, illustrates the usual mode of its occurrence.

These deposits of carbonate of lead, when followed to the solid limestone, frequently change into sulphide in the cracks and fissures leading from the pockets.

Zinc.—Closely associated with the ores of lead in various mines within the two counties are the ores of zinc. The two principal ores, and those of the most commercial importance, are blende and calamine.

The most plentiful of these two ores is the sulphide of zinc. It does not occur with the lead found in the pockets and cavities charged with clay, but it has been found abundantly in lodes in the chert beds above the limestone.

Its chief home is with the lead ores in true lodes in the ore-bearing limestones. It is also obtained from the same lodes in the lowest limestones; but it is neither so plentiful nor of such richness in metallic zinc as when found in the limestones above. The same remarks are true of the carbonate. This ore is, however, found abundantly in parts of the lowest limestones; and at the present time, considerable quantities are obtained from the lodes worked in these beds at the Park mines, south

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of Minera. In the lodes, the zinc ores occur usually on the upper side of the lodes, overlying the sulphide of lead, as shown in Fig. 7. The ores also occur occasionally in the midst of decomposed portions of the strata, like the deposits of the same ores at Vieille Montagne, in Belgium.

The proportion of zinc ores to those of lead has been very uniform over a long series of years—the quantity of zinc raised being about three fourths that of lead. Being of less specific gravity, and not occurring in the clay pockets or flats, it will be seen that in bulk the zinc ores must more largely fill the east and west lodes than do the ores of lead.

Silver is intimately mixed with the ores of lead, more particularly the sulphide, in the two counties, the proportion in which it occurs, as spread over the whole of the lead raised being 4½ ounces to the ton of ore, and 7 ounces to the ton of lead.

The bulk of the silver is, however, obtained from the ores raised from the east and west lodes. The ores found in the N. and S. cross-courses are very poor in silver; so, also, are those obtained from the flats or pockets in which the matrix is clay, the proportion in these cases seldom exceeding three ounces to the ton of ore. It is also found that lead ores, when associated with blende, are most productive of silver. For example, during the four years ended December, 1878, at the Minera mines, 8645 tons of blende have been raised, along with 8633 tons of metallic lead, and the proportion of silver has been 6¼ ounces to the ton of lead; while at Talargoch mine, during the same period, 8836 tons of blende have been raised, along with 3461 tons of metallic lead, and the proportion of silver has been 9½ ounces to the ton of lead. The same remarks hold good concerning the lead ore raised from the lower Silurian strata. The mines whose ores yield the largest proportion of silver are those which produce the largest quantities of blende.

The Minera Mine—Fig. 8—is worked on the course of a great fault in the limestone and millstone grit strata. This fault also enters the Coal Measures, thus showing that the filling of the crack, with its metalliferous contents of lead and zinc ores, took place at a period subsequent to the deposition of the coal strata. The amount of the displacement, about 300 feet, has had the effect of bringing non-productive beds opposite the beds usually productive of ores, and hence the lode is productive throughout the greater part of its depth, being most productive where favorable strata are just opposite each other. This great dislocation has also had the effect of breaking the strata in its vicinity. Hence there are several subsidiary cracks, which, perpendicularly, run both roughly parallel to, and slightly divergent from, the main fissure. Longitudinally, these cracks start from the main lode, and at some distance come into it again. the ore being usually most plentiful near the junctions, and in those parts of their course where the cracks are widest. Sometimes these cracks die out as they enter the limestone, and in this case the ore dies out also, as it recedes farther from the main lode.

The workings extend along the lode in its course from S.W. to N.E.—at right angles to the section—for nearly a mile in length, the greatest gap occurring where the non-productive beds of the section 5 come to the surface. The lode has now been worked to a depth of 290 yards. Besides the workings on the lode proper, a great deal of lead ore was formerly obtained in and near the limestone beds in the millstone grit *x*, *x*, of the section as they occur in the high ground near the left hand of the section. The lead contains at present an average of twelve ounces of silver to the ton, which is higher than the average of a few years ago, as already referred to.

(TO BE CONTINUED.)

THE STRENGTH OF CORRUGATED BOILER-FLUES.

English and continental engineering circles have, for more than a year, been treating on the subject of corrugated boiler-flues, but little has been said concerning them here, because they were not in our markets. We learn now that Messrs. Hartmann, le Doux & Maecker, No. 184 Pearl street, this city, have been appointed agents of the English inventors, and it may be appropriate, therefore, to put on record the text of a report made by Mr. William Parker, Chief Engineer-Surveyor to Lloyd's Register of British and Foreign Shipping:

"In accordance with the instructions contained in your letter of the 23d inst., I proceeded to Leeds to attend a test to destruction of a rolled corrugated flue or furnace, for the purpose of obtaining some further information on the strength of such structures.

"Several previous experiments have been made to ascertain the strength of these furnaces, as compared with plain ones of the same diameter and thickness, and, although the corrugated flues then experimented upon were not truly round, they showed such a decided excess of strength over plain furnaces that it was considered that a pressure of at least 25 per cent over that allowed for plain flues could be safely permitted for them. The method of manufacture until recently adopted with these furnaces was to form a plain cylindrical furnace, and then produce the corrugations by hammering it between large swages. By this process, it was exceedingly difficult to insure the furnaces being truly round when finished, and this materially weakened the furnaces, as any deviation from the circular form necessarily causes a loss of strength. In order to obviate this result, and also to provide adequately for the increased demand for corrugated furnaces, the Leeds Forge Company has recently laid down a large rolling-mill for the manufacture of the flues. By this method, they are made perfectly true, and must, therefore, be stronger than those made by the original process. The experiment conducted on Friday last was intended to show the extent of this superiority.

"The experimental furnace was 6 feet 9 inches long, 3 feet 1⅞ inches outside diameter, had 18 corrugations 1½ inches deep, and pitched 6 inches apart from center to center of each corrugation. The material composing the flue was mild steel, which was shown by the testing of a piece cut from the plate to have a tenacity of 22·7 tons per square inch, with an elongation of 35 per cent in a length of 10 inches. The furnace was inclosed in a strong wrought-iron cylinder, specially made for the purpose, the annular space between the furnace and cylinder was filled with water, and by means of an hydraulic pump the requisite pressure was applied. Two of Messrs. Dewrance's large pressure-gauges were attached to the cylinder, to indicate the pressure exerted on the furnace.

"Before any pressure was applied, the furnace was carefully gauged for roundness, and it was found to be perfectly true along its whole length.

"The pressure was then applied, and at each increment of 100 pounds per square inch the furnace was carefully gauged, both vertically and horizontally, at the central corrugation, and the third one from each end, and also longitudinally, so that the elongation under various pressures, the limit of elasticity of the material, and the ultimate strength to resist the collapse, should be ascertained. As will be seen from the attached table of results, up to a pressure of 500 pounds per square inch, no alteration in the cylindrical form of the furnace was perceptible, but it had slightly elongated even from the first application of 100 pounds pressure; at 800 pounds, it had sprung or altered its circular form to the extent of $\frac{1}{16}$ inch, while it had gone on steadily elongating to fully $\frac{1}{16}$ inch; but on the pressure being released, it entirely recovered its original shape; at 850 pounds pressure, its alteration was slightly increased, and on relieving the pressure, permanent set could be distinctly measured, both cylindrically and longitudinally, and, at a pressure of 900 pounds per square inch, it slowly collapsed, altering its form more rapidly than could be followed up by the pump.

"After this, twelve holes were drilled at various parts of the furnace, to ascertain the actual thickness of the plate, and the various places showed thicknesses varying from ·51 to ·53 of an inch.

"This experiment shows that the ultimate crushing strength of the furnace could be expressed by the formula:

$$\frac{60{,}000 \times t}{d}$$

where t is the thickness of the plate and d the mean diameter of furnace.

"As the result of this and previous experiments, I would respectfully submit for the consideration of the committee that, for the future, corrugated furnaces (1½ inches deep) should be approved of for a working pressure found by the following formula:

$$\text{Working pressure} = \frac{1000 \times (T - 2)}{D}$$

where T is the thickness of the plate in sixteenths of an inch, and D the greatest diameter of the furnace in inches.

"If this rule is adopted, new furnaces of $\frac{9}{16}$, $\frac{8}{16}$, $\frac{7}{16}$, and $\frac{6}{16}$ of an inch in thickness will possess margins of safety of 5, 5·17, 5·45, and 5·62 respectively, while the same furnaces, when their thickness is reduced by corrosion by ⅛ inch, will in each case possess a margin of strength of 3·9.

"The introduction of the term $(T - 2)$ in the numerator practically provides for the fact that an equal amount of corrosion weakens a structure composed of thick plates to a less extent than it does one made of thin plates. This is already provided for in the society's rules on the shell and combustion chamber plating of boilers, and should apply also to furnaces.

"I may state that at this experiment I was met by Mr. A. C. Kirk, of the firm of R. Napier & Sons, and by representatives from the Admiralty and from the Board of Trade, who were all satisfied as to the value of this experiment in arriving at a satisfactory formula for corrugated flues. I am, sir, your obedient servant, WILLIAM PARKER.

"The Secretary, Lloyd's Registry."

PARTICULARS OF TEST OF A CORRUGATED FURNACE AT THE WORKS OF THE LEEDS FORGE COMPANY, NOVEMBER 24TH, 1882.

Pressure in pounds per square inch.	Alteration of form transversely.						Permanent set.			Elongation in a length of 5 feet 9 inches.
	Horizontally.			Vertically.						
	A	B	C	A	B	C	A	B	C	
100	nil.	nil.	nil.	nil.	nil.	nil.	nil.	nil.	nil.	·010
200	.....	.....	.....	.....	.....	.....	.....	.....	.....	·035
300	.....	.....	.....	.....	.....	.....	.....	.....	.....	·035
400	.....	.....	.....	.....	.....	.....	.....	.....	.....	·070
500	.....	.....	.....	.....	.....	.....	.....	.....	.....	·060
600	·03	·015	·03	·03	·025	·03	.....	.....	.....	·070
700	·03	·015	·03	·03	·025	·03	.....	.....	.....	·070
800	·04	·030	·05	nil	·025	·03	.....	.....	.....	·080
850	·10	·050	·08	·04	·025	·03	·035	·04	·035	·110
900	Total collapse ensued.									

A represents third corrugation from one end.
B represents third corrugation from other end.
C represents central corrugation.
Mean diameter of flue, 2·11½.
Mean thickness of flue, ·521.
The above flue was rolled in Fox's patent corrugating mill, and welded by coal-gas and atmospheric air.
Tensile stress of material, 22·77 tons per square inch.
Elongation in 10 inches, 35 per cent.

LUMINOUS JEWELS.—M. Gaston Trouvé, the well-known electrician of Paris, has lately designed a series of ornaments for ladies' wear consisting of glass, colored and cut to imitate rubies, diamonds, etc., fitted in an envelope, surrounding a small incandescent lamp of low resistance. The light shines through the pieces of glass only, and gives them all the appearance of the stone they are intended to imitate. The lamp is fed from a small battery, which is carried about the person. It is composed of three pairs of zinc-carbon plates (two carbons to each zinc), or a larger number according to the current required. These plates dip in a saturated solution of bichromate of potash, which is contained in an ebonite cell with three compartments. The plates are fitted into a cover, which is kept securely down on the top of the cell by two bands of India rubber passed around the whole. Finally, the battery is incased in two sheets of gutta-percha, so as to prevent any leakage. A miniature switch is carried in the pocket or elsewhere within reach, to which the battery and lamp wires are connected. The pressure of a finger on the arm of this switch makes or breaks communication with the lamp. The battery weighs (with six plates) 300 grams, and will work about 30 minutes with a lamp of from two to three volts. A larger battery, to work a four or eight-volt lamp weighs 800 grams.

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FURNACE, MILL, AND FACTORY.

The Montreal *Herald* says: The deputation—headed by two Cincinnati gentlemen—who waited on Sir Leonard Tilley, at Toronto, to urge upon him legislation in aid of the establishment of works for the manufacture of pig and bar-iron demanded a government bonus, amounting to $6 a ton on pig-iron and $18 on wrought-iron or merchant bar. They allege that, if this degree of protection be granted, the parties whom they represent will invest two millions of dollars in works at Toronto and give employment to from 2500 to 3000 men. An account of this interview states that "Sir Leonard said that of course he could make no definite statement as to what the Dominion government might do, but would bring the whole matter before his colleagues for consideration. And at last, whatever was proposed would have to be passed upon by Parliament. One thing he pointed out, that no concession would be made in favor of any particular company only—whatever change was adopted would have to apply to all competitors alike. This the American gentlemen said they perfectly understood." The Toronto *World* believes that Canadian ore can be laid down at the furnaces for from $2 to $2.50 per ton, or one half of what it costs laid down say at the furnaces of Pennsylvania or Ohio. It is admitted that labor would cost nearly the same in both countries, whatever difference there is being in favor of Canada, but that the American iron-works secure their coke at from three to four dollars per ton less than it can be obtained for in Canada. This may be so in Toronto; but if iron-works be established in the vicinity of the coal mines of Nova Scotia, where iron ore of every variety is to be procured, coke can be had as cheaply as anywhere in the United States. It is very unlikely indeed that the Dominion will allow itself to be saddled with a fancy tariff on iron, in order to force the growth of works at points as far removed as possible from the coal-fields of the Dominion. The proposal to import coke from the United States at $8.10 per ton to manufacture iron in Canada is sufficient to show the hollowness of the whole movement. The attitude of those Cincinnati gentlemen, and especially the extravagant bonuses they demand, looks a good deal like an attempt to prevent the establishment of the manufacture of iron in Canada.

The Lechner Manufacturing Company, Columbus, Ohio, has furnished the Holly Manufacturing Company, Lockport, N. Y.; Dupee & Bowman, Forest, Ohio; Woodlawn Mill Company, Woodlawn, Kan.; Cairo Box and Basket Factory, Cairo, Ill., with roller detachable chains for driving purposes. In addition to this, it has furnished G. A. Granger, New Lexington, Ohio, and Ingram Brothers, New Brighton, Pa., with chain elevators.

The Iron City Forging Company, Limited, composed of J. E. Morrison, J. H. Brice, and W. I. Chaffey, recently organized, has erected machine forging works at Summer Station, West Penn Railroad, and they are equiped with every thing necessary for railroad and steamboat forging.

The Newcastle *News* a day or two ago had an item stating that the Rosena furnace had made during the month of November 2913 tons of iron, and that it was probable that this was the largest output ever made in the Shenango Valley. Raney & Berger, however, step to the front with the statement that during the month of November their furnace made 3255 tons, or an average of 108 tons per day. This, it is said, beats any thing ever turned out in the valley.

The Chartiers Iron and Steel Company, Limited, office 143 Fulton avenue, Pittsburg, has recently organized, with a capital of $60,000. The company is composed of John C. Kirkpatrick, Chairman; D. A. Carter, Secretary; B. C. Wilson, Treasurer; and John Henry, Superintendent. It is erecting works at Mansfield Valley, some six miles out the Pan-Handle Railroad, for the manufacture of fine sheet-iron and sheet-steel, and expects to be in operation next April.

The Springfield Iron Company, of Springfield, has been filling an order recently for some very large steel plates. Among others, were one size 228 inches long, 75 inches wide, and ¾ inch thick. The ingots from which these plates were rolled weighed about 6000 pounds.

The Cleveland Crucible-Steel-Works have been bought by Daniel McGarry, and a company, composed in part of the late owners, has organized into the Cleveland Steel Company, to manufacture the same class of goods as at present. The works started up last week.

The Wistar furnace, in Harrisburg, has been sold for $100,000 to the Reading Railroad Company, which will take possession January 1st, 1884.

Stockholders of the bankrupt Danville Steel Company have agreed to transfer the plant to a new company to be at once organized.

The plate-mill attached to the Bailey Nail-Works, in Harrisburg, has shut down, and about 150 men are thrown out of employment. A scarcity of work is the cause.

The Crescent Steel-Works are to have a new melting-furnace, which will be the largest and most complete furnace in the country.

The holiday issue of the *Iron Era*, of Dover, N. J., contains the following: Although business is quite dull just at present with the Atlantic Dynamite and Judson Powder companies at McCainsville, yet the year just closing has been a successful one with them, and they have manufactured a larger amount this year than ever before. It is estimated that the output of the two companies for the year will reach fully four and a half million pounds of powder—or 22,500 tons—as the monthly product has always been above 350,000 pounds. Of this amount, the Atlantic Company manufactures in the proportion of 200,000 pounds to 150,000 pounds for the Judson. About 80 hands and immense quantities of chemicals are employed in making the detonents. The Atlantic Company was the first to manufacture dynamite east of the Rocky Mountains, and its growth has been steady. The success of the Judson powder has been really wonderful, as the company was only organized in 1880. From the time it was first introduced as a low and cheap explosive, its progress has been very rapid, until it is now used on the largest works in the country.

A dispatch from Toledo, Ohio, says that, in the case of the Brown, Bonnell & Co. receivership in the United States Court, claims to the amount of $1,301,000 have been proved upon the order for sale and general distribution. But certain creditors procured a confession of judgment for $540,000, and their attorney went to Cleveland and paid off the original judgment of $51,000. He thereupon asked that the proceedings be discontinued and the receiver discharged. Judge Baxter has announced his decision that the property should be held in trust for all the creditors alike, none of whom would be discriminated against by the judgment creditors in the State courts, and that if they undertook to disturb the property of the company under the judgments obtained at Youngstown, he would enjoin them.

The Western Nail Association decided to close down for a period of six weeks, from December 29th. The meeting at Pittsburg was one of the largest ever held, every mill West being represented.

The Norway Iron-Works, at South Boston, have been sold to a company at the head of which is George P. King. The business will be conducted under the title of the Norway Steel and Iron-Works. The price paid is said to be $150,000.

The workmen of the Edgar Thomson Steel Company, at Pittsburg, having accepted the reduction of 18 per cent in their wages, the mills are running as usual, and steady work is promised to 3000 men through the winter. To the steel men, this reduction means a cut in the wages at all the steel rail mills of the country.

The Penn Iron-Works, of Lancaster, Pa., have shut down until after the holidays, thereby throwing 175 hands out of employment. The suspension is likely to prove permanent, as the men refuse to accept the contemplated reduction in wages.

The Maiden Creek Iron Company's rolling-mill, at Blandon, Pa., shut down December 18th for an indefinite period, in consequence of the dull trade.

The Morris & Cumings Dredging Company, of New York City, will ship to Brazil the largest dredging-machine ever constructed in this country. The company has just finished the canal from Cronstadt to St. Petersburg, and as a result of that work the Brazilian government ordered this machine.

The Bessemer Steel-Works, Pueblo, Colo., turned out 600 tons of steel ingots during the week ended December 15th.

The creditors of the Danville Steel Company have held a meeting in Philadelphia and organized a new company under the Limited Liability Act of 1874. It was organized with the intention of taking the Danville Steel-Works, but this will depend on a proper conveyance being made by the Danville Steel Company, and on the action of the remaining creditors of the company. Steps, however, are taken to carry out the action of the stockholders of the old company. The new company will be known by the title of Grove, Grier & Co., Limited. A capital stock of $83,000 has already been subscribed. This will be increased to $100,000. A Board of Managers has been elected, consisting of Messrs. R. M. Grove, James Cruikshank, and L. K. Rishel, of Danville, and E. Samuel and William Selfridge, of Philadelphia. The officers of the Board are, R. M. Grove, Chairman; L. X. Grier, Vice-Chairman; William Selfridge, Secretary and Treasurer.

A reduction of 10 per cent, without notice, was made in the wages of the laborers at the New Jersey Steel and Iron-Works, Trenton, December 20th.

Nearly all the iron mills in Pittsburg are making arrangements for the usual shut-down during the holidays. Most of them will cease on Saturday, and remain closed until the first week in January, while a few will shut down only to Tuesday next and run the remainder of the week.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

Much has been accomplished in the mines during the past week, says the Tombstone *Epitaph*. The Contention pumps have been completed, new hoisting machinery has been erected in three different mines, and assessment-work is doing on nearly every claim in the district. The ore output and bullion production have markedly increased during the past few weeks.

EMPIRE.—The whim of the new shaft is completed, and sinking is again resumed. Lately, the ledge in the new shaft has shown mineralization, and assays as high as $15 in silver have been obtained. In the old workings, prospecting in the direction of the ore-body in the Girard is pushed vigorously ahead, there being little doubt that the ore-body extends into the Empire.

GRAND CENTRAL.—The main shaft is down 30 feet below the water-level. Pumping will not be commenced until the Contention shaft has reached the same depth, which will be in about ten days. After this, both mines will work in sympathy with each other, it being necessary that both keep the same level. In the stopes, every thing is progressing as usual. No new developments have been made lately. The shipment of the usual quantity of ore to the mill is kept up.

MAMMOTH.—Work is going on steadily. The underground workings are connected with those of the Rattlesnake and Bunker Hill, both owned by the same company. The last reported strike of a new ore-body in the Mammoth is gaining in importance every day. It is worked day and night, and no decrease has been noticed.

SIDNEY.—Work has been suspended for the present, owing to some disagreement among the stockholders. The location of this property is adjoining the Grand Central.

TOMBSTONE.—Underground, every thing looks very favorable. The increased output compels the company to stop buying ore as it formerly did, the company's smelting capacity being hardly sufficient to treat the ore produced from the West Side mine.

MOHAVE COUNTY.

MCCRACKEN.—Active operations are to be resumed at this mine, after a three years' stand-still. The twenty-stamp mill is getting into working order, and development at the mine will be pushed vigorously.

PIMA COUNTY.

QUIJATOA.—These mines, the sale of which we reported in the last number of the JOURNAL, embrace the Peerless group, and comprise the Peer, Peerless, Ibex, Shield, Wide West, and Cholla, six claims in compact form—1800 wide by 3000 feet in length. There are several other adjoining claims that are very promising. The Crocker and Mountain Goat are continuations of the Peerless mine. The former is said to be a promising prospect, and high-grade ore has been found on the main lode. On the west side of the mountain, is the Cholla, Wadsworth, and Josh Billings, promising silver prospects, and the Wedge, Emerald, and Murray copper mines.

PINAL COUNTY.

SILVER KING.—The company has now at Casa Grande the machinery for well-boring, and is going to sink a 12-inch well in the mill. Besides the Queen Creek flow, it has a 6-inch well, 150 feet deep. The drill will go through the volcanic rock, and will probably find abundant artesian water.

CALIFORNIA.

INYO COUNTY.

MAXIM.—This company, which is said to be composed of New York capitalists, some two months ago purchased the Arasta mine, which has since been worked. The Inyo *Independent* says that the mine was worked to a limited extent some seventeen years ago. The shaft which is now sinking has attained a depth of forty feet, and a three-foot ledge of rich ore has been struck. The necessary machinery has been bought, and is now on its way to the mine.

MONO COUNTY.

MAY LUNDY.—Considerable activity prevails in and about this mine, and the force is engaged in extracting ore. The mill is running full capacity, with over 700 tons of ore in the yard. Nothing positive has yet been learned of the rumored sale of this mine to English capitalists.

BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended December 8th shows: Ore crushed, 145 tons; average assay value of pulp, $24.45 per ton; of tailings, $4.90 per ton. There were 190 car-loads of ore hoisted from the mine—13 car-loads of which were from the 770 (shaft) level, and 177 car-loads were extracted from the 640 to the 780 levels.

STANDARD CONSOLIDATED.—There is no change of importance to note. The official report for the week ended December 8th shows: Ore extracted and shipped to mills, 1296 tons; crude bullion received, 2130 ounces; bullion shipped, $10,998.60.

SIERRA COUNTY.

ALASKA.—The work of raising the water from this mine has been resumed, and it is expected that the mine will soon be in full operation.

COLUMBO.—This claim is located west of the Sierra Buttes mine. From an adit-level which has cut the vein some 225 feet below the surface, a very rich class of ore is exposed, showing free gold in abundance, and giving satisfactory results. This mine was purchased some months ago by Eastern capitalists, who propose to erect extensive machinery and thoroughly develop the mine.

RUBY.—This gravel mine has produced its first bullion.

SOUTH FORK.—This mine continues to yield handsome returns to its leasers, the Bald Mountain Extension Company. From 427 car-loads of gravel, ninety

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and a half ounces of gold were cleaned up. The pump at the Pliocene shaft has been started up. The Extension Company has let a contract for running ahead the main tunnel 400 feet, at $3.75 a foot.

CANADA.

PROVINCE OF NOVA SCOTIA.

There has been little excitement in gold mining in Nova Scotia this season. The usual tribute-work has been carried on, and several individuals have made good profits. Among the companies that have been working with steady returns may be mentioned the Strawberry Hill, Oxford, Salmon River, and Gallagher mines.

The Oxford mine shows, since August, 1882, a return of 1538 tons, yielding 2775 ounces. The Salmon River mill, since August, 1881, has crushed 11,974 tons, yielding 9531 ounces. The Gallagher mines, at Isaac's Harbor, have been very successful since they started in the spring of 1883. There have been 962 tons crushed by them, and a yield of 2413 ounces secured.

The only new district that promises well at present is the Bridgewater, where a large tract of auriferous ground has been proved. The prospectors are making arrangements to put up a mill, and, should the locality pan out well, gold mining west of Halifax will receive a fresh start.

COLORADO.

CHAFFEE COUNTY.

ALPINE.—Owing to the lack of ore, the smelter has been idle for a short time. The intention of the managers however, is to start up the blast-furnace not later than the end of December.

HORTENSE.—There are two car-loads of ore ready for shipment which will, it is estimated, run $100 to the ton. Work is progressing at present on the winze between the fourth and fifth levels, which shows about five inches of 101 ounce ore. Samples of the ore sorted from all parts of the mine gave a return of sixty ounces in silver and 1·15 ounces in gold. The ore in sight will probably average $75 to the ton The fifth level, now in 147 feet, will be driven ahead, and it is thought will strike the ore-body at about 175 feet. When the winze to this level is completed, the mine will be in good shape for back-stoping and hoisting the ore. The lessees who now have the mine have done a large amount of dead-work in the way of cleaning out the levels, removing waste dirt, etc. From this time on, however, until the expiration of their lease in August, systematic development will be made.

CLEAR CREEK COUNTY.

A discovery of a rich gold-bearing vein, just off the Whitlow Survey, on Soda Creek, has been made which, it is thought, in richness will eclipse the Whitlow, Golden Leaf, or Golden Dustman lodes. Pan prospects go very high.

CENTENNIAL.—This lode in Hukill Gulch, Spanish Bar District, shows well. A drift has been run on the lode 120 feet, and at the breast a shaft sunk 11 feet, in which is exposed a streak of solid mineral eight inches wide. It is a galena ore in which are largely intermingled gray copper and black oxide of copper, resembling very much the rich pockets of the Hukill mine.

NEW YORK & COLORADO.—The new and large mill of this company, which is located in Germantown, three miles west of Empire, has been finished, and the mill opened for operations.

WISCONSIN & MOORE LODES.—Recently, while the work of driving the main tunnel on these lodes was progressing, a large and well-defined crevice, carrying a body of decomposed ore, was encountered. A test made at the Rocky Mountain mill gave twenty-two ounces silver per ton. This crevice was struck about 250 feet from the mouth of the tunnel.

GILPIN COUNTY.

UNION & BONANZA.—The tunnels are driving night and day. The Bonanza is now in under Maryland Mountain a distance of 1120 feet. In driving it 120 feet farther, the Robert Emmett mine will be intersected. Several levels are driving east on different veins that have been tapped by the tunnel workings. One vein, which is thought to be the easterly extension of the Cyclops, is turning out a very good quality of smelting ore.

GUNNISON COUNTY.

An important sale of five gold placers has been consummated. The property embraces 147 acres of ground in Taylor Park, thirteen miles north of Tin Cup. The consideration was $10,000. From the work so far done on the property, it promises to become one of the heaviest gold producers in that district.

LAKE COUNTY.

ARKANSAS VALLEY SMELTING COMPANY.—Dr. D. H. Dougan, the present manager of this company, will retire from the management of this company's works here in Leadville on January first. Dr. Dougan has been in charge of the Arkansas Valley Smelter for about six months past. Mr. Charles T. Limburg, the former manager, is mentioned as Dr. Dougan's probable successor.

BRIAN BORU.—The Kearney lease on this mine is meeting all the expectations of its sanguine owners. The mine at present is employing eighteen men and shipping ten tons of ore a day. This shipment will soon be doubled. The mine is looking very well, and discloses some very large bodies of magnificent galena sand and hard carbonates.

HUMBOLDT.—The lessees on the Thistle mine, on Carbonate Hill, one of the properties of this company, have disclosed a streak of ore, and the dump at the shaft shows about a ton of mineral. The value of the new discovery has not yet been ascertained.

IOWA GULCH.—The Scooper, the property of this company, shows two feet of ore of extraordinary grade. The manager stated that the mine was leased about four months ago, and since then a force has been employed in exploration-work. The most favorable indication of mineral was along the walls of the porphyry dike, and prospect-work was advanced in this direction. The point at which operations were begun was a short distance northeast of the shaft, and a trifling depth below the first level. After driving work for some time, seams of galena ore in an iron matrix were encountered, and being closely followed, these stringers of ore gradually led to a well-defined vein of pay mineral, which at the present time discloses from twenty to thirty inches of ore. That the new discovery promises to result in more than a single small pocket, is demonstrated by the development of apparently the same ore-body at another point, twenty feet distant. In addition to these developments, a small quantity of ore has been opened in still another place. The ore developed in the larger streak, the reporter is informed by responsible parties, has been assayed a number of times, and has returned from 1500 to 2000 ounces to the ton, being very rich in chlorides. The value of the ore when shipped in large lots is still unknown, but will be determined shortly.

IRON HILL CONSOLIDATED.—This company has reduced the wages paid to trammers and surface laborers to two dollars and a half per day.

SIERRA NEVADA.—This claim is situated on the southeast slope of Iron Hill, adjoining the Colonel Sellers mine. The favorable location of the claim attracted the attention of a number of gentlemen several months ago, and shortly afterward they formed a pool with the view of developing the same. Operations were begun immediately and pushed with such vigor that at the present time the shaft has a depth of 247 feet. The ore zone, it is expected, will be encountered at a depth of about three hundred feet, which, it is calculated, will be reached by January first next. The owners of the Colonel Sellers mine have already driven a drift to near the line of the Sierra Nevada, disclosing good ore, and the projectors of the new enterprise are reasonably certain of the mineral extending into their territory. A twenty-horse-power hoisting-engine and other improvements have been placed on the property.

SILVER CORD.—The company has purchased a controlling interest in a portion of the Ruby mine. The consideration in the deed is stated at $150,000, but the actual amount paid was only $48,500. The portion of the Ruby in which the Cord has secured a three-fourths interest is a trifle over half of the southern part of the claim, being about 164 feet. The Silver Cord Company would probably have purchased the entire claim, but was prohibited from doing so by a compact made with the Iron Silver Company some time ago. When the conflicts between the Iron Silver and Silver Cord companies were settled, a compromise line was established, which was designed to limit the further acquisition of territory that might possibly reopen the conflicts adjusted. The line was particularly desired as fixing the boundaries between the two mines, as they advanced on the vein beyond their side-lines and into adjacent ground. The Iron Silver Company has since extended its development well into neighboring claims, and has attempted to secure the ore under the statutes permitting the owners of the apex of a vein to follow it beyond their side-lines. The Silver Cord, on the other hand, has from time to time purchased portions of other territory to the rear of the outcrop, until it has acquired over sixty acres of ground. Its recent purchase of the Ruby completes the acquirement of new territory, as the Cord now owns all the territory for fifteen hundred feet, back of the claims located parallel with the outcrop of the vein. The purchase of this piece of ground, it is believed, will give the Silver Cord a considerable distance of the ore-chute, that heretofore was outside of its territory.

PITKIN COUNTY.

Encouraging reports comes from the Tellurium District, which is about twelve miles on a straight line northeast of Ashcroft, and comprises Jordan's, Old Man's, and Tellurium gulches, near the head of Taylor Park.

The most prominent mine in the section is the Lavicy A. The vein is a quartz porphyry vein in granite, carrying sulphurets of silver running from $180 to $2400 to the ton. The developments of the mine consist of a shaft 170 feet in depth, with a level 140 feet in length at 40 feet from the surface, and another 120 feet long at 120 feet from the surface, also a rise from the end of the lower level to the surface, making another 120 feet. Eighteen men are employed on the property, and a considerable amount of ore is extracted and shipped to the St. Elmo smelting-works.

In Jordan's Gulch, is the Nellie H. claim, located in an eight-foot vein in granite, showing a two-foot pay-streak of quartz, from which mill-runs have been obtained, returning 127 ounces in silver, one and three quarter ounces in gold, and 26 per cent in copper. The property is opened by a tunnel, in 32 feet, and a shaft, down 22 feet.

In Old Man's Gulch, are four claims. The vein is the same as the Nellie H., although three miles distant, and shows some very good mineral.

In Tellurium Gulch, in the old Tellurium tunnel, started in 1859, a force of fourteen men is now working, and some very fine ore is taken out. This vein was discovered in 1859, and the present owners, when they relocated the property in 1880, found three tons of galena ore on the dump. The tunnel shows a fair streak of very highgrade ore.

SAN JUAN COUNTY.

MONTEZUMA.—This tunnel cut the Victoria vein after running 594 feet, and at a depth of 300 feet. The lode shows a five-foot crevice and three feet of solid mineral—gray copper, yellow copper, pyrites of iron, and galena. No mill-runs have yet been had. Work to rise and connect with a shaft sunk thirty feet two years ago will be commenced, which had to be abandoned on account of water. Drifting will also be done. The ore can be taken out and loaded on the car for $2.75 a ton. Work will also be commenced again on the Ajax tunnel, which will cut the Victoria lode 520 feet deeper and 150 feet to the right. This tunnel is now in 340 feet, and 170 feet before the vein is cut.

GEORGIA.

An important strike in the vicinity of Dahlonega has caused considerable excitement. It is believed that the vein discovered is a continuation of the Fish Trap vein. The reports from various other mines in Lumpkin County are of a favorable nature.

DAHO.

The Denver *Tribune* reports that the silver and lead product of this section for the year 1883 will not be less than $2,500,000. The Philadelphia Smelting Company, at Ketchum, has two 50-ton furnaces and one 40-ton furnace. It shipped this year over 3000 tons of bullion, worth over $1,000,000. It shows that it has smelted ore from over ninety mines or prospects, the average value of the same being over 145 ounces silver and 50 per cent lead. The Minnie More mine, at Belleview, and the Elkhorn mine, at or rather near Ketchum, are remarkably strong veins in black lime, and are large producers. The Elkhorn has produced 2200 tons of ore, which assays 125 ounces and 50 per cent lead. The output of the Minnie More, at Belleview, is about 50 tons per day, with an average of 100 ounces silver and 60 per cent lead. The Idahoan, near Bullion, has shipped about 2500 tons; average, 100 ounces and 50 to 60 per cent lead. The Bullion, Mayflower, Eureka, and other mines at Bullion average 150 ounces silver and 60 per cent lead. The Jay Gould, at Bullion, averages 100 ounces silver and 60 per cent lead. The Narrow Gauges mines Nos. 1 and 2, the Davitt, Snow Fly, Montana, and Mount View mines, in Deer Creek, are all producers of mineral, and run at mill from 100 to 150 ounces silver and 50 to 70 per cent lead. The Imperial, in Green Horn Gulch, is a producer of ore that runs from 50 to 60 ounces silver and 50 to 60 per cent lead. It is a very promising-looking prospect. One remarkable thing we found in this district, and that was all of the mines had paid for their purchase money and all developments and improvements. There is in the valley a sampler at Hailey and a smelter at Ketchum. Through these institutions all of the ore passes.

MAINE.

DOUGLAS.—To hear a statement from the treasurer as to the indebtedness of the company; to consider and determine the best means of raising sufficient money to pay the debts of the corporation and for its other needs, and, if deemed advisable, to vote to borrow not exceeding thirty thousand dollars, fixing the time of payment and rate of interest; to vote to mortgage the real estate and other property of the company to secure said payment; and to authorize the treasurer to sign and issue in behalf of the company notes or bonds of the company as may be necessary, not to exceed the limit named, was the business proposed to be transacted at the recent special meeting of stockholders. The result of this meeting has not yet been published. It is stated that the company shipped sixteen tons of refined copper to Boston during the week ended December 15th.

MICHIGAN.

BELT.—Work on the new stamp-mill goes on as rapidly as possible, and is fast drawing to completion. It is hoped that the mill will be started by New Years' Day. The underground work in both mines is pushed ahead as rapidly as possible, and is everywhere looking encouraging. The openings made in the old mine on the Champion vein are quite extensive, and will furnish a large amount of profitable stoping ground. The openings made in the new mine on the Knowlton vein are also reported to be favorable.

CHAPIN.—A force of between four and five hundred miners has been set to work in the Chapin mine, the men re-employed being those who were but passive participants in the recent strike. The force now employed will be increased gradually during the winter, and the mine will doubtless be working as many men by the time another shipping season opens as prior to the strike.

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MINNESOTA.—The reported sale of this mine to the Earl of Denbigh and other English capitalists has been denied. According to the Marquette *Mining Journal*, the Minnesota stockholders voted to sell the property, and the matter has been laid before some English parties, who are making an investigation of its merits. The stockholders voted to sell the property for $50,000, and an agent has been trying to dispose of it in London for $75,000.

NANAIMO.—A new find of importance has recently been made at this mine, but independent of the old mine. The find is south and west of the old mine, and has been traced by a series of test pits a distance of 200 feet. A belt of jasper 300 feet in width separates the newly discovered deposit from that constituting the lens in which the mine is situated. No cross-cutting has been done as yet to determine the extent of the new discovery, but, from all evidence, it is of large proportions. The ore is of good quality, as regards metallic iron, but a non-Bessemer, as the other ores of the vicinity.

The Marquette *Mining Journal* gives the following analyses of iron ore taken from the new mines of Agogebic, Sunday Lake, and Montreal districts, and which were made by and at the instance of wholly disinterested parties:

Name of mine and location.	Metallic Iron.	Phos.	Silica.
Section 10, town 47, range 45	64·82	·046	6·50
" " " " " "	67 85	·040	1·84
" " " " " "	65·48	·058	3·95
Colby mine, Secs. 15 and 16, town 47, range 46	64·45	·084	4·91
" " " " " " "	48·63	·083	6·08
Latter assay gives metallic manganese	11·41	...	...
Ironton, Sec. 17, town 47, range 46	65·22	·079	1·75
Sec. 24, town 47, range 47, metallic manganese..13·21..	47·52	·046	6·11
Vaughn mine, town 47, range 47	61·45	·042	7·69
Norrie mine, Sec. 23, town 47, range 47	63·65	·040	2·59
" " " " " " "	64·37	·046	1·14
" " " " " " "	62·13	·065	5·14
" " " " " " "	62·83	·035	2·06
Ryan mine, Sec. 33, town 46, range 2, east	63·58	·074	2·56
Montreal mine, Sec. 33, town 46, range 2, east	68·28	·060	1·28
" " " " " " "	66·50	·067	1·56
" " " " " " "	61·45	·078	10·20
Sec. 1, town 45, range 1, east	65·67	·102	1·65

The Ryan and Montreal mines are across the line in Wisconsin, the others in Michigan. These districts will be supplied with railroad facilities next season, possibly in time to enable some of the mines, to ship a part of their product.

MONTANA.

Mr. L. A. Walker, Assistant-Assayer in charge of the United States Assay-Office at Helena, during the absence of Assayer Harrison, gives the following statement to the *Herald* of the gold and silver received at Helena for the year 1883, and since the establishment of the Assay-Office in 1876:

1883.	Gold.	Silver.
January	$43,618.88	$6,735.69
February	26,821.03	844.51
March	24,535.18	697.04
April	36,611 36	945.87
May	40,489.69	1,117.39
June	74,437.23	6,706.87
July	108,123.57	1,754.48
August	94,154.73	1,033.26
September	93,348.78	1,199.45
October	78,401.36	1,219.77
November	103,750.36	994.93
December (estimated)	49,500.00	500.00
Total	$773,792 17	$23,749.46

Values of gold and silver bullion deposited at the United States Assay-Office, Helena, from January 1st, 1877, to December 31st, 1883:

	Gold.	Silver.
Year ended Dec. 31, 1877	$379,481.18	$241,197.12
" " " " 1878	298,681.77	404,567.98
" " " " 1879	512,809.15	175,732.93
" " " " 1880	495,155.19	97,924.60
" " " " 1881	570,536 63	98,714.04
" " " " 1882	678,925.33	91,013.16
" " " " 1883	773,702.17	23,749.46
Total	$3,709,381.42	$1,132,899.29

JEFFERSON COUNTY.

The railroad has reached Wickes, the last rail being laid a short distance from the smelter, and the company will soon begin the shipment of such ores as can not be worked at Cainet, to the reduction-works of the East.

MADISON COUNTY.

VIRGINIA CITY REDUCTION COMPANY.—These works have started and are running night and day on ore from the Prospect mine.

SILVER BOW COUNTY.

ALICE.—The Salt Lake *Tribune* publishes the following interview, as a reply to the letter recently written to the ENGINEERING AND MINING JOURNAL:

The article was shown to Mr. J. R. Walker, President of the Alice Company, on his return from San Francisco, and he was asked whether the property was skillfully and economically managed. He replied: "The Alice Company is worked as economically as, and perhaps more so than, any other company in the West. I don't except any. The president gets no salary, and all we pay for labor is what goes to the workmen at the mines and mills, a book-keeper, and one assistant-secretary. The management of Superintendent Hall and his assistant, Mr. Daft, has never been questioned, and we are in every way satisfied with it."

"Are the newspaper figures showing the shipments correct?"

"While the figures as given in the *Tribune* and other papers may be approximately correct, based on the shipments of a given month, yet they are not absolutely so, because a part of the product of the preceding month is included in these shipments as reported. The amalgam is on hand, but it takes from eight to ten days to put it in a marketable shape; that is to say, to manufacture it into doré bars. At the end of the year, however, the actual shipments and the newspapers' reported shipments agree, while the monthly shipments as actually made may be reported differently by the papers."

"Is the shipment of $195,836.63 reported as having been made in October correct?"

"According to newspaper figures, it may be correct, but the actual production for that month was $102,346.05 assay value. This netted the company in New York $86,856.23. This discount is due to the difference between the actual market value of the silver in New York and the assay value. All the assayers' tables are based on the standard price of silver being placed at $1.2929 per ounce; and in figuring the value of bullion, the worth of a particular bar is based upon this standard price of silver. But, as you well know, the present market value of bullion is about $1.10 per ounce for fine silver. Our shipments from the Alice, however, are not of fine silver, but consist of bullion, containing silver, some little gold, base metals, consisting of some little lead and some copper, and costs perhaps two cents per gross ounce for refining and separation, so that not only do we not get $1.2929 (on which basis we have to figure here), but we do not even get $1.10, the market price for fine silver."

"I see the disbursements for October are placed at $41,600. Do these figures include your entire disbursements for that month?"

"No, sir; those figures represent simply an estimate of the funds required by the superintendent for the payment of labor, ore extraction, reduction, prospecting, and dead-work, mine and mill improvements, freight, some lumber, and a few local bills at Butte. It does not include the cost of salt, wood, oils, quicksilver, expressage on bullion, and a hundred other things necessary for the running of so large a mass of machinery and such extensive mines as the Alice and Magna Charta are."

"Can you show me the actual receipts and expenses for the year?"

"In about a month from now, say about January 1st, we shall get out a report of the financial condition of the company, and the stockholders can then see for themselves just exactly how the business stands. While we claim to have worked the property as economically as it could possibly have been worked, we do not claim to have made the ore in the mines, and hence have to take it as we find it. Our ore assays from 35 to 50 ounces, and while the statement that 'Stockholder' makes regarding our having produced sixty car-loads of ore a day may be true, yet his information that our ore assays from 150 to 200 ounces is not true, and the ore we are now taking out is not 'better ore than any taken out for years.'"

"Is the company out of debt?"

"By no means. The chief indebtedness we have is that due to the Walker Brothers, for the purchase of the Magna Charta, Valdemere, and other outside lode claims contiguous to the main property. Walker Brothers loaned that money to the company at 4 per cent, a very low rate of interest, and, instead of taking the receipts of the company and applying them to the payment of that debt, the Walker Brothers, as the holders of the majority of the stock, have gone on making improvements for the benefit of the company. This debt due by the Alice Company can easily be discharged if the stockholders so desire; for the Walker Brothers will to-day take back less than one half of the property they sold to the Alice Company and discharge the indebtedness due by the company to them. In other words, they are willing to give the Alice Company more than one half of the property for nothing and take the balance in satisfaction of the debt due by the company to them."

"When will you resume payment of dividends?"

"Dividends will be resumed as soon as the company is out of debt and is able to make a dividend. The last dividend was paid in December, 1881, and since then the product of the property has been used for opening up new ground, sinking two new shafts, and developing further on the old shaft, erecting additional new machinery necessary to work the property acquired from Walker Brothers and also in making partial payments for the properties purchased from Walker Brothers.

"Our reasons for the non-resumption of dividends are as follows: First. The fact that the Utah & Northern has heretofore charged such arbitrary rates on necessary supplies, such as salt, quicksilver, etc., has made our running expenses very high. We expect relief, however, from this source next spring, when we hope to see the Northern Pacific completed into Butte. In addition to this, the cost of fuel has doubled in the past three years, on account of so many mines being opened and the wood having to be hauled double the distance. Other expenditures have increased since then, but it is not necessary to mention them in detail. Secondly. Since the first developments were made in the mine, we have struck a poorer grade of ore, and that has necessarily reduced our income. Thirdly. We have so enlarged the property by purchasing additional mines and extensive and expensive machinery, all of which had to be paid out of our receipts, that our dividend-paying power has been entirely prostrated. Our expenses have also been increased necessarily by the purchase of these properties, and, as in all enterprises of this character, it takes time to realize on the money invested. It will eventually regulate itself, and the property will then show up in its true light.

"Another very pertinent matter in this connection is the fact that most of the large stock companies organized on the Comstock and other places have been run on the assessable plan, whereby stockholders could at any time be called upon to pay for all such improvement as we have made on the Alice. But our company has not only not assessed its stockholders for these improvements, but it has paid for them out of the net earnings, and in addition purchased valuable properties on credit at a nominal rate of interest from parties whose sole aim has been to make the Alice a mining property that should be a credit to Butte and the whole territory of Montana. It has always given us great pleasure to have the residents of Butte and Walkerville, as well as mining men and experts from all parts of the country, visit the property and examine the same. We have never denied admission to the property, and it always has been and is now opened for the inspection of all or any parties who desire to see it and its workings."

COLORADO SMELTING AND MINING COMPANY.—The most important transaction of the past week was the reorganization of the Colorado & Montana Smelting and Mining Company, under the name of the Colorado Smelting and Mining Company. Articles of incorporation have been filed in which the capital stock is placed at $1,000,000, and the following officers named: N. P. Hill, President; W. A. Clark, Vice-President; H. R. Wolcott, Secretary; H. Williams, Manager. In addition to the valuable properties heretofore owned by the Colorado & Montana Company, the new company includes in its list of properties a three-fourths interest in the Basin Flume Company and the Gagnon mine.

NEVADA.

ESMERALDA COUNTY.

NORTHERN BELLE.—Various rumors regarding this company are in circulation. One of them states that the company's checks went to protest in San Francisco recently, and the mine was forthwith attached by the Carson & Colorado Railroad Company. It is stated that the mine will eventually be sold to satisfy the $360,000 judgment, and most likely be bid in by the Holmes Company. Another report states that the company has discharged all its men and shut down the mills. The mine and mills will probably remain closed until the property passes into the hands of the Holmes people, who will probably resume work and prospect for more ore-bodies.

STOREY COUNTY—COMSTOCK LODE.

The greater portion of the big hydraulic pump at the Combination is in position and the work is crowded as rapidly as possible. Owing to the low water in the Carson River, the mills are not running full-time.

ALTA.—The water is out of the mine nearly down to the 2150 level. As the pumps are now drawing the water from about 3000 feet of drifts, progress is at present very slow. The draining of the Alta will allow of work being resumed in the Benton, and the Justice folks will also doubtless resume operations, drifting into their ground from the Alta, as they had arranged to do before the flooding of the latter mine.

CHOLLAR & POTOSI.—With the starting of this pump, work will be resumed on the 2600 level.

UNION CONSOLIDATED.—At the north end, the south drift in the Union Consolidated is out over 70 feet from the joint Sierra Nevada station at the 3100 level. It is in vein porphyry and other vein material which as yet shows no value. The drift is pushed directly for the main drift that is coming north of the same level. The two are nearing each other at the rate of about 70 feet per week. This connection will be quite an event for the north end mines. It will form an air-gallery for the Mexican, Union Consolidated, and Sierra Nevada, from which a new departure may be taken in deep exploration to the east and west.

PENNSYLVANIA.

The Chickies Iron Company has struck a new vein of ore south of the present workings at its Springfield bank. A shaft has been sunk some 40 feet, all in ore, with every indication of its running to a great depth. This company has lowered its plane at the Myers bank, and is now working a 40-foot breast of very rich specular and hematite combined.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Dec. 21.

This week has been one of the dullest in the mining market, and it can not be said that the dealings furnish any items of interest. The transactions were scattered throughout the list, but they were generally very small. Iron Silver was one of the stocks most largely dealt in, and it suffered a slight decline in prices. Northern Belle shows no material change in price from our last, but continues weak. Sutro Tunnel was very actively dealt in, and was a little weak. Sonora was also very active, but remains steady in price. We give a complete summary of the market below. The total number of shares sold aggregates 94,335, as against 120,260 last week.

The Comstock shares were very moderately dealt in at steady prices. California was quiet and steady at 15@16c. Consolidated Virginia was also quiet at steady prices, selling from 30@33c. Sierra Nevada was strong, under a small business, selling from $2.55@$3.50@$3.25. Union Consolidated was quiet and steady, selling from $2.55@$2.80@$2.75. Mexican was very quiet, selling at $1.90 to-day. Sutro Tunnel was very actively dealt in at irregular prices; it sold from 19@15@16c.

The Leadville stocks were quiet and steady. Amie sold from 9@10c., with a small business. Chrysolite was quiet and steady, selling from $1.30@$1.25. Dunkin was irregular, selling from 28@26@27c. Breece sold at 15c. Iron Silver was very actively dealt in, and was weak; it sold from $2.30@$2@$2.05. Leadville was weak, under small business, selling from 50@40@42c. Little Chief was quiet and strong, selling from 56@60c. Little Pittsburg sold from 52@47c. under a small business. Climax was quiet at 7c.

The Bodie stocks were very quiet at steady prices. Bodie Consolidated was strong, with a fair business, selling from 65@75@71c. Standard was quiet and steady, selling from $6@$5.75.

The Tuscarora stocks were almost neglected. Grand Prize was quiet at 25@24c. Navajo sold to the extent of 200 shares at $3.25. Independence sold at 8c.

In the miscellaneous list, Alice sold at $2.60, with one small transaction. Eureka was quiet and steady at $3. Green Mountain was strong, under a moderate business, selling from $1.20@$1.35@$1.30. Homestake was quiet and strong, selling at $12. Horn-Silver was active at steady prices; it sold from $6.13@$6.25. Northern Belle was irregular, selling from 16@25@22c., with a small business. Robinson Consolidated was quiet and steady, selling from 33@30c. Sierra Grande was a little weak, selling from 65@60c., under a small business. Silver King was strong at $7.63. Stormont sold to-day at 15c. Castle Creek was very weak at the opening of the market, but regained some strength at the close; it sold from 8@40c., with a small business.

Barcelona was quiet and a little weak, selling from 22@20c. Central Arizona was steady at 20c., with a small business. Eastern Oregon was very irregular, under a small business; it sold from 12@8@18@15c. Harlem was quiet and a little weak, selling from $1.15@$1.05. Sonora Consolidated was very active at steady prices; it sold from 24@22@23c. North Mexican sold from 80@65c., with a small business. Colorado Central was quiet and steady at 38@39c.

There was considerable excitement in mining circles this week, occasioned by the election of trustees of the Ophir Mining Company, at San Francisco, and the bitterly contested fight between Mr. Flood and Senator Sharon for the control of the company. The following dispatch from San Francisco, giving full details of the contest, will no doubt be of interest:

The election was the most exciting since the great Hale & Norcross fight in 1868, when the shares of that company rose to $8000. The capital stock of the Ophir Company is $10,800,000, in shares of $100 each. The real fight was to obtain possession of the milling ore, in which all the profits lie. Up to this morning, the general belief was, that Senator Sharon would capture the mine. This was strengthened by the known fact that Secretary McCoy, who married Sharon's niece, was going to vote his 1100 proxies for the Sharon interest. At mid-day, the Nevada block was surrounded by an eager crowd, anxious to learn the probable result. The voting commenced at 1.05 P.M. At half-past two o'clock, the vote stood: Flood, 41,714; Morrow, representing the Sharon interest, 2537. Mr. Richardson, of the Bank of California, holding Sharon certificates and proxies, appeared and voted 47,105 shares. This was offset by W. H. Wright, who cast 1460 votes for Flood, giving him the victory with 50,922 votes against Sharon's 48,855. The State law calls for seven trustees. By mutual agreement, four were to be from the winning side. They are C. L. Weller, C. O'Connor, Charles Fish, and R. H. Follis, Sharon's trustees are A. K. P. Harman, Morris Schmidt, and J. H. Robinson. E. C. Holmes was elected secretary. The victory is credited to the energy of J. L. Flood, son of the millionaire. He says the policy of the company will be to continue work on the lower levels, in the hope of finding a new bonanza, and to continue the search as deep as it is possible to go. The secretary's report showed a balance of $6500 on hand on December 18th, deducting all indebtedness. The stock sold to-day at $20 cash: seller ten days, $7.

Senator Sharon's defeat is said to be due to a mistake or to deceit. When the name of Homer O. King, a mining broker, was called, Mr. Morrow produced the firm's proxy for 2665 shares, but the Flood party immediately reduced this to 10, producing 2655 shares of actual stock. Three similar occurrences followed, and this gave Mr. Flood the election. While Senator Sharon held all the proxies, Mr. Flood held solid stock. A later dispatch states that the vote by which Mr. Flood retained control of the Ophir was Flood, 51,580½; Sharon, 49,092.

MEETINGS.

The Bullion Consolidated Mining Company, Room 62, Drexel Building, New York City. Annual meeting of stockholders and election of trustees January 8th, at ten o'clock A.M.

The Ophir Consolidated Mining Company, Room 62, Drexel Building, New York City. Annual meeting of stockholders and election of trustees January 8th, at eleven o'clock A.M.

DIVIDENDS.

The Bonanza King Consolidated Mining Company, of California, has declared a dividend of twenty-five cents per share, payable immediately.

The Contention Mining Company, of Arizona, has declared a dividend of twenty-five cents per share, payable December 24th, at the Farmers' Loan and Trust Company, Nos. 20 and 22 William street, New York City.

The Father de Smet Consolidated Gold Mining Company, of Dakota, has declared dividend No. 30, of twenty cents per share, payable at the office of Laidlaw & Co., No. 14 Wall street, New York, December 31st.

The Hope Mining Company, of Montana, has declared a dividend of $1.50 per share, payable December 31st.

The Ontario Silver Mining Company, of Utah, has declared its 90th dividend, of $75,000, for November, payable at the office of Messrs. Lounsbery & Haggin, No. 15 Broad street, on December 31st. Transfers will close December 24th. The total of dividends to date is $5,150,000.

The Osceola Consolidated Mining Company, of Michigan, has declared a dividend (No. 17), of fifty cents per share, payable December 15th, to stockholders of record.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows on oil for the past week:

This has been one of the dullest weeks of the year in the oil market; the extreme range of fluctuations was 2⅛ cents per barrel. The highest price was $1.14⅝ last Saturday, and the lowest was $1.12½ on Wednesday. The approach of the holidays and the dullness that usually accompanies that season has prevented any activity, and many bulls sold their oil to avoid carrying charges. The Boards in Oil City, New York, Pittsburg, and Bradford will close from Saturday, three P.M., until Wednesday, December 26th, at ten A.M.

Carrying rates in this market have been about 70 cents, and this discouraged the bulls and invited some short selling. To-day, Grandin No. 18 was reported 6 feet in the sand and showing for a fairly good well. It is on the southwestern frontier of Balltown, and is important as showing that the Balltown District is not entirely exhausted.

One of the weakening influences of the month has been the excess of runs (or receipts) over shipments (or deliveries), which shows that so far this month there has been an accumulation of oil. During each of the months of August, September, October, and November, the stock of oil was reduced. The best informed oil men, however, believe that unless some new field is discovered this winter that the visible supply of oil will be considerably reduced before spring. Exports this month are on an average 7000 barrels per day larger than in November. The market is expected to be better and higher early in the year for both refined and crude.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Dec. 15.....	$1.14	$1.14⅝	$1.13⅝	$1.13¾	4,093,000
17.....	1.13⅞	1.14⅜	1.13¾	1.13⅞	3,775,000
18.....	1.14⅛	1.14⅜	1.12⅞	1.12⅞	5,725,000
19.....	1.13	1.13⅜	1.12¼	1.13¼	4,861,000
20.	1.13⅜	1.13¾	1.12¾	1.13	4,638,000
21.....	1.13⅛	1.13¼	1.12⅝	1.12⅞	4,047,000
Total sales.					27,139,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Dec. 14.	Dec. 15.	Dec. 17.	Dec. 18.	Dec. 19.	Dec. 20.
Albion						
Alpha		.90		.90	1	1
Alta	1⅝	1¼	1½	1⅝	1⅝	1¼
Argenta						
Bechtel						
Belcher						
Belle Isle						
Best & Belcher	2¾	2½	2⅝	2½	2¾	2½
Bodie	.75	.75	.80	.75	.75	.80
Bullion						
Bulwer						
California		.10	.10	.10	.15	.10
Challar	2¼	2	2	2	2½	2¼
Con. Virginia	.35	.30	.30	.30	.35	.30
Crown Point			.80	.80		
Elko Cons						.20
Eureka Cons	3¼	3	3	2¾	2⅝	2½
Exchequer						
Gould & Curry	2¼	1½	1⅝	1½	1¾	1⅝
Grand Prize		.25			.25	.20
Hale & Norcross	1⅛	1	1	1½		1⅝
Independence						
Martin White						
Mexican	2⅛	2	2⅛	2	2¼	2⅛
Mono						
Mount Diablo		2¼	2	2		1¾
Navajo	3⅜	3½	3½	3½	3⅜	3½
Northern Belle	.20	.20	.45	.20		
North Belle Isle						
Ophir	10	11½	15⅛	18	20	4
Overman						
Potosi	.90	.90	.90	.90	1⅛	.95
Savage		.80	.90	.85	1	.95
Scorpion						
Sierra Nevada	3¼	2⅞	2⅞	2⅝	3⅛	2⅞
Silver King						
Tip Top						
Union Cons	3	2⅛	2⅛	2⅛	3	2⅝
Utah	1⅛	1½	1½	1¼	1⅞	1⅛
Wales Cons						
Yellow Jacket	2	1¾	1⅝	1⅝	2	1¾

The following are the financial balances of the various mining companies on December 1st:

CASH ON HAND.

Alta	$8,820.40	Mexican	$19,482.37
Argenta	129.82	Mono	2,347.10
*Belcher	18,366.54	Martin White	1,128.27
Benton Con	1,930.85	Occidental	5,707.01
Best & Belcher	24,191.32	Ophir	39,972.45
Bulwer	3,626.03	Potosi	23,347.53
Bodie Con	22,750.86	Sierra Nevada	50,859.32
Chollar	70,116.21	Summit	740.40
Challenge Con	5,453.46	Standard	144,930.80
Jackson	3,419.40	Tioga Con	800.82
†Con. Virginia	54,093.76	Union Con	21,683.29
‡California	151.85	Utah	2,829.00
Crown Point	22,158.01		

INDEBTEDNESS.

Lady Washington Con	$4,028.09
§Day (overdraft)	2,649.88
Grand Prize (overdraft)	26,571.79
Gould & Curry	6,888.15
Hale & Norcross	18,090.71
‖Northern Belle	18,623.64
Savage	18,746.12

Albion indebtedness exact amount not yet known; approximate, $260,000.

* Due Sutro Tunnel Company, $10,920.

† Monthly expenses of mine partly paid; amount unknown.

‡ Overdraft at Nevada Bank, $950.92.

§ Bills payable, $76,567.57.

‖ Bullion unsold, $28,700.92.

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BULLION MARKET.

NEW YORK, Friday Evening, Dec. 21.

Under higher rates for silver abroad and for sterling exchange here, the figures of the accompanying table show some advance in rates for silver in our market.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Dec. 15	50 13-16	110⅛	Dec. 19	50⅞	110⅜
17	50⅞	110¼	20	50⅞	110½
18	50⅞	110¼	21	50⅞	110⅜

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of November.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$885,934
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"	——	12,604
Bodie, G. S.	Cal		199,859
Bodie Tunnel, G.	"		52,742
*Bonanza King, G.	"		426,967
*Boston & Montana, G.	Mont		140,323
*Central Arizona, S.	Ariz		35,845
*Christy, S.	Utah	17,141	236,600
*Chrysolite, S. L.	Colo	17,624	345,403
*Consolidated Bobtail, G.	Colo		62,743
*Contention, S.	Ariz	63,497	854,886
Crescent, G. S. L.	Utah		266,498
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		388,562
*Derbec Blue Gravel, G. S.	Cal		115,043
Dunkin, S. L.	Colo		49,250
Evening Star, S. L.	Colo		47,061
*Father de Smet, G.	Dak	24.556	325,237
*Frisco M. and S. Co., G. S. L.	Utah		$77,084
*Granite Mountain, S.	Mont	——	323,523
Gunnell, S.	Colo		58,828
*Halle, G.	S. C.		34,625
*Head Center Consolidated	Ariz		45,340
*Head Center and Tranquillity	Ariz.		89,108
*Hecla Consolidated, G. S. L.	Mont	**	633,979
*Homestake, G.	Dak.		866,709
*Hope, S.	Mont	——	82,060
Horn-Silver, S. L.	Utah	240,000	2,977,200
*Howell S. and Mg. Co., G. S. L.	Ariz	49,075	193,952
Idaho, G.	Cal		150,642
*Independence, G. S.	Nev		32,991
*Iron Silver, S. L.	Colo		1,031,952
*Jocuistitla, S.	Mex		‡258,959
*Kentuck, G. S.	Nev		20,550
*Lexington, S.	Mont	119,134	1,173,685
*Little Pittsburg, S. L.	Colo	15,441	87,552
*Marguerite, G.	Cal		74,622
*Martin White, G. S.	Nev		136,317
Morning Star, S. D.	Colo		84,428
Mount Diablo	Nev	39,992	468,242
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S.	"	30,502	569,607
*Ontario, S. L.	Utah		1,807,178
*Oxford, G.	N. S.		54,055
*Phœnix, G.	N. C.		21,009
*Pinal Consolidated, S. L.	Ariz		181,485
*Plymouth Consolidated, G.	Cal	77,366	450,456
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		203,947
*Silver Cord, G. S. L.	Colo	31,262	972,567
Silver King, S.	Ariz		367,802
*South Yuba, G.	Cal		37,272
Standard, G.	Cal	71,066	1,034,685
Star, S.	Nev		27,095
*Stormont, S.	Utah	17,086	232,638
Syndicate, G.	Cal	10,230	66,238
Tintic M. and M. Co.	Utah	1 873	36,543
*Tip Top, S.	Ariz		37,868
*Tombstone, G. S. L.	"		664,618
Wyoming Consolidated.	Cal		31,541
Yellow Jacket, S.	Nev		265,885
Total amount of shipments to date			$20,878,877

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended December 21st, as compiled from various sources, amounted to $119,000, as against $207,878 reported for the previous week. The receipts from January 1st, 1883, to date are $11,145,321.

Foreign Bank Statement.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank gained £31,500 bullion, and the proportion of its reserve to its liabilities was reduced from 43⅞ to 43 1/16 per cent, against 39½ per cent at this date last year. December 20th, the bank lost £25,000 bullion on balance. The weekly statement of the Bank of France shows a decrease of 725,000 francs gold and a gain of 1,500,000 francs silver.

At Government Contract Rates.—Treasurer Wyman is making arrangements to deliver fractional silver from Washington at the government contract rates with Adams Express Company, at the expense of the applicant. The government contract rates are considerably lower than could be obtained by private firms.

METALS.

NEW YORK, Friday Evening, Dec. 21.

Copper.—The market remains quiet, with Lake at 14⅛@15c., first hands asking 15½c., and other brands 14@14¾c., according to quality.

The most interesting feature from London is the fact that Best Selected is apparently following Chili Bars, the latter being considered the chiefly speculative article. The drop of Best Selected from £65 last week to £64 to-day indicates that the recent decline in Chili Bars, now £57, was not due to exclusively speculative influences.

Messrs. James & Shakspeare have issued the following statistics of copper, compiled from the Board of Trade returns:

	Jan. 1 to Nov. 30. 1883. Tons.	1882. Tons.
Imports:		
Pure in pyrites	13,902	14,381
precipitate	21,510	16,366
ore	14,706	14,356
regulus	8,399	8,274
Bars, cakes, etc.	32,571	32,091
	91,088	85,468
Exports:		
Raw (English)	15,491	11,579
Sheets	14,380	14,646
Yellow metal at 60 per cent	11,055	10,206
Brass at 70 per cent	3,103	3,201
	44,029	39,632
Foreign	10,208	11,830
	54,237	51,462

Lead.—Holders appear to be making an effort to stay the decline, some of them declining to sell Common at less than 3·70@3·75c. We have, however, been quoted Refined at 3·65c., which indicates that the attempt is not by any means general. The best season for Common has passed by, and buyers, having extremely bearish views in regard to the metal, will not touch it. In the present state of the market, quotations mean very little, as the market has not been fairly tested here for two weeks.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

Our market is quiet. Sales will not aggregate more than 100 tons of Refined at 3·30c., delivered at St. Louis. Nothing is doing in Common.

Messrs. Everett & Post, of Chicago, telegraph:

There is a fairly active demand for both Hard and Soft lead, and prices are held stiff at 3·35c. However, scarcely any thing is offered at that. Some future lead has been sold here at 3·40@3·42½c.

Spelter.—This metal is, if any thing, exhibiting slight signs of weakness. We quote nominally 4@4¼c. London cables, £15 7s. 6d.

Antimony.—This metal is strong. There are no arrivals of Cookson's, though Hallett's is in fair supply.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 21.

American Pig.—Business is very quiet, though it is reported that more effort is making to close contracts for delivery next year at concessions fr om ruling rates. There is some uncertainty as to the immediate future, though furnace men are hopeful as to the prospects. Of course, a very dull week or two is now expected. We quote Foundry No. 1, $20@$22.50; No. 2, $18.50@$19.50; and Gray Forge, $17.50@$19, all at tide-water. Bessemer pig is dull, nominally at $20@$20.50. There was a sale of 2000 tons of Spiegeleisen, 20 per cent, at $28.75. We quote $29.

There have been no transactions at the Metal Exchange this week.

Scotch Pig.—Though the arrivals do not foot up to more than from 1000 to 1200 tons per week, some of the pig is sold from dock at a concession.

We quote ex ship and to arrive: Coltness, $22@$23; Langloan, $22.50@$23; Summerlee, $22.50; Eglinton, $20@$20.50; and Dalmellington, $20@$20.50.

At the Exchange, the following cable quotations were received to-day: Coltness, 55s.; Langloan, 53s. 6d.; Summerlee, 52s. 6d.; Gartsherrie, 51s. 3d.; Eglinton, at Ardrossan, 45s. 6d.; and Dalmellington, 47s. 6d. Warrants were 43s. 7d. to-day.

Steel Rails.—There has been considerable inquiry, and in the aggregate a large quantity of steel rails have been placed at $34 for winter delivery, and $35@$36 for summer work, all at mill. Much capital has been made out of a reported sale of 7500 tons at $30. These rails were heavy section seconds, and the price is in reality very good. Light seconds generally fetch from $4@$5 less than first-class rails, but are much more easily placed than heavy seconds.

Old Rails.—Quiet at $22@$22.50.

Philadelphia. December 21.

Pig-Iron.—In answer to inquiries as to the conditions of the pig-iron market, prominent makers and brokers assert that there is no weakness in standard brands. Large consumers who have been negotiating for the past week or so deny the correctness of this statement, and say that very favorable terms can be had, especially for large lots. So far as actual sales go to prove the condition of the market, they show that a few standard brands are held with considerable firmness, but that the great bulk of low-priced irons are moving at such prices as can be had. It is impossible to give exact prices, as every transaction fixes its own. It is stated that some large lots have been ordered for forward delivery, but the usual demand is for small lots for current requirements. Reports from furnaces show a slight increase in production and a more rapid diminution of stocks, showing an increase of stocks in consumers' hands. If some offers now in hand are accepted, a good deal of business will be done in January; but these prices will allow no profit to makers. On account of the fact that a good deal of mill capacity will take a long holiday rest, and because of the very low selling prices of finished iron, the movements in forge iron have assumed very small proportions, and prices are very low for all except the standard makes. For these, there is a good demand, and no concessions below $17 can be had. There are several buyers in the market to-day, looking after Southern irons.

Foreign Irons.—Consumers of Bessemer pig, in view of the condition of the steel rail market, are not anxious to crowd in stocks, but still some two or three brokers have instructions to buy at certain figures, $1 below asking prices. Within three or four days past, 7700 tons of ore have been received. Spiegeleisen is nominally $29.50.

Blooms.—Charcoal Blooms are selling at $55@$57, and anthracite at $47@$47.50.

Muck Bars.—Nominally $32.

Merchant Iron.—Nominally 2@2·10c., and common, 1·70@1·80c.; but when it comes to business, better terms can be had. Competition for business is depressing prices for refined iron in some cases down to 1·90c., and manufacturers say that they have no profit at that price. There was a good deal of inquiry in the market yesterday and to-day, and offers for small lots are in hand, and will probably be accepted. Country mills are shading prices, especially for common iron. There are rumors of large orders for cars to be given out in January.

Nails.—As indicated in former reports, a downward tendency is at work in nail prices, and quotations are now given at $2.45@$2.55. The jobbing demand is light. Eastern nail men are in better spirits since the announcement of the suspension of six weeks to take place in Western mills. It is thought that this will check the downward tendency of prices. The favorable weather has permitted a large amount of building to be continued, and the consumption of nails up to this time has been quite liberal.

Plate and Tank Iron.—Quotations show a slight decline, and demand is light.

Structural Iron.—The movements in structural iron are of a very trifling character, and nothing of importance will be done until January.

Steel Rails.—Quotations are nominally $34@$35,

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICE PER SHARES AT WHICH SALES WERE MADE.												SALES.
	Dec. 15.		Dec. 17.		Dec. 18.		Dec. 19.		Dec. 20.		Dec. 21.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.									2.60				100
Amie Con., Co.	.10	.09	.10		.10		.10						5,115
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.													
Bodie Cons., Ca.	.65		.70				.69		.75	.71			1,200
Breece, Co.									.15		.15		1,700
Bulwer, Ca.													
California, Ne.					.16	.15	.16						1,800
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Castle Creek			.08						.40	.35	.40	.35	1,000
Chrysolite, Co.	1.30		1.30	1.25			1.30				1.25	.30	1,100
Cons. Va., Ne.	.30		.30				.33	.31	.33		.33	.30	4,100
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.	.25										.27	.25	1,100
Eureka Cons., Ne.									3.00				100
Excelsior, Ca.													
Father de Smet, Dk.	3.00												170
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.													
Grand Prize, Ne.											.25	.24	200
Great Eastern, Dk.													
Green Mountain, Ca.	1.20				1.30	1.25			1.35	1.30			900
Hale & Norcross, Ne.													
Hall-Anderson, N. S													
Hibernia, Co.													
Homestake, Dk.			12.00		12.00						10.00		120
Horn-Silver, Ut.	6.25	6.13	6.13		6.25		6.25		6.25		6.25	6.13	3,120
Hukill, Co.													
Independence, Ne.	.08												100
Iron Silver, Co.	2.30	2.25	2.30	2.20	2.30	2.25	2.25	2.00	2.05	2.00	2.05		13,800
La Plata, Co.													
Leadville C., Co.	.50	.40	.42										550
Little Chief, Co.	.58	.57			.57	.56			.57		.60	.59	2,500
Little Pittsburg, Co.							.52		.47				300
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.			3.25										200
Northern Belle, Ne.			.20	.16	.25	.19	.25	.22	.20		.22		1,035
North Belle Isle, Ne.													
Ontario, Ut.			30.00										20
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.33						.31		.30		.30		2,950
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.					.65	.62					.60		700
Sierra Nevada, Ne.			2.75				2.75	2.55	3.50		3.25		850
Silver King, Ar.			7.63										100
Spring Valley, Ca.													
Standard, Ca.	5.75						6.00	5.75			5.75		805
Stormont, Ut.											.15		1,000
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES
	Dec. 15.		Dec. 17.		Dec. 18.		Dec. 19.		Dec. 20.		Dec. 21.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta-Montana													
American Flag													
Barcelona, G	.21	.20	.21		.22		.22		.21		.20		3,500
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'cher, G. S.													
Big Pittsburg, S. L													
Bradshaw, S.													100
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., G.													
Central Ariz'na, S.	.20								.20				300
Cherokee, G.													
Cholla													
Climax, Co.											.07		1,000
Colorado Central	.39	.36	.39										675
Cons. Pacific													
Crowell, G.													
Dahlonega, G.													
Decatur													100
Dunderberg													
Durango, G.													200
Eastern Oregon	.12	.08	.16	.08			.16	.14			.15		6,500
Elko Cons.													
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.15		1.10		1.10		1.06		1.05		1.05		2,500
Hortense, S.													
Imperial													
Lacrosse, G.													
Lucerne													
Mariposa Pref., G													
" Com., G													
Mexican, G. S.											1.90		45
Miner Boy													
Mono													
North Mexican	.80	.67	.65		.66	.65							1,400
North Standard, G.													
N. Horn-Silv'r, S. L.													
Ord'nt'l & Miller, S.			.66		.67						.67		1,300
Parnell													
Rappahannock, G.													
Red Elephant, S.											.06		1,000
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.24	.23	.24	.23	.24	.23	.24	.22	.22		.23	.22	15,000
South Bodie, G.													
South Bulwer, G.													
South Flite													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel	.18	.17	.19	.18	.18		.16	.15	.16		.16		13,400
Taylor Plumas													
Unadilla, S													
Union Cons., G. S.											2.75		580

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 46,735. Non-dividend shares sold, 47,600.

BOSTON MINING STOCKS.

	Dec. 14.		Dec. 15.		Dec. 17.		Dec. 18.		Dec. 19.		Dec. 20.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Amie													
Atlantic											10.00		100
Aztec													
Bodie Con													
Bonanza D.	1.50				1.50				1.25				200
Bowman Sil	.12	.10	.09		.10		.11		.11		.11	.10	15,250
Bruns. Ant.			18.00										50
Bulwer													
California													
Cal. & Hec.			238		239		239						23
Catalpa	32½				32½				33	32½	33		1,000
Co. Virginia													
Contention't.			.01		.04		.04						1,800
Copper Falls													
Crescent					.15								1,000
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin	.29		.30		.30		.29		.28		.28		1,300
Elko Con													
Empire	.25		.25		.25	.24	.25		.25		.25		8,000
Eureka Con.													
Franklin	12.00	11.50			12.00	11.75					12.00		440
Gila County													
Hancock G.													
Harshaw													
Horn-Silver													
Huron													
Independ'ce													
Indian Queen													
Mammoth					.02								500
Mass. & N.M.							.02						1,000
Milton													
Napa											2.50		40
National													
Ontario													
Osceola									17.50				12
Penn-Breck													
Pewabic													
Pine Tree									.08				500
Plymouth													
Quincy	49.50		48.00						47.00	46.00	47.00		75
Ridge													
Robinson													
San Pedro			.10										100
S'ra Grande													
Silver Islet	3.00												10
Silver King													
Simpson Gd													
Sonora Con					.25		.24						300
South Pacl.													
Standard													
Sullivan	1.02½	1.00			.97		1.10		1.12½	1.05	.16		2,068
Sutro Tun.	.16						.19	.18	.16				1,600
Sycamore													
Twin Lead													
Vizina													

PHILADELPHIA MINING STOCKS.

	Dec. 14.		Dec. 15.		Dec. 17.		Dec. 18.		Dec. 19.		Dec. 20.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent.	.17				.17		.16		.16		.16		6,400
Arizona So.			.01										3,000
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati							.08		.09	.08	.09		12,200
Comprom'e.	.32	.30	.35		.35		.40		.35		.40	.30	5,753
Contention													
Con. Virg.													
Dauntless							.02						5,000
Del Monte													
Denver City							.16						200
Eureka													
Girard													
Governor													
Grand Uni'n	.02		.02										8,000
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Gulch	.03		.04	.03			.04		.04		.04		23,800
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.	.05												1,600
Little Maud	.02		.03		.03		.03		.04		.04		14,500
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan			.02						.02				3,200
Navajo													
North'n B'l													
Orion													
Orion Pref.													
Palmetto E.													
Pembina							.10						1,000
Penn-Breck					.03		.03	.02	.04	.03	.03		7,700
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis	.10						.10		.10				1,000
Rara Avis E.	.07		.07		.07		.07		.07		.07		7,700
Record													
Rico Pion'r.													
Sierra Apac.							.15		.15				3,000
Sierra Bella							.80		.30		.30		7,500
Sierra G'nde	.65		.62½		.62½		.62½		.60				8,100
Sierra Nev.													
Silver Cord	.80								.80				600
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l													
Tombstone									.67½				300
Victor													
Yale Mt.													

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and there is considerable anxiety among makers to secure orders for January and February.

Old Rails.—Spot lots sold at $23.50. Southern rails are looked after, and small lots are bought.

Scrap-Iron.—Good scrap has dropped 50c.@$1 per ton. Cargo, $22 nominally.

Pittsburg. December 20.

The workmen at the Edgar Thomson mill have accepted the reduction of 13 per cent in their wages, and all goes on quietly. The workmen in the North Chicago Rolling-Mill have accepted a reduction of 10 per cent. The strike on the Monongahela River leaves some 2000 men idle. The iron trade shows little difference compared with what it has been reported to be for the last week or two. Consumers of pig-iron are purchasing from hand to mouth, and some orders are withheld on account of a difference of 25c. per ton. Forge iron, Lake ore, is held for $18, and there is considerable firmness shown by local makers because of the depletion of stocks said to be going on, but which consumers are loth to believe in. The Lucy furnaces are both out, and two or three more, it is said, will soon follow. The talk is, that stocks are light; but buyers have very little trouble in getting concessions on outside inferior iron, though iron made in the country is held with more firmness. Lowest sales of Gray Forge have been made at $16.50, and numerous sales have been made all the way from that figure up to $17.50. Muck Bars are dull at $32. Very little Merchant iron is selling, and quotations are 1·60@1.80c. Consumers generally are running with small stocks, and this is considered the most favorable feature of the market. If any large proportion of the consumers who need stocks come into the market in January, the demand will be heavy, and prices will certainly improve. Car-load lots of nails are selling at $2.35@$2.50, and offers are in hand at $2.25@$2.35. Discounts on Pipes are 70@75 per cent; Tubes, 60@62½. There is an active inquiry for old rails, but few sales are reported. Large lots are wanted for delivery in April, but sellers decline to accept the offers which are made. Steel Rails are quoted firm at $35. Inquiries are numerous, and offers are in hand something less. Low-grade steel is dull.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 21.

Anthracite.

For the present, the danger of a rupture of the "harmonious" relations between the anthracite coal companies seems to have passed by. At one time, it seemed imminent. For some sizes, for instance, chestnut, there is more inquiry, but the stock afloat and in cars is large, and there is no scarcity. So far as the trade in general is concerned, it is still dull and quiet; but in spite of the urgency of early action, no decision as to what is to be done in January has been reached. Experience has apparently taught the companies that if they want to reach any conclusions at all, it is well to start early in discussion. Prices are practically unchanged, being $3.50 for broken and $3.95@$4 for stove, f. o. b.

The anthracite coal tonnage of all the carrying companies for the eleven months of 1883, ended November 30th, was 29,659,886 tons, an increase of 3,139,229 tons, as compared with the same period last year. The stock of coal on hand at tide-water shipping points, November 30th, was 696,380 tons.

Bituminous.

From the Cumberland region, it is reported that tomorrow the water will be drawn off from the canal. Trade is, if any thing, flatter than it has been, and prices are naturally in buyers' favor.

Pittsburg.

The railroad trade a week ago seemed in the worst shape; but within the past few days, events on the river go to show that the coming winter will be marked by such dullness in that branch of the industry as has not existed for years. The policy, on the part of most operators, of availing themselves of every rise to send out thousands of tons of coal, irrespective of the condition of stocks and of markets below, is now producing its legitimate results. Unusually large quantities of coal in every port and a restricted demand have decided operators to close most of the largest of the seventy pits along the Monongahela and Youghiogheny rivers. Walton & Co. shut down on Saturday the last of their three pits, reducing 800 men to idleness. W. H. Brown's Sons will close all their works save the one at Saltsburg, and will discharge at least 600 men. John A. Wood, O'Neil & Co., and other large firms, had not decided on Saturday what to do, but would at all events run very slack, and devote their energies to getting matters in shape for a "freeze-up." This condition of the trade is, of course, intensified by the extreme dullness in the iron and steel trade and the glass trade at this recognized center of those great industries. Prices for river coal are nominally 7½c. for second pool at Louisville; 7¼c. at Cincinnati, with no prospects of better prices unless a long severe cold period should occur. Fourth pool coal can be purchased at 6½@6¾ to 7c. at these points. This matter of coal from the different pools is just now a live topic for the trade. The testimony given before the arbitrators last week included some spicy accusations on the part of the miners' representatives, and by one or two lower pool operators also. They charged well-known operators with filling all orders with fourth pool coal, which coal, by the time it had passed Cincinnati, became, in some mysterious way, the best "second pool coal." Fourth pool coal is inferior in quality, being "leaner" in heating and gas-making qualities. It costs a half-cent less to mine, and the gentlemen before the arbitrating committee took advantage of the occasion to say some pretty rough things about men who would cheat their customers down the river and get rich at the expense of the miners too. Considerable feeling has been stirred up in this direction, and Umpire Weeks has had a trying time of it, as he was present at all the conferences. Friday last, all the testimony was in, and in a few days Mr. Weeks will decide how rates shall rule in the fourth pool.

Coke is going the way I felt certain it would. Prices being on bed-rock (95c.@$1), they could not go lower. So production is to be restricted, the coke-makers enjoying two days of rest per week, Sunday and Wednesday. All ovens charged Friday are drawn Monday, those charged on Saturday are drawn on Tuesday, and no charging or other direct work is done on Wednesday. Thursday charges are drawn on Saturday. This reduces the full and usual output by 15 per cent, say to 3600 cars per week. Mr. H. C. Frick could not speak of the outlook. It depended upon the future of the iron trade. The valleys of Ohio take now barely half their usual amount, and the stoppage of one furnace at the Edgar Thomson works, and the two Lucy furnaces here, represents a falling off of 50 cars per day in the demand. I might add, for the benefit of the readers of COAL, that the extensive coke firm of H. C. Frick & Co. has opened a branch office in Philadelphia, at No. 313 Walnut street. Prices of crushed coke remain at $1.75 per ton, about as low in proportion as the uncrushed article.

Chicago.

Nothing is heard any more of a scarcity of cars, and when one considers the often-repeated cry of a few weeks since, "Cars are so scarce we can get no coal forward," the question naturally comes up, How came the situation to change so quickly? A cautious and well-informed coal man suggested to your correspondent that the shortage in the supply of cars during October and November was not an actual but an enforced shortage. Eastern operators were obtaining such rates to Buffalo that, with the low lake freights holding most of the time, it did not pay them to ship by rail through to the West, and the shortage in the car supply was created to further the ends of these shippers. The suggestion did not appear far-fetched, but, in the light of recent events, quite plausible.

The chief interest in the bituminous market the past week has centered in the fight between shippers of Hocking Valley coal. As near as can be learned, the story is about this: Four or five shippers, representing the chief interests in Hocking Valley coal, attempted to freeze out an outside shipper who had arrangements with a railroad line into Chicago over which the other shippers did not forward their coal, and which line had been left out of consideration by them. The shipper, placed on the defensive, met the cut of the others in Hocking Valley from $3.75 to $3.25—which cut was made at the opening of the week—by a still further cut to $3.15, and, as he seemed able to carry the war on to an uncomfortable extent, the other shippers came down a little, and to-day the price for Hocking Valley is $3.35. As a consequence of the fight, large shipments of Hocking Valley have been made. The general market for soft coals is quiet, under a somewhat lighter inquiry and a larger supply. The mines in the Indiana Block District are not running up to their full capacity.

Horsford's Acid Phosphate.

Marked Benefit in Indigestion.

DR. A. L. HALL, Fair Haven, N. Y., says: "Have prescribed it with marked benefit in indigestion and urinary troubles."

WANTED.—POSITION AS RESPONSIBLE business agent or manager of mines or metallurgical works, by a gentleman of long experience in similar positions in Nevada and Colorado. Address
MANAGER,
P.O. Box 203, N. Y. City.

TO INVESTORS.

The Keith Electric Company, having secured and paid for valuable patents covering a complete system of electric lighting, and having demonstrated the economy and reliability of their light, are now prepared to push its introduction with the utmost energy. For this purpose a limited amount of the stock is offered at $20 per share.
For full particulars address
AUSTIN GALLAGHER,
Drexel Building,
Corner Wall and Broad Streets, New York.

DIVIDENDS.

SAN FRANCISCO, Dec. 14, 1883.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared dividend No. 30, of TWENTY CENTS per share, payable at the office of Laidlaw & Co., 14 Wall Street, New York, 31st inst.
Transfer-books will close 22d inst.
H. DEAS, Secretary.

ONTARIO SILVER MINING COMPANY,
15 Broad Street,
NEW YORK, Dec. 19, 1883.
DIVIDEND NO. 90.
The regular monthly dividend of FIFTY CENTS per share has been declared for November, payable at the office of the transfer-agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on the 31st inst.
Transfer-books close on the 24th inst.
LOUNSBERY & HAGGIN, Transfer-Agents.

NEW YORK, Dec. 15, 1883.

THE CONTENTION CONSOLIDATED MINING COMPANY has this day declared an extra dividend of TWENTY-FIVE CENTS per share, payable December 24th, instant, at the office of the Farmers' Loan and Trust Company, 20 and 22 William Street, on all stock registered in New York.
Transfer-books close this December 15th, 1883.
W. HART SMITH, Vice-President.

ROTHWELL'S

Great Map of the Wyoming Valley.

This, the most elaborate and accurate topographical map ever made in this country, outside of the Coast Survey, covers an area of TWO HUNDRED SQUARE MILES, and the work upon it cost over $12,000. It represents a coal-field which produced in 1882 over 13,000,000 tons of Anthracite. The Map was constructed altogether from original surveys. Every Road, Colliery, Building, or land or property line existing at the time is accurately located. The surface configuration is shown by CONTOUR LINES TEN FEET APART, VERTICALLY; and the elevation of every point above sea-level is given

But a small edition of this Map was printed, and the plates were then destroyed.

A few copies are for sale.

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THE ENGINEERING AND MINING JOURNAL

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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E.,
} Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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DR. THOMAS M. DROWN has resigned the secretaryship of the American Institute of Mining Engineers. Among other candidates, we learn that Dr. R. W. RAYMOND and Mr. CHARLES KIRCHHOFF, Jr., have been nominated for the position.

A MEETING was held on the 27th of December, at the Fifth Avenue Hotel in this city, to arrange preliminaries for bringing about an agreement by which coal and iron ore will be allowed to enter free of duty into Canada and the United States. Those interested in mining coal in certain bituminous districts of Pennsylvania and Ohio, and those engaged in mining iron ore in Canada and in manufacturing pig-iron in this country, are in favor of such reciprocity.

AFTER a good deal of dickering, the railroad companies tapping the Connellsville region have come to an understanding, although it is rumored that the Pennsylvania Railroad is not quite content with its share. The allotment of the new coke pool, to take effect on the 1st of January, is given as follows: The Pennsylvania Railroad, 55 per cent; the Baltimore & Ohio Railroad, 25 per cent; and the Pittsburg & Lake Erie, with its new extension, the Pittsburg, McKeesport & Youghiogheny, 20 per cent. This has the appearance of an armistice, during which the contestants will probably continue to maneuver for position favorable in a future fight.

IN our next issue, the ENGINEERING AND MINING JOURNAL will come to its readers enlarged and with new claims to support through the advantages offered by the consolidation with *Coal*, a journal which was established and has been conducted in the interest of the Coal Trade—the producers, vendors, and consumers of coal. As an independent and accurate exponent of this industry, it has met with a most gratifying and, we believe, exceptional success. This encouragement and appreciation, and the calls upon it to extend the sphere of its usefulness by bringing in such collateral and allied industries as the iron trade and other large consumers of coal, have convinced the publishers of *Coal* of the advantages that would accrue to its patrons by giving them that full information concerning those metallurgical industries which are among the largest consumers of coal, and which information they have now to glean from the columns of other periodicals. With the view, therefore, of greatly increasing the field of information especially valuable to the members of the coal trade, and of benefiting the advertising patrons of *Coal* by bringing their wares to the notice of a much larger circle of purchasers than is possible through a journal devoted exclusively to any one department of the coal-consuming industry, it has been decided to merge *Coal* in the columns of the ENGINEERING AND MINING JOURNAL.

The patrons of the latter will also be great gainers by the step taken. They will be able to avail themselves of the facilities for the gathering of news which *Coal* has acquired during two years of close attention to the interests of an industry upon which all are to some extent dependent. Special correspondents of acknowledged ability will weekly report on the fluctuations in the markets at Boston, Buffalo, Pittsburg, and Chicago, discussing the many questions which affect the prosperity of the coal trade. The columns of the ENGINEERING AND MINING JOURNAL AND COAL will closely reflect progress in all branches of coal mining, the utilization of fuel, and the local development of our vast resources.

DURING the past year, we have followed closely and with much interest the work of M. P. MANHÈS, at Septèmes, France, in developing the method of Bessemerizing copper mattes, because we believe that the many modifications in practical details which he has worked out are likely to make the process one of the greatest importance to the copper industry of this country. A few years ago, it might have been capable of a few local applications. To-day and in the near future, it will be an important aid in working material which constitutes the source of fully one quarter of our total product, which has risen to quite 45,000 net tons of metal. We trust that it will not be long before this latest and most important step in the simplification of copper smelting will have found a home in this country.

We are pleased to notice that M. MANHÈS has invaded another branch of metallurgy, in which, it is true, comparatively few are interested in this country. M. MANHÈS has recently begun a series of experiments on a small scale in concentrating nickel mattes from the Berg Seljen mines in Norway. The *Génie Civil* tells us that Mr. J. GARNIER, so prominently identified with the development of the famous mines of New Caledonia, and M. G. SALOMON brought a lot of 16 per cent nickel matte from Berg Seljen. Three lots of 50 pounds, melted in a crucible, were run into a converter of the same type as that used for Bessemerizing copper matte, the pressure of the blast being from 350 to 500 millimeters of mercury. The blowing was stopped respectively in five, ten, and fifteen minutes with the following results:

	Copper.	Nickel.	Iron.
First blow:			
Before blowing	5·86	16·30	22·40
After 5 minutes	11·00	30·73	n. d.
Cinder	0·05	1·51	n. d.
Second blow:			
Before blowing	5·86	16·94	22·40
After 10 minutes	14·13	50·80	10·00
Cinder	0·60	3·00	n. d.
Third blow:			
Before blowing	5·80	16·60	22·40
After 15 minutes	11·30	70·06	1·20
Cinder	0·30	4·00	n. d.

So far as they go, the results are decidedly encouraging. They clearly indicate that it is not a very difficult matter to concentrate low-grade nickel mattes into a product of such high tenor in nickel that they can go directly to the refining processes. On one vital point, however, the experiments furnish no data. The material worked with is called a "matte," and from its origin we judge that it carries little arsenic. It remains to be seen in what manner arsenic behaves in the converter. If it obstinately clings to the metal, the advantages of a rapid and cheap concentration would probably be outbalanced by the drawbacks incident to the presence of arsenic in great quantity in later operations. It is true that, so far as its relations to copper are concerned, M. MANHÈS has assured the metallurgical world that arsenic is not troublesome. He has not, however, submitted figures to substantiate his claim. One point speaks in favor of the probable elimination of at least a considerable proportion of the arsenic. It is known that a large part of the sulphur, when Bessemerizing copper mattes, is volatilized, escaping as sulphur, not as sulphurous acid, as might be inferred from the fact that the process involves almost a violent oxidation.

With all the reserve due to the lack of data on the point referred to, there is some satisfaction in the thought that a promise is held out of the cheapening of so useful a metal as nickel. Especially so, as it is, we understand, one of the component parts of the alloy which is brought out in Pittsburg by a leading firm of iron-makers as a protective coating for iron and steel.

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THE MINES OF FRESNILLO.—II.*

Special Correspondence of the Engineering and Mining Journal.

Of even more general interest than the data as to the Proaño mines, which this Fresnillo memoir provides, are the metallurgical notices and the statistics of work done in the great Hacienda Nueva, the typical establishment for the treatment of silver ores by the patio.

It seems that long ago the surface chlorides were amalgamated in copper vessels by a method known as *beneficio de caza*. On the resumption of work in 1830, the base metal ores were smelted; a small quantity of chloride was still subjected to the *beneficio de caza;* but 95 per cent was treated by the patio at three small establishments near Fresnillo and at others near Zacatecas. But no statistics of cost are preserved. Between 1831 and 1844, however, was erected the great Hacienda Nueva at a cost of $340,132. It was during this period that Duport wrote his work on the production of the precious metals in Mexico, which gives plans of the new Fresnillo works and a full description of the treatment. In Duport's day, however, the stamps and arrastras were worked by mule power. Subsequently the 60-inch cylinder engines, when replaced at the mine by the 80-inch, were transferred to the hacienda.

This large establishment, whose patio can hold 64 *tortas* of 120,000 pounds of ore each, or 3840 tons, is the largest of its kind in the world. Yet of average mixture of oxidised and rebellious ores it could treat only 900 tons weekly. Herein lies the disadvantage of the method. The first cost is vastly greater than that of a mill on the Washoe process, and the ground occupied incomparably more. The establishment does not treat more than would a 50-stamp silver mill, and yet it covers an area of 900 feet by 900 feet. The plant consists of two 60-inch cylinder engines, 314 arrastras, 12 stamp mills, pump-washers and sluices, magistral furnaces, and stables for 1500 animals—all surrounding the court or *patio*, in which, as above stated, 64 *tortas*, about 15 yards in diameter each, can be treated at the same time.

The theory of the patio has always been a vexed question. It depends, of course, on the action of the chlorides of copper, whatever that action may be, on certain silver compounds, fitting them for the attack of mercury. The same reactions are taken advantage of when salt and bluestone are added to the pans in the Washoe process, and the Kröhnke method, used so successfully in Chili, is based upon them. The advantages of the patio are that, the grinding once effected, no mechanical power is consumed, and that no furnace treatment, and therefore no fuel, is required. The disadvantages are the length of time consumed in the operation and the great expenditure of animal force. In the small way, a patio plant can be extemporized at little outlay; and where fuel is scarce and animals plenty, and the climate sufficiently temperate, probably no method can compete with it. The results are as close as or closer than are obtained on similar ore by our hasty methods of amalgamation. The question, therefore, presents itself, whether, by employing good machinery and kneading the patio by some mechanical appliance instead of the feet of animals, a perfect extraction could not be effected, time saved, and expenses, in some cases, lessened.

The operations are:

I. The coarse crushing, which is at Fresnillo, as elsewhere, effected by stamp-mills even more primitive than those still to be seen in Cornwall and Germany, with wooden stems and clumsy iron shoes.

II. The pulverization. The coarse sand from the battery is reduced to pulp in the arrastra, a basin whose bottom and rim are constructed of large stones, in which another large stone is dragged around by mule-power. The product of an arrastra is from 600 to 1500 pounds per day, according to hardness of material and fineness of grinding. At Fresnillo, very fine grinding is not preferred, and the yield at each arrastra is about half a ton. As great a disparity as exists between a Mexican and a Californian stamp battery divides the Mexican arrastra from the grinding-mill used at Escobar and Orsa's great silver establishments in Chili. The pulverization is effected by the same mechanical elements, applied in the same way; but the whole structure is of iron, the parts are perfectly adjusted, the feed and discharge are automatic, and the pulp remarkably fine and even.

III. The pulp as received from the arrastra is partially drained in slime-pits.

IV. But it is still semi-fluid when thrown on the floor of the patio in quantities at Fresnillo of 60 tons, and is prevented from spreading by a temporary barrier of timbers and manure. Thus it is left until evaporation has reduced it to such consistency that it can be still easily penetrated by the feet of the animals.

V. The metallurgical treatment consists:

(*a.*) Of the addition of salt, 2½ per cent by weight of the *torta*, after which the mass is turned over by shovels and trodden by from eight to fifteen horses or mules. These are tied to and revolve around a stake which forms the center of the *torta*.

(*b.*) Sometimes with the salt—more generally twenty-four hours afterward—from 1 to 2 per cent of *magistral*—roasted cupriferous pyrites—is incorporated with the mass. In certain localities, bluestone in proportionate quantities replaces the roasted ore.

(*c.*) The gradual addition of the mercury now begins, and the skill of the *azogueros* (mercury man) is called into play. He watches the progress of the amalgamation, adding magistral when it lags, and mercury when the consistency of the amalgam indicates; and he kneads the pulp with the troop of horses oftener or less frequently as his judgment dictates. During the winter months, especially at Fresnillo, when the surface of the *tortas* freezes at night, peculiar complications supervene, which tax his skill. Duport well describes the indications which guide the *azogueros* when he says: "Without pretending to isolate the examination of the different parts of the *tentadura* tests, one may say that the color of the mercury is the guide for the proportion of the *magistral*, the condition of the *limadura* (the flowering and granulated mercury) indicates the daily progress, and the greater or less degree of solidity in the amalgam determines the addition of more mercury and the end of the operation."

VI. The amalgamation completed, the ore passes to the washers, and the amalgam is retorted.

The time occupied varies from fifteen days in summer on free ores to thirty or forty days when the season is cold or the ores base; but the note to page 35 gives the result of Henry MacIntosh's investigation at the Hacienda del Salto on the accelerating effect of continued motion: "Two *tortas* of the same weight and the same mixture of ore were spread at the same time upon the *patio*. One of them worked with eight *repasos* of five or six hours each, at intervals of three or four days, required twenty-seven days. The other one, worked by causing the same number of mules employed in the *repasos* of the first one to travel over it uninterruptedly day and night, was finished in eighty hours. The yield of silver and the loss of mercury in the two cases were sensibly the same. But the cost of the *repasos* being very high at Guadalupe y Calvo, a double quantity of work for the mules in order to gain time was not profitable."

When watching the animals plodding through the pulp, it must occur to every one that, where steam-power is as cheap as animal power, or where water-power is available, the work would be better done by a machine like a great chocolate-mill, whose rollers would be provided with large teeth.

Such in outline is the patio process. The first statistical exhibits from 1835 to 1844 are given in general terms only. In that period, $8,261,875 worth of reagents were employed, in the reduction of which, quicksilver at the average cost of $1.33 per pound was used, and cost $2,128,000; magistral cost, $292 500; salt, $841,375; total, $3,261,875. The average loss and consumption of mercury declined to 10½ ounces per mark of silver, and the cost of production fell toward the end of that period to $9.75 per ton, exclusive of mercury.

The results, materials consumed, and cost of beneficiation at Proaño for the next period, namely, from 1853 to 1862, as tabulated in the memoir, are exact and worthy of study.

The totals are as follows:

Ore worked, tons	452,284·80
Silver produced, marks	1,096,281·32
Value of silver	$9,825,598.68
Salt consumed, cargas	186,229

Or 123 pounds per ton = 6 per cent.

Magistral consumed	7,922 tons, or 35 pounds per ton = 1·75 per cent.
Quicksilver "	904,306 pounds,
	or 1·9 pounds per ton of ore treated,
	or 13·197 ounces per mark,
	or 0·87 ounce per $1 worth of silver recovered.
Average yield	2,424 marks,
	or $21.74 per ton.

	Per cent.
Average difference between yield and assay value	19·480
Highest difference	24·000
Lowest "	10·435
Cost of treatment	$5,051,769.66
	or $11.169 per ton.

During that period, the deepest ores were treated—ores so base that they would have yielded so imperfectly to pan amalgamation that our mill men would have subjected them to a preparatory chloridizing roast. They consequently consumed more chemicals and more labor in their treatment than if they had been oxidized by nature; for, whether decomposition of a base ore takes place rapidly in the furnace or slowly in the *patio*, reagents to effect the decomposition must be consumed, and labor to bring these reagents into contact with the ore and with one another must be expended.

Considering that the cost of the articles consumed, taken from a price-list of supplies in 1844, was as follows: Salt, $10 per ton; magistral, $50 per ton; quicksilver, $1.20 per pound; wood, $22.50 per ton; and that all kinds of iron-ware and supplies were inordinately dear, it must be admitted that the patio process is not an uneconomical method, when it can treat a base ore under these conditions for $11.16 per ton, and not an insufficient one when it extracts 80 per cent of its silver value from such refractory material. It would surely be worth while for our metallurgists in Mexico to consider whether the method can not be so modified that its defects will be remedied, while its advantages are retained.

J. D., JR.

* *Sketch of the Great Historic Mines of the Cerro de Proaño, at Fresnillo, State of Zacatecas, Mexico.* 1883.

POSSIBLE ECONOMIES IN MINING IN THE SAN JUAN COUNTRY.

Special Correspondence of the Engineering and Mining Journal.

Early in April of this year, your correspondent, with two other large ore-buyers, made an estimate of the probable output of the ores of the precious metals from Silverton during 1883. With a thorough knowledge of the working mines and their dumps, it was not difficult to arrive at a fair basis of computation, and all three agreed very closely in the aggregate amount, the average of the several estimates being, in round numbers, 18,500 tons. The actual shipments for the year (allowing for the whole month the daily average since the 1st of December to date) amount to about 16,000 tons. Had the price of lead and the demand for copper ores continued as in the month of August, there is no doubt that the output from the mines would have been increased by at least 2000 tons. When it is considered that many of the mines included in our estimates have produced less than might reasonably have been expected, while the deficit from this cause has been largely made up from new sources of supply, it may safely be stated that the productive capacity of the district, without further development, is not far from 25,000 tons per annum. But this estimate means much more than at first sight appears. There has been no time this season when ores carrying less than from 20 to 25 ounces of silver or its equivalent in value, per ton, could have been shipped without loss, and when the cost of mining and hauling to the railroad is added, we may regard ores worth $30 per ton as practically unremunerative, on the average. It is evident, therefore, that we shall not go wide of the mark if we add at least thirty per cent for such ores as have been produced by mines unable to ship the whole of their output, and an intimate knowledge of the dump ore of the region convinces me that this allowance is none too large for fairness. This gives a feasible product of 32,500 tons, to which must be added a considerable amount to cover the neatly arranged dumps, which have been carefully held back by miners upon the mistaken notion that these

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will influence the sale of their properties more than authentic certificates of mill-runs. I believe I shall be considered conservative by the best judges, if I allow 1500 tons for this item, making a total possible contribution of 34,000 tons, or a daily average of nearly 100 tons.

There is abundant reason for placing the average value of the ore shipped this year much higher than last year's product. The accepted estimates for 1882 ($650,000), were based upon an average of $75 per ton. We may take $85 as a fair average for 1883, thus reaching a grand total of $1,360,000. My own figures early in the season were $1,500,000, which amount would no doubt have been realized had not the shipments fallen off materially, owing to the drop in the market price of lead in October and November. The actual product, allowing for ores not shipped, has not gone short of $2,000,000, exclusive of large quantities of concentrating grades, which may eventually be worked at a profit. Still further allowances must also be made for vast stores of rebellious ores, for which there is no market immediately available, but which really present no metallurgical difficulties that have not elsewhere been overcome, and which will, ere long, be treated successfully in Colorado.

A careful study of the resources of our district, extending over a period of nearly five years, and a most intimate acquaintance with the character of our ores, gained by extensive handling of them in sampling and concentrating mills, together with frequent analyses, qualitative and quantitative, in the wet way and by means of the blow-pipe, have given the writer a tolerably clear insight into the capabilities of the country and the essential features of its future prosperity. In every mining enterprise, there are four items of expenditure which practically control the profits to be realized, and each of these is affected by a variety of circumstances, making it necessary to take advantage of every possible economy in practice in order to achieve success.

The first consideration is the cost of mining. This is dependent upon two things, namely: A. Labor. B. Character of rock to be worked. In all new countries, skilled miners are lacking, and such labor as can be secured must be hired at very high rates. To render this efficient and economical, it is essential to employ well-trained foremen of shifts, who will direct the work in detail, and these must be responsible to a competent superintendent capable of planning the general workings and properly developing the mine. Even with skilled labor, this organization is proper, but with the crude material frequently employed in the West, it is impossible to succeed in any other way. Labor is too high-priced now for what it can ordinarily accomplish, and we must look for economy of mining partly in the direction of careful selection, or in the policy of grading compensation according to quality of work. By some such means it will eventually be possible to reduce the cost of mining a ton of ore several dollars below the present average. Contract labor has one advantage now, that inexperienced managers or slow-working companies can avoid considerable risk; but competent managers usually find it very difficult to let contracts at fair prices, and the cost of incompetence is ruinous. We can not hope to bring down the average cost of mining by any just gradation of labor, so long as the untrained mine managers are largely in the majority.

The character of the rock varies greatly in this region; but there are comparatively few mines in which the average per thousand feet is much different from the general average of the veins of the district. Hence, we have a right to expect that some basis for calculation may be found in the actual prices paid for contract work throughout the county. But here, again, we are at sea. I could cite numerous instances where good managers have run drifts in tough rock by day labor at a cost less than half the price paid by others for contract work in the most favorable ground. If we class development-work as permanent improvement, and take cognizance only of the ore extraction *per se*, we may get a more reliable estimate, but, again, I have in mind not a few actual cases where one manager has made the same work cost just one half what another has expended per fathom of stoping ground. It is, then, quite apparent that whatever saving we may expect from the application of labor or the choice of favorable vein material must come almost wholly through the substitution of experienced and thoroughly competent managers for many of the amateur low-priced overseers now employed. It is impossible to state what is the present average cost of mining per ton of ore, but it is safe to say that it is nearer ten dollars than five dollars. I know of two mines worked upon the same vein under quite similar conditions. One is in charge of a competent superintendent, the other is managed (?) by a speculator totally ignorant of the first principles of mining. The latter has taken out ore at a cost of eight dollars per ton, and the mine is left in an unworkable condition, and undeveloped; the former has developed his property with far less expense, and has taken out much more ore from inferior ground, at a cost of $2.75 per ton, keeping the mine in good condition, and he is still taking out ore.

The second source of outlay is the transfer of ore from mine to mill or railroad. Almost without exception, the pack train and the wagon are relied upon for this purpose. No united effort has yet been made to secure cheaper methods, or to lessen the present cost of packing and hauling. The average rate the past season has been $1 per ton for packing and 50 cents per ton for hauling, for each mile of travel, though occasional lots have been moved more cheaply. I can not now recall one instance of transportation by teams belonging to the mining companies, and but two or three pack-trains have been worked in this way for short distances only. Teamsters do not often amass wealth rapidly from this business, but no doubt they, or the mine-owners themselves, could transport the ore much more cheaply, if a regular and continuous supply could be confidently relied upon. Packers can not do as well as the teamsters usually, but they have no expenses of moment when idle. The remedy for the high cost of shipping by trail will be the construction of tramways; but few properties are yet sufficiently developed to warrant the necessary expenditure. However, several prominent mines are shipping large amounts of ore by burros and wagons, which could annually save thousands of dollars by the use of some economical wire-rope or surface-rail system of transfer. It would require too much space to detail here the facts and figures upon which I base my statement; but I am convinced by long and careful investigation that a reduction of cost can be made of at least 20 cents per ton per mile, upon the average, by proper management. This would be equivalent to an average increase of fully $1.50 per ton in the net receipts from ore shipped.

The third item of expense is railroad transportation. The low price of lead has already had a most serious effect upon our local mining industry, and worse results must follow in the spring, unless some radical revision of the railroad tariff is brought about this winter. Much is anticipated from the Miners and Smelters' Association of Denver, especially as several prominent railroad officers are enrolled as members of that body. Mr. A. S. Hughes, the General Freight Agent of the Denver & Rio Grande Railroad, has always shown a commendable desire to adjust rates upon an equitable basis, but his decisions sometimes appear to be based upon wrong premises and insufficient knowledge of the facts.

In 1882, after the completion of the railroad to Silverton, the ore-shipments averaged less than 20 tons per day, with the freight to Denver and Pueblo at $16 per ton. For the ten months during which the rate was $12, and the price of lead unchanged, there were shipped, on an average, at least 40 tons daily; and with the freight reduced to $8, my calculations show a probable business of 80 tons per day for the railroad, which, I am sure, could easily be increased next season to 100 tons or more with a $6 tariff. The exact cost of transportation is not now within my reach, but all the commonly accepted principles of railroad traffic are wide of the truth if it will not pay better to haul 80 tons at $8 than to transport 40 tons at $12, with the same motor and train-gang. The railroad's policy heretofore has apparently been to get all the country would or could stand; now the time has come when the officers ought to see that we can not stand the present tariff. Four dollars per ton less for freight charges in September would have signified so much more profit to the miner; now it merely enables him to ship ores which can not be handled with a rate of $12. Even at $6 per ton, many good mines would realize less for their output than they were getting in August, with freight at $12. Hence any reduction in the tariff that the railroad can possibly afford will not throw greater profit into the miner's hand, until there comes a reaction in the lead market. Without a liberal reduction, the railroad will suffer very serious losses in traffic. Already with all the roads in excellent order, and many mines putting out ore in abundance, the weekly shipments have fallen off from 600 tons to 180 tons.

The fourth and last expense directly affecting the ore-seller is the charge for treatment at the reduction-works. The recent organization of the Miners and Smelters' Association at Denver is as opportune as it is welcome to those who have at heart the true interests of mining. In the first place, it may do more than any other agency toward dispelling the woful ignorance which exists concerning the processes of ore treatment, and it may possibly aid in convincing many that successful mining requires as much skill and training as the profitable reduction of ores by smelting or other methods. It is a common claim of the Western press that the smelters have been making undue profits, and that their treatment charges have been excessive. While it is proper to reply that the mere statement of such a claim by a novice in the art and science of metallurgy, is insufficient proof of its truth, it may be worth while to discuss the question briefly. The nominal charges for smelting galena ores have ranged from ten to twenty dollars per ton this season. Ore buyers have, however, been instructed to purchase very choice grades, in some cases, on the basis of eight, or even seven dollars off for treatment. Of course, it will be understood that the lowest charges have been for ores of very clean character, running unusually high in lead; but the highest deductions, it should be remarked, have only occurred in very lean ores, often of a rebellious nature; and besides, the lead has been estimated at very good prices, before the smelting charges have been levied. This year, most buyers have also paid something for each unit of lead in any ore, regardless of the amount, but last year nothing was allowed for this metal in ores carrying less than 20 per cent. Again, silver and gold have usually brought higher percentages of market value than formerly. These facts all go to prove that the reduction-works have done more in the way of concession than any other agent coming between mine and bullion.

We can now more intelligently discuss the question of the possible economies to be introduced into the mining business in the face of the present conditions. One plan, which has been advocated to some extent, is to reduce miners' wages from 50 cents to $1 per day. This has been tried in an adjoining county, and has produced there a state of war. I can not sympathize with any set of men who attempt to accomplish their ends by force applied to those who are willing to accept the terms of employers. At the same time, it seems very evident that the reduction of wages should be adopted as the last resort in times of depression. If the mines can not be run at a profit without cutting down the cost of labor, and if this action will make them pay their way, it is certainly better for all concerned to apply the remedy, and the workmen are unjust to themselves if they do not make the best of it and acquiesce at once. However, the item of labor is not the most onerous burden by any means, and the intelligent manager will exhaust every effort to secure economy in other directions before he will reduce his pay-roll. A far better plan will be to replace incompetent men by skilled miners. The wages now paid are not excessive so much from the amount expended as from the inferior work often performed. If it be impossible, as it seems to be now, to bring about a proper gradation of wages, according to quality of work, it behoves the wise manager to employ only the best labor obtainable. If $4 or $3.50 per day is too much for the average labor performed, let those who are not average workmen stand aside, and put in their places the best men that can be found. This will encourage the worthy, and stimulate or weed out the incapable. While upon this topic, let me throw out a hint to the trustees of large mining corporations. If my views are correct, it will avail little to adopt them unless the same principle be applied to the managers and superintendents and foremen themselves. More money has been wasted in this country at the hands of incompetent overseers of all grades than has ever been expended for labor, including the poorest.

As for the feasibility of reducing the cost of mining in other ways, there is no doubt of the propriety of employing power drills and other machinery, when handled by competent men. Not only will the use of these machines lessen the cost per foot or fathom of excavation in drifts, shafts, and stopes, but the cost per ton of ore extracted will be much reduced by the increased output, which bears its share of the general expense, with-

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out additional outlay for such items as management, interest, taxes, and permanent improvements.

The rate for transportation to mill or railroad may be reduced in two ways, and I do not apprehend that those who live by this business will lose any thing of consequence by the change. The imperative need is the construction of tramways to carry the ore to points more accessible by trails or wagon-roads. By the use of such means, it is safe to predict a saving of one dollar per ton in very many instances; and if the same system be extended, so as to provide mechanical modes of transport along our gulches and cañons down to the railroad, it will be possible to effect a further reduction of at least three dollars per ton upon the whole product of the district.

Another step toward economy, which may be immediately taken, and without the objection of large original cost, is the employment of teams owned by the companies themselves. Probably the saving by this method would amount, in many cases, to several dollars per ton.

Whatever reduction can be secured in railroad rates will, however, prove most beneficial. We now pay $12 on every ton of ore shipped to Denver or Pueblo. If we could save $4 per ton, we should draw this much more cash from outside, and put it into circulation here. None of the money paid for freight is employed in business here, and nearly all of it is received by the railroad company at the point of destination. In more ways than one, a reduction of these charges would benefit us and increase the net revenue of the railroad. Let the rate be put at $8, and the increased output arising simply from the ability to ship ores of lower grade (vast quantities of which have already been mined) would throw into the miners' hands fully $100,000 more next year than can be expected with the present tariff. This again means at least 10,000 tons more ore handled by the railroad company, at very little additional cost. And this gain will go on enlarging in geometrical ratio, until one road can not transport our entire product. I have facts in abundance to support my claims.

The saving that may be justly anticipated from lower smelting charges is manifestly very small, under the prevailing circumstances. The reasons for this conclusion will be much more apparent and convincing to the professional metallurgist, of course, than to the public, which looks upon smelting as the simplest of all manipulation, requiring only capital and ordinary labor. But it is to these same skilled engineers that we must turn for guidance out of the dilemma. The condition of the lead market will enforce a partial suspension of production, which will undoubtedly enhance the cost. This will cause the smelters to refuse the least desirable ores, and to seek such qualities as will flux themselves. Mines remote from market will shut down for a time; and while the supply of ore exceeds the demand, the reducers can get what they require at very low prices. A reaction will follow from the gradual stoppage of the supply, schedules will run up, and smelters will find competition very close. It will then be apparent that only by the most skillful management can ores be reduced at a profit. Here will come into play the inventive faculties of the metallurgist, and he who most successfully treats the waste materials and most closely utilizes the by-products will reap the richest rewards.

To us, the most beneficial results will accrue from the savings in railroad freights and in ore reduction; for what we expend each year in these items is all passed out of the district, while the cost of mining and of local transportation is applied where it will enter into circulation at home. It therefore becomes a matter of the highest importance to us to know if the railroad and the smelter are reaping undue rewards from the products of our mines, upon which we have lavished faith and capital, while they are handling them wholly without risk. Slovenly and wasteful methods will not long be tolerated in American metallurgy.

Taking all these points into consideration, I believe the outlook of the San Juan country for the coming years is not only bright and hopeful of itself, but we have still further chances of progression arising from the acknowledged fact that our formidable rival, Leadville, is losing her *prestige* as a carbonate field, and is beginning to put out an increased amount of sulphide ores, which, like ours, require a preliminary roasting.

SILVERTON, COLO., Dec. 18. THEODORE B. COMSTOCK.

AUTOMATIC COAL MINER.—An automatic coal miner, consisting of four horizontal reciprocating picks, delivering 250 blows a minute, is building at Pottsville. A scraper chain is connected with and follows each pick or cutter, and removes the cutting as fast as made. The machine will cut a gap 6 feet forward, 4 feet across the face of the coal, and 4 inches high without being moved. It can be easily managed by one man, and can be set at any angle. The motive power is compressed air, but electricity may be used.

CHESAPEAKE & OHIO CANAL.—Shipments by the Chesapeake & Ohio Canal closed for the season December 15th, although a few boats may leave this week. The water was to be shut off December 22d. The season has been a very good and prosperous one for the canal. From information obtained at the collector's office, it appears that during the season which just closed, 6288 boats, carrying 707,466 tons of coal, cleared from this port. The tonnage is over double that of the previous season (1882), when only 316,648 tons of coal were shipped from this point by canal. The gross amount of revenue collected at Cumberland during the season was about $300,000. From this, will be deducted a number of items, including wharfage, etc.

DIAMOND COMPANY (LIMITED).—Roswell W. Keene, of No. 10 Wall street, has filed with the Secretary of State a certificate of incorporation of the Diamond Company (Limited), for the purpose, as set forth in the prospectus, of "mining diamonds and other precious stones, the cutting and working, purchase and sale, the selling and loaning of the same for the purpose of gain and profit and the cultivation of art." The capital stock of the company is placed at $2,000,000, every dollar of which has yet to be subscribed. The other incorporators are Eunice Keene and Marian E. Keene, of Brooklyn, Henry J. Turner, and Sarah C. Turner. Roswell W. Keene says he spent a year in the South Africa diamond-fields, and is convinced that money can be easily made by buying diamonds there and selling them here.

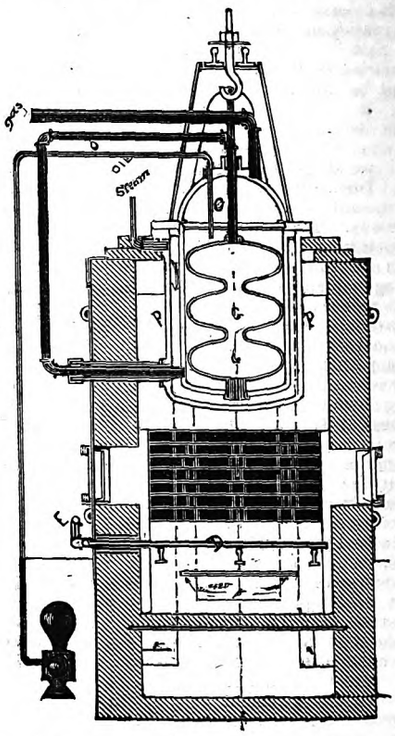
PETROLEUM AS A FUEL IN IRON MANUFACTURE AND METALLURGY.

In our report of the visits of the members of the American Institute of Mining Engineers to the Norway Iron-Works, at the time of the Boston meeting, we referred at some length to a series of experiments carried on to utilize petroleum as a fuel for heating and puddling-furnaces. These have since progressed so far that the Vapor Fuel Company has now come before the metallurgical world with details of the apparatus used.

The generator of vapor fuel is termed the "thermogen," and is simple in construction and operation. It consists of two retorts of the best cast-steel, tightly elbowed together at the top. Within the inner retort are two globes, also of cast-steel, while surrounding the whole and resting upon a base of brick-work, as shown by the accompanying cut, is the apparatus complete.

The crude petroleum is kept in tanks situated at some convenient point outside of the works underground. The method of producing "vapor fuel" may be briefly described as follows: Steam is forced between the two retorts, is superheated, and thence passes into the lower globe within the inner retort and then into the upper, heating them both intensely. A small force-pump connected with the "thermogen" forces the oil through a small pipe, entering above the upper globe, upon the surface of which it falls in a fine spray. This globe is generally so intensely heated by the steam that has passed through it as to vaporize the oil instantly. Then the steam, which has passed out of the "thermogen" through a pipe extending from its top around on the outside to its base, re-enters, and, mingling directly with the gas, acts as a carrier, taking it through a pipe from the top of the retorts to the furnace.

Vapor fuel is in use at the Norway Iron-Works for boiler-heating, for



puddling, steel-making, and reheating furnaces; and so admirably does it perform its work (on the largest scale), that it is considered by the officers of the company and by the workmen to be not only the equal of coal as a fuel, but its superior. For a new process to quickly win its way with metal workers, who have been deceived many times by fine theories proving impracticable, is a strong indorsement in itself. Although adapted to an innumerable number of purposes, vapor fuel is possessed of especial value for metallurgical purposes; and if the experience of the Norway Iron-Works is a criterion to estimate by, there is no known fuel that will compare with it for the smelting of ores in reverberatory furnaces. In many parts of the country, it costs less than coal, it will save three quarters of the wear and tear of furnaces incidental to the use of coal in the latter, it is easily regulated and under control, it affords a high heat at a moment's notice, gives off no dangerous or disagreeable gases, and there are no ashes or *débris* to be removed where it is used.

One man can operate a "thermogen" with ease, acting as both engineer and fireman, and start a flame that has a heat of 6000 degrees Fahr., or over, in one minute, and yet with the turning of a valve can extinguish it entirely or reduce it to the extent that the exigencies of any operation may demand. Vapor fuel has already gone into operation in several extensive iron, steel, and copper smelting-works, and preparations are rapidly perfecting in half a dozen of the largest iron-working concerns on the continent for its introduction. When applied to steam-raising, it requires no radical changes in the setting or construction of boilers, and can be applied with the loss of but little time to any class of boilers in use. Its capability of providing an intense heat and the perfect control with which it can be handled and its cheapness are the chief claims for "vapor fuel", as well as the saving of the labor of firing and the handling of coal and ashes; while its obviating the necessity of cleansing grates is held to be a strong point in its favor. The use of vapor fuel for the reheating of steel ingots and blooms and similar work is said to be equally satisfactory. When applied to steel-melting, however, its merits are held to be still more conspicuous, no expensive alterations of a coal-gas furnace for the introduction of vapor fuel being necessary.

The cost of a vapor fuel plant doing the same work as a coal-gas plant

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is claimed to be one tenth that of the latter, while it also insures a great saving in labor (as well as cost of fuel), one man with a thermogen doing the work requiring a dozen men by the older method. It is stated that comparison has proved (at the Norway Iron-Works) that in a year's use a vapor fuel furnace does 25 per cent more work than a coal-gas furnace, and at the end of that time is in a much better condition.

The Vapor Fuel Company, of Washington, was incorporated in February, 1882, under a special charter granted by the Virginia Legislature.

THE BAROMETER AN UNRELIABLE AID IN FORETELLING STRIKING VARIATIONS IN THE PRESSURE OF GAS IN OLD WORKINGS.

The results have just been published in England of one of the most valuable series of investigations yet made upon one of the many questions bearing upon the issuing of fire-damp into mine workings from old workings. These investigations were placed before the North of England Institute of Mining and Mechanical Engineers by Mr. V. W. Corbett, at its meeting at Barrow-in-Furness in July last. They were the outgrowth of the great explosion at the Seaham colliery on the 8th of September, 1880, which occasioned the loss of 164 men and boys. The workings were found to be on fire, and stoppings were therefore put in to cut off certain parts of the workings. The sealed workings therefore became a vast reservoir, several hundred acres in extent, and Mr. Corbett made use of the occasion to endeavor to ascertain whether there was any relation between the pressure of the air as revealed by readings of the barometer and the fluctuations in the pressure of the gas in these workings, as shown by the readings of water-gauges. Observations concerning the issuing of the gas were also made in a gallery about 50 yards long, connected with the sealed workings. It was used in much the same way as the tube of a barometer, to indicate the distance from the waste at which gas was found in the gallery, a man going in every hour with a safety-lamp to note the distance from the waste at which he first observed gas in the lamp. For seven months, all the observations, with three barometers, three thermometers, four water-gauges, and the "gas-check" in the gallery, were made hourly, and have been plotted by Mr. Corbett in a series of highly instructive diagrams. Three instances of great fluctuations of the pressure of the gas in the workings were observed, extending at times over from six to nine days. In no case did the barometer readings furnish any early warning of the coming of an influx of gas from the sealed-up workings. On the contrary, the barometers were found to fall at times when the pressure in the workings, as indicated by the water-gauges, was rising. In some cases, the beginning of the corresponding upward movement of the barometer was delayed from thirty-five to forty hours. The barometer appears to recognize only general or clearly defined great fluctuations, and even then slowly and tardily. Mr. Corbett's mass of data, in our mind, furnishes a striking proof that the barometer is a very poor and unreliable aid in foretelling any striking or alarming variations in the pressure of gas in old workings. It is true that the objection has been made that the existence of a mine-fire in those workings to some extent vitiated the results, and that only proof furnished by an analysis of the gas issuing from them could set them at rest. Still, even with that doubt hanging over the investigations, they are strongly confirmatory of the opinion long held that, long before the barometer indicates any change, the gas in the galleries of a mine may have come and disappeared. The elaborate tests by Mr. Lindsay Wood on the presence of gas in solid coal have dispelled the notion that there is any close connection between the issue of fire-damp from fresh openings and the atmospheric pressure. Therefore most mining men will abandon the long-cherished hope that the barometer can be of any material aid to them in guarding against the loss of life and destruction of property due to colliery explosions.

IN a paper on Coal-Gas and Gas-Engines, by F. Fisher—*Dingl. Polyt. Jour.* 249,178—the author analyzed the gas employed in driving a six-horse Otto engine, and found its composition to be as follows: Benzine, 0·69; propylene, 0·37; ethylene, 2·11; methane, 37·55; hydrogen, 46·27; carbonic oxide, 11·19; carbon dioxide, 0·81; nitrogen, 1·01; oxygen, trace; total, 100. With the engine running at a low speed, the gaseous mixture, after explosion, contained 2·4 per cent CO_2 and 17·2 per cent O; at high speed, after explosion, 6·5 per cent CO_2 and 9·9 per cent O, the temperature being 400 degrees C. It is therefore evident that the quantity of air taken in by this machine is from two to four times the volume necessary for complete combustion; and further, that gaseous mixtures much poorer in combustible constituents than ordinary coal-gas may be used in place of the latter.

THE NEW TELEPHONE.—Experiments were made recently on the large wire of the Postal Telegraph Company between New York and Meadville, Pa., a distance of 509 miles, with a telephone devised by Prof. Webster Gillett, of Ypsilanti, Mich. Owing to the storm and atmospheric conditions, the magneto bell was kept jingling by the induction alone, but there was little difficulty in carrying on a conversation. What Professor Gillett calls a 10-point instrument was used. He uses in his transmitter a needle attached to a rubber disk, coming in contact with granulated carbon, held under compression to increase the conductivity for taking up loss by friction and other causes. Most instruments have solid carbon buttons. Each point is like adding another telephone in power. The feature of the receiver attached to the telephone is the increased magnetic surface presented to the diaphragm. Chicago, a distance of 1010 miles, including a cable containing 22 wires, has been reached satisfactorily with the 10-point instrument. The single-point instrument has been operated for from 75 to 100 miles. The 10-point instrument was during the experiments reduced to six points, and communication was still kept up. The plan is to construct an instrument that will open communication by cable across the ocean as well as covering long land distances. A 20-point instrument is making for the purpose of ascertaining the distance it will reach. Professor Gillett stated that the French cable was 2486 miles long from end to end, and the resistance is 2·89 ohms. The resistance of the wire used during the next experiment was 1¼ ohms, but as satisfactory results have been obtained from the smaller copper wire, the resistance of which was 6 ohms.

SKETCH OF THE METALLIFEROUS DEPOSITS OF FLINTSHIRE AND DENBIGHSHIRE, WALES.*

(*Concluded from page* 385.)

In endeavoring to sum up the teachings of the foregoing, Mr. Davies says it may be safely inferred:

1. That the limestones, grits, and cherts, or the calcareous strata generally, of the two counties have, up to the present time, been more productive of the ores of lead and zinc, with their associated silver, north of the Great Yale fault and the group of mines connected with it, than they have been south of this point.

2. That, so far, the lodes have not, to the south of this point, been explored in the cherts, grits, and limestones lying above the main limestones, and that possibly in the future the lodes in these beds, as they lie over the limestones seen in the great escarpment of the Eglwyseg rocks, may prove productive of ores, as they have northward.

3. That the metalliferous deposits are confined to certain zones, or groups, or clusters of strata as defined in the foregoing pages.

4. That the productive parts of the lodes follow these strata down the course of their dip to the southeast, and that in this direction they may be followed and worked so far as draining and pumping facilities will allow.

5. That the last inference is especially applicable to the lodes that are on lines of great displacement of strata, the minor lodes dying out in this direction.

6. That the most permanently productive mines have been worked along east and west lines of displacement of the strata.

7. The fact that lodes are productive in certain groups of strata must be borne in mind in following and exploring a lode from a known productive point along its course.

The exceptions to this rule are (1) where a lode like the Minera is on a line of great displacement, and productive beds on one side of it are brought opposite to unproductive beds on the other, when the result will probably be productiveness in a less degree. Or, if the lower limestones are brought against the middle limestones, the result will probably be only a very slight diminution of productiveness. (2) When the beds are brought up to the surface on an east and west line by faults. In this case, the lode may be expected to be productive at two points, and at the same depths, because the productive beds have been thrown up by the fault.

8. That the great north and south faults are not productive of ore in commercially profitably quantities, except when numerous east and west lodes intersect them, and that, as a rule, the lead ore from these lodes is not of so good a quality as that from the east and west lodes.

9. Nevertheless, it would seem that these north and south lodes have in some way contributed to the productiveness of the east and west lodes, inasmuch as these last are richer in their vicinity. Probably they have facilitated the passage of water charged with metallic ores into the east and west lodes, which has deposited its burden before it has penetrated very far into the latter.

10. That in "flats," or "flat lodes" charged with clay, silver is not so abundant in the lead ore, and zinc is nearly altogether absent.

11. That the formation of "swallows" and such like cavities in the limestone beds as are now charged with clay and lead ore is of a subsequent date to the formation and filling of the east and west lodes containing the ores of lead and zinc, as proved by the fact that the swallows and pockets cut through the limestone with their lodes, which are now seen standing on either side of such cavities.

12. Therefore, the lead ore contained in the flats is of a newer origin than the lead ore in the north and south lodes, as is evident from the last inference, and also from the fact that the filling of the cracks and cavities with both earthy and metallic matters must have taken place after the cracks and cavities themselves had been formed.

13. The date of the filling of the east and west cracks of displacement is subsequent to the deposition of the Coal Measures, and probably before the deposition of the Triassic or New Red Sandstone beds, because the cracks run through and displace the Coal Measures, but are covered over with red sandstones of the Cheshire plain. The absence of fragments of the Coal Measures in the cracks, and the subsequently formed cavities, seem to point to an extensive denudation of the upper portion of the Carboniferous strata from off the lower before the cracks and cavities became charged with their metallic and other contents.

14. The cavities themselves seem to point to the ridges and beds of limestone lying for a long time within tidal and flood action. The original cracks were widened, and caverns scooped out, by the long-continued action of water. This condition of things was followed by the depression of the limestone beds into deeper water, in which gradually they became filled with the materials they now hold, such materials being subjected to chemical and mechanical agencies, by which they were dissolved out of the original rock, carried to their destination, and there sorted and deposited according to their specific gravity and chemical affinity.

But these last two paragraphs have carried us into the domain of the theoretical and speculative, and they have led us to forestall somewhat the answers that should be given to the questions, Whence were the ores of lead and zinc originally derived? Whence did they come into the fissures of the limestone? How did they come there? During what period or periods did they become fixed in their present position? And what were the principal agents to which their deposition in their present form is due?

On all of these questions there may exist, in the present state of our knowledge, considerable difference of opinion.

1. It may be safe to start with the assumption that the rocks of the earth's surface has been formed and re-formed, again and again, by the wearing down of previously formed, collected, and deposited matter,

* Abstract of a paper from the January, 1883, number of *Y Cymmrodor*. By D. C. Davies, F.G.S., author of *Metalliferous Minerals and Mining; Slate and Slate Quarrying, etc.*

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such depositions have, from time to time, been aided and effected by emissions and ejections of matter from the interior of the earth, in the various conditions of gases, vapors, liquids, and solids, even as such emissions and ejections are taking place now in volcanoes, geysers, and springs of water charged with calcareous and other substances, both terrestrial and sub-marine.

3. It is inferred that in the seas in which our limestone beds were deposited, such emissions of calcareous matter were very abundant, that the origin of the great bulk of the calcareous matter of the strata is to be sought for in this source; the shell beds, the earthy matter of the impurer limestones and the silica, and other substances of the sandstone and cherty beds, being derived from the wearing down of older rocks, together with some portion, doubtless, of the calcareous matter.

4. That with the calcareous matter rising from the interior of the earth there came up also the metals, together with the substances with which, as "ores," they are now associated.

5. Confining the observations now, for a time to lead: this metal may have come from the earth's interior in two forms—first, in a pure and gaseous form, to be mixed with and held in solution by the waters of the sea for a time; or as mixed with carbonic acid—as carbonate of lead. Judging from the abundance of carbonic acid present in these early waters, it is reasonable to think that this last was the prevailing form. Indeed, it is difficult to conceive of the mineral remaining for any length of time in a pure state, surrounded as it would be, from the beginning, with other substances with which it would readily combine. With the lime also so largely present, it would be deposited upon the sea bottom, and thus form an integral part of the subsequent rock. But, just as in the clay pockets the carbonate of lead lies in the lowest place, it would, from its specific gravity, sink as low down in the calcareous ooze or mud of the sea as it could; and as now and again the continuous deposition of the calcareous matter was checked by the inflow of earthy matter from the land, as now marked by the shale or marl beds, the base of each bed or layer of calcareous ooze would be most strongly charged with the metallic substance. It would thus be in a favorable position to be taken up and carried off by the agent to be presently referred to.

6. After the whole series of the calcareous beds, with their interstratified shales, grits, and sandstones, were deposited, came the elevation of the whole out of the water, with the consequent drying and contraction, causing cracks, great and small, in every direction; followed by movements in the earth's crust, causing dislocations, shattering of strata, and innumerable cracks, besides the great movements to the south and east. These would, added to the original inequalities of the surface as the beds were lifted out of the sea, and consequent, in a great measure, upon them, be hollows filled with water and fed by rains; old channels and furrows to be widened and deepened by atmospheric and aqueous denudation; rain falling and water flowing and percolating through every crack and crevice. There would be long periods also when, now partly and now totally, the strata would be submerged in the sea, its water filling every chink and pore in the beds.

7. What was the agent, or what were the agents, by means of which the ores became fixed finally in the depositories where they are now found?

Negatively, the agency of heat to any great extent in the operation must be dismissed. It has been suggested occasionally, that the presence of rocks of a supposed igneous or metamorphic origin near the region of mineralized limestones, has had much to do with the deposition of the metallic ores. It does not seem, however, as far as the strata of the district we are considering is concerned, to have been the case.

That the principal agent was water must have become apparent. It is along water-courses that the ore is deposited. It is in cavities and recesses, where the flow of water has been temporarily checked, that the ore has accumulated. The quantity of the ore lessens usually in proportion to the distance reached from the great water-courses. The earthy fillings of the lodes and flats are aqueous deposits, and the ores of lead and zinc are interstratified with these. The accretions of ore in the flats are rounded by the action of water.

It is water, therefore, that, filtering and percolating through the cracks and interstices of the strata, has taken up and carried off, along with other materials of the bed, the metallic ores, until, reaching points where the flow was less rapid, where natural intercepting tanks and slime-pits, so to speak, existed, the metallic burden of the water held in solution or suspension would be deposited.

In water so strongly impregnated with various mineral matters, it is also probable that chemical action would be facilitated in places, and precipitation effected. The chemical action, taking place both when the minerals were first dissolved out of their parent beds, and when taken forward by the water, might be assisted by the temperature of the water, and it is possible that movements in the strata themselves, and those adjacent, with the intrusion near them of igneous rocks, might both generate heat, and also cause the emanation of gases that would assist both in the dissolving and taking up of the minerals and also in their subsequent deposition.

Then the different beds themselves would have different temperatures. They would also possess different degrees of magnetic or electric power. For, although as yet not much is known of the way in which magnetic currents have affected the deposition of metallic ores, it is known that these currents have done much in giving these ores an east and west direction, and in determining the points at which they should be precipitated from their watery solution.

8. Mechanically speaking, the crack, limited in size, in the lower limestones, may have been partly filled with earthy minerals before the great flow of mineralized water commenced. In the upper limestones, the abundance of shaly matter would soon fill up the cracks, and the intervening shale-beds would effectually close them to the flow of water, so that the absence of metallic ores from these beds is partly accounted for in this way.

9. Still the shale-beds and the fossiliferous limestones have had much to do with the change, almost universal, which has taken place in the lead ore from its early condition as carbonate of lead, and its other early combinations and forms, to sulphide.

These beds consist largely of organic matter, so strongly charged with sulphur that the fossils have in many cases lost their original material, and become lumps and masses of pyrites. Water flowing over and through these beds becomes charged with sulphureted hydrogen. A sulphurous bed of fossils at Dyserth is a good example of this. Chemists know that, when manipulating with this gas, the surface of the lead-fittings in their laboratories becomes altered into a sulphide. Here, then, is the agent, or at least one chief agent, by which the carbonate, nitrate, silicate, or other early conditions of the mineral have become converted into a sulphide as it is now found. It must be remembered, also, how largely present sulphur is throughout the whole of the limestones, and still more so in the overlying Coal Measures. The powerful decomposing effect of water containing carbonic acid, such as in places the waters of the carboniferous seas would be, upon the silicates of minerals, is also well known; and here is indicated an agent whose influence would be active on the mineral contents of the beds of sandstones at the summit of the group.

10. This operation can not be limited to any one time. It is a process that might have gone on as the materials were deposited. Subsequently, for long periods, the water flowing through and by the fossiliferous limestones, shales, and coal-beds would carry on the process. In water, also, previously charged with plumbiferous matter flowing over these beds, the change to sulphides would take place.

11. It will be seen that zinc was present in large quantities as well as lead, in those early waters, and, to a considerable extent, the remarks just made apply to its deposition also, as well as to the changes it has undergone. The ores became deposited together, occupying, to a large extent, the position their different specific gravities would assign them.

12. During the latter period, when the galena of the flats and pockets was deposited, zinc appears not to have been present in the waters of the sea. That the galena was derived from the material existing in the water, and not from the wearing away of the older ore-deposits in the limestone or in the older Silurian rocks, is proved by the fact that zinc, which is so largely associated with lead in the lodes of these strata, is altogether absent. The separate origin is also proved by the greater absence of silver from the lead ore of these newer deposits.

Various modifications and additions to the processes whose outline has thus been sketched will very likely occur.

ANOTHER POSSIBLE CAUSE OF BOILER EXPLOSIONS.

M. Vignes, in the *Journal la France*, draws attention to experiments made as long ago as 1846, by Professor Donny, of Ghent, and intended to show the influence which air exercises on the boiling-point of water and on the character of its ebullition. In this experiment, ordinary water is placed in a clean glass tube, open at one end, and boiled long enough to drive away not only the air above the surface of the water, but all the air dissolved in the water. Then, when the upper part of the tube is full of pure steam, the mouth is hermetically sealed and the tube is left to cool. When cool, it is about half full of water, above which is vapor of water at a very low pressure. The tube being thus prepared, its lower end is plunged into a bath of glycerine or oil, which is gradually heated. No ebullition is visible in the tube when the temperature reaches 234 degrees Fahr. At 240 degrees Fahr., however, the column of water bursts, as it were, in two, with a sudden explosion, and part of it is flung against the sealed end with such force as often to break it open. Now, in industrial works, it often happens that a boiler, having been filled with water, works for three or four hours without receiving a further supply. It may then be cooled down, and the next time it is wanted it may very probably be fired up again without starting the feed-pump, the water-level being judged sufficiently high; but the water in such a boiler will be in the same condition as that in the test-tube; that is, it will be deprived of all air, and consist of water below and vapor above, the latter, however, being probably at a much higher pressure than that of the water in the tube. This water has no free surfaces in its interior due to the presence of bubbles of air, from which evaporation can take place. Consequently, as in the test-tube, there will be delay in vaporizing—at least, until the expansion becomes great enough to overcome the pressure of the superincumbent vapor, and a sudden flashing into steam, which will be of the nature of an explosion, and may easily overcome the resistance of the boiler. The pressure thus attained may be very great. In the test-tube, the pressure of the temperature of explosion—240 degrees Fahr.—will be eighty-six times what may be taken as the pressure of the superincumbent vapor in the boiler, as already observed. That pressure will probably be much higher, and the pressure of the explosion will probably be much higher also. To avoid this source of danger, it will be sufficient, as M. Vignes points out, to make it a rule always to feed a boiler when it is fired up after standing. This will have the double effect of lowering the pressure and of facilitating evaporation, by distributing the mass of water in the boiler, and charging it to some extent with bubbles of air. Meanwhile, the facts he has adduced are certainly sufficient to warrant a belief that we have here a key to many cases of boiler explosions which have hitherto been wrapped in mystery and it seems very desirable that careful and precise experiments should be undertaken to prove or disprove the production, on a large scale, of the phenomena thus shown to exist in laboratory experiments.

JOHN HUGHES DEWEES, who died at Thomasville, North Carolina, on the 7th of this month, was born at Trappe, Montgomery County, Pa., on the 26th day of February, 1831, being the oldest son of Dr. Jacob Dewees, from whom he inherited a fondness for scientific pursuits. He began life as a civil engineer on the Chester Valley Railroad, and was subsequently employed under Kimber Cleaver in the location and construction of what is now the Shamokin division of the Northern Central Railroad. After its completion, he remained in the Shamokin region, giving his attention to mine engineering and geology, and became extensively engaged in the mining of coal. In 1874, having received the appointment of Assistant State Geologist, he made a thorough examination of the iron ores of the Juniata District. One volume of his report has been published for several years, and the other is now in press. In 1879, he resigned his position, since which time he has been engaged in general professional work.

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CABLE SYSTEM OF TRANSPORTATION.

A proposition was recently made by the National Cable Railroad Company, of this city, to the Brooklyn Bridge trustees, to take charge of the cable transportation over that structure. In regard to this proposition and other matters of detail, President William P. Shinn recently made the following statement:

The cable system of transportation was first put in operation on street railroads by Mr. A. S. Hallidie, in San Francisco, in 1873, and has since been extended so that it is used on nearly all the street roads in that city. In 1881, the system was adopted by the Chicago City Railroad Company, and twenty miles of cable have been in successful operation there for nearly two years. The use of cable for transportation has been carried on for many years in connection with mining operations, but Mr. Hallidie was the first person to successfully apply it to the transportation of passengers in the streets of a city. His patents and others which are now controlled by the National Cable Railroad Company, of this city, cover the only complete system that has been put into practical use, and the patents have been broadly sustained in the United States courts in California. The National Railroad Company has been organized with power to build, own, lease, and operate street railroads with cable power. It proposes to begin active operations at an early date. The company has made a proposition to the trustees of the Brooklyn Bridge to transport over that structure a maximum of 6000 passengers an hour in each direction within sixty days after being put in possession; and the company further agrees, whenever the necessary terminal facilities shall have been provided by the trustees, itself to provide the additional facilities necessary to the transportation of from 15,000 to 20,000 passengers an hour in each direction. Complaint has been made that so little use is made of the bridge. The distance—about a mile and a quarter—is too great for many persons to walk, especially in hot, cold, or otherwise unfavorable weather, and the irregularity with which cars have been running does not invite travel by that route. To bring the bridge into general use, it is absolutely essential that cars should be run promptly, frequently, and with certainty. This the company proposes to do if its proposition is accepted. The proposition looks to an immediate reduction of the fares from five to three cents, and a further reduction to two cents whenever the bridge is made free by the Legislature. With a fare of two cents, and tickets in quantity sold at a somewhat less price, there is no reason why the Brooklyn Bridge should not be made the great artery of communication between the two cities.

President Shinn, according to *Mechanics*, further stated that he had not yet been officially advised that any action had been taken, newspaper reports being to the effect that the proposition was laid on the table without debate. It was also reported that no action had been taken because the terms were unsatisfactory. The company made a plain business proposal to do upon the bridge what has not been done and what did not seem likely to be done. The terms as to details were, of course, proper matters for discussion and amendment, if necessary. As to the use of the Hallidie patents in Chicago, it was remarked that building was begun in that city without these patents; but it was soon decided that it would be best to obtain the right to use them. which the Chicago company proceeded to do, and the road is now constructed and operated under that system. It may be of interest to here state that a road operated by the Hallidie system is already in use in Liverpool, and another company has been authorized to construct one in London.

DRAUGHT-TUBES OF TURBINES.

In a paper on the water-power of the Falls of St. Anthony, read by Mr. J. P. Frizell, at the annual convention of the American Society of Civil Engineers at St. Paul, Minn., we find the following passage, which is worthy of careful consideration:

A conspicuous instance of the misuse of power is furnished by the draught-tubes with which almost every wheel is provided. The usual arrangement of the wheel is this: A vertical shaft is carried well down into the limestone. A shelf or ledge is there left around the shaft, and the latter is carried with diminished diameter through the limestone and to the necessary depth in the sandstone. On this shelf, rests the platform which supports the wheel. The water is discharged from the wheel through a draught-tube, which reaches down below the surface of the water in the wheel-pit. The water thus acts not directly, by its weight above the wheel, but indirectly, by diminishing the atmospheric pressure below the wheel. These draught-tubes are almost invariably too small. I give a few instances:

A 54-inch "New American" turbine, acting under a head of 48 feet, has a draught-tube 52 inches in diameter. The wheel is stated by the makers to discharge, with full gate, 216·45 cubic feet per second under a head of 40 feet. The effective head, as we shall see, is about 44 feet, and consequently the discharge with full gate should be 227·27 cubic feet per second. This would require a velocity through the draught-tube of 15·41 feet per second, corresponding to a head of 3·69 feet. Adding the frictional head in the draught-tube, assumed to be 24 feet long, we have 4·10 feet for the loss of head at this wheel, or about $\frac{1}{12}$ the total power of the wheel. With the wheel running at full gate, this loss amounts to 1·4 mill powers, worth commercially some $1400 per annum.

In another mill, the proprietor is now putting in a 40-inch Victor wheel, to work under a head of 43 feet, provided with a draught-tube 40 inches diameter. We shall find the effective head here to be a little over 37 feet. The discharge, under a head of 37 feet, is given by the makers as 155·3 cubic feet per second. This implies a velocity of 17·8 feet per second in the draught-tube, involving a loss of head of 4·92 feet. Adding 0·59 feet for the fractional loss of head in the draught-tube, assumed to be 20 feet long, we have for the total loss of head 5·51 feet, or something over one eighth the total power of the wheel. These are only two instances taken at random, and might be multiplied to any extent.

The waste of power is not the only evil result of this gross disregard of the laws of hydraulics. The inordinate velocity with which the water is discharged from the draught-tube is very destructive to the wheel-pit. On one occasion, a miller had used his raceway for a common sewer of his mill, a use which rendered the wheel-pit tolerably safe from inspection. Having occasion to visit it, he found a cavity under the draught-tube some 30 feet in depth. Nothing disconcerted by so trifling an accident, he filled up his pit and set his mill to running again. But when the owner of the adjoining mill, in attempting to deepen his race, pumped up materials recognized as coming from the above-mentioned pit, it was felt that the limit of safety had been reached, and the latter enterprise was discontinued.

Some of the millers, with a praiseworthy determination not to be beaten in this combat with the laws of nature, have lined the bottoms of their wheel-pits with boiler-plate. If they would put sufficient iron in their draught-tubes, I think they would have no occasion to use that material in their wheel-pits.

FURNACE, MILL, AND FACTORY.

The Stillwell & Bierce Manufacturing Company, Dayton, Ohio, manufacturer of turbine-wheels and feed-water heaters and purifiers, has completed two additions to its works—one 76 by 40 feet and the other 40 by 60 feet—by which it will increase its capacity one third.

The Deane Steam-Pump Company has just shipped a low-pressure pump having a capacity of 3000 gallons per minute. It was built for a party in New York State, and is to be used for irrigating purposes. The discharge-pipe required is 18 inches in diameter.

The Gates Iron-Works are shipping a 500-ton crusher to P. M. & J. F. Shanley, Newark, N. J., and one 100-ton crusher, with elevator mounted on wheels, to the Hopes Artificial Stone Company, Baltimore, Md.

Jones & Laughlins, of the American Iron-Works, are preparing to experiment with the Fuel-Gas Company's natural gas in a few of their puddling and heating-furnaces. If the result proves to be satisfactory, they will use the gas in all their furnaces instead of coal. These works contain 76 puddling-furnaces, 3 scrap-furnaces, and 30 heating-furnaces.

The Laclede Wire and Fence Company, of St. Louis, recently incorporated with a capital of $10,000, has purchased the wire and machine works of Butterfield Brothers & Co., in that city, the latter company retiring from business. The purchase represents an investment of something like $16,000, and this outlay will be increased to about $20,000 before the beginning of the new year by the buying of additional machinery for the works. The stockholders of the new company are: Charles L. Merrill, President; Paul Robyn, Vice-President; W. D. Van Blarcom, Secretary and Treasurer; and J. C. Van Blarcom, present cashier of the Bank of Commerce. The board of directors consists of the three officers named. The business of the new concern is the manufacture of barbed wire and the handling of plain wire of all kinds.

The pool of the tube manufacturers has finally been formed, and the prices will be increased. The principal firms of the new combination are: Morris, Tasker & Co., of Philadelphia; the American Iron and Tube Company, of Middletown, Pa.; the Lake Shore Tube-Works, of Cleveland, O.; the Reading Iron-Works, of Reading, Pa.; National Tube-Works, of McKeesport, Pa.; Spang, Chalfant & Co., of Sharpsburg, Pa.; and the Pennsylvania Tube-Works, of Pittsburg.

It is stated that the Pottstown Iron Company contemplates erecting a large universal plate and shape mill on its grounds.

Notices have been posted in the several departments of the Steelton mills announcing a reduction of wages and a slight reduction of force, to take effect January 1st. The reduction in wages will not affect the outside laborers or those who are now making $1.20 per day.

The 10 per cent reduction offered by Graff, Bennett & Co., at the Clinton mills, Pittsburg, to the engineers and laborers has been compromised by the engineers suffering only a 5 per cent reduction and the laborers 10 per cent, with the understanding that they will receive their old wages as soon as the price of iron advances sufficiently to justify the firm to make the increase.

Notice was given on Saturday night for the closing indefinitely of the Philadelphia & Reading Coal and Iron Company's rail mill at Reading on January 1st. Three hundred hands will be thrown out of employment. The cause assigned is dullness in the iron trade. This mill makes the largest part of the rails used by the Philadelphia & Reading Railroad Company, and also furnishes rails to other parties.

A few years ago, a Swedish captain of engineers had charge of some harbor work, but failed to carry it out in the specified time because the explosives at his command were unsuitable. He asked and obtained six months' time to experiment on explosives, and during his investigations invented "forcite." This explosive, winning rapid favor in Europe, attracted the attention of gentlemen for a long time identified with the manufacture of nitro-glycerine powders on the Pacific coast, the outcome being that works were put up by the American Forcite Powder Manufacturing Company at Lake Hopatcong, N. J., under the management of Mr. M. Eissler. The editor of the Dover *Iron Era* has recently visited the works, as yet not quite finished, and from his long description we take the following data. The machine-house is a large brick structure, 44 by 84 feet in size, divided into four rooms by brick walls running up to the gable, and making each compartment separately fire-proof. In the first room are the large steel tubular boilers of 75 horse-power, substantially set in masonry, which furnish the power and steam for the purposes of the whole works. The second room contains an Ingersoll duplex air-compressor and air-receiver; a handsome 25 horse-power engine; one of Worthington's large force-pumps, having a capacity of 300 gallons per minute; also the boiler feed-pumps and heater. In one part of the third room is a repair-shop, fitted up with lathes and other tools for the repair of the machinery. The other part of this room is intended for the preparation of raw material, and the fourth room is designed for a like purpose, both containing a large amount of machinery necessary to the work. Throughout the whole building, the shaftings are arranged on independent bearings, in order to avoid all friction and loss of motion.

Building No. 8 is adapted to a new and novel feature in the manufacture of powder. It is a brick structure, 25 by 65 feet in dimensions, and contains the machinery and implements necessary for the regaining of the waste acids which remain after the manufacture of the nitro-glycerine. The apparatus consists of four very large retorts, each weighing 5000 pounds, for the reconcentration of acids, which are connected with condensing-towers, and a complete system of machinery necessary for the work to be performed.

The nitro-glycerine house is a three-story frame building, 32 by 32 feet in size. In the third story is the apparatus for the mixing of the glycerine. When this is accomplished, the acids are discharged in a series of vats, situated on the lower floors, where the processes of separation and purification are carried out. The whole work is done automatically by the use of compressed air, there being no individual handling whatever of the materials. As this building is situated twenty feet higher than the acid-regaining works, every particle of the resting acids are carried by gravitation through lead pipes to the acid-regaining works, where they are reconcentrated and sent back again by the aid of compressed air to the nitro-glycerine house and worked over and over again.

The nitro-glycerine is carried to the first mixing-house through large India rubber pipes, well protected and laid under ground. Here it is converted into the powder called forcite, for which superior advantages are claimed over the other powders.

From here, the nitro-glycerine is conducted in the same manner to the second mixing-house, which is sunk into the ground, to obtain the necessary grade to conduct the liquid by gravitation.

Still ascending the grade, the first cartridge-house is reached, where the powder is put into cartridges with the aid of two machines. There are two more cart-

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ridge-houses of the same pattern, furnished with the same number of machines. In the first house, the machines are operated by a little upright engine, run by compressed air. The power for running the machines in the other two buildings is transmitted by wire rope from the engine in the first. From these buildings the cartridges are carried to the packing-houses.

The Ingersoll Rock Drill Company, of New York City, has furnished for the Washington Aqueduct Tunnel a compressor plant consisting of four improved Ingersoll "straight-line" air-compressors, having 24 by 30-inch cylinders; 6 100 horse-power boilers; 28 3½-inch "Eclipse" drills; 4 hoisting-engines, and 5 pumps, together with the necessary pipe, etc. The plant is located at a central point, and the air is carried five miles through 12, 10, and 6-inch pipes to the head of four shafts, where it is received by 4-inch pipes and supplied to 28 Ingersoll drills, hoisting-engines, pumps, etc. When the tunnel, which will be 4¾ miles in length, is completed, the air will have been carried through ten miles of piping.

Three thousand employés of the National Tube-Works Company, of McKeesport, decided to accept a reduction of from 12½ to 25 per cent in their wages after January 1st.

James Hooven & Sons and J. H. Boone & Co., iron manufacturers of Norristown, Pa., have given notice that on and after January 1st, 1884, the wages of puddlers will be reduced from $4 to $3.75 per day, and that the wages of all other employés will be reduced in proportion.

The Thomas Iron Company, at Hokendauqua, has given notice of a general reduction of 10 per cent in all wages, to take effect January 1st. This company has recently reduced its working force at least one third. The Crane Iron Company, at Catasauqua, has given notice of another reduction of 10 per cent, to take effect January 1st. This makes a reduction of 20 per cent by this company, which on Saturday further cut down expenses by discharging some of its hands. Nearly every furnace in the valley has reduced its wages. The Glendon Iron Company is an exception, though it has cut down production.

The Iron City Forging Company, a new concern, has completed its works at Sumner station, near Pittsburg.

The rolling-mill of Atkins Brothers, in Pottsville, Pa., has shut down for the present. The length of the stoppage is uncertain.

Etna Furnace, near Cave Spring, Ga., has gone into blast again after a short stoppage.

Clarksville has appointed a committee to visit Cincinnati and consider the proposition to move the Malleable Iron-Works, now operated in the latter city, to Clarksville. The proposition is, substantially, that Clarksville contribute $37,500 for a half-interest in the new enterprise to be established there, to which the company will add its plant, valued at $49,235.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

HERRING VS COPPER QUEEN.—The suit is one brought by Colonel Herring, administrator of the estate of his brother, Joseph Herring, against the Copper Queen Mining Company, to recover one third interest in the Copper King mine at Bisbee. A jury has been waived in the case, and a majority of plaintiff's witnesses have already testified. On the decision in this case, says the Tombstone *Epitaph*, hangs the title to still another third of this mine, for which Joseph Dyer, as administrator of his brother's estate, is sueing.

TOMBSTONE DISTRICT.

CONTENTION.—The pump started up December 10th, and since then the main shaft has been pushed ahead with all the vigor possible. It is expected that the level of the Grand Central shaft, which is 30 feet below the water surface, will soon be reached. All the machinery works admirably; in fact, better than expected. The mine was perfectly drained in about five hours, after which the pumps were run at less than half of their speed. While work is pushed ahead vigorously below the water-level, no less activity prevails in the upper levels, and the stopes are still furnishing the usual contingent of ore, and will in all probability continue to do so, after prospecting and development-work below the water has gone far enough to enable the management to extract sufficient ore from that region to keep the company's mill running at its full capacity.

DEFENSE.—A number of parties are at work chloriding on this mine. The mine appears to be literally covered by a net-work of ledges, some of them carrying ore exceedingly rich in silver. This mine has always been an excellent field for chloriders, and is now, as more depth is attained, if any thing, increasing in productiveness.

GROUND HOG.—The developments recently made will soon necessitate the erection of some reduction machinery.

GILA COUNTY.

OLD DOMINION.—A new 80-ton furnace, to replace the old No. 1, has been received. The company will soon have the three furnaces in full blast.

PINAL COUNTY.

COPPEROSITY.—This group of mines has been sold to San Francisco parties for $57,000. The Florence *Enterprise* states that they are situated about 35 miles south of Casa Grande. The group consists of the Copperosity, Welshman, Little Chief, and Copper Giant, all being on the same vein. The four claims take in 5200 feet in length by the usual width of 600 feet. Ore crops continuously for 4500 feet on the vein. It is the intention of the company, which will be known as the Casa Grande Copper Mining Company, to erect a fifty-ton smelter. It is stated that coke can be delivered at the mines for $22 per ton and all supplies at $6 per ton from Casa Grande. There is also a great abundance of wood in the immediate vicinity for fuel.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

Reports from this district show nothing of importance. Work goes on, and the production continues. It is stated by San Francisco papers that James S. Mowers has filed a complaint against John Pattie and sixty-eight co-defendants. Plaintiff alleges that as sheriff of Mono County he attached certain property of the Noonday Mining Company on a writ of execution issued by the Superior Court of the city and county of San Francisco, to satisfy a claim of Henry Wadsworth. That he as sheriff sold the said property at public auction, and that Wadsworth became purchaser at $7000, which $7000 Wadsworth credited toward the satisfaction of his judgment against the company. The defendants, as employés of the mine, have now brought claims against the sheriff for the recovery of wages due for services rendered. Plaintiff asks the equitable relief of court, and that said claims be decided adversely to defendants. Similar suits have been brought by the same plaintiff against the employés of the North Noonday Mining Company and the Red Cloud Consolidated Mining Company.

NEVADA COUNTY.

EMPIRE.—The shaft is down 1428 feet. Ore is raised from five different levels. It is of good milling quality, showing sulphurets in abundance and plenty of galena. There are now about 250 tons of quartz on the dump at the mill.

IDAHO.—The company has done a great deal of prospecting in the last year, and has made many important and valuable changes in its works. The lower levels of the mine are looking well, holding a good-sized ledge.

IMPERIAL.—Pumping continues, and it is expected that sinking will shortly be resumed.

MAGENTA.—Preparations for steady work have been made. The mine is now free from water.

PLUMAS COUNTY—GREENVILLE DISTRICT.

ARCADIAN.—The development made shows that the mine is a good one and that the prospects are very favorable.

GREEN MOUNTAIN.—Good progress is made in running the tunnel in the mine, and the indications are that, by the middle of January the Blake chimney will be reached.

COLORADO.

DOLORES COUNTY.

This has apparently been a dull season in the mines of this section, but the output is more than double that of the preceding year, when the various estimates placed it at about $125,000. The production is estimated as follows: Grand View Smelter, $135,000; Santa Clara Milling Company, $61,000; Rico Reduction Company, $12,000; ores not treated in Rico, $75,000. Total, $283,000.

RICO REDUCTION COMPANY.—This company will erect concentration-works on the West Dolores next year. The ores to be handled are the Little Susie, Little Wonder, Russian Bear, and other properties in which the company has an interest; but it will also do custom work for other claims.

GUNNISON COUNTY.

MOFFET SMELTER.—According to the *Review-Press*, this smelter remains a failure. The owner of these works came from the lead district of Missouri, and with a great flourish of trumpets announced that he would put up reduction-works and teach Colorado smelters a thing or two about argentiferous galena smelting. The works have been completed now for about a year, and have their first car-load of bullion to ship. Alterations and improvements have been going on ever since, yet the furnaces will not work.

ROSE & REED CONCENTRATOR.—This concentrator is kept busily running both day and night on Forest Queen ore, and it is more than likely that it will be busy all winter, on ore from this mine, as preparation to work all winter has been made.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY.—The properties have been formally delivered to the representatives of the English company. Extensive operations and improvements are contemplated.

LAKE COUNTY.

On an average, about ten cars of ore a day, amounting to about one million pounds a week, are shipped from Fryer Hill mines to Utah. The ore is shipped to the Horn-Silver, Mingo, Germania, and Morgan smelters. The reason for shipping the ores such a great distance is the fact that there is a better market in Utah for the class of ores shipped than in Colorado. The ores referred to are low grade, containing no lead, and from six to twelve ounces in silver to the ton. They carry, however, a large percentage of iron—not less, we believe, than forty-five per cent excess over the silica—and consequently are valuable to the Utah works for the creation of an economical slag, while the silver pays for the mining and a portion of the freight.

ELGIN.—The new furnace at the Elgin smelter was blown in on the 18th inst., and the establishment has three stacks in blast. The new furnace increases the capacity of the works forty per cent.

EVENING STAR.—The company's mines continue producing a limited amount of low-grade ore. While the resources of the mine are nearly exhausted, the property has so far more than paid all expenses, and notwithstanding the great amount of new work done, occasional transmissions of money are made to the New York office.

IRON HILL CONSOLIDATED.—The operations during the eleven months past—the time the company has been organized—show that the property has advanced very rapidly, until it stands very near the head of the list of large producing mines. The shallow shaft on the White Cap has been increased to a depth of 340 feet, and the forty feet of drifting in the property have been extended until at present there are over 6000 linear feet of levels, branching out into all portions of the territory and opening up extensive ore-bodies. The bare hill-side has been covered with shaft-houses, ore-bins, timber buildings, and work-shops. One twenty and one fifty horse power hoisting-engine occupy the place where formerly stood a Joplin whim and a windlass. A large building and good machinery have been placed on the Imes shaft, where there had been only a rattle-trap hoister and a primitive log cabin. In addition, about 16,000 tons of ore have been extracted and shipped to the smelters, and large resources opened. While working on the southern end of the property, the company shipped a great deal of high-grade lead ore. Recently, however, in pushing work from the White Cap shaft, the ore has improved to a remarkable extent in silver, and a large ore-chute has been opened, from which a hundred-ton lot settled for lately ran eleven one hundredths of an ounce in gold and thirty-three ounces in silver to the ton. The ore carries but thirteen per cent in lead. The mine is producing at the rate of about 2000 tons a month, and is employing one hundred and fifty men.

IRON SILVER.—The company's mines during the first eleven months of this year produced 85,154 (dry) tons of ore, which will make the entire yield of the mines for 1883 at least 92,654 net tons. The ore, the managing director states, will average over twenty-five per cent in lead. This makes a gross yield in lead of 23,163 tons, and places the Iron Silver at the head of the lead-producing mines of America, with quite a margin over the next largest producer, which is the Horn-Silver, of Utah.

LITTLE PITTSBURG.—During the month of November, the company netted above all expenses, $5000. The prospects for this month are not nearly as flattering, and the company will be fortunate if there is any margin remaining at the close of December, to be added to the cash resources. The ore-bodies that have yielded in the past were small, irregular, and unreliable, and the same is to be expected from those now opened. The only new work, warranting special mention, is the No. 10 shaft. This has lately been straightened up, and portions of it retimbered, placing it in working condition. The sinking of the shaft to greater depth will now be resumed, and it is possible, although extremely doubtful, that new ore-bodies will be found lower down.

LITTLE SILVER.—Recently a three-foot body of ore was opened, from which a lot has been shipped to the smelters and settled for on the basis of twenty per cent in lead and twenty-two ounces in silver to the ton. The ore is showing a marked improvement, as advances are made on the body, and assays have been obtained of from seventy-five to one hundred ounces. Considerable galena and carbonate ore is also discovered.

MIKE & STARR.—Exploration work is carried on. The workings continue in iron pyrites and zinc-blende.

ROBERT E. LEE.—Negotiations with English parties for this mine are in progress, and parties are now on their way here from England. The low-grade ore taken from the mine about a year ago, and which has just been shipped, shows that the ore has averaged fairly well in silver, the lowest return yet received being eighteen ounces to the ton, while the highest settlement was on a basis of forty-six ounces in silver to the ton.

ROSEVILLE-ALTA.—Mr. N. N. Robertson, manager of this company's mines, a short time since brought suit for $15,000 against the company for salary and money advanced and now due him.

OURAY COUNTY.

CINCINNATI.—The company is sinking two shafts and driving a long tunnel to connect with them, so that in the spring the ore in which they are now sinking can be stoped out without hinderance by water. The drift will, in all probability, connect with the first shaft by the middle of May. By this tunnel, the mine will be drained at an average depth of 100 feet below the surface; that is to say, it

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will free 100 feet of back or stoping ground for its entire length of 1500 feet. The Cincinnati is a true fissure-vein, averaging in width about 12 feet between the walls and carrying from six to eight feet of ore-bearing quartz. It is in a trachyte formation of country-rock, and dips to the west, with a course about northeast, southwest; altitude, 11,250 feet above sea-level. The character of the ore is free or native gold associated with galena, copper, and iron pyrites, and zinc-blende in a matrix of white crystalline quartz and what is called here rose quartz, a silicate of manganese. On the surface, there is a great deal of the black oxide of manganese, but this disappears with depth.

SAN JUAN COUNTY.

Mineral Point has had a number of energetic citizens at work this year. James Boyce shipped considerable ore to Silverton for sampling and concentrating, from the British Queen, which carries large bodies of high-grade rock, running from 21 ounces to over 200 ounces in silver. George W. McIntyre sent a quantity of galena and pyritous ores, of shipping and concentrating grades. J. W. Cooper had some fair-sized lots of Chicago ore concentrated by Comstock & Co. quite profitably, after shipping fifteen miles to Silverton. A good concentrator in this locality might do a paying business. One is now established, but did no work last year. Other mines in the vicinity are the Old Lot, Maid of the Mist, Red Cloud, London, Mastodon, and the properties of the Waldron Consolidated Company. Some of these have also shipped this season.

Animas Forks is the center of a rich mineral district. Greenleaf's concentrator and that of the Eclipse Smelting Company are within easy reach. The latter has been running a part of the year. Another mill of the kind is projected for the Mastodon mine, in California Gulch. Some of the producing mines in this section are the Sioux City, Little Dora, Mountain Queen, etc.

Eureka has held back somewhat in anticipation of an extension of the railroad, but work has favorably progressed upon most of the mines in the vicinity. The Sunnyside and Ella mines have been the largest shippers. Developments have been made this year upon the Tom Moore, Byron, Hard Cash, Roving Ranger, Ben Franklin, Hidden Hand, Sunnyside Extension, Cuba, and others of the Niagara Consolidated Company.

Between Eureka and Howardsville, many claims have been worked, usually with encouraging results. The Middleton concentrator had poor success with portions of its machinery, but managed to get matters righted at the beginning of winter, so as to be ready for next season's business.

Howardsville and Cunningham Gulch have not fallen behind. The Highland Mary, Pride of the West, and Green Mountain lodes have yielded good results, and many other veins could produce largely, if systematically worked. The Howardsville concentrator shut down early after an unsatisfactory trial-run.

Silverton has grown materially since 1882, the population having more than doubled within the past year. Shipments, many of them quite heavy, have been made from the King Solomon, North Star (King Solomon Mountain), Round Mountain, Silver Lake, Nevada, Legal Tender, Aspen, Gray Eagle, Idaho, Empire, North Star & North Star No. 2 (Sultan Mountain), Emerald, Cleveland group, Zuni, and other properties. Three sampling-mills and one concentrator have been steadily running.

From Cement Creek, have come some of the most important shipments, though the district is newly worked. The Samson, Paul, and others have begun to produce a good quality of free gold ore, and rich galenas have been produced by the Galena, Uncle Sam, Climax, and McMillan lodes.

Poughkeepsie Gulch has sent high-grade contributions from the Bonanza, Alaska, etc., and the Columbia has shipped liberally.

Red Mountain has eclipsed all other districts in the amount of her shipments and in the number of mines producing. Among those which have furnished the largest part are the National Belle, which continues to improve in the lower workings; the Yankee Girl, Congress, Hudson, Enterprise, Treasure Trove, and numerous others which have yielded good ore from the start; the Excelsior, Silver Ledge, Turquois, Little Prince, and many more. The ore-bodies in this section are large and solid, being mainly the fillings of old hot-spring chambers. The cave in the National Belle is but one of the many already opened and yet to be discovered in that region.

Some good developments have been made in new districts, as in Mill Creek, near Chattanooga, in Ruby Basin, Pennsylvania Gulch, and Ice Lake Basin, the last three localities showing rich gold croppings. These points offer probably one of the best openings for capital, with intelligent selection and capable management.

Ophir still yields the best ores shipped to Silverton, as regards grade and quality. The Nevada, Caribou, Silver Belle, Santa Cruz, Grand View, and Pitkin have been the heaviest shippers, with smaller lots from the Mohawk, Crown Jewel, and others. One of the most promising veins, located at Trout Lake, is the San Juan mine, belonging to New York parties, and managed by D. W. Sisson. I mention this particularly, because it presents an example of what may be done by the exercise of watchful care and economy. Mr. Sisson has done more work with little money than nine tenths of the managers of this country, and has placed his mine upon an enviable footing.

Next season, we shall have good reports from many other localities. I predict good things from Bear Creek, Round Mountain, and new spots on Red Mountain.

SILVERTON, COLO., Dec. 18. THEODORE B. COMSTOCK.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—A heavy verdict has been recovered by a former manager of this company. It seems that in May, 1882, L. B. Parker leased of the Robinson Consolidated Mining Company all that portion of the Robinson mine above the fifth level for a period of one year, work to begin June 1st, and the company to receive 25 per cent royalty. Accordingly, on that day he commenced operations, and by July 1st had expended $5100 in repairs and development-work, in doing which a large and valuable body of mineral was discovered. News of this being received by the officers of the company in New York, they notified Mr. Parker that his lease was canceled. As he had complied with all its provisions, he went to New York and demanded an explanation. An agreement was entered into that Parker should be retained as manager of the property at a salary of $500 a month, receive $2000 in cash, and the company were to pay him the difference in value on 2000 shares of stock at any time he might demand it before May 1st, 1883, on condition that Parker should produce enough ore to enable the company to declare a dividend of $20,000 by October 15th, 1882. It was further agreed that Parker waived some of his claims against the company for their violation of the lease in the event of this agreement being strictly fulfilled. During October, Parker, having forwarded them the $20,000 demanded, and the stock having appreciated about ninety cents per share, he called for a settlement, which the company refused; also declining to pay the $2000 as agreed upon, and shortly afterward notifying him that his services as manager were no longer required. In January last, Parker brought suit against the company in the sum of $50,000. The suit was called for trial during the spring term of the District Court in Leadville. The Robinson Company not appearing, default was entered against them. The matter was submitted to a jury, which, after a few moments' deliberation, returned a verdict for $40,000 damages, and assessed the costs upon the company.

DAKOTA.

FATHER DE SMET.—The superintendent writes December 4th: I herewith inclose you express company's receipt for bar No. 172, containing 779¾ ounces gold, the result of the clean-up of the mill for last half of November, and making 1502·28 ounces for the month. This is a lighter shipment than usual for this time of the month, and is owing to running through a considerable quantity of low-grade ore coming from open cuts near the surface, where we are forming stopes. This new run is starting off better, and from indications in the mine will make a good showing for this month's work. I have begun an uprise in Cook's chamber, to connect through to the Justice open cut, which will be of great advantage in handling ore from latter place when completed. The south header, third level, shows an improvement in quality of the ore. The remainder of the mine is as usual. The report for the week ended December 7th shows ore extracted from first, second, and third levels 2160 tons; ore milled, 2100 tons.

PONCA.—At this mica mine, mica is found in large sheets, but that so far taken out is not of very good quality. The prospects are favorable for finding a large amount of good mica when the workings are advanced.

STAND-BY.—A partial clean-up was made, giving satisfactory results. Ten additional stamps will shortly be started up, making forty in all.

MAINE.

DOUGLAS.—At a meeting of the stockholders, held at Bangor recently, it was voted to authorize the treasurer to borrow not exceeding $30,000, and to issue the company's notes, payable in one year. Capt. Daniel Dunn has been appointed superintendent, and will now have charge of both the Stewart and Douglas mines. The report made by Captain Dunn states that the work done in the lowest workings shows an improved condition, and that the prospects of the property are very favorable in every respect.

STEWART.—At the annual meeting, the following officers were chosen for the ensuing year: President, F. M. Laughton; Treasurer, F. H. Williams; Secretary, John S. Jenness; Directors, F. M. Laughton, John S. Jenness, F. W. Hill, C. E. Hill, C. P. Wiggin, J. R. Bodwell, and F. H. Williams. At a subsequent meeting of the directors, an assessment of ten cents per share was levied, payable December 25th.

MEXICO.

Things have been at a stand-still at Pachuca, according to the correspondent of the Mexican *Financier*. At the San Nicolas mine, preparations have been made for the cross-cut to tap the big bonanza.

The new road to El Cristo mine, building by the Tellos, is approaching completion, and when built it will certainly be the finest in this district, and a great advantage to all the mines in that section.

The California mine has been taken back by the free shareholders once more. The Rosario Viejo mine, under its present able management, is picking up.

The Sombrerete Mining Company has been exempted from the payment of municipal taxes by act of the Legislature of Zacatecas.

The news from Zacatecas is of an exceptionally good character. The Veta Negra has been pumped out to a depth of 800 feet, with enough ore disclosed, of from $50 to $80 a ton, or more, to warrant the company a surplus of over $1,000,000, over and above all expenses to date—and these expenses have been very heavy, it is said nearly $1,000,000.

The number of mining operators going into Chihuahua is exceptionally large, and many transfers of mining properties to American and English companies are in process of consummation.

The Jocuistita mine, of Sinaloa, was worked for the past three or four years on the best ore that could be found in it, and now only low-grade remains, which will last for several years, but from which no dividends may be expected legitimately.

MICHIGAN.

BEAUFORT.—Operations will be continued during the winter.

FRANKLIN.—The surplus as shown by an approximate statement made at the meeting of the directors held recently is $271,745.

HYDRAULIC POWER COMPANY.—The machinery on the Menominee River has been started up for the first time, and every thing was found to work smoothly and satisfactorily. The works will begin to furnish power for the Chapin and Ludington mines early in he new year.

IRON RIVER.—The force has been reduced to 75 men, and these are principally employed in sinking, and to a limited extent, preparing ground for future work. The management does not regard the outlook for next season as a very promising one, and for that reason will not mine any considerable quantity of ore until positively assured of a market at remunerative prices.

IRON STAR.—The new Iron Star Mining Company recently referred to, says the Marquette *Journal*, as having been organized in Detroit, appears simply to have been a reorganization of the Great Western Iron Company on a new and more substantial basis. The new organization is composed of men who have ample means with which to push the work of development, and the most of them being large consumers of ore, it will not be surprising should the Great Western come to the front with a largely increased product the coming year.

MICHIGAMME.—A new and apparently large body of ore has recently been struck in No. 4 shaft at this mine.

SAGINAW.—This company has begun explorations on the property on section 4, town 39, range 29, purchased last year from the executors of the Ingalls estate. The property in question adjoins the Saginaw mine on the east, and is deemed very valuable. A series of test-pits is sinking by the company and a churn-drill is also used in the work. The ledge has been reached in two pits. One of the pits encountered slates and the other limestone, and the work is now locating with the view of determining what lies between the two.

THURBER-BERRINGER.—The shaft at this gold and silver exploration is down between 40 and 50 feet, and in the bottom shows a vein a little over seven feet wide between well-defined walls. It is the intention to sink this shaft to a depth of 100 feet.

MONTANA.

LEWIS & CLARKE COUNTY.

Montana papers have been for the past few weeks discussing the question of the proposed establishment of extensive reduction-works at St. Paul, Minn., for the treatment of Montana ores. A number of prominent mining men in Helena have been interviewed on this subject, and they all unanimously oppose such a project. Naturally, for such works can as well be erected in Helena, which is surrounded by a number of mines that only need development and a market for the ores. Statements show that wood, water, iron ore, and limestone are plentiful and convenient. Coke (English) can be laid down for about $21 per ton, shipped by way of Portland. Pittsburg coke costs at Salt Lake $27 per ton, and as it will cost very nearly as much at St. Paul. Another point to be considered is, that St. Paul would have to haul fluxes, in many cases, hundreds of miles, while Helena has them almost at her very door. The only thing that would be cheaper at St. Paul is labor.

SILVER BOW COUNTY.

ALICE.—The directors are reported to be preparing a financial statement of the company's affairs, which, they hope, will prove amply satisfactory to the inquiring and dissatisfied stockholders who are threatening to make some trouble.

BELL.—An ore-body of high grade has been discovered. Its width is reliably reported to be eight feet. It occurs as a massive copper sulphide assaying from 50 to 76 per cent of that metal, much of it being a pure copper glance. Thus far, the silver assays have averaged $65, though samples of ore of high grade in silver have been put through the assay furnace.

COLUSA.—Operations are active in the 400-foot level of the Colusa. The ledge has been penetrated, and an extensive body of low-grade copper ore is reported. Further exploration will doubtless show the mine to be more productive at the increased depth lately attained. It is estimated that the upper levels contain enough ore to supply the smelter for two years.

MOULTON.—The important strike made some time ago from the 400-foot level holds its own in good shape. Explorations in good ore are active.

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NEVADA.

ESMERALDA COUNTY.

MOUNT DIABLO.—A most elaborate report was presented at the annual meeting held in San Francisco recently. Extracts from it show that during the past year the greater portion of the labor has been directed to extraction of ore, and the result has been satisfactory. But little new work has been done during the year, except such as was necessary in developing the ore already found. The deepest stope that has thus far been worked in the mine is the stope below the third level, between winzes No. 1 and No. 2. This stope is 500 feet below the collar of the shaft, and about 160 feet west of it. There was considerable expense involved in working this stope, as the ore and waste had to be hoisted by a windlass 200 feet. Though this stope did not open very well, yet it yielded considerable $75 ore, with some of much higher grade, and every thing justifies the belief that further prospecting in this part of the mine will yield good results. Work at the other levels, winzes, drifts, etc., shows good prospects. A small body of sulphurets was found above No. 4 winze, between the 2d and 3d levels, that yielded 125 tons of sulphurets assaying $200 a ton. This body was in hard rock, and no such amount of sulphurets has been found elsewhere in the mine. Various plans to open the mine 200 feet deeper than the present workings, or 740 feet below the level of the collar of our shaft, have been discussed, but nothing definite has been decided on. Another financial question that may come up in the near future is in relation to milling facilities. Owing to the recent legal developments in this district and the chaotic state of affairs at present, it may be found necessary in the future to acquire a mill of our own, and it would seem advisable, at any rate, to so arrange that we should be somewhat independent in the matter. The leaching process that is soon to be in operation at the works of the Mount Cory Mill and Mining Company in Hawthorne might enable us to get a higher percentage from our lower grade ores than we are now obtaining by the process we are using, and at no greater cost. It is further stated that the following year will necessarily be a very expensive one, but from the experience of the past year and from the present outlook at the mine, there is every reason to believe that the results of the expenditure of the money will be satisfactory to all concerned.

	Tons.
The statement of ore shows ore on hand November 30th, 1883	400
Ore extracted during the year	8,027
Low-grade ore shipped to mill this year, but extracted in former years.	375
Total	8,802
Amount sent to Belleville	8,029
Amount of ore at mine	772
Tons. Lbs.	
Amount of ore sent to mill. 8,029 520	
Amount of ore milled 7,847 ...	
Amount of ore at mill	182
Total amount on hand November 30th, 1883	955

RECEIPTS.

The financial statement shows cash on hand December 18th, 1882	$10,478.07	
Bullion	441,157.62—	$451,635.69

DISBURSEMENTS.

Mine supplies	$7,418.55	
Labor at mine	104,519.65	
Transportation of ore	18,467.32	
Freight	2,965.75	
Bullion tax	3,857.31	
Milling	117,705.00	
Bullion discount	75 534.53	
Express charges on bullion	4.748.90	
Water	2,098.38	
Wood	3,037.98	
Dividends—1, 2, 3, 4	50,000.00	
General expenses	10,935.68—	$401,339.05
Cash on hand November 30th, 1883		50,296.64
Gross value of unsold bullion in Bank of California	46,460.87	
Discount, estimated at 17½ per cent	8,130.65—	38,330.22
Total surplus		$88,626.86

The following is a statement of the principal materials used at the mine during the past year, and the quantity now on hand:

No. 2 Hercules powder, 11,850 pounds; crystal wax candles, 12,680 pounds; fuse (D. T.), 80,250 feet; triple force caps, 41,650; coal oil, 262½ gallons; wood, 142 cords; charcoal, 2041 bushels; coke, 7000 pounds; lumber, 32,738 feet; water, 100,000 gallons.

LINCOLN COUNTY.

BRISTOL.—The troubles of this company will soon be settled, and the company will resume operations at an early day. The company's mines contain large quantities of low-grade rock, which will average $30 in silver. This ore is rebellious, but the company now has a process by which it can be worked to an advantage.

DAY.—The furnace at Bristol is undergoing a thorough overhauling at present, so that when it starts running there will be no cause for stopping. The bins are filled with coal and the teams are steadily hauling ore.

STOREY COUNTY—COMSTOCK LODE.

ALTA.—The water has all been taken out, and operations on the 2150 level have been resumed.

CHOLLAR-NORCROSS-SAVAGE.—The new hydraulic pump at this shaft will start up, and will give new life to all the middle mines.

DELAWARE TUNNEL.—Colonel J. B. Bissell and Mr. J. C. Langhorne, from Leadville, have recently inspected the progress of this tunnel. This is a prospecting enterprise, backed principally by Leadville people, and prosecuted in search of the northern extension of the Comstock lode. The tunnel at present has a length of 2800 feet, has already cut several seams of mineral in porphyry, and is daily expected to pierce the east country-rock and encounter the ledge. Another assessment has been collected, which will suffice to continue the work to a successful issue. The appearances of the ground at the head of the tunnel indicate the near approach to mineral.

GOULD & CURRY.—During the past year, the work has been confined to the 2500 level, according to the report presented at the annual meeting in San Francisco. On this level, five drifts or cross-cuts were run, aggregating in length 2040 feet. At the Bonner shaft, the machinery is overhauled and repairs are making to the main hoisting-works building, preparatory to putting the shaft in good order for the purpose of opening some ground on the old levels, which in the hurry to obtain depth was left unexplored. The above fact we mentioned in the JOURNAL some weeks ago; but since it seems to be a most important item in the annual report, we repeat it. The financial statement shows:

RECEIPTS.

Cash on hand as per statement December 18th, 1882		$16,114.79
Assessments:		
No. 44, on 108,000 shares, 50c	$54,000.00	
No. 45, on 108,000 shares, 50c	54,000.00	
No. 46, on 2116 shares, 50c	1,058.00—	109,058.00
Mine account:		
Sale sundry supplies		3,681.43
Balance:		
Cash indebtedness		17,277.22
		$149,131.44

DISBURSEMENTS.

Mine supplies	$1,888.66	
Wood	1,372.80	
Labor and salaries	9,993.83	
Joint shaft, G. & C. and B. & B., one half expense	127,438.08	
General expenses	8,438.07—	$149,131.44

KENTUCK.—The report presented at the annual meeting in San Francisco shows that during the year $26,857 have been realized by the company, of which sum $23,980 have been paid in dividends to the stockholders. The yield was largely increased by the discovery of a body of ore on the 240 level, referred to in the last annual report. By a singular coincidence, it came to, but did not extend beyond, the north or south lines of claim, extending 30 feet above and 40 feet below the 240 level. A summary shows that 366 feet of winzes have been sunk, 1084 feet of new drifts and old ones reopened and timbered. At present, there are 12 floors of filling between the 434 and 240 levels, of an average thickness of 50 feet, which is the resource in sight from which to draw pay ore, and it is reasonable to suppose they will supply 50 tons per day for six months, of a grade much below the rate per ton realized the past year, yet affording a good revenue to the company, and, with increased reduction contemplated, partly making up the loss in value. Encroachments upon the company's claim, attempted by the Original Gold Hill Gold and Silver Mining Company, have been resisted and defeated, and the application for United States patent, which has slumbered for many years, has been revived, prosecuted, and is in a fair way to be secured. The directors renewed for one year, and until annulled by a future board of directors, the contract with C. C. Stevenson, under which he pays the taxes, the Sutro Tunnel royalty, all costs of extraction, and pays to the Kentuck Company a sum per annum graded according to the yield of the ore. It is a plan under which the company is always certain to receive some revenue without risk or expense.

OPHIR.—The result of the recent election seems to have been very satisfactory to the people at Virginia City. It is stated that there was a very lively demonstration at that place by the "deep miners," as they call themselves. They had huge bonfires blazing at various places. This seems to have been only a miners' celebration; for not a mining officer was seen. The annual report presented at the meeting shows that there have been extracted from the mine 3878 tons and 1810 pounds of ore, which have yielded $36,607.34, or at the rate of $9.44 per ton, being about 60 per cent of the assay value of the ore, it being very loose. No allowance has been made for moisture. This ore has been taken from above the level of the old Central tunnel. The work on the 1600, 1700, 1900, 2000, 2300, 2500, and 2700 levels has been confined to keeping the various drifts and connecting winzes in proper repair, necessary to the maintenance of the system of drainage and ventilation. To facilitate the extraction of the low-grade ore left in the old workings near the surface, the old Central tunnel, which was run in near our south line in the year 1882, cutting the vein at a point about 150 feet below the collar of the old Mexican shaft, has been cleaned out and thoroughly retimbered. The old drifts and winzes about that level have also been repaired. Owing to the want of the necessary ventilation in the lower levels (which deficiency will be remedied soon), the work for the last few months has been confined to explorations for ore near the surface. The returns from this portion of the mine so far have been unsatisfactory, but further explorations may give better results. The purchase of the Morgan mill property will enable the company to work low-grade ore that it would otherwise be unable to extract without loss. When the main north lateral drift on the 3100 level between the Ophir-Mexican and the Sierra Nevada-Union Consolidated winze is completed, the explorations of the 3100 level should be resumed, as the late developments in the Mexican ground have demonstrated the fact that the vein through which the Ophir-Mexican winze was sunk is continuous and strong down to this point, indicating that something of value may be found in further explorations.

The statement of the receipts and disbursements for the fiscal year ended November 30th, 1883, shows:

RECEIPTS.

To balance from last yearly report	$3,336.37
From sundry mines for labor	58,347.00
From sundry mines for supplies, etc	34,015.83
From sundry mines for office expenses	75.05
Sundry drafts on president	297,353.56
Total	$393,027.81

DISBURSEMENTS.

Salaries and wages	$167,985.16
Supplies and miscellaneous expenses	155,674.35
Milling	25,995.64
Sutro Tunnel, royalty on ore	1,944.35
Morgan mill expense	29 377.54
General expenses	12,833.09
	$392,810.13
Balance, cash on hand	817.68
Total	$393,627.81
Gross expense	$392,810.13
Received from other mines	92,937.88
Net expenses	$209,872.25

WHITE PINE COUNTY.

CRESCENT & EAGLE.—It is stated that a sixty-stamp mill will be erected at the mine. It is said that there are thousands of tons of $12 quartz in sight.

OSCEOLA.—The mill has begun crushing ore. The company has about 1500 tons of ore on the dumps ready for shipment, and is taking out about 30 tons daily. It will probably increase its force shortly.

NEW MEXICO.

GRANT COUNTY.

BLUE BELL.—Rumor states that this mine, situated at Bullard's Peak, has been sold for $12,000. This is the mine that first brought this camp into prominence; but the owners, having so much in hand, have neglected it, doing nothing more on it than the annual assessment-work. Work is to be pushed vigorously.

SAN MIGUEL COUNTY.

The recent gold discoveries in the vicinity of Las Vegas have created great excitement. Probably the reports are exaggerated. They state that gold has been found in paying quantities in a lot at the hot springs, owned by a prominent resident of Topeka. The hills and valleys around Vegas are all swarming with excited gold-seekers, many of whom meet with success. A company has been formed, and will develop some claims. A few years ago, Elizabethtown, near Las Vegas, had a population of five thousand gold miners, and for a number of years a company engaged in hydraulic mining has taken out fifty thousand dollars annually. Some Colorado capitalists are already on the ground investigating the extent and richness of the deposits.

PENNSYLVANIA.

SUNBURY SMELTING-WORKS.—At a meeting of stockholders, at Sunbury, held December 24th, Manager Kidney made an official report that the company was embarrassed, and that $75,000 are needed to place it on a sound basis.

UTAH.

BOX ELDER COUNTY.

The lead mine at Bingham is sending out some fine ore. A big strike was made in the west drift a short time ago, of a large body of free-milling ore. A shipment of 60 tons made last week sampled 57 ounces silver and no lead. The mine is shipping 15 tons of first-class ore per day.

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FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Dec. 28.

The mining market was exceedingly dull this week, owing to the Exchange being closed on Monday and Tuesday being a holiday, and but for the default of a broker on his contracts the market would have been lifeless. On Wednesday, it was announced that Mr. C. S. Benham had disappeared, and had failed to meet his contracts. Large blocks of the stock of Harlem and Sonora Consolidated were sold out on his account under the rule, and the prices of these stocks were forced down to a very low figure. Harlem declined from $1.15 last week to 17c., and Sonora from 22c. to 8c. It is said that Mr. Benham has left for the West, owing members of the Exchange a large amount of money on contracts. Bodie Consolidated sold at a very high figure to-day, through manipulation. This stock has been quite strong on the San Francisco market for the past few days. Amie was very actively dealt in to-day at weak prices. Below will be found a complete summary of the market. The total number of shares sold aggregates 151,146 shares, as against 94,335 last week.

The Comstock shares were very quiet, at steady prices. California sold at 12c., and Consolidated Virginia at 32c. Sierra Nevada was quiet and steady, selling from $3.40@$3.50. Best & Belcher sold at $2.50 with one small transaction. Sutro Tunnel was quiet and steady, selling at 17c.

The Leadville stocks were quiet at irregular prices. Amie was very active to-day, and sold at weak prices; it ranged between 9@7c., the transactions aggregating 15,700 shares. Chrysolite was moderately dealt in at irregular prices, selling from $1.30@$1.25. Iron Silver was also irregular, with a fair business; it sold from $2.20@$2.05@$2.10. Little Chief was quiet and steady at 56@58c.

In the Bodie stocks, Bodie Consolidated was quite strong to-day, in sympathy with the San Francisco market. The company levied an assessment of fifty cents a share last week, making a total of one dollar per share levied within six months. The stock sold on this market from 85@65c. during the week, and from 70c.@$1.50 to-day, closing at $1.45. Standard was quiet, selling from $6@$5.75. Bulwer was quiet at 45c.

In the Tuscarora stocks, Navajo was quiet at $3.60 and Elko Consolidated records one transaction at 17c.

In the miscellaneous list, Alice was weak, with a small business, selling from $2.60@$2.25. Caribou sold at 7c. Green Mountain was strong, with a small business, selling from $1.35@$1.50. The tunnel, which is advancing at the rate of 60 feet a week, has reached the zone of barren quartz found in higher levels. The prospects are considered very favorable. The chief buyers of the stock are in siders.

Homestake was quiet and steady at $10. Horn-Silver was irregular, with a moderate business, selling from $6.38@$6.50@$6.25. Northern Belle was quiet and weak, selling at 65c. assessment paid, and from 25@18c. assessment unpaid. Robinson Consolidated was quiet and steady at 30@31c. Sierra Grande records one transaction at 60c.

Barcelona was weak, under a small business, selling from 20@13c. Bradshaw was quiet and steady, selling from 11@17c. Eastern Oregon was weak, with a very small business, selling at 10c. Harlem suffered a very strong decline; it sold from 25@9@14c., with an active business. Sonora Consolidated was very active and very weak, selling from 22@8@10c., with a business of 97,600 shares.

MEETINGS.

The Arizona Consolidated Mill and Mining Company, Metropolitan Hotel, New York City. Annual meeting of stockholders and election of trustees, January 7th, at twelve o'clock M.

The Gold Cup Mining and Smelting Company, No. 89 Water street, New York City. Annual meeting of stockholders and election of trustees, January 8th, from twelve to two o'clock P.M.

DIVIDENDS.

The Franklin Mining Company, of Michigan, has declared a dividend of two dollars per share, payable January 1st to stockholders of record December 22d.

The Iron Silver Mining Company, of Colorado, has declared a dividend (No. 13) of twenty cents per share, payable January 9th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the past week:

The fluctuations of the past week have been between $1.14⅛ and $1.13, which means almost total stagnation. Monday, the Exchanges all closed and Tuesday was a holiday, and this fact served to prevent trading. The market to-day (Friday) is very much like Friday of last week, both in the range of prices and dullness. It is not likely that the market will resume its old-time activity till New Year's is passed. Refined is firm at 9¼.

On Saturday last, the two Oil Exchanges balloted on the question of consolidation. The members of the New York Mining Stock and National Petroleum Exchange voted in favor of consolidation by a large majority, but the members of the New York Petroleum Exchange were considerably excited over the question, and a close vote was the result. It was carried, however, the vote standing 269 in favor and 250 against the consolidation, 169 not voting. There was considerable dissatisfaction expressed by the minority, who claimed that this vote did not show that the Exchange was in favor of consolidation. A joint committee has been appointed by both Exchanges to prepare a new constitution, and this must be ratified by both before the consolidation can be finally effected.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Dec. 22.....	$1.13⅝	$1.14⅝	$1.13¼	$1.14⅝	3,592,000
24.....	.....	.....	.....	.....	.....
25.....	.....	.....	.....	.....	.....
26.....	1.14⅛	1.14⅛	1.13	1.13⅜	3,829,000
27.	1.13¼	1.13⅝	1.13	1.13¼	2,745,000
28.....	1.13⅜	1.13½	1.13	1.13¼	2,942,000
Total sales					13,108,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Dec. 21.	Dec. 22.	Dec. 24.	Dec. 25.	Dec. 26.	Dec. 27.
Albion	.....	.....	.....	.....	.....	.....
Alpha	1⅜	1⅛	.....	.....	1⅛	1⅜
Alta	1¼	1¼	.....	.....	1¼	1¼
Argenta	.....	.....	.....	.....	.....	.05
Bechtel	.....	.....	.....	.....	.....	.....
Belcher	.90	.....	.....	.....	.....	1
Belle Isle	.25	.....	.....	.....	.20	.....
Best & Belcher	3	2⅞	.....	.....	3	2¾
Bodie	1	.80	.....	.....	1	1⅛
Bullion	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
California	.10	.10	.....	.....	.....	.10
Challar	2⅝	2⅝	.....	.....	2¾	2⅝
Con. Virginia	.30	.35	.....	.....	.35	.30
Crown Point	.90	.....	.....	.....	.....	.90
Elko Cons	.....	.20	.....	.....	.....	.20
Eureka Cons	2¼	.....	.....	.....	2¼	2¼
Exchequer	.....	.....	.....	.....	.....	.....
Gould & Curry	2	1⅞	.....	.....	2	2
Grand Prize	.20	.....	.....	.....	.20	.20
Hale & Norcross	2	1⅞	.....	.....	2¼	2⅜
Independence	.....	.....	.....	.....	.....	.....
Martin White	.....	.....	.....	.....	.....	.25
Mexican	2¼	2⅛	.....	.....	2⅛	2⅛
Mono	.....	.....	.....	.....	.....	.....
Mount Diablo	1¼	1¼	.....	.....	.....	1⅞
Navajo	.....	3½	.....	.....	3⅝	.....
Northern Belle	.20	.20	.....	.....	.20	.20
North Belle Isle	.....	.....	.....	.....	.....	.....
Ophir	3¾	4	.....	.....	4	4
Overman	.....	.....	.....	.....	.....	.....
Potosi	1⅛	1	.....	.....	1⅛	1¼
Savage	1	.95	.....	.....	1⅛	1⅛
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nevada	3¼	3¼	.....	.....	3¼	3¼
Silver King	.....	.....	.....	.....	.....	.....
Tip Top	.....	.....	.....	.....	.....	.....
Union Cons	3	2⅞	.....	.....	2¾	2¾
Utah	1¾	1⅝	.....	.....	1½	1½
Wales Cons	.....	.....	.....	.....	.....	.....
Yellow Jacket	2⅛	2	.....	.....	2⅛	2

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, December 27.

Owing to illness, your correspondent was unable to send you a review of the market last week, and will endeavor now to give a *résumé* of the past two weeks. The most important item of interest is the fact that the stockholders of the Franklin Mining Company have at last received their first dividend of $2 a share. At the annual meeting, the report of the directors showed that on December 1st the company had a surplus of assets of $271,754.02, from which it was voted to pay the dividend of $2 per share on 40,000 shares—$80,000—leaving a balance of over $190,000 on hand. When the present management of the company took the property from the tributers, there was no ore in sight, and the mill was a wreck. There were $16,000 in the treasury, however, and that sum has been increased as shown above without calling upon the stockholders for any thing, and the output has been increased from what was considered an impossible 40 tons per month to 200 tons. The lower levels of the mine are now reported richer than ever before in the history of the property. The stock has been very firm at $11¾@$12, with quite an active demand, the last sale being at $10, ex dividend. Calumet & Hecla has ruled steady, but not particularly active, at $239@$238¼, the last quotation being the price to-day. Quincy has dragged heavily and declined from $49¼@$46, but has rallied somewhat, the last sale being at $48 for one share only. Osceola sold at $17½, ex dividend, and a sale of Atlantic at $10 shows an advance of $1 over last sale. Pewabic was heavy, and declined from $3@$2 per share, at which price it is now offered. Huron advanced from $1@$1 9-16, with sales of 600 shares. The reports from the mine are encouraging.

In silver stocks, there has been but little activity and no special feature. Bonanza sold at $1¼, a decline of $\frac{3}{16}$. Silver Islet sold at $3, same as before. Catalpa, at 30c. Sullivan sold at $\frac{1}{2}$; but at the Mining Exchange, sales are reported as high as $1.12½ regular and $1.17½, buyer 60, with later sales at $1.05, buyer 60. Bowman Silver has declined to 7c. Empire, steady at about 25c. Dunkin, 27@28c. regular, and 30c., buyer 30. Massachusetts & New Mexico has been assessed again, this time 10c. per share, and there is no market for the stock. On the whole, the outlook for mining stocks in this market is not very encouraging to holders.

These was no feature of interest this afternoon, the market closing tame and lifeless.

BULLION MARKET.

NEW YORK, Friday Evening, Dec. 28.

The London silver market has shown great firmness the present week, and rates here have advanced as per accompanying table:

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Dec. 22	50 15-16	110⅝	Dec. 26	50 15-16	*
24	50 15-16	110½	27	50 15-16	110⅝
25	Holiday.	.....	28	51	110¾

*110⅝@110½.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended December 28th, as compiled from various sources, amounted to $81,000, as against $119,000 reported for the previous week. The receipts from January 1st, 1883, to date are $11,226,321.

Foreign Bank Statement.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £532,000 bullion, and the proportion of its reserve to its liabilities was reduced from 43 1/16 to 39 13/16 per cent, against 36 1/16 per cent at this date last year. December 27th, the bank lost £153,000 bullion on balance. The weekly statement of the Bank of France shows a decrease of 1,900,000 francs gold and a decrease of 1,050,000 francs silver. The Imperial Bank of Germany lost specie to the amount of 10,320,000 marks.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver

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bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of November.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont.	.....	$885,934
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont	"	——	12,604
Bodie, G. S.	Cal.	.....	199,859
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	.....	426,967
*Boston & Montana, G.	Mont.	.....	140,323
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah.	17,141	236,600
*Chrysolite, S. L.	Colo.	17,624	345,403
*Consolidated Bobtail, G.	Colo.	8,484	71,227
*Contention, S.	Ariz.	63,497	854,886
Crescent, G. S. L.	Utah.	.....	266,498
*Custer, G. S.	Idaho.	.....	43,572
*Deadwood-Terra, G.	Dak.	.....	388,562
*Derbec Blue Gravel, G. S.	Cal.	.....	115,043
Dunkin, S. L.	Colo.	.....	49,250
Evening Star, S. L.	Colo.	.....	47,061
*Father de Smet, G.	Dak.	24,556	325,237
*Frisco M. and S. Co., G. S. L.	Utah.	.....	$77,084
*Granite Mountain, S.	Mont.	——	323,523
Gunnell, S.	Colo.	.....	58,828
*Hatle, G.	S. C.	3,317	37,942
*Head Center Consolidated	Ariz.	.....	45,340
*Head Center and Tranquillity	Ariz.	.....	89,108
*Hecla Consolidated, G. S. L.	Mont.	**	633,979
*Homestake, G.	Dak.	.....	866,709
*Hope, S.	Mont.	——	82,060
Horn-Silver, S. L.	Utah.	240,000	2,977,200
*Howell S. and Mg. Co., G. S. L.	Ariz.	49,075	193,952
Idaho, G.	Cal.	.....	150,642
*Independence, G. S.	Nev.	.....	32,991
*Iron Silver, S. L.	Colo.	.....	1,031,952
*Jocuistita, S.	Mex.	.....	‡258,959
*Kentuck, G. S.	Nev.	.....	20,550
*Lexington, S.	Mont.	119,134	1,173,685
*Little Pittsburg, S. L.	Colo.	15,441	87,552
*Marguerite, G.	Cal.	.....	74,622
*Martin White, G. S.	Nev.	.....	136,317
Morning Star, S. D.	Colo.	.....	84,428
Mount Diablo	Nev.	39,992	468,242
*Navajo, G. S.	"	.....	411,642
*North Belle Isle	"	.....	2,153
Northern Belle, S.	"	30,502	569,607
*Ontario, S. L.	Utah.	.....	1,807,178
*Oxford, G.	N. S.	.....	54,055
*Phœnix, G.	N. C.	.....	21,009
*Pinal Consolidated, S. L.	Ariz.	.....	181,485
*Plymouth Consolidated, G.	Cal.	77,366	450,456
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	.....	203,947
*Silver Cord, G. S. L.	Colo.	31,262	972,567
Silver King, S.	Ariz.	.....	367,802
*South Yuba, G.	Cal.	.....	37,272
Standard, G.	Cal.	71,066	1,034,685
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah.	17,086	232,638
Syndicate, G.	Cal.	10,230	66,238
Tintic M. and M. Co.	Utah.	1 873	36,543
*Tip Top, S.	Ariz.	——	37,868
*Tombstone, G. S. L.	"	.....	664,618
Wyoming Consolidated.	Cal.	.....	31,541
Yellow Jacket, S.	Nev.	.....	265,885
Total amount of shipments to date			$20,890,678

* Official. †Net value. ‡Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. **Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Dec. 28.

Copper.—Business is restricted to narrow limits. The offerings of outside lots of Lake at 14⅞c. have ceased, and it would probably be a difficult matter to obtain any Lake at less than 15c. On the other hand, the past month has not been a very active one for manufacturers and there are evidences of a falling off in the consumption. So far as outside brands are concerned, refiners complain of a scarcity of raw material, the sources of supply from which it is drawn being less prolific than formerly. The great increase in the production has been in Montana, but directly and indirectly the greater part of the output of the mines and works at Butte City goes abroad.

We quote outside brands, according to quality, 14@14¼c. England cables £57 for Chili Bars and £64 for Best Selected.

Tin.—This metal has somewhat improved, under a light business, 19@19⅛c. being asked for Straits spot, large lines. London cables to-day, £83 2s. 6d.

Lead.—Outside of a few small car-lots which have changed hands, absolutely nothing has been done. Holders maintain their attitude of firmness without having as yet impressed buyers much. The stand taken by some of the holders is represented to be due to the fact that the lead they have on hand has cost them more than they can now get for it. It certainly would do them no good to attempt to force it on a reluctant market. So far as Common is concerned, the future depends very much upon whether there will be an open winter, encouraging to the building trade, which at this season is its sole reliance, the shot trade being practically over. It is likely that within the next few weeks, should holders remain firm, a number of buyers will be forced to take lead at the figure asked. This does not, however, affect the general situation, and should not therefore give rise to any undue hopes.

Messrs. John Wahl & Co., of St. Louis, telegraph to us as follows to-day:

Our market is quiet and dull, with prices unchanged. We quote Refined 3·30c., and Common at the same figure.

Spelter.—There is nothing to report. The market drags along at 4⅝@4¾c., with occasional lots offered at a slight concession. Silesian is nominally 5⅞c.

Antimony.—In sympathy with foreign advices, antimony is firmer, being quoted 11¼c. for Cookson's and 10¼c. for Hallett's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 28.

American Pig.—Some of the furnace companies report a fair business and are booking orders in round lots. The impression seems to prevail that prices are as low as it is possible without entailing a heavy loss upon many of the producers. Some of them are out of the race, and others are expected to fall off at an early date. On the other hand, the general reduction of wages so quietly submitted to seems to point to the possibility of lower figures, should sellers become urgent. It is true, however, that stocks are decreasing in producers' hands, and that there are very few weak concerns left. The market is steady, furnacemen showing considerable firmness. We quote Foundry, No. 1, $20@$22.50; No. 2, $18.50@$19.50; and Gray Forge, $17.50@$19, all at tide-water. There has been a little more activity in Bessemer pig at the range of $20@$20.25. We hear of a sale of 5000 tons of Spiegeleisen at about $28.50. This morning, the *Tribune*, the *Times*, and other daily newspapers erroneously stated in a special dispatch that an injunction had been granted against the New Jersey Zinc and Iron Company. The fact in the case is, that the injunction is in favor of the New Jersey Zinc and Iron Company against Trotter.

There have been no transactions in iron at the Metal Exchange this week.

Scotch Pig.—The market is dull, the arrivals being light, and the sales chiefly to arrive.

We quote ex ship and to arrive: Coltness, $22@$23; Langloan, $22.50@$23; Summerlee, $22.50; Eglinton, $20@$20.50; and Dalmellington, $20@$20.50.

At the Exchange, the following cable quotations were received to-day: Coltness, 55s.; Langloan, 53s. 6d.; Summerlee, 52s. 6d.; Gartsherrie, 50s. 6d.; Eglinton, at Ardrossan, 45s. 3d.; and Dalmellington, 47s. 6d.

Steel Rails.—There has been some activity, due principally to the fact that, under exceptional circumstances, some sales were made at a low figure, the whole aggregating 30,000 tons for winter delivery. It appears that the contract at Chicago led to some concessions by some of the mills engaged in it on Eastern business also. This in time involved others who had stood aloof until now. There have since been very exaggerated rumors concerning mythical transactions, while the actual concession made was a little more than $1 below current market quotations.

Old Rails.—There is nothing doing. We quote $22@$22.50 for Ts.

Philadelphia. December 27.

Three or four large consumers of pig-iron, who have been fortunate enough to place contracts for large lots of forge and foundry iron at very low rates for next year's delivery, are very certain that lowest prices have been reached, and that an upward tendency will be developed within a short time; but, so far as can be ascertained, this opinion is not generally entertained, and most buyers are satisfied that it is safe to continue to buy in small lots, and that they will be able to buy to as good advantage during the winter as at present. There are some inquiries in hand today for special brands of foundry. There is a little more firmness in standard brands, and less anxiety to cut prices, owing to the expectation of an active demand in January. Should this active demand not be developed, a further weakness is quite probable. Considering the condition of stocks in consumers' hands, it seems quite probable that the demand will be sufficient to enable makers to hold rates with more firmness than during November. Inferior brands are still weak. Forge sells this week at $17.50@$18. There are inquiries for Southern irons at $18. Very few orders have yet been placed, but there is demand for all that can be had. Standard Forge ranges from $18@$19, with $18.50 as a fair average for a good make. The talk among brokers is, that the demand must improve during January, considering the indifferent demand for the past sixty days. For Foundry irons, prices range from $18.50 for No. 2, to $21 for No. 1, with $19 and $20.50 as the average selling prices.

Foreign Irons.—The only large sale of Bessemer Pig was one lot of 5000 tons at $20, tide-water. Several other lots are wanted. Spiegeleisen is also inquired for freely, and in a few days sales will be announced.

Muck Bars.—Quotations are given at $32@$32.50—no sales.

Blooms.—Quotations, $46@$47 for Anthracite, and $55@$57 for Charcoal.

Merchant Iron.—The competition in the finished iron trade has put the ruling prices very low. A number of inquiries have been presented during the holidays. Two or three manufacturers are confident of selling a month's output in a few days. Quotations, 2c. for Refined, and 1·75c. for Common. Bids in hand are at 1·80@1·90c., and some buyers expect to place orders for Refined at 1·80c., and for Common at 1·60c. The Thomas Iron Company has reduced wages 10 per cent.

Nails.—Jobbing demand is light. Quotations nominally $2.45@$2.55. Offers are in hand at $2.35. The six weeks' suspension in Western mills begins on Monday, and is expected to help the Eastern trade.

Plate and Tank Iron.—There is a little more inquiry in hand, but no large orders are to be expected until January.

Structural Iron.—Mills are closing up large orders, and are anxious to secure the business which has been in sight for a long time. Quotations are unchanged.

Steel Rails.—Makers quote $35 firm to-day, but are not able to say much as to February business. They assert that there is less pressure in a downward direction than a few weeks ago, and that buyers will come forward and buy at present prices.

Old Rails.—For Tees, $23 is asked, and $25 for Bridge Rails. For Double Heads, $25 is wanted for shipment. In the absence of business, it is impossible to give selling prices.

Scrap-Iron.—For cargo lots, $22 is asked. Crop-Ends are offered at $22. No. 1 Scrap, $22.50@$24. Very little doing.

Pittsburg. December 27.

To-day's quotations in crude iron are from $16.50@$16.75 for White and Mottled. Neutral, Lake ore, $17. Gray Forge, $17@$17.50. Foundry, $19.50@$21.50. The week's transactions have not been up to the average. It is impossible to determine the outlook with any degree of certainty. Good arguments are given on both sides for very opposite views. The advantage is at present, and will for a long time to come probably be, with the buyers, and buyers are showing a corresponding indifference as to future requirements. An occasional large lot of forge is sold, but most of the business is in from 25 to 50-ton lots. So many mills have shut down that there is but little hope of any improvement in forge. Very little iron will be made between this and January 10th. Some few manufacturers look for a very active demand next month, and base their expectations upon the fact that business for the last few weeks has been below the average, and that stocks in consumers' hands are light. The suspension to begin on the 19th has already had some influence on the shading of nail quotations. The lowest figures heard of are $2.30, although it is said that sales have been made at less. Old rails are under fair inquiry. No sales of importance have taken place. For prompt delivery, $24 is asked; $23@$23.50 offered for late delivery. The movement in steel rails is without any interest. Quotations, $34@$35. Track supplies are in better request. Spikes are in fairly active demand at $2.50. Other small railroad material is moving slowly. Crop-Ends, $23@$23.50 for American. Movements in scrap are without interest.

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NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Dec. 22.		Dec. 24.		Dec. 25.		Dec. 26.		Dec. 27.		Dec. 28.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.60										2.25		200
Amie Con. Co.											.09	.07	15,700
Argenta, Ne.													
Barr & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.													
Bodie Cons., Ca.	.85	.70					.66	.65	.85	.80	1.50	.70	2,029
Breece, Co.													
Bulwer, Ca.											.45		200
California, Ne.	.12												100
Cal. & Hecla, Mich.													
Carbonate Hill.													
Carbon Con., Co.	.07								.07				1,300
Castle Creek.													
Chrysolite, Co.	1.30						1.15		1.25		1.25		1,125
Cons. Va., Ne.	.32										.32	.31	1,235
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.													
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.													
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.									.01				200
Green Mountain, Ca.							1.35		1.50	1.40	1.50		650
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.									10.00				25
Horn-Silver, Ut.	6.88						6.50		6.38	6.25	6.25		2,233
Hukill, Co.													
Independence, Ne.													
Iron Silver, Co.							2.20		2.10		2.15	2.05	3,610
La Plata, Co.													
Leadville C., Co.													
Little Chief, Co.							.56				.58		500
Little Pittsburg, Co.													
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.	3.60												500
Northern Belle, Ne.	.25	.22					.25	.20			.65	.18	360
North Belle Isle, Ne.													
Ontario, Ut.			29.25										200
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.30						.30		.31				1,800
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	60												100
Sierra Nevada, Ne.	3.40								3.50				120
Silver King, Ar.													
Spring Valley, Ca.													
Standard, Ca.	6.00										5.75		150
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Dec. 22.		Dec. 24.		Dec. 25.		Dec. 26.		Dec. 27.		Dec. 28.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta-Montana													
American Flag.													
Barcelona, G.													
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'icher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.	.12	.11											1,200
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G.													
Clav'r's W. & M. Co.													
Cal., G.													
Central Ariz'na, S.													
Cherokee, G.													
Chollar													
Climax, Co.													
Colorado Central.													
Cons. Pacific.													
Crowell, G.													
Dahlonega, G.													
Decatur													
Dunderberg													
Durango, G.													
Eastern Oregon													
Elko Cons.													
Enterprise													
Fannie Barret.													
Globe Copper.													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.													
Hortense, S.													
Imperial													
Lacrosse, G.													
Lucerne													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.													
Miner Boy													
Mono													
North Mexican													
North Standard, G.													
N. Horn-Silv'r, S L.													
Orf'nt'l & Miller, S.													
Parnell													
Sapphannock, G.											.08	.07	2,800
Red Elephant, S.													
Ruby, of Arizona.													
Silver Cliff, S.											.06		200
Sonora Con.	.22										.20	.09	97,600
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.	.01												2,500
" Nos. 2 & 3, S.													
Sutro Tunnel.	.17										.17		2,200
Taylor Plumas													
Unadilla, S.	.01												400
Union Cons., G. S.													

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 32,336. Non-dividend shares sold, 118,810.

BOSTON MINING STOCKS.

	Dec. 21.		Dec. 22.		Dec. 24.		Dec. 25.		Dec. 26.		Dec. 27.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alloucz													
Amie													
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.											1.38		50
Bowman Sil.	.10	.09							.09	.07	.07	.05	6,250
Bruns. Ant.											10.00		10
Bulwer													
California													
Cal. & Hec.			238		239	238			239		238¼		29
Catalpa	.34				.30				.34				700
Co. Virginia													
Contentm't.									.04		.03		2,500
Copper F'lls													
Crescent									.15		.15		400
"Cust"													
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin	.28	.27							.30		.28		500
Elko Con													
Empire	.26	.24							.25	.24	.25		5,000
Eureka Con.													
Franklin			9.75		10.13	10.00			9.75				205
Gila County													
Hancock G.													
Harshaw													
Horn-Silver													
Huron			1 9-16		1 9-16								600
Independ'ce													
Indian Queen													
Mammoth													
Mass. & N.M.													
Milton													
Napa													
National													
Ontario													
Osceola													
Penn-Breck.													
Pewabic					2.00				2.00				150
Pine Tree	.09	.08											1,000
Plymouth													
Quincy	47.00		48.00								46.00		18
Ridge													
Robinson	.30												100
San Pedro									.10				200
S'ra Grande													
Silver Islet													
Silver King													
Simpson Gd													
Sonora Con													
South Pacf.													
Standard	5.88												50
Sullivan	1.13								1.08	1.00	.95		550
Sutro Tun.	.16								.17	.16			600
Sycamore													
Twin Lead.													
Vizina													

PHILADELPHIA MINING STOCKS.

	Dec. 21.		Dec. 22.		Dec. 24.		Dec. 25.		Dec. 26.		Dec. 27		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.16	.15	.16								.17	.16	7,900
Arizona So.													
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.09	.08									.10		7,100
Comprom'e.	.40		.40								.40	.37	2,500
Contention													
Con. Virg.													
Dauntless											.01		1,500
Del Monte													
Denver City	.16	.15	.16								.17		13,100
Eureka													
Girard													
Governor											.02		5,000
Grand Uni'n	.02												3,000
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Gulch					.04						.04		1,100
Iron Silver	2.10										2.05		560
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud	.04		.04								.04		4,200
Little Pitts.	.47		.46								.45		500
L'g & D'y H													
Montana													
Mt. Sheridan			.03								.03	.02	3,500
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.	.03		.04								.04		4,100
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis	.10		.11										2,100
Rara Avis E.	.07		.07								.07		4,300
Record													
Rico Pion'r.													
Sierra Apac.	.14		.15										300
Sierra Be.la.	.30		.30								.30		9,000
Sierra G'nde			.62½								.62½	.60	2,900
Sierra Nev.													
Silver Cord											.90		2,000
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.													
Tombstone			.65								.70	.65	.67½	420
Victor													
Yale Mt.													

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COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 28.

Anthracite.

The trade is naturally quiet during holiday week and just before the end of the year, when nobody cares to order fresh supplies, especially on what buyers consider a declining market. The stocks afloat and in cars here are not so heavy as they have been, and a better feeling might develop if the companies took prompt action. It seems to-day that a decision concerning the policy during the next three months will soon be reached—either to-morrow or Monday next. The matter is certainly being thoroughly canvassed, and it is understood that a plan has been submitted looking to a cessation of more than thirty days during the next three months, to include, possibly, two full weeks of stoppage, the rest to be three-day work for a number of weeks. This probably would give tone to the market, which is now dull.

Mr. John H. Jones, official accountant, has issued the following statement of the anthracite coal tonnage for the month of November, 1883, compared with the same period last year, which includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	Nov., 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	1,242,399	9,732,085	6,355,690	I. 3,376,395
Central RR. of N. J.	*.....	1,745,399	3,862,703	D. 2,117,304
Lehigh Valley RR.	†623,843	5,849,307	5,408,808	I. 440,499
Del., Lack. & W. RR.	489,769	4,708,419	4,230,067	I. 478,352
Del. & Hud. Canal Co.	‡378,634	3,288,977	2,906,848	I. 382,128
Penna. RR.	268,838	2,557,625	2,169,601	I. 388,024
Pa. Coal Co.	155,488	1,432,170	1,344,544	I. 87,626
N. Y., L. E. & W. RR.	39,122	345,904	242,394	I. 103,510
Total.	3,198,094	29,659,886	26,520,656	I. 3,139,230

* Included in tonnage of the Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 8000 tons.

‡ In addition, there were 59,024 tons transported from the mines by the Delaware & Hudson Canal Company, during October, which are included in the tonnage of other interests.

The stock of coal on hand at tide-water shipping points, November 30th, 1883, was 696,380 tons; on October 31st, 1883, 604,865 tons; increase, 91,515 tons.

Bituminous.

There is practically nothing to report. Orders are scarce, and prices are correspondingly unsettled.

Buffalo.

The great cantilever bridge at Niagara Falls, 910 feet in length, was tested and formally opened last Thursday, December 20th. It is a triumph of engineering skill and a marvel of rapid construction. From eight to ten thousand persons were present. The testing train was estimated to weigh 1900 tons; composed of 20 locomotives and 24 flat-cars heavily loaded with ballast, and so divided that one half moved up one track and the remainder on the other. The bridge is 239 feet above the river to the base of the railroad track, and the clear span across the river is 495 feet. The weight of the bridge itself is 3000 tons.

The New York Central & Hudson River Railroad Company owns $320,287.33 in stock of the Morris Run Coal and Mining Company. The movement of coal over this road for 1882-83, as compared with 1881-82, shows a falling off—exact figures not stated.

The American Midland is the last mystery in the railroad world. It is rumored that, with sundry connections, it will tap the coal-fields of Pennsylvania on its way to connect with the West Shore Railroad to New York. Its Western terminus is at Fort Wayne, Indiana. The Buffalo *Courier*, which keeps its readers well posted on railroad matters, says: "Incidentally, it may be remarked that Fort Wayne, being the starting-point, is of considerable significance, for argument's sake if nothing else, because it brings the American Midland into direct and important connection with the Gould system. Again, this becomes of still greater importance upon the supposition that the survey now making from Red Bank, at the mouth of Red Bank Creek and at the junction of the low-grade with the river division of the Alleghany Valley, is in the same interest as that which projected the American Midland. The engineers have fifty miles located of this line on the opposite side of the creek, paralleling the low-grade of the Alleghany Valley. An examination of the map shows that, if this parallel is continued to Driftwood and so on eastward through the anthracite coal region, it will bring it to a connection with the Lackawanna at Scranton, or, still farther east, with the West Shore at Middletown, thus establishing a new and great trunk line between New York and Chicago. From the numerous proposals that the West Shore has had to take its business West, and from the comparative indifference it has exhibited with respect to the selection of a route, it is only fair to presume that it is interested in this new line, or that there is at least some understanding between its backers and Jay Gould."

The question of a reciprocity treaty with Canada is again talked about by our citizens. There are earnest advocates for as well as against a measure looking to the settlement of this long-discussed matter. As far as we are concerned, as a border city and a friendly neighbor, a reciprocity treaty would have a large vote in its favor, if wisely drawn.

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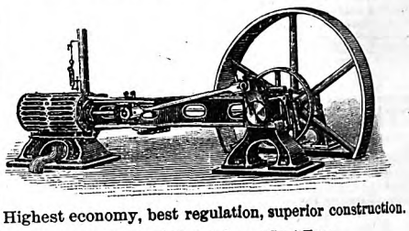
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DIVIDENDS.

OFFICE OF THE IRON SILVER MINING COMPANY, 12 Wall Street,
NEW YORK, Dec. 22, 1883.

The trustees of this company have this day declared

DIVIDEND NO. 13,

of TWENTY CENTS per share, payable at this office on Wednesday, January 9th, 1884.

Transfer-books will be closed at three o'clock P.M., Wednesday, January 2d, and will be reopened on Thursday, January 10th.

HOMER A. HOIT, Secretary.

SAN FRANCISCO, Dec. 14, 1883.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared dividend No. 30, of TWENTY CENTS per share, payable at the office of Laidlaw & Co., 14 Wall Street, New York, 31st inst.

Transfer-books will close 22d inst.

H. DEAS, Secretary.

MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch: 9 miles, 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch: 10 miles. Size, 26×30 inches. Pocket form, $1.50; as a wall-map, $2.

SAN JUAN MINING REGION (COLO.).—Kibbe's Geographical and Geological Map of the San Juan Mining Region. 1881. Shows county lines, wagon-roads, stage routes, trails, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide. Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half inch to the mile. 22×27 inches. Includes, on same sheet, a reduced Map of the State of Colorado. Printed in colors, with board covers. $1.50.

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